

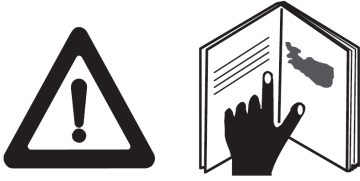
Leica **SteerDirect ES^{plus}** Installation Manual



1. Introduction

Purchase

Congratulations on your purchase of the new Leica SteerDirect ES Plus.







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 Plus 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 Plus. 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:

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

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

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4. Product Overview

Benefits

The Leica SteerDirect ES Plus Kit consists of a MDU, 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 relevant guide for further details on these products.

This installation guide will provide the necessary steps to successfully install the Leica SteerDirect ES Plus 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 Plus. These deviations are caused by individual applications and have no impact on the function capabilities of the Leica SteerDirect ES Plus.

Use only original parts

Leica Geosystems original spare parts are especially designed for the Leica SteerDirect ES Plus. 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 Plus should not be used because they might jeopardize the safety and function of the Leica SteerDirect ES Plus. We therefore cannot be responsible for such redesign or adaptations. Any obstinate changes on our Leica SteerDirect ES Plus 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 Plus 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 all machinery the basic rule applies. The more exact the system is adjusted, calibrated and operated the higher the quality of results will be.

4.1 Product Compatibility

Compatibility

The Leica SteerDirect ES Plus Kit is only compatible with the following Leica Products:-

- mojo3D/mojoXact combination
- mojo3D/mojoTwist combination
- mojoXact Plus / Universal Terminal combination
- mojoXact Plus / mojo3D combination



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

5. Pre-Installation Vehicle Preparation



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



Danger

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.

6. System Description

General

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

The Leica SteerDirect ES Plus kit is composed of the MDU and associated cabling. The Leica SteerDirect ES Plus Kit is designed to interface to the Leica guidance system via CAN bus.

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



Caution

Even when relying on the function of the Leica SteerDirect ES Plus 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 Plus turn off the power switch so that the lights are off.

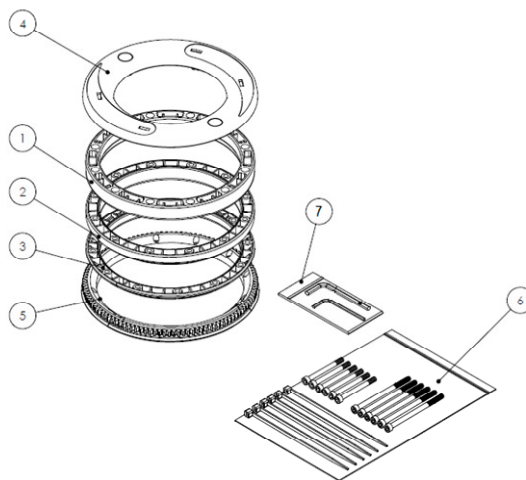


7. Equipment List

7.1 Leica SteerDirect ES Plus Kit- 812746

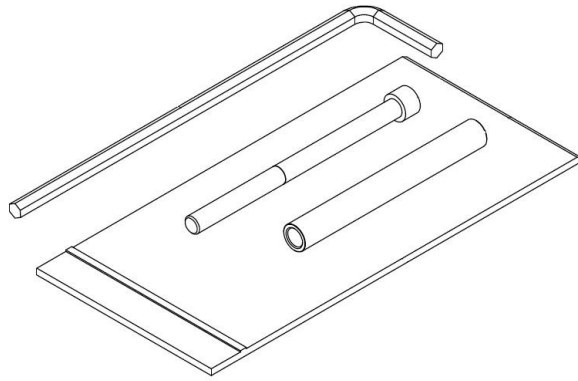


Qty	Description	Article #
1	Leica SteerDirect ES Plus MDU (Mechanical Drive Unit)	812746

