# XSITE EASY

# **USER MANUAL**

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#### APPENDICES

EC Declaration of Conformity FCC Declaration of Conformity

# **1 INTRODUCTION**

This document is the user manual for the Xsite EASY excavator guidance system. Please read this manual completely, paying special attention to the safety instructions, and make sure you understand all the information in the manual before using the system. Keep the manual available for future reference.

#### System software version

This manual applies to software version 2.2.

#### Manufacturer's contact information

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#### Conformity to EU directives (European Union)

This product is in conformity with EMC (2004/108/EC), RoHS (2002/95/EC), and WEEE (2002/96/EC) directives. This product may not be disposed of together with unsorted household waste - it must be properly recycled according to local regulations.



#### Conformity to FCC rules (North America)

This product complies with part 15 of the FCC rules.



#### Disclaimer

The manufacturer does not accept any liability for damages caused by:

- Inappropriate assembly and/or installation
- Non-observance of the instruction manual
- Non-intended and improper use
- Use beyond operation limits
- Use by insufficiently qualified and trained personnel
- Use of unauthorized spare parts and accessories
- Deconstructing and/or rebuilding of the product

#### Instruction manual

This instruction manual contains basic information to be considered when using and maintaining the product. Observing all security instructions and guidelines given here is indispensable for secure operation. This instruction manual must therefore be read and applied, without fail, by any person assigned with working processes to do with the machine, such as operation, fault finding and maintenance.

This manual is to be considered a part of the product and as such must be passed on to relevant third parties or subsequent owners. It must be permanently kept at the usage site and be available for the operating personnel. Furthermore, general safety regulations, manufacturer's safety regulations and local accident prevention regulations for the area in which the product is being used, must also all be observed.

The product is available with a number of sensor combinations. If your system is not equipped with some of the sensors or other components described in this manual, those sections of the manual are not applicable to you.

We are eager to ensure that this instruction manual is correct and up-to-date. To maintain our technological edge, it may be necessary to undertake modifications to the product and its operation without prior notice. If you are using a newer or older version of the product or software than that described in this manual, the information herein may no longer be applicable. If this is the case, your local dealer will be happy to provide you with a new manual. We do not accept liability for disturbances, failures or damages resulting from the use of an out-of-date manual.

The text and graphics within this manual have been collated with the greatest possible care. However, we will not be held liable for possible errors or consequences arising from them. Should you wish to make suggestions regarding this manual or point out possible errors, please contact your local dealer. We will gladly take your ideas and suggestions into consideration.

#### Explanation of used symbols

Warning notices are marked in this instruction manual with symbols. Under all circumstances observe these notices and proceed carefully to prevent accidents, personal injuries, and material damages.

# Caution

Indicates a hazardous situation. If not avoided, could result in death, serious injury, or material damages.

Note	Emphasizes useful tips, recommendations and other information for efficient and trouble-free operation.

# 1.1 Safety instructions

This section outlines all important safety matters concerning the optimal safety of personnel as well as failure-free operation. These instructions shall enable users to recognize potential risks of use and, as far as possible, prevent them in advance. Every user has to understand and observe these instructions.



The product must not be solely relied on for the operation of the machine. The operator must maintain a proper view of the operating area at all times.

#### Conventional use

The product has been exclusively designed and constructed for conventional use as described here.

- Positioning the bucket of an excavator with the help of gravitation sensors, laser receiver, or other sensors.
- Indication of the position of the measuring point to the user.
- Comparison of the position of the measuring point with various types of reference information.

Any other use not listed here, as well as any application not complying with the technical data, is not considered conventional use.

#### Improper use

- Non-conventional use
- Exceeding the limit values given on the data sheet
- Use of the product without instructions
- Use of the product beyond the limits of use
- Invalidation of safety equipment
- Removal of indicating or warning labels
- Opening, rebuilding or alteration of the product
- Use of the product in spite of obvious defects or damages
- Use of the product with unauthorized accessories from other manufacturers
- Use of the product at insufficiently secured construction sites

#### Alteration and rebuilding of the product

To prevent risks and ensure optimal performance, alterations, attachments or rebuilding of the product may not be carried out without the manufacturer's explicit permission.

#### The foremans's responsibility

The product is used in the industrial sector. The foreman of the product is therefore subject to legal responsibilities for operational safety. In addition to the operational safety instructions in this manual, the relevant safety, accident prevention and environmental protection regulations for the area in which the product is operating must also be observed.

Particularly applicable:

- The foreman must make sure he is aware of the current operational safety regulations and, in a risk assessment, be able to detect additional risks caused by the special working conditions at the usage site of the product. These risks must be compiled in the form of written instructions, which must then be kept near to the product and permanently be available for the persons working with it
- The foreman must clearly define the responsibilities of the personnel with regard to the appliance
- The foreman must ensure that the contents of the instruction manual have been fully understood by the operating personnel
- The information in the instruction manual must be observed thoroughly and without exception
- The foreman must ensure that all maintenance, inspection and assembling processes are carried out by qualified, specialized personnel, and that such personnel have fully acquainted themselves with the product and its application by carefully studying the product manuals
- The foreman must inform the manufacturer or the authorized dealer if any safety defects are found or occur during operation

#### Special risks

Caution

#### Epilepsy warning

Some people are susceptible to epileptic seizures or loss of consciousness when exposed to certain flashing lights or light patterns. Immediately discontinue use and consult your doctor if any of the following symptoms occur while using the product: dizziness, blurred vision, eye or muscle twitches, loss of consciousness, disorientation or any involuntary movement or convulsion.

#### Caution Risks caused by electric current

When working close to electricity systems (for example overhead powerlines), there is a danger of death due to electric shock. Keep sufficient safety distance to electrical systems.

# Caution

Moving components

Keep other persons away from the working range of the machine and the tool. Remove objects from the working range of the machine and the tool. Do not interfere with the moving components during operation.

#### Caution Ove

Overhanging machine parts

System components assembled after the machine has left the factory can increase the typical dimensions of the machine. Being unaware of this can lead to injuries and material damages.

