Leica SteerDirect-ES Installation Guide







1. Introduction

Purchase



Congratulations on your purchase of the new Leica SteerDirect ES.

This guide contains important safety directions as well as instructions for installing the product and operating it. Refer to the Safety Precautions for further information. Read carefully through the Installation Guide before you begin operation of vehicle. The Leica SteerDirect ES is to be used solely in combination with Leica Geosystems' guidance systems. Therefore it's mandatory to also observe the directions and instructions contained in the Leica guidance product manual.

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 agricultural vehicle manufacturer.

This guide describes how to install the Leica SteerDirect ES. Even if you have installed other Leica Geosystems products before, we recommend you read this guide to ensure correct installation of this product.

Symbols

Symbols used in this guide have the following meanings:

Туре	Description
A Danger	Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.
Marning	Indicates a potentially hazardous situation or an unintended use which, if not avoided, could result in death or serious injury.
A 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.

Note - The absence of specific alerts does not mean that there are no safety risks involved.

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3. Product Overview

Benefits	 The Leica SteerDirect ES Kit consists of a Leica SteerDirect MDU, Steer Ready Controller & associated Wiring Harness, brackets and bolts which will form the foundation of your new auto-steer solution. This Leica SteerDirect Kit is designed to be used in conjunction with the Leica agricultural guidance products. The installation of a guidance product is not included in this guide. Please refer to your local dealer or the malanest product.
	the relevant guide for further details on these products. This installation guide will provide the necessary steps to successfully install the Leica SteerDirect ES Kit.
To understand this guide	To ease the use of this guide please observe the following advice: Relating to all pictures and schematics, they are to be seen as reference only. There may be slight deviations from the actual looks of the Leica SteerDirect ES. These deviations are caused by individual applications and have no impact on the function capabilities of the Leica SteerDirect ES.
Use only original parts	Leica Geosystems original spare parts are especially designed for the Leica SteerDirect ES. They live up to the high design standards for safety and reliability. We advise you, that components or parts, not provided by Leica Geosystems for the Leica SteerDirect ES should not be used because they might jeopardize the safety and function of the Leica SteerDirect ES. We therefore cannot be responsible for such redesign or adaptations. Any obstinate changes on our Leica SteerDirect ES void the company warranty. In addition conformity declaration or local authority regulations could be voided. This also applies to the removal of factory applied seals.



The Leica SteerDirect ES supports you and improves your efficiency, while working in the field. The responsibility for quality and work related results rests as always with the driver. As common with most all machinery the basic rule applies. The more exact the system is adjusted, calibrated and operated the higher the quality of results will be.

3.1 Product Compatibility

Compatibility Th

- The Leica SteerDirect ES Kit is only compatible with the following Leica Products:-
 - mojo3D/mojoXact combination
 - mojo3D/mojoTwist combination



NOTE: It is **not** compatible with the mojoRTK console or the mojoMINI.

4. Pre-Installation Vehicle Preparation



- 1. Park the vehicle on a hard, level surface and block the front and rear wheels.
- 2. Align the machine straight ahead.
- 3. Remove all dirt and trash from the areas of the vehicle where the Leica SteerDirect ES will be installed.



Before beginning installation, please ensure that the vehicle is turned off and a **DO NOT START** tag is attached to the ignition.



Note: The left and right hand sides of the vehicle are referenced while standing behind the vehicle, facing the normal direction of travel.

5. System Description

General

The Leica SteerDirect ES is capable of interfacing to existing vehicles like tractors and other self propelled machines in agriculture and forestry applications.

The Leica SteerDirect ES Kit is composed of the Leica SteerDirect ES MDU, Steer Ready Controller and associated cabling. The Leica SteerDirect ES Kit is designed to interface to the Leica guidance system via CAN bus.

The Leica SteerDirect ES is designed to assist the machine operator to use the equipment more efficiently.



Even when relying on the function of the Leica SteerDirect ES the driver is still responsible for observation of the machine and the surrounding area. They should shut down or assume manual steering control in dangerous situations. To shut down the Leica SteerDirect ES turn off the power switch so that the light is off.