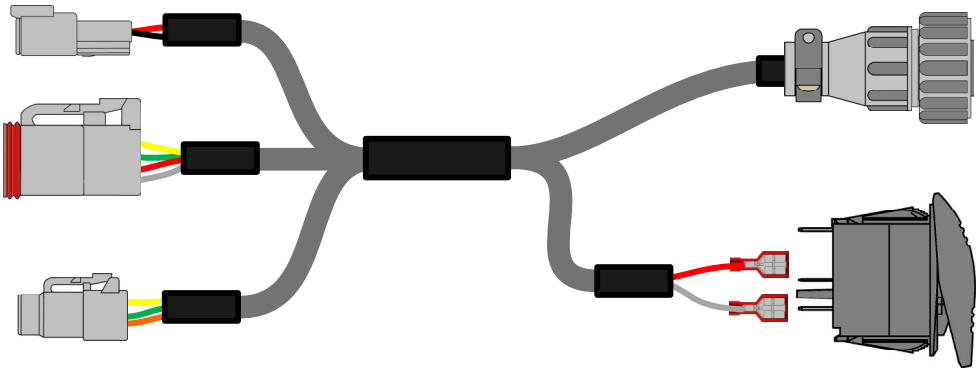


Qty	Description	Article #
1	Leica SteerDirect ES Switch Kit	805042
	1. Upper Ring	
	2. Spacer 5.75" x 0.50" Thick	
	3. Spacer 5.75" x 0.25" Thick	
	4. Ring Cap Assembly	
	5. Main Gear Assembly	
	6. Hardware Kit	
	7. Hex Key 7/64" Black Oxide Hex Key 5/32" Black Oxide	

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

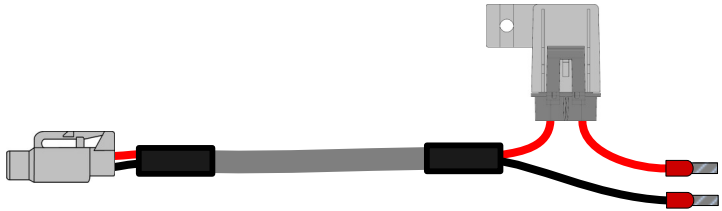


Qty	Description	Article #
1	Leica SteerDirect ES Plus Anti-Rotation Pin Kit	818500



Switch Included with cable

Qty	Description	Article #
1	Cable, SteerDirect ES Plus	807606



Qty	Description	Article #
1	Cable, SteerDirect ES Plus, Power	808539

8. Installation

8.1 Leica SteerDirect ES Plus Installation

Refer to Leica SteerDirect ES Plus Switch Kit components on page 7 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 (Supplied)
- 5/32" Allen Wrench (Supplied)
- 1/4" Open Wrench
- 1/4" Nut Driver
- Torque wrench 0 to 20 lbf-in (0 to 2 Nm), for 5/32" hex bit

8.1.1 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 Plus MDU easily between vehicles.

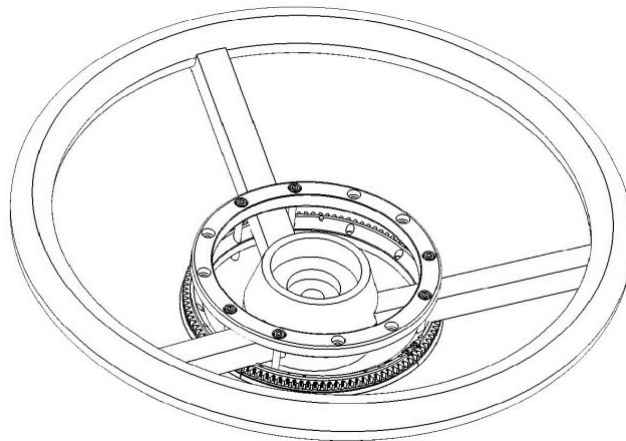


Figure 1 - Completed Main Gear Installation

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.