Caution	<i>Risk of injury caused by malfunction</i> Uncontrolled machine actions caused by the malfunction of a system component can lead to severe personal injuries or cause material damage within the machine's working range. Ensure that the machine is operated, controlled and inspected by a qualified and experienced operator, who is capable of carrying out emergency measures, such as an emergency stop.
Caution	<i>Lacking instruction</i> Lacking or insufficient instruction can lead to operating errors or incorrect use. This can lead to severe personal injuries, as well as significant material and environmental damage. Observe the manufacturer's safety instructions and the foreman's directives.
Caution	Risk of injury caused by insufficient safeguarding Insufficient safeguarding of the construction site and the location of the component (for example the position of the laser emitter), can lead to hazardous situations on the construction site and surrounding traffic. Ensure sufficient safeguarding of the construction site. Ensure sufficient safeguarding of the locations of each single component. Observe the country-specific safety and accident prevention regulations, as well as the current road traffic regulations.
Caution	<i>Risks caused by faulty measurement results</i> Faulty measurement results due to use of a damaged (for example dropped) product, improper use or alteration to the product can lead to severe material damages. Do not use products showing obvious signs of damage. Before re-using a component that has been dropped, carry out a test measurement to ensure accurate readings.
Caution	<i>Risk of injury caused by unreadable signs</i> In the course of time, labels and symbols on the product can become unrecognisable due to dirt, wear or other damage. Labels and symbols can also get detached. Always keep safety, warning and operation instructions in good enough condition that they can easily be read. Regularly check the adhesiveness of the labels and symbols on the product. Do not remove any labels or symbols from the product.
Caution	<i>Risk of injury caused by inappropriate disposal of the product</i> When burning plastic parts, toxic gases that can cause illnesses are emitted. Dispose the product properly according to the current national country-specific disposal regulations. Careless disposal might also enable unauthorized persons to improperly use the product; in doing so, these persons and/or third parties might be severely injured and also pollute the environment. At all times, protect the product against access by unauthorized persons.

#### Proceeding in case of danger and accidents

Preventive measures

- Always be prepared for possible accidents or fire
- Keep first-aid equipment (ambulance box, blankets etc.) within reach
- Familiarize all personnel with accident notification and first-aid equipment as well as procedures for alerting the emergency services
- Keep access routes clear for emergency vehicles

In the event of accident, proceed appropriately:

- Immediately shut down the product by switching the power off
- Begin first-aid-measures
- Recover persons out of the hazard zone
- Inform the responsible person at the usage site
- Alert medical assistance and/or the fire brigade
- Ensure that access routes are clear for emergency vehicles

### 1.2 Product overview

Xsite EASY is a machine guidance system for excavators. Xsite EASY indicates the position of the measuring point compared to a reference level.

The system contains the following components by default (Figure 1):

- Display unit
- Connection box for LED display
- Gravitation sensors for bucket, dipper stick, main boom, and frame

The system can be expanded by adding the following optional accessories (Figure 1):

- Tilt bucket sensor
- Dual block boom sensor
- Laser receiver
- LED display



Figure 1. System diagram

# 1.3 Handling of the system

The display is not completely waterproof. If the display or other components are taken away from the construction machine, a carrying case should be used. Make sure that the components are clean and dry before placing them in the carrying case. Also make sure that the carrying case is clean and dry.

### 1.4 Transportation and storage

When taking the equipment to the usage site or carrying it in the field, always ensure that the product is transported in secured, suitable containers. Never transport the product loosely in a vehicle. Knocks and hits can severely harm the functioning of the product. In case of transportation by railway, plane or ship, always use the original packaging, transport containers and transport boxes. The packaging protects the product against hits and vibration.

Only store the product in well aired, dry rooms. During storage, protect it against dampness, and use the original packaging whenever possible. Avoid strong fluctuations in temperature during storage. Water condensation can form gradually, harming the functioning of the product.

### 1.5 Support and maintenance

Maintenance services are provided by the manufacturer or authorised dealer. The installation and servicing of the product should only be carried out by trained and qualified personnel.



For safety reasons, only representatives of the manufacturer are allowed to open the housings.

# 2 GETTING STARTED

This chapter provides information about connecting the cables, starting and shutting down the system, display unit settings and basic accuracy tests. It also introduces the detachment of the laser receiver and changing a tilting bucket into a basic bucket.

### 2.1 Connecting the cables

Connect the power cable and the CAN cable to the connectors on the rear of the display (Figure 2). Then twist the connectors clockwise while pushing. The connectors are properly connected when, with medium power applied, they do not turn further clockwise. The cables are disconnected by twisting the connectors anticlockwise.



Do not connect the CAN cable and power cable to each other because the CANbus will become permanently powered and eventually empty the battery of the excavator.



Figure 2. Connecting the power cable and the CAN cable

After connecting the cables, attach the display to the window of the excavator. Attach the display in a place where it creates minimum obstruction to the view from the cabin.

# 2.2 Switching the system ON/OFF

Excavator should be started up before turning Xsite Easy on. This procedure minimise power spikes and results flawless operation. Turn the system ON by pressing the "Power" button (see chapter 3.1). When the XD2 lightbar powers up, the LED on the bottom right corner blinks.

The system is turned OFF by pressing and holding the "Power" button for 3 seconds.

Table 1. Time needed to warm up the sensors in cold environment.

Temperature	Heating time
-20°C	approx. 20 min
-10°C	approx.10 min
-5°C	approx. 5 min

#### 2.3 Display unit settings

The chapters below describe the different settings found under the display unit settings. See chapter 3 for instructions on how to make changes to the settings.

#### 2.3.1 Display brightness

The brightness of the display can be set in "Main menu"  $\rightarrow$  "Display unit"  $\rightarrow$  "Display"  $\rightarrow$  "Brightness". Choose between bright, medium and dim.

#### 2.3.2 Sound settings

Sound settings can be adjusted in "Main menu"  $\rightarrow$  "Display unit"  $\rightarrow$  "Sounds". Select which of the laser, target and button sounds are ON by pressing the "OK" button on the corresponding selections. The volume can be switched between high, low and muted from the "Volume" menu.

**Note** Warning level sounds are always ON, they can not be switched OFF.

#### 2.3.3 Power button function

The function of the short press of the "Power" button can be adjusted in "Main menu"  $\rightarrow$  "Display unit"  $\rightarrow$  "Buttons". Select either the possibility to switch the laser ON or OFF by pressing "OK" on the "Laser" selection or select the possibility to use the memory function by pressing "OK" on the "Memory" selection. The laser function is explained in chapter 6.3.1 and the memory function in chapter 6.3.2.

### 2.3.4 Date and time

The date and time can be changed by selecting "Main menu"  $\rightarrow$  "Display unit"  $\rightarrow$  "Date and time". Select the page 1/2 to adjust time and page 2/2 to adjust date. The order of the digits for adjusting the date is year, month and date.

#### 2.3.5 Language

Select the language in "Main menu"  $\rightarrow$  "Display unit"  $\rightarrow$  "Language". Select the desired language and press the "OK" button to confirm the change. After choosing the language, press any key for the system to shutdown. Turn the system ON again afterwards by pressing the "Power" button.