6. Equipment List

Note: Some of the components supplied for this kit are not utilised.

6.1 Leica SteerDirect ES Kit- 805040



Qty	Description	Article #
1	Leica SteerDirect ES MDU	805041
	(Mechanical Drive Unit)	



Qty	Description	Article #
1	Leica SteerDirect ES Switch Kit	805042
	1. Upper Ring	
	2. Spacer 5.75" x 0.50" Thick	
	3. Spacer 5.75" x 0.25" Thick	
	4. Ring Cap Assembly	
	5. Main Gear Assembly	
	6. Hardware Kit	
	7. Hex Key 7/64" Black Oxide	
	8. Hex Key 5/32" Black Oxide	

NOTE: You may purchase additional Leica SteerDirect Switch Kits from your dealer. This allows you to move the Leica Steerdirect ES MDU easily and quickly between two or more vehicles. The Leica SteerDirect Switch Kit contains all the parts that will remain permanently attached to each vehicle. Contact your dealer for further information.

Qty	Description	Article #
1	Leica SteerDirect ES Anti-Rotation Pin	806830

6.2 SRK Part A - 676035



Qty	Description	Article #
1	Steer Ready Controller	676171



Qty	Description	Article #
1	Universal Bracket	676173
2	M6 x 60mm Bolt 316 Stainless Steel	
2	M6 Star Washer 316 Stainless Steel	





Qty	Description	Article #
1	SRK Machine Cable	676172

NOTE: This 676172 Cable is not used with the Leica SteerDirect ES. Cable 805043 is used instead.



Qty	Description	Article #
1	SRK Cab Cable	676186

6.3 Other



Qty	Description	Article #
1	Cable, Steering - CAN, mojo3D-Xact,	782687
	Leica SteerDirect	



Qty	Description	Article #
1	Leica SteerDirect-ES Interface Cable	805043



Qty	Description	Article #
1	Cable, Power Cable	676179

7. Installation

7.1 Leica SteerDirect ES Installation

Refer to Leica SteerDirect ES Switch Kit components on page 8 to identify the parts used in this section. The tool list below consists of special tools required to complete the installation. A complete set of common installation tools is assumed.

- 7/64" Allen Wrench
- 5/32'' Allen Wrench
- 1/4'' Open Wrench
- 1/4'' Nut Driver
- Torque wrench 0 to 20 lbf-in (0 to 2 Nm), for 5/32" hex bit
- Loctite 242 or equivalent

7.1.1 Install the Main Gear on the Steering Wheel

The goal of this section is the installation of the main gear on the steering wheel. A completed installation is shown in Figure 1. Through the use of switch kits, main gears can be installed and left on multiple vehicles allowing the user to move the Steer Direct ES MDU easily between vehicles.



Figure 1 – Completed Main Gear Installation

NOTE: The installation of the main gear on the steering wheel does NOT require removing the steering wheel from the vehicle.

1. Remove 2 hex screws from the Smaller section of the Main Gear as shown in Figure 2.



Figure 2 – Main Gear Hex Screws

2. Remove the smaller section by pulling downwards as shown in the Figure 3.

Note: Tolerances are tight; pull directly downwards on smaller section.



Figure 3 – Main Gear Exploded View

3. Install the larger section under steering wheel around steering column. Install with the gear side on the top, closest to the steering wheel as shown in Figure 4.



Figure 4 – Installed Main Gear

Note: Weave the gear around the steering wheel spokes if necessary; certain steering columns may be too thick for the gear opening.

4. Reinstall the smaller section using care to push directly upwards on the sector, because it is a very tight fit.

Note: To facilitate the fit between the two gear sections, you may apply a drop of oil or apply a thin film of grease to the two alignment pins before mating the gear sections.

5. Reinstall and secure the 2 hex screws. At this point the main gear is assembled around the steering column below the steering wheel as shown in the Figure 4. The gear is free to move around and must be now clamped to the steering wheel.

Note: If you are installing a universal anti-rotation bracket on a CNH vehicle, a CNH fit kit may be required to move the steering away from the instrument panel. Contact your dealer for further information.