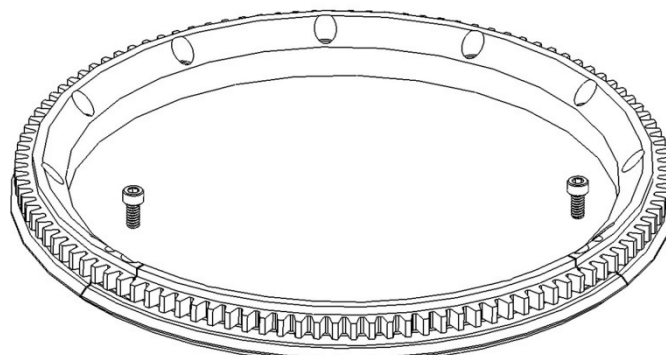


Figure 2 - Main Gear Hex Screws

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

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

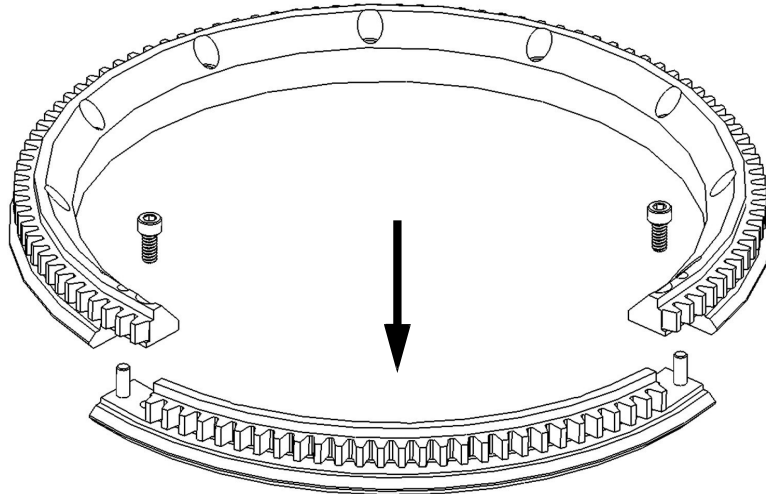


Figure 3 – Main Gear Exploded View

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.

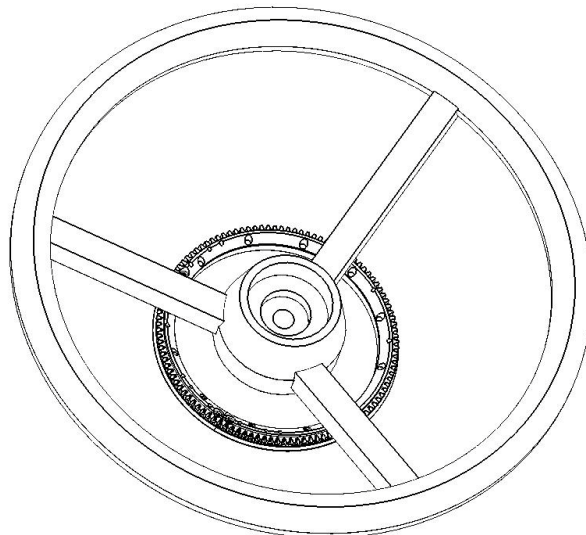


Figure 4 – Installed Main Gear

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.

8.1.2 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 MDU housing.

8.1.3 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 Plus MDU.