Regardless of the chosen language, accessing the language selection is always possible as follows: press the "Main menu" button  $\rightarrow$  press "Down arrow" until the last (bottom) selection is chosen  $\rightarrow$  press "OK"  $\rightarrow$  press "Down arrow" until the last (bottom) selection is chosen  $\rightarrow$  press "OK". The language menu will now open.

#### 2.4 Checking the accuracy of the system

The accuracy of the system should be always tested before starting work. The following procedures provide an easy way to check the accuracy.

**Note** During the test, all machine parts (bucket, stick, boom) should move to get 100 % certainty of the accuracy of the system.

### 2.4.1 Depth and distance accuracy test 1

Below are the instructions for carrying out accuracy test 1 (Figure 3).

- 1. Place the bucket on a reference point and zero the measurement value (Figure 23).
- 2. Turn the bucket (without tilting it sideways) to a different position and place it on the same point.
- 3. The depth and distance readings should be close to zero in every position ( ±1 cm accuracy tolerance is allowed).



Figure 3. Accuracy test 1

### 2.4.2 Depth and distance accuracy test 2

Below are the instructions for carrying out accuracy test 2 (Figure 4)

- 1. Place the bucket on the ground and zero the measurement reading.
- 2. Move the bucket and use a tape measure to measure the depth and distance difference between the bucket measuring point and the zeroed point.
- 3. The system should indicate the same readings with a  $\pm 1$  cm accuracy tolerance.



Figure 4. Bucket accuracy test 2

### 2.4.3 Tilting bucket accuracy test

When using the tilt function, test the accuracy of the bucket edges (Figure 5).

- 1. Straighten the tilt rotator.
- 2. Switch the measuring point to centre and select a measurement mode showing depth and distance.
- 3. Align the bucket blade to a horizontal level and move the centre of the bucket to the reference point. Zero depth and distance readings by pressing the "0.0" button.
- 4. Tilt the bucket and put the left corner on the reference point. Change the measuring point to the lowest corner.
- 5. Depth and distance readings should be "0.00" in every position (make sure that the correct measuring point is in use).
- 6. Repeat this accuracy test with the other corner of the bucket.
- 7. If the accuracy is worse than  $\pm 2$  cm, carry out tilt bucket calibration (chapter 5.3).



Figure 5. Tilt bucket accuracy test

# 2.5 Detaching the laser receiver

It is recommended that the laser receiver is detached when it is not being used, for example when carrying out work where there is a risk of damaging the laser receiver, such as dredging. When removing the laser receiver, be sure to connect the detached cables together afterwards. Apply a small amount of anti-corrosion gel or grease into the connector parts of the cables in order to prevent water from getting into the connectors.



Figure 6. Laser receiver connected and bypassed



Always remember to put anti-corrosion gel or grease into the connectors (for example SuperLube® Anti-Corrosion Gel).

#### 2.6 Replacing a tilting bucket with a non-tilting bucket

Detach the cable going into the tilt bucket sensor, apply grease to the cable connector and attach a plug to protect the connector.

Select the bucket that will be used from "Main menu"  $\rightarrow$  "Buckets" and go to "Tilt calibration". The first 1/7 page is for switching the tilt function ON or OFF. If the tilt function is ON, press the "0.0" button to switch it OFF.



Always remember to put anti-corrosion gel or grease into the connectors (for example SuperLube® Anti-Corrosion Gel).

# **3 USER INTERFACE**

Xsite EASY is operated using a button interface. The user interface is introduced in Figure 7 and explained in more detail in chapters 3.1-3.6. Use the "Bucket" button to perform the function shown on the bottom left, and correspondingly use the "0.0" button to perform the function shown on the bottom right.



Figure 7. Xsite EASY user interface

### 3.1 Buttons

The Xsite EASY system is controlled using five function buttons and four arrow keys. The functions for the different buttons are explained in Table 2.

Table 2. Buttons and i	icons
------------------------	-------

-/	Arrow keys	
	<ul> <li>Navig</li> <li>Char</li> <li>Char</li> <li>Char</li> <li>Char</li> <li>Char</li> </ul>	gate within menus nge bucket measuring point while working using the left and right arrows nge the screen view while working using the up and down arrows nge cursor position in text and number editors using the left and right arrows nge characters in text and number editors using the up and down arrows
ок	OK button	
	Press	<ul><li>Accept the choice in menus and dialogs</li><li>Accept the new value/name in number/text editor</li></ul>
	Hold 3 sec	Open the action dialog in wizards
Δ	Bucket button	
	Press	<ul> <li>Change bucket</li> <li>Cancel/go back in the menus</li> <li>Left function key</li> </ul>
	Hold 3 sec	Set slope
0.0	0.0 button	
	Press	<ul><li>Zero the measurement values</li><li>Right function key</li></ul>
	Hold 3 sec	Set starting level
-Ö-	Menu button	
	Press	Settings
	Hold 3 sec	Installation settings
ப	Power butte	on
	Press	<ul><li>Turn ON the system</li><li>Laser/memory function ON/OFF</li></ul>
	Hold 3 sec	Turn OFF the system

### 3.2 Measurement mode

Screen views with different measurement symbols can be changed using the up and down arrow keys. "0.0" in the picture indicates the point where the bucket has been zeroed. Figure 8 shows four of the most commonly used measuring symbol functions. Table 3 lists all the symbols.



Figure 8. Basic measurement symbol functions

#### Table 3. Measurement symbol explanations

Depth	
	Height from the zero point to the bucket measuring point
	Distance
17	Horizontal distance from the zero point to the bucket measuring point
<b>↑</b>	Slope
_	Height from the target surface to the bucket measuring point
71	Laser jobsite height
	Height of the bucket measuring point compared to laser jobsite height
7l t	Jobsite target height (with laser)
	When laser is used the reading is zero at target height
1	Bucket figure side view
Ч	Illustration of the bucket angle viewed from side

Τ°	Bucket tilting angle in degrees
	Angle of the tilting bucket compared to horizontal level in degrees
Т%	Bucket tilting angle in percent
	Angle of the tilting bucket compared to horizontal level in percents
R°	Machine roll in degrees
	Angle of the side tilt of the cabin in degrees
R%	Machine roll in percent
	Angle of the side tilt of the cabin in percents
B°	Bucket angle in degrees
	Angle of the bucket compared to the plumb line
P°	Machine pitch in degrees
	Angle of the forward and backward tilt of the cabin in degrees
P%	Machine pitch in percent
	Angle of the forward and backward tilt of the cabin in percents
CL	Digital clock
	Shows the time
CLa	Analogue clock
	Traditional alternative to the digital clock
BFR	Bucket figure front view
	Illustration of the bucket angle viewed from front
S%	Slope percentage
	Slope percentage from the zeroed point to the bucket measuring point
F°	Pitch angle for flat bucket or drill/pile attachment in degrees
	Angle of the forward and backward tilt of the bucket in degrees
F%	Pitch angle for flat bucket or drill/pile attachment in percent
	Angle of the forward and backward tilt of the bucket in percent
X°	Roll angle for flat bucket or drill/pile attachment in degrees
	Angle of the side tilt of the bucket in degrees
X%	Roll angle for flat bucket or drill/pile attachment in percent
	Angle of the side tilt of the bucket in percents

### 3.2.1 Screen views

There are 4 preset screen views and 2 optional screen views that can be edited by pressing the "Menu" button and selecting "Screen views". First select either "Custom1" or "Custom2", then choose the layout type. There are 6 different layout types with up to four different components being shown at the same time. The components can be set from "Custom1" and "Custom2"  $\rightarrow$  "Components". There are a total of 14 different components from which to choose (Table 3). Optional screen views can be switched off by selecting the blank "\_" value for the first component of the layout.