7.1.2 Examine Steering Wheel and Column

Examine the steering wheel underside to determine if a spacer is necessary. A steering wheel with a soft covering material usually requires installation of a spacer to avoid interference with the Leica SteerDirect ES MDU housing.

7.1.3 Install Spacer (If Needed)

Install the spacer around the steering column between the steering wheel and the main gear as shown in Figure 5. Flex the plastic spacer as needed to clear the steering wheel spokes as shown in Figure 6 The large chamfer on the outside diameter of the spacer ring should be facing the main gear as shown in Figure 5

Note: Two spacers with different thicknesses are included in the kit. Select the thinnest spacer that provides sufficient clearance between steering wheel and the Leica SteerDirect ES MDU.



Figure 5 – Wheel with Spacer



Figure 6 – Spacer Flexing

7.1.4 Install the Clamp Ring

The gear is free to move around and must be now clamped to the steering wheel. This procedure will install and center the ring gear for typical 3 spoked, normal shaped steering wheels.

1. Place the clamp ring on top of the steering wheel and install a minimum of 6 hex screws. Install a screw on each side of every spoke keeping the screws as close to the spokes as possible. At this stage keep the screws fairly loose to allow for centering. See Figure 7.

Note: Two lengths of screws are provided in the kit to support different thicknesses of steering wheel spokes. Select the shorter of the two screws

that still provides full thread engagement.



2. With the main gear clamped loosely, rotate and move the gear until 3 screws touch the spokes evenly. Figure 8 shows the main gear rotated counter-clockwise until three of the mounting screws touch the steering wheel spokes evenly.

The red circles indicate which circles are touching the spokes



Figure 8 – Main Gear Centred

- **3.** Check the installation by rotating the steering wheel and watching for offcenter movement of the main gear. Repeat the centering process as necessary.
- **4.** Tighten the screws with an Allen key. Torque to 6 lbf-in (0.7 Nm). Tighten the screws in a cross-pattern (as opposed to tightening each screw in a clockwise or counter-clockwise order).

Note: Do not over-tighten the clamp ring screws.

5. Check the installation again after tightening by rotating the steering wheel and watching for off-center movement of the main gear. Repeat the centering process as necessary.



6. Snap the plastic cover over the top ring as shown in Figure 9.

Figure 9 – Plastic Cover Ring

7.2 Attach the Anti-rotation Pin

- 1. Chose the desired Leica SteerDirect ES MDU orientation. The Leica SteerDirect ES MDU can be mounted in any orientation the user chooses. Consider the following when choosing an orientation:
 - Ease of installing anti-rotation bracketry
 - Access to the Power Switch
 - Avoid locations where a knee could accidently press the power switch.
 - Avoid blocking the vehicle's steering column controls and indicators.
 - Cable routing with minimal obstruction in the cab •
- 2. Based on your preferred orientation, choose one of three locations for the Anti-rotation Pin as shown in Figure 10.



Figure 10 – Anti-rotation Pin Locations

3. Apply Loctite 242 or equivalent medium strength thread locker to the anti rotation pin threads.

Note: Loctite 242 is not supplied with the Leica Steerdirect ES Kit.

4. Install the anti-rotation pin and tighten to 40 in.lbs (4.5 N.m.) using a 1/4'' wrench or flat screwdriver.

Note: The anti-rotation pin must always be kept tight to avoid breakage or separation. Periodically check the anti-rotation pin and confirm that it is tight.

7.3 Install the Leica SteerDirect ES MDU

This procedure describes the installation and alignment of the Leica SteerDirect ES MDU to the Main Gear.

1. Open the Leica SteerDirect ES MDU release latch as shown in Figure 11.



Figure 11 – Leica SteerDirect ES MDU Release Latch

2. Fit the Leica SteerDirect ES MDU around the Main Gear so that the three rollers align on the Main Gear race as shown in Figure 12.

Note: The plastic cover on the MDU can be used as a guide to fit the bottom portion of the MDU to the V-rollers.