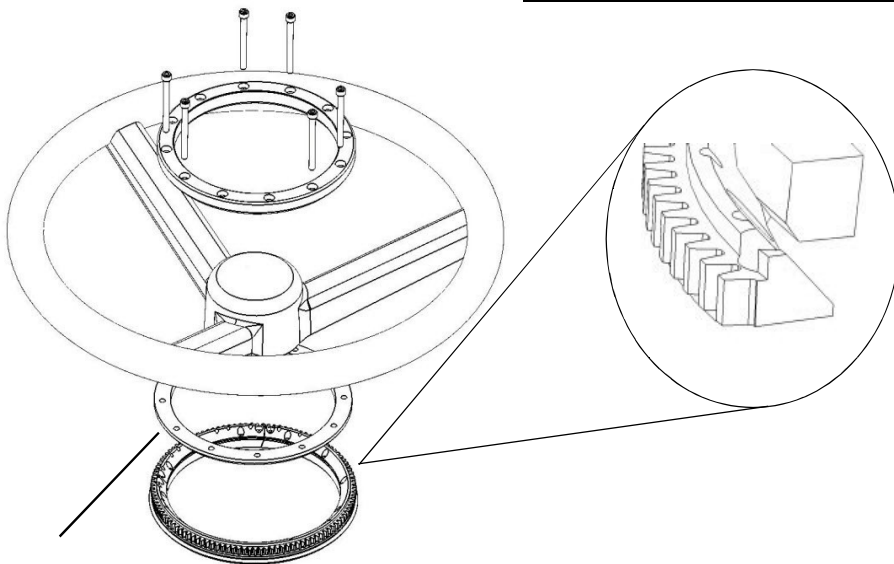


Figure 5 - Wheel with Spacer



Figure 6 - Spacer Flexing

8.1.4 Install the Clamp Ring

1. 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 spoke shaped steering wheel.
2. 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.

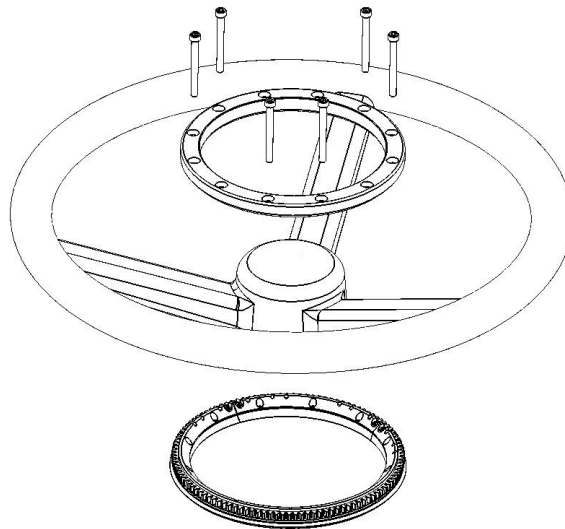


Figure 7 - Clamp Ring

3. With the main gear clamped loosely, rotate and move the gear until 3 screws touch the three spokes evenly. Figure 8 shows the main gear rotated counter-clockwise until three of the mounting screws touch the steering wheel spokes evenly. This procedure will help to automatically centre the gear under the steering wheel.