### 3.2.2 Status bar

Below the measurement data is the status bar, which can show the name of the active bucket, measurement point or laser status (Figure 9). What is shown in the status bar can be set in "Main menu"  $\rightarrow$  "Screen views"  $\rightarrow$  "Status bar". Press the "OK" button to switch the selected option (Laser, Measurement point or Bucket name) ON or OFF. If more than one option is switched ON, the selected options will alternate on the status bar.



Figure 9. Status bar showing the active bucket

### 3.3 Number editor

To enter numbers in certain menus (such as bucket length or jobsite height), use the left and right arrow keys to select the number that needs to be changed and use the up and down arrows to choose the correct number for the current selection. Press the "0.0" button to set the number value to "0.00". Accept the new value with the "OK" button or undo the changes with the "Bucket" button (Figure 10).



- 1: Title
- 2: +/- symbols and the numerical value
- 3: Active number or +/- character

4: Undo the changes using the "Bucket" button

- 5: Accept the changes using the "OK" button
- 6: Zero the number value

3.4 Text editor

Entering text is carried out in the same way as entering numbers (chapter 3.3). The text editor is shown in Figure 11. Use the left and right arrow keys to select the character that needs to be changed and use the up and down arrows to choose the correct symbol for the current selection. Pressing the "0.0" button will clear the selected character. Accept the changes using the "OK" button or undo the changes using the "Bucket" button.



- 1: Title
- 2: Characters
- 3: Active character
- 4: Undo the changes with the "Bucket" button
- 5: Accept the changes with the "OK" button
- 6: Clear the selected character

### 3.5 Wizards

The wizard menus are browsed using the left and right arrow keys (Figure 12). Use the "Bucket" button to perform the function shown on the bottom left, and correspondingly use the "0.0" button to perform the function shown on the bottom right. Pressing and holding the "OK" button for three seconds opens the action dialog, from where it is also possible to perform the commands available in the selected wizard menu. Use up and down arrows to select the desired command and accept the selected choice with the "OK" button.



Figure 12. Example of a wizard menu

### 3.6 Menus

Press the "Menu" button to enter the main menu (Figure 13). Use the up and down arrow keys to select the desired option and use the "OK" button to proceed. Note that many menus have more than three options, so all of them are not visible at the same time. Press the "Bucket" button to go back in the menus. When the "Bucket" button is pressed in the main menu, the measurement mode will appear.



Figure 13. Main menu



2: List of options. The highlighted part is the active selection.

3: Bar indicating the position of the highlighted selection among all the menu options.

# 4 CHANGING THE BUCKET AND THE MEASURING POINT

To change the bucket

- 1. Open the bucket selection list by pressing the "Bucket" button (Figure 14).
- 2. Choose the desired bucket on the list and press either "OK" or the right arrow button.
- 3. Select the correct measuring point.

<b>Note</b> If the bucket is being used for the first time, it is worn out or the me have been changed, see chapter 5 for instructions on how to add, the bucket.
---



Figure 14. Changing the bucket

During work, the measuring point can be changed using the left and right arrow keys. Choose left, centre, right or automatic measuring point. When automatic mode is chosen, the system selects the lowest point of the bucket as the measuring point when the bucket blade is tilted over 3 degrees. When the bucket blade is tilted less than 3 degrees, the system selects the buckets centre as the measuring point

Note	The current bucket and measuring point is shown in the status bar (chapter 3.2.2).
Note	The current bucket and measuring point is shown in the status bar (chapter 3.2.2

# 5 ADD, EDIT OR CALIBRATE A BUCKET

Note	Before using a new bucket, it must be calibrated. If a bucket is worn out or the measurements have changed, recalibration is needed.
Hote	Always check the bucket measuring accuracy after calibration (chapter 2.4).

To select an existing bucket for editing, go to "Main menu"  $\rightarrow$  "Buckets" and choose the desired bucket.

To create a new bucket, go to "Main menu"  $\rightarrow$  "Buckets" and choose "<New bucket>" from the bottom of the list. To create a bucket with no preset values, select "Blank values". To copy values from an existing bucket, select "Copy existing" and select the desired bucket from the list.

Bucket settings are shown in Table 4.

Table 4. Bucket settings

Setting	Description
Measures	Enter or change the measurements of the bucket
Calibration	Carry out bucket calibration
Name	Change the name of the bucket
Tilt calibration	Run the tilt calibration wizard (includes bucket calibration)
Туре	Choose the type of the bucket
Angle calibration	Carry out the angle calibration (only shown when the type of the bucket is "Flat" or "Drill/Pile")
Remove	Delete the selected bucket

Buckets need to be calibrated using either a normal bucket calibration or a tilt calibration. Which of these calibrations is carried out depends on the circumstances, which are outlined in Table 5.

Option	Description
Bucket calibration (chapter 5.2)	<ul> <li>A new bucket is added that does not tilt sideways</li> <li>A new bucket is added that tilts sideways and whose tilt calibration parameters are to be copied from an existing bucket</li> </ul>
Tilt calibration (chapter 5.3)	<ul> <li>A new bucket is added that tilts sideways, and tilt calibration parameters are not copied from an existing bucket</li> </ul>
	<ul> <li>A new bucket that tilts sideways is added and tilt calibration has not been carried out</li> </ul>
	The tilting part (for example tilt rotator or tilting quick coupler) has     been changed

Table 5. How to determine whether a bucket calibration or tilt calibration is needed

The tilt calibration wizard includes bucket calibration.

Note	If the type of the bucket is "Flat" or "Drill/Pile", normal bucket calibration (chapter 5.2) and angle calibration (chapter 5.4) have to be carried out.
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# 5.1 Bucket measurements

Add/edit bucket measurements by going to "Main menu" → "Buckets", selecting the correct bucket and selecting "Measures". Measure and enter the "Length", "Left Width", "Right Width", and "Quick coupler/P15" parameters (Figure 15). The "Quick coupler/P15" measure is not needed if the bucket does not tilt sideways.