3. Ensure that the main gear race has properly engaged the three rollers before closing latch. See Figure 12.



Make sure that the main gear race has properly engaged the three rollers before closing latch. If the race is not engaged properly, you risk damaging the Leica SteerDirect ES MDU and steering wheel while the Steering System is operating.

- **4.** Rotate the Leica SteerDirect ES MDU manually to ensure smooth rolling.
- **5.** Continue to the Bracket installation section.

8. Universal Bracket Installation

This chapter contains the following sections:

- Universal Bracket Installation Kit Overview
- Universal Bracket Installation Procedure

The universal anti-rotation bracket is available through your dealer. It should be used for vehicles that are not supported with a custom vehicle-specific bracket. Consult your dealer for a list of all available anti-rotation brackets. An Antirotation bracket is required to complete the Leica SteerDirect ES installation.

805044 - SteerDirect ES Universal Bracket Kit

Note: You may require a different bracket kit depending on your specific vehicle. If you are installing a vehicle-specific anti-rotation bracket, skip this section of the manual and refer to the installation instructions provided with your vehiclespecific bracket kit. Vehicle-specific kits currently available are listed below. Contact your dealer for details.

805045 - SteerDirect ES JD 8000-9000-4700-7920 Install Kit
805046 - SteerDirect ES CNH-PUMA-MAXXUM Install Kit
805047 - SteerDirect ES CNH-MX-STX Install Kit
805048 - SteerDirect ES JD 6000-7000 Install Kit
806829 - SteerDirect ES JD 6000-7000 Premium Install Kit

8.1 Universal Bracket Installation Kit Overview

To complete your Leica SteerDirect ES installation and prevent the rotation of the Leica SteerDirect ES MDU, an anti-rotation bracket must be mounted to the vehicle steering column just below the steering wheel. This chapter provides instructions for installing a universal bracket kit that is available as an accessory through your dealer. Many other brackets are available to fit specific vehicles models and can be ordered through your dealer. Contact your dealer for details and availability for your vehicle model.

The typical universal bracket kit includes the components shown in Figure 13.



Figure 13 – Universal Bracket Kit

Item	Component	Qty
1.	Flange Bearing	1
2.	Fifth Wheel Slider	1
3.	Front Bracket	1
4.	Back Bracket ('V' shape)	1
5.	Clamping screws. Machine Screw Phillips 1/4 - 20 x 4" (Washers, Lock Washers and Nuts)	4
6.	Bolts 5/16 -18 x 3/4" (Slider Attaching Bolts)	2

Table 1 – Universal Bracket Installation Kit Components

8.2 Universal Bracket Installation Procedure

Note: The Leica SteerDirect ES MDU is attached to the steering wheel prior to installation of the bracket kit.

- **1.** Make sure that you have all of the required parts. See Figure 13.
- **2.** Attach front bracket to the fifth wheel slider bracket using the two bolts (slider attaching bolts). See Figure 14. Tighten finger tight.

Note: The slider will require adjustment once installed on the steering column.



Figure 14 – Fifth Wheel Slider Attachment

3. Place the flange bearing assembly over anti-rotation pin.

Note: It is important that the anti-rotation pin is placed through the flange bearing before attaching the back bracket.



Figure 15 – Slide Flange Bearing

4. Attach the back bracket to the front bracket using the four machine screws clamping the steering column between the front and back brackets.



Figure 16 – Attaching the Brackets

5. Tighten the clamping assembly.



Make sure the assembly does not interfere with any of the vehicle control levers on the steering column.

6. Adjust the position of the fifth wheel slider so the flange bearing is approximately in the middle of the anti-rotation pin and tighten the bolts (Slider attaching bolts).



Figure 17 – Fifth Wheel Slider Adjustment

7. The bracket installation is complete.

9. Controller Installation

The controller may be mounted anywhere on the machine to give access to all cabling required. Suggested location is inside the cab for ease of access to the Leica SteerDirect ES MDU.