The red circles indicate which circles are touching the spokes

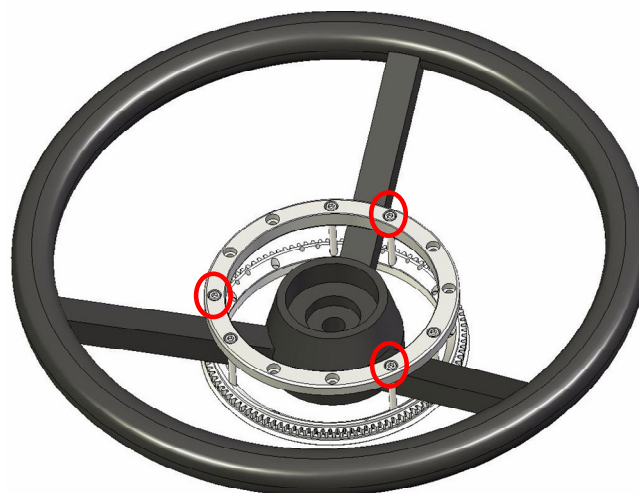


Figure 8 - Main Gear Centred

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

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

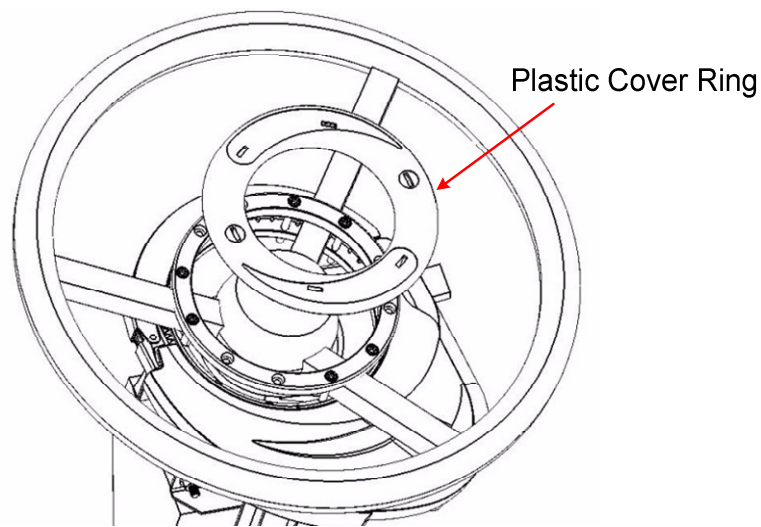


Figure 9 – Plastic Cover Ring

8.2 Attach the Anti-rotation Pin

1. Choose the desired MDU orientation. The MDU can be mounted in any orientation the user chooses. Consider the following when choosing an orientation:
 - Ease of installing anti-rotation bracket
 - Access to the Power Switch
 - Avoid locations where a knee could accidentally 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.

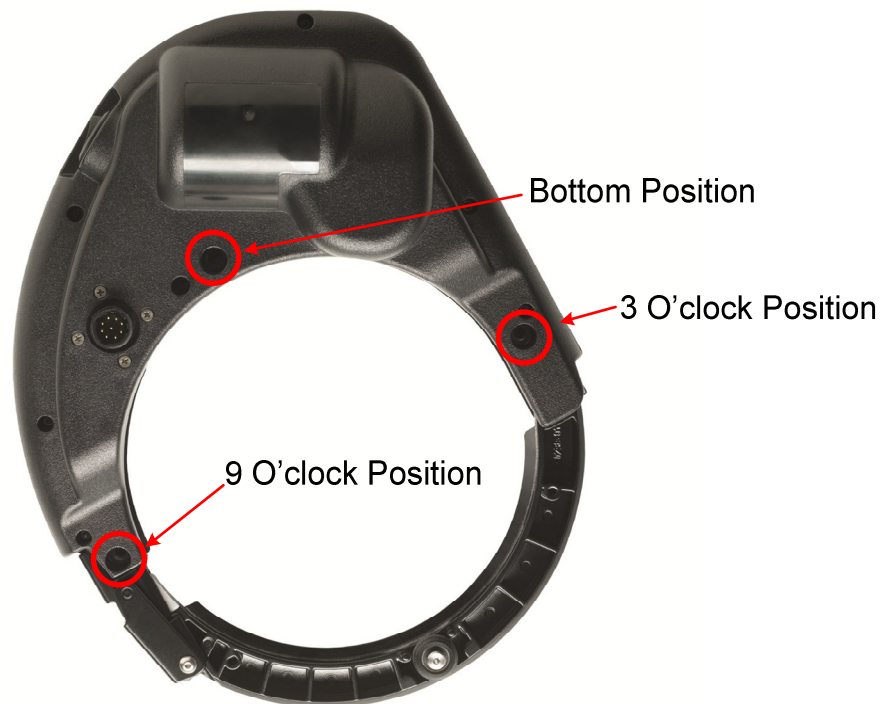


Figure 10 – Anti-rotation Pin Locations

3. Assemble the anti-rotation pin by inserting the long screw through the metal sleeve provided.
4. Install the anti-rotation pin under the MDU in one of the three positions and tighten to 100 in.lbs (11.3 Nm) using the 3/16" hex key (Allen key) provided.

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. Always tighten to the specified torque.

8.3 Install the Leica SteerDirect ES Plus MDU