Figure 15. Bucket measures: 1) Length, 2) Left width, 3) Right width, 4) Quick coupler

### 5.2 Bucket calibration

To carry out a bucket calibration, select "Calibration" from the Bucket settings. A calibration magnet and a plumb line are needed for the bucket calibration. Set the plumb line on the lowest pin of the stick. Turn the bucket slowly towards the plumb line. When the tip of the bucket touches the string without moving it, keep the bucket still and press the "CALIB" button (Figure 16). After a few seconds the calibration is complete.



Figure 16. Turn the bucket to the plumb line

In Figure 16 quick coupler is illustrated on the left and tilt rotator on the right.

**Note** It is important to test the accuracy of the bucket after calibration. Carry out the accuracy test as described in chapter 2.4.1 and 2.4.2. If the accuracy is less than ±1 cm, recalibrate the bucket.

#### 5.3 Tilt bucket calibration

Tilt calibration calibrates the part between the bucket and stick that tilts sideways (for example tilt rotator, tilting quick coupler).

**Note** If the calibration data is copied from an existing bucket which is already tilt calibrated, a new tilt calibration is not necessary. The accuracy test should still be performed, as instructed in chapter 2.4.3.

To carry out the tilt calibration, go to "Main menu" and select "Buckets". Create a new bucket or choose an existing bucket to be calibrated from the list. Then select "Tilt calibration" from the bucket settings menu.

Carry out the tilt bucket calibration as follows: Note! Step 3 is performed only if there is a tilt rotator.

- 1. Switch the tilt bucket ON by pressing the "0.0" button. NOTE: After doing the calibration, switch the tilt bucket OFF from this menu if the tilt function is not used.
- 2. Drive the machine to a flat surface and rotate the machine until the roll value is close to zero (until the "Turn!" text changes to "OK!").
- 3. Straighten the tilt rotator. Do this by turning the bucket in and straightening the tilt rotator with a spirit level (Figure 17).
- 4. Align the bucket blade to a horizontal level (Figure 18).
- 5. Perform the bucket calibration using a plumb line (see "5.2 Bucket calibration").
- 6. Turn the bucket in, press "CALIB" and turn the bucket slowly forward. The bucket should make a 180 degree turn (Figure 19). When this is done, press "CALIB" once more to accept the calibration.
- 7. Turn the tilting axis to horizontal level and press "CALIB" (Figure 20). After this step, the tilt calibration is complete. Press the "Bucket" button twice and save the settings if the tilt calibration was successful. Finally test the accuracy as instructed in chapter 2.4.3.



Figure 17. Tilt bucket calibration step 3



Figure 18. Tilt bucket calibration step 4



Figure 19. Tilt bucket calibration step 6



Figure 20. Tilt bucket calibration step 7

### 5.4 Angle calibration

When using a flat-bottomed bucket, the operator can measure the angle of the bottom of the bucket. When using a drill/pile attachment, the operator can measure the angle of the attachment.

Angle calibration can be done only if the bucket type is "Flat" or "Drill/Pile" (Figure 21). Bucket type can be chosen in "Main menu"  $\rightarrow$  "Buckets"  $\rightarrow$  old/new bucket  $\rightarrow$  "Type".



Figure 21. Flat-bottomed bucket (left), drill/pile attachment (right)

To carry out the bucket angle calibration, go to "Main menu" and select "Buckets". Create a new bucket or choose an existing bucket to be calibrated from the list. Then select "Angle calibration" from the bucket settings menu.

Carry out the calibration as follows:

- 1. Drive the machine to a flat surface and rotate the machine until the roll value is close to zero (until the "Turn!" text changes to "OK!").
- 2. Choose calibration orientation. In "Normal" orientation (Figure 21), the bottom of the flat bucket is aligned horizontally and drill/pile attachment is aligned vertically. In "90 degrees" orientation (Figure 22), the bottom of the flat bucket is aligned vertically and drill/pile attachment is aligned horizontally.
- 3. Press "CALIB". After this step, the angle calibration is complete. Go back with the "Bucket" button and save the settings.

After the angle calibration, test the accuracy by placing the bucket on a known surface. The F and X readings should be consistent with the actual surface. Alternatively, use a spirit level or point laser for testing the accuracy.



Figure 22. "90 degrees" calibration orientation for flat-bottomed bucket (left) and drill/pile attachment (right)

### 5.5 Bucket name

The bucket name can be set in "Main menu"  $\rightarrow$  "Buckets"  $\rightarrow$  old/new bucket  $\rightarrow$  "Name". Then either choose a preset bucket name from the list (page 1/2) or rename the bucket (page 2/2). If necessary, see chapter 3.4 on how to edit text.

# 6 DEPTH MEASUREMENT FROM A REFERENCE POINT

**Note** Check the accuracy of the system before starting work (see chapter 2.4).

Depth from a reference point can be measured in two different ways (Table 6).

Use case	Description	
Digging from zero level (chapter 6.1)	Measurement value will be zeroed at the starting point. The display indicates the depth of the bucket compared to the zero level.	
Digging with a known starting level (chapter 6.2)	The height difference between the starting level and target level is set as the starting level. When the measurement value is zeroed, the starting level value appears on the screen. When moving the bucket towards the target level, the reading on the screen decreases, and finally shows zero when the target level has been reached.	

#### Table 6. Depth measuring use cases

### 6.1 Digging from zero level

When digging from zero level, set the bucket at the desired level or starting point (the stake in this example) and then press the "0.0" button. The reading "0.00" appears on the screen (Figure 23).



Figure 23. Zeroing the reading on a stake

Measure the depth with the bucket. The system indicates the depth of the measuring point compared to the zero level. A positive reading value is above the zero level and a negative reading value is below it (Figure 24).



Figure 24. Digging towards wanted value

# 6.2 Digging with a known starting level

Set the height difference between the starting point and the target level as the starting level (3.00 m in this example) in "Main menu"  $\rightarrow$  "Starting level". Use the arrow keys to set the desired height and press "Save". You can also set the starting level by pressing and holding the "0.0" button in the measurement mode for three seconds.

Move the bucket to a stake or other reference point. Zero the measurement value by pressing the "0.0" button. The starting level ("3.00" in this example) appears on the screen (Figure 25).



Figure 25. Zeroing the reading on a stake

During digging, the value decreases. Target level has been reached when the reading is "0.00" (Figure 26).



Figure 26. Digging towards zero

#### 6.3 Depth measurement, moving the excavator

When moving the excavator, its altitude always changes. To maintain the original reference level, the bucket must be taken to a certain reference point before and after moving the machine, or a rotating laser has to be used.