The controller may be directly mounted to any appropriate surface. However if you wish to secure the controller using the supplied bracket follow the instructions below:

1. Secure the SRC mounting bracket using either existing fasteners, drilling a mounting hole or using large cable ties. Any of the holes in the SRC bracket may be used for mounting. The orientation of the controller is not critical.



Figure 18 - Bracket Mounting Points

2. Mount the controller to the bracket using the M6 fasteners supplied.



Figure 19 - Controller Mounting

9.1 Routing the Wiring

All cables should be routed in a way to reduce the risk of mechanical damage where possible. Cables should not be run near heat sources. Generally routing cabling along existing wiring looms is easiest. Cable ties are provided in the part A kit for securing cabling.

For a complete wiring reference see Section 10.

9.1.1 Connecting the SR Controller

Connect the Grey and Black connectors from the Leica SteerDirect ES Interface Cable to the controller. These connectors are keyed and therefore cannot be connected incorrectly.



Figure 20 - Controller Connections

The connector labelled "Steering Wheel" on the Leica SteerDirect ES Interface Cable is connected to the Leica SteerDirect ES MDU.



Figure 21 – Leica SteerDirect ES MDU Connection

NOTE: The Wheel Angle Sensor connector on the Leica SteerDirect ES Interface Cable is not used with the Leica SteerDirect ES.

9.1.2 Cab Harness

The cab cable connects to all peripherals inside the cab and also connects to the machine cable. It's recommended to roughly layout the harness in the cab but do not secure or hide the harness until all other connections are made.

- 1. Layout the cab cable within the cabin so that:
 - a. The CAN Bus connector routes towards the guidance product.
 - b. The Power connector routes towards the power source.
 - c. The Switch crimps routes towards the console and desired switch location.

NOTE: The Steering Override connector is not used with the Leica SteerDirect ES. The Steering Override is built into the Leica SteerDirect ES MDU.



Figure 22 - Cab Cable Connections

2. Route the To Cab Exterior connector to the Leica SteerDirect ES Interface Cable already installed.

9.1.3 CAN

The CAN connection will connect to the Leica guidance product using the following cable:

• 782687 - Cable, Steering - CAN, mojo3D-Xact, Leica SteerDirect

Consult your guidance product manual for cable installation. The CAN extension cable (676030) provided can also be utilised if required.





9.1.4 Switch

- 1. Select a location for the Engage Switch. The switch is a standard size and fits most spare switch locations.
- 2. Route the switch crimps from the Cab Cable to the desired switch location.
- 3. Connect the wire crimps to the switch terminals. The wires and switch terminals are number labelled.



Figure 24 - Power and Engage Switch Connections

4. Press the switch into the console. Normally the orientation is so the light is above the steering wheel however the switch may be inserted in either direction.

9.1.5 Power

Connect the power cable (Article No. 676179) between a cab power outlet and the Cab cable.

10. Wiring Harness Diagram



Figure 25 - Wiring Harness Diagram

11. Configuring the Leica SteerDirect ES

This chapter explains how to configure the Leica SteerDirect ES product on a mojo3D and mojoXact guidance system. Hardware installation of the kit and guidance products should be performed before configuration.

11.1 Steering Kit Selection

When the Leica mojo3D starts up for the first time it will start a configuration sequence designed to guide you through the initial setup of the console.

The Leica mojo3D user manual explains the standard configuration settings, ensure that you select either the Twist or mojoXact as an attached device by selecting the corresponding icon.



If not configuring the mojo3D and mojoXact for the first time select the vehicle wizard from the main menu.





Once you have reached the vehicle type section of the setup sequence please select the "SteerDirect ES" steering kit from the list available.

NOTE: The available steer kits will vary depending on the device and unlock codes being used.

The communication status will be displayed. Please ensure that the installation is complete and the engage switch is on so that the red light is illuminated.

	Quick Steer	
	SteerDirect ES	
		1
Steering Kit Status		
CAN Bus Connected		
Steering Kit Active		
1.		

Proceed through the remaining setup wizard stages following the prompts on screen and the instructions in the mojo3D User Manual. The mojoXact if used may need to reboot once the configuration is complete.