Note	When moving the excavator, it is advised to use the laser to achieve the best possible accuracy (see chapter 6.3.1).
------	--

### 6.3.1 Moving the excavator with laser receiver

When the excavator is moved to a new place and depth is being measured, a rotating laser has to be set to horizontal level.

Set the laser transmitter to horizontal level at any height. Go to the "Main menu"  $\rightarrow$  "Laser". Press "Right arrow" twice to enter page 3/3 and set the laser ON. It is also possible to control the laser with the "Power" button (see chapter 3.1). Pressing the "Power" button will turn the laser "ON" or "OFF".

Move the boom slowly, so that the laser receiver hits the laser beam. It is advisable to move the dipper stick to as upright position as possible when reaching the laser beam. The laser receiver symbol on the screen indicates laser hits. The laser hit has been accepted when the text "Hold!" changes to "Hit accepted!" and the black background changes to a white background (Figure 27).



Figure 27. Moving the laser receiver to the beam. The laser receiver symbols indicate laser hits and acceptance.

Move the bucket to a stake or other reference point. Zero the measurement value by pressing the "0.0" button (Figure 28) ("Starting level" = "0.00" in this example).



Figure 28. Zeroing the reading

Measure depth normally (Figure 29).



Figure 29. Depth measuring

Move the excavator to a new place. After moving the excavator, move the laser receiver to the beam (Figure 30). It is advisable to move the dipper stick to as upright position as possible when reaching the laser beam.



Figure 30. Moving the excavator and receiving the laser beam

After receiving the laser hit, digging can be continued. Depth is measured compared to the original reference level, even though the altitude of the excavator might have changed (Figure 31).





### 6.3.2 Moving the excavator by using the memory function

When measuring depth, the excavator can be moved by using the memory function. Switch on the memory function from "Main menu"  $\rightarrow$  "Display unit"  $\rightarrow$  "Buttons" and press the "OK" button on the "Memory" selection. Measure the depth normally (Figure 32). In this example, the bucket has been zeroed on the stake with a "Starting level" value of "0.00".



Figure 32. Measure depth normally

Before moving the excavator, move the bucket to a fixed point (for example a stone). Store the altitude of the fixed point into the memory by pressing the "Power" button (Figure 33). The text "MEMORY" will appear on the screen and the memory function is activated.



Figure 33. Activating the memory function

Move the excavator to a new place and move the bucket to the same fixed point. Release the stored height value by pressing the "Power" button again (Figure 34). The "MEMORY" text will disappear.



Figure 34. Moving the machine to a new place

Digging can be continued. The depth is measured compared to the original reference level, even though the altitude of the excavator might have changed (Figure 35).



Figure 35. Digging can be continued after moving the machine

#### 6.3.3 Moving the excavator by using the zero function

When measuring depth, the excavator can be moved in order to continue digging at the same depth (for example when digging a foundation) with the help of the zero function. Measure the depth normally (Figure 36). In this example, the "Starting level" is "0.00".



Figure 36. Measure depth normally

Move the machine to a new place, to a point where digging can be continued. After the excavator has been moved, reach the measuring point on the completed surface and zero the measurement value by pressing the "0.0" button (Figure 37). After zeroing, digging can be continued (figure 38).





Figure 37. Zeroing the reading after moving the excavator



± 0.00

Figure 38. Digging can be continued

# 7 DEPTH MEASUREMENT FROM LASER JOBSITE HEIGHT

The laser jobsite height function requires a rotating laser that has been set to a known height. Set the rotating laser to horizontal level.

**Note** It is recommended to use as fast laser rotation speed as possible.

Go to "Main menu" and select "Laser". Press "Right arrow" twice to enter page 3/3 and set the laser to ON. It is also possible to control the laser with the "Power" button (see chapter 3.1).

There are two ways to use the laser jobsite height function in depth measurement (Table 7).

Table 7. Laser jobsite height use cases

Use case	Description
Jobsite height is zero	ZL value indicates the height from a laser beam to the bucket measuring point
Jobsite height is the absolute height of the laser beam	ZL value indicates the absolute height of the bucket measuring point

To set the jobsite height, go to "Main menu"  $\rightarrow$  "Laser" and press "EDIT" on "Jobsite height". Enter the desired height and press "ACCEPT".

Note	If the XD2 LED display is used, the jobsite target height can be adjusted in "Main menu" $\rightarrow$ "Laser" $\rightarrow$ page 2/3 "Jobsite target height". See chapter 10 for more
	information about the XD2 LED display and target levels.

Move the boom slowly, so that the laser receiver hits the laser beam. It is advisable to move the dipper stick to as upright position as possible when reaching the laser beam. The laser receiver symbol on the screen indicates laser hits. The laser hit has been accepted when the text "Hold!" changes to "Hit accepted!" and the black background changes to a white background (Figure 39).



Figure 39. Moving the laser receiver to the beam. The laser receiver symbols indicate laser hits and acceptance.

When the beam has been accepted, ZL value indicates either the height difference between the bucket and the laser beam ("Jobsite height" = "0.00", Figure 40), or the absolute height of the bucket ("Jobsite height" = "30.00", the absolute height of the laser, Figure 41).



Figure 40. Using laser reference when the jobsite height is "0,00"



Figure 41. Using laser reference when the jobsite height is the absolute height of the laser beam ("30.00" in this example)

When moving the excavator, the laser receiver has to be taken to the laser beam again (Figure 42) before continuing the work.



Figure 42. Moving the laser receiver to the beam after moving the excavator

Digging can then be continued and the depth is measured compared to the original reference level, even though the altitude of the excavator might have changed (Figure 43).



Figure 43. Work can be continued after moving the machine

# **8 SLOPE MEASUREMENT**

Note

Check the accuracy of the system before starting work (see chapter 2.4).

Slope can be measured in two different ways (Table 8).

	Table 8. S	Slope	measurement	use	cases
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Use case	Description
Slope digging from zero level (chapter 8.2)	Slope starting level is set to "0.00". The reading will be zeroed at the starting point of the slope. The display indicates the height of the measuring point compared to the target grade.
Slope digging with a known starting level (chapter 8.3)	The height from the starting point to the target level is set for the slope starting level. When the measurement value is zeroed, the slope starting level appears on the screen. When moving the bucket towards the target level, the reading on the screen decreases, and finally shows zero when the target level has been reached.

#### 8.1 Create/edit a slope

When measuring slopes, select a screen view that shows the "2" icon. Choose the slope unit by selecting "Main menu"  $\rightarrow$  "Slope"  $\rightarrow$  "LIST". Choose "Percent", "Fraction" or "Degrees". For example, a +10% slope is about 5.7° in degrees and 1/10 in fractions.

To edit the slope, go to "Main menu"  $\rightarrow$  "Slope" and press "Right arrow", or press and hold the "Bucket" button for three seconds when in measurement mode. Adjust the slope by selecting "EDIT" and setting the slope rate. Selecting a negative ( - ) slope will create a downhill slope and selecting a positive ( + ) slope will create an uphill slope (Figure 44).



Figure 44. Downhill slope ( - ) on the left and uphill slope ( + ) on the right.

# 8.2 Slope digging from zero level

Set the slope value as described in chapter 8.1.

Set the starting level to zero (Press "0.0" for 3 seconds or "Main menu"  $\rightarrow$  "Starting level"). Move the bucket to the starting point of the slope. Zero the measurement value by pressing the "0.0". Reading "0.00" appears on the screen (Figure 45).



Figure 45. Zeroing the reading

The " $\uparrow$ " value shows the height difference between the bucket and the target surface. The reading is positive above the surface (Figure 46) and negative below the surface. The target surface has been reached when the " $\uparrow$ " reading is "0.00" (Figure 47).







Figure 47. The reading is "0.00" on the target grade

### 8.3 Slope digging with a known starting level

Set the slope value according to chapter 8.1.

The height difference between the starting point and the target level is the starting level (3.00 m in this example). Set this starting level in "Main menu"  $\rightarrow$  "Starting level" or hold the "0.0" button for 3 seconds.

Move the bucket to a stake or other reference point. Zero the measurement value by pressing the "0.0" button. The starting level ("3.00" in this example) appears on the screen (Figure 48).



Figure 48. Zeroing the reading

The " $\mathcal{T}$ " value shows the height difference between the bucket and the target surface. The reading is positive above the surface (Figure 49) and negative below the surface. The target surface has been reached when " $\mathcal{T}$ " is "0.00" (Figure 50).



Figure 49. The reading is positive when the bucket is above the surface



Figure 50. The reading is "0.00" on the target grade

# 8.4 Slope digging, moving the excavator

When moving the excavator, its altitude always changes. To maintain the original reference level, the bucket must be taken to a certain reference point before and after moving the machine, or a rotating laser has to be used.

When moving the excavator, it is advisable to use a laser to achieve the best possible accuracy (see chapter 8.4.1).

#### 8.4.1 Moving the excavator with a laser receiver

Tilt the laser transmitter to the same gradient that has been entered into the system. Set the laser transmitter to any height. Go to the "Main menu"  $\rightarrow$  "Laser". Press "Right arrow" twice to enter page 3/3 and set the laser to ON. It is also possible to control the laser with the "Power" button (see chapter 2.3.5).

Move the boom slowly so that the laser receiver hits the laser beam. It is advisable to move the dipper stick to as upright position as possible when reaching the laser beam. The laser receiver symbol on the screen indicates laser hits. The laser hit has been accepted when the text "Hold!" changes to "Hit accepted!" and the black background changes to a white background (Figure 51).



Figure 51. Moving the laser receiver to the beam. The laser receiver symbols indicate laser hits and acceptance

Zero the reading to the slope starting point (Figure 52) ("Starting level" = "0.00" in this example).





Note

Measure the slope normally (Figure 53).



Figure 53. Measuring the slope

Move the excavator to a new position and move the laser receiver to the beam (Figure 54). It is advisable to move the dipper stick to as upright position as possible when reaching the laser beam. The laser receiver symbol on the screen indicates laser hits. The laser hit has been accepted when the text "Hold!" changes to "Hit accepted!" and the black background changes to a white background.



Figure 54. Moving the excavator and moving the laser receiver to the beam. The laser receiver symbols indicate laser hits and acceptance

Digging can be continued and the slope will be measured compared to the original reference level (Figure 55).



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Figure 55. Work can be continued after moving the machine
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### 8.4.2 Moving the excavator by using zero function

When measuring a slope, the excavator can be moved with the help of the zero function. Measure the slope normally (Figure 56). In this example, the "Starting level" is "0.00".



10.00

Figure 56. Measure slope normally

Move the machine to a new position. After the excavator has been moved, reach the measuring point on the completed surface and zero the measurement value by pressing the "0.0" button (Figure 57). After zeroing, digging can be continued (Figure 58).



Figure 57. Zeroing the reading after moving the excavator



Figure 58. Digging can be continued

# 9 DISTANCE MEASUREMENT

Select a screen view which indicates horizontal distance from the zero point to the bucket measuring point.

**Note** Check the accuracy of the system before starting the work (see chapter 2.4).

When measuring horizontal distance, the starting point is always "0.00". The measurement value is zeroed at the starting point. The display indicates the distance from the starting point to the bucket.

Move the bucket to a stake or other reference point. Zero the measurement value. The reading "0.00" appears on the screen (Figure 59).



Figure 59. Zeroing the reading on a stake

When the bucket is moved away from the excavator, the distance value increases. When the bucket is moved towards the excavator, the distance value decreases (Figure 60).



Figure 60. Distance measurement

# **10 TARGET LEVELS**

The user can set four reference levels: top level, up level, target level and low level. To set limits for the reference levels, go to "Main menu"  $\rightarrow$  "Target levels"  $\rightarrow$  "Limits". Choose the level to be edited using the "Right" and "Left" arrow keys and press "EDIT". Levels, XD2 colours, default values and sounds are shown in Table 9.

Level	XD2 colour	Default values	Sound
Top level	Yellow arrow downwards	Above the zero level 8 to 15 cm	
High level	Blue arrow downwards	Above the zero level 3 to 8 cm	
Target level	Green line	Zero level ±3 cm	
Low level	Red arrow upwards	Below the zero level 3 to 8 cm	

Table 9. Target level default settings

To switch the target level sounds ON or OFF, go to "Main menu"  $\rightarrow$  "Display unit"  $\rightarrow$  "Sounds" and press the "OK" button on the "Target" selection.

The target level mode is the setting that determines which measurement type the target level function complies with. Set the target level mode in "Main menu"  $\rightarrow$  "Target levels"  $\rightarrow$  "Mode". Choose depth, distance, slope, laser jobsite height, or auto as the target level (see Table 3). By choosing auto, the target level function always complies with the measurement type that is shown on the top left part of the screen.

The jobsite target level can be adjusted in "Main menu"  $\rightarrow$  "Laser"  $\rightarrow$  page 2/3 "Jobsite target height". For example, if the laser jobsite height is 100 m (rotating laser is set to 100 m) and the jobsite target height is 95 m, the XD2 LED display shows a green light when the bucket measuring point is 5 m below the laser beam.

#### 10.1 XD2 LED display

The XD2 LED display is an optional accessory (Figure 61). The XD2 indicates the height difference between the bucket measuring point and the target surface by light signals. In Figure 61, the bucket measuring point is currently at the target surface.

To set the brightness of the XD2 LEDs, go to "Main menu"  $\rightarrow$  "Target levels"  $\rightarrow$  "Limits" and select the 5/5 page. Select "LIST" and choose "Bright", "Medium" or "Dim".



Figure 61. XD2 LED patterns. (1) = Top/yellow level, (2) = High/blue level, (3) = Target/green level, (4) = Low/red level

# **11 WARNING LEVELS**

Warning level functionality gives the operator an alarm if the bucket or boom reaches a predefined warning level.



Warning level functionality does not stop the movement of the boom.

Warning level functionality does not guarantee your safety. Manufacturer is not responsible for any possible damage.

There are four warning levels available: high limit, low limit, far limit and near limit (Figure 62).



Figure 62. Warning levels: 1) High limit, 2) Low limit, 3) Far limit, 4) Near limit

The system measures the position of the pivot points: the tip of the bucket, the pin between the bucket and the stick and the pin between the stick and the boom (Figure 63). Some parts of the bucket or boom may reach the warning levels before the system gives the alarm. Therefore a safety margin must be applied when setting a warning level (Figure 63).

Caution The system measures the position of the pivot points. Some parts of the bucket or boom may reach the warning levels before the system gives the alarm.



Figure 63. Pivot points and safety margins

To set a warning level, go to "Main menu"  $\rightarrow$  "Warning levels" and choose one of the four warning levels.

For example, to set the high limit, go to "Main menu"  $\rightarrow$  "Warning levels"  $\rightarrow$  "High limit". If the high limit is OFF, switch it ON by pressing "CHNG". Press "Right arrow" to proceed. Lift the boom up until the bucket or boom is near the wanted high limit and press "SET". The upper reading on the screen is the set warning level (values of high and low limit are compared to the main boom pin and values of far and near limit are compared to the rotating centre point of the machine). The lower reading in parentheses is the current position of the bucket. After setting the warning level, go back by pressing "EXIT" (bucket button).

If any of the pivot points reach the predefined limit, the system gives the operator an alarm in the following ways:

- Warning sound will be played
- Warning message will be shown in the status bar of the screen
- Blinking exclamation mark will be shown on XD2 lightbar (XD2 is an optional accessory)

To switch OFF high/low/far/near limit, go to "Main menu"  $\rightarrow$  "Warning levels"  $\rightarrow$  "High/Low/Far/Near limit". Press "CHNG" to switch the warning level functionality OFF. Go back by pressing "EXIT" (bucket button).

#### Caution

After moving the excavator, the warning levels must be reset.

# **12 TROUBLESHOOTING**

Symptom	Possible cause	Action
Inaccurate measurement when bucket tilting is used and tilt axle is about perpendicular to the Earth. See figure 64	Inaccuracy is a due to the physics of the gravitational sensors.	No known solution.
Inaccurate measurement	Bucket is changed but correct bucket is not being used by the system	Select the correct bucket, see chapter 4.
Inaccurate measurement	Calibration of the bucket has not been performed correctly	Calibrate the bucket, see chapter 5.2
Inoperative laser receiver	The laser receiver is OFF	Turn the laser receiver on, see chapter 2.3.3
Inoperative laser receiver	The laser receiver is broken or lacks power.	Contact local dealer or service.



Figure 64. Tilting axle is about perpendicular to the Earth

### **13 TECHNICAL SPECIFICATIONS**

#### Xsite EASY display unit

Measuring axis

Measuring range

Operating voltage

IP classification

Dimensions

Power consumption

Operating temperature

Resolution

Display size	2.7"
Resolution	128 x 64 pixels
Operating voltage	20 36 VDC
Power consumption	2 W
IP classification	IP42
Operating temperature	-20°C +60°C
Dimensions	132 mm x 144 mm x 45 mm (without RAM mount)
Weight	0.4 kg
I/O	CAN

#### G1 sensor

X, Y, Z (three-axis) 0.05° 360° per axis 10...36 VDC 2.5 W (heating on), 1 W (heating off) IP67 -20°C...+60°C 98 mm x 41 mm x 33 mm 0.2 kg CAN

#### **EL2 laser receiver**

I/O

Weight

180° Receiving angle Receiving area 150 mm Resolution 5 mm 10...36 VDC Operating voltage Power consumption 2.5 W IP classification IP67 Operating temperature -20°C...+60°C Dimensions 315 mm x 96 mm x 55 mm Weight 0.7 kg CAN. RS-232 I/O **Compatible lasers** Rotating lasers (visible light and infrared)

#### **XD2 LED display** LED type

Number of LEDs

IP classification

Dimensions

Weight

I/O

Operating voltage Power consumption

RGB 50 10...36 VDC <2 W (typ) IP43 Operating temperature -20°C...+50°C 120 mm x 60 mm x 25 mm (without RAM mount) 0.04 kg 2 x CAN

# EC Declaration of Conformity

Document no: EDV3-EC-002

We, the undersigned,

Manufacturer:	Novatron Oy	
Address:	Myllyhaantie 6 E, 33960 Pirkkala, Finland	
Phone number:	+358-3-357 2600	
Fax number:	+358-3-357 2677	

certify and declare under our sole responsibility that the following equipment,

Name:	Easy Dig / Xsite EASY
Components:	100012 Easy Dig v3 display / 100022 Xsite EASY v3 display
	130192 G1 sensor
	100008 EL2 laser receiver
	100065 XD2 LED display
	140102 XD2 connection box

is in conformity with the requirements of EMC directive 2004/108/EC. The following standards have been applied: EN 13309:2010, ISO 7637-2:2004.

Place of issue:	Pirkkala, Finland
Date of issue:	12 March 2013

Aukka Tervahauta Managing Director Novatron Oy

# FCC Declaration of Conformity

Document no: EDV3-FCC-002

We, the undersigned,

Manufacturer:	Novatron Oy
Address:	Myllyhaantie 6 E, 33960 Pirkkala, Finland
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Fax number:	+358-3-357 2677

certify and declare under our sole responsibility that the following equipment,

Easy Dig / Xsite EASY
100012 Easy Dig v3 display / 100022 Xsite EASY v3 display
130192 G1 sensor
100008 EL2 laser receiver
100065 XD2 LED display
140102 XD2 connection box

complies with part 15 of the FCC rules.

Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) This device must accept any interference received, including interference that may cause undesired operation.

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Place of issue: Date of issue: Pirkkala, Finland 12 March 2013

Jukka Tervahauta Managing Director Novatron Oy