11.2 Controller Configuration

The Controller is configured after selecting the SteerDirect ES steerkit option in the Steer Kit list. The Controller can also be configured using the following steps. This only needs to be done if the controller has been swapped out or the SteerDirect ES was not turned on when the initial setup was performed.



To configure the controller, select the Steering Test icon from the Steering menu.



Press the start button on the configure Steering Kit screen.

Wait for the configuration to finish. This should not take long. Proceed to the next menu.

Configure S	iteering Kit		
	Complete		
		Start	

This menu provides a quick method of finding out steer kit settings such as firmware version, current state and adjustment values. Proceed through the menus back to the main screen.

State : Vehicle Make :	late	
Vohiclo Make ·		
	Leica	
Vehicle Model :	SteerDirect ES	
Setpoint :	0	
Encoder :	0	
WAS Number :	Open	
SRK Control Mode :	0	
Flow rate integrator :	N/A	
Centre position :	N/A	
Ticks per curv :	N/A	
Max left curv :	-0.30000	
Max right curv :	0.30000	
Left cal value :	8191	
Centre cal value :	16384	
Right cal value :	24575	
Left ticks per curv :	109223.33333	
Right ticks per curv :	109223.33333	

NOTE: The controller firmware version required for the Leica SteerDirect ES is **204B** or later. If the controller has incompatible firmware an error similar to below will be displayed.





11.1 Custom SteerDirect ES Settings

For the SteerDirect ES in addition to the normal tuning settings there are two extra settings available for optimising the steering performance on the Leica SteerDirect ES. These can be changed by following the steps below.

To configure the custom settings for the SteerDirect ES, select the Steering Settings icon from the Steering menu.

The first setting that is available is the **Gain** setting.

The Gain value adjusts how quickly the SteerDirect ES approaches the wayline. A gain value that is too low may cause the vehicle to respond slower causing oscillations around the wayline at higher speeds. A value that is too high may result in the wheels being too twitchy.

After entering the required Gain value proceed to the next menu. The next setting that is available is the **Dampening** setting. The Dampening value adjusts the rate at which the heading changes. A low Dampening value may cause the vehicle to overshoot the line. A high Dampening value may cause the vehicle to be slower to acquire the wayline.

After entering the required Dampening value proceed back to the main guidance page.



Gain		
100	-	
Minimum: 50		
Maximum: 150		
and the second second		

Dampening	
100	
Minimum: 50	
Maximum: 150	

11.2 Steering Tests

To access the steering test page select the steering settings icon.









The Steering Test allows the installer to test the rotation and mounting of the SteerDirect ES kit. This is useful for checking the direction of the SteerDirect ES and checking the lock to lock time.

Once in the steering test actuation page engage steering and then select the direction actuation.





For the Steering Test the left and right buttons will actuate the steering left and right while the centre button will stop steering.

Safety Directions 12.

12.1 General



The Leica SteerDirect ES is to be used solely in combination with Leica Guidance systems. Therefore it's mandatory to also observe the directions and instructions contained in the Leica guidance product manual.

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.

12.2 Intended Use		
Permitted Use	 The Leica SteerDirect ES is exclusively developed for usage in agriculture or forestry by persons in control. The Leica SteerDirect ES is only intended to be fitted to agricultural tractors. It is not permitted to install this product in any other vehicles. 	
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 when using on the intended site. The Leica SteerDirect ES is not suitable for applications on narrow dikes or on steep hillsides, where danger of vehicle roll over exists. 	
A 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 on how to work with it.	



Unauthorized modification of agricultural machine by mounting or installing 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 or installing the product.

12.3 Limits of Use

Environment

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



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.

12.4 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 of the product. 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. 		
M 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. Unauthorized modification of machines by mounting the product may alter the function and safety of the machine.		

12.5 Hazards of Use



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

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 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.



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.



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.



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

Precautions:

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



If the product is improperly disposed of, the following can happen: If polymer parts are burnt, poisonous gas are produced which may impair health.

By disposing of the product irresponsibly you may enable unauthorized 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 unauthorized personnel.



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



On public roads and drives always disengage the Leica SteerDirect ES via the power switch. For safety reasons it is better if you keep one hand on the steering wheel, when using the Leica SteerDirect ES at speeds over 6 mph (10 km/h). In case of malfunction you are able to take action immediately.

M Warning

With exemption of the driver no other person should ride in the drivers area of the vehicle fitted with a Leica SteerDirect ES. Additional persons could distract or block visibility of the driver from operating and observing the Leica SteerDirect ES which could lead to dangerous situations.



The presence of a rider on a passenger seat is only acceptable for brief observations or for training purpose. The passenger seat is never considered a children seat. Only persons especially experienced, with the operation of the machine, should be considered for schooling on a machine which is fitted with a Leica SteerDirect ES.



Pay special attention that no children are near or on the vehicle which is fitted with a Leica SteerDirect ES, especially when the Leica SteerDirect ES is active. Children are unpredictable and supervision is limited when operating the Leica SteerDirect ES. They might be exposed to additional danger.



Before starting field work make yourself comfortable with the use of the Leica SteerDirect ES and the vehicle. As soon as the Leica SteerDirect ES is activated, an adult, responsible person has to be in charge of supervision and monitoring. In dangerous situations it is always safer to disengage the Leica SteerDirect ES and drive by hand, in order to avoid personal injury or material damage.



At no time should there be any person within the danger zone once the Leica SteerDirect ES system is activated.

At any sign of danger the operator should deactivate the Leica SteerDirect ES system immediately. He has to ask any person within the danger zone to leave promptly. Only when there are no more people within the danger zone can he re-activate the Leica SteerDirect ES system.

For service and control duties only authorized persons can enter the danger zone, after verbal confirmation with the operator. Such people have to be clearly informed about possible dangers before entering the danger zone. All activities between the operator and these persons should be discussed beforehand. All service, adjustment and control duties on this Leica SteerDirect ES system should only take place if technically possible, on a parked vehicle with the engine turned off.



People present within the danger zone are exposed to serious bodily harm or even death. People could be run over in case of malfunction of the machine. The operator is obligated to stop the vehicle as soon as people enter the danger zone.

- Always have a fire extinguisher and First Aid kit at hand.
- Always have actual emergency phone numbers for Fire department, ambulance and doctor handy.

Prepare for possible emergencies

13. Care and Maintenance

This chapter describes the required care and maintenance for your Leica SteerDirect ES system. Should you require repair services, spare parts or warranty, contact your dealer. Only the factory or an authorized service center has the correct parts and training necessary to service your Leica SteerDirect ES system.

- Keep the anti-rotation pin tight at all times. Check the anti-rotation pin every 250 hours of operation or every six months, whichever occurs first, and tighten as necessary. Do not operate the Leica SteerDirect ES unit if the anti-rotation pin is loose.
- Keep the anti-rotation bracket well secured to the steering column at all times. Check the anti-rotation bracket every 250 hours of operation or every six months, whichever occurs first, and confirm that it is secure and all fasteners are tight. Tighten as necessary.
- Do not expose your Mechanical Drive Unit (MDU) to water or rain. Store the MDU in a protected location. On open platform tractors, remove it from the vehicle when not in use.
- Check all cables and electrical connectors every six months. Secure any loose cables using cable ties.
- Clean the outside surfaces of your Mechanical Drive Unit and the three guide rollers using a damp cloth. Do not apply spray cleaners, spray waxes, liquids or lubricants such as WD-40. The use of any liquid cleaning agent or lubricant may damage the internal components of your Mechanical Drive Unit and will void the factory warranty.
- Always clean the main gear and main gear race (see Figure 4 and Figure 12) with a damp cloth to remove dust before installing the MDU to the steering wheel. This is especially important when moving the MDU between vehicles.
- The Mechanical Drive Unit is manufactured with sealed bearings and self lubricating components and does not require lubrication. Do not apply oil, grease or spray lubricants.

Note: Any attempt to open the Mechanical Drive Unit (MDU) or the Steer Ready Controller (SRC) will void the factory warranty.

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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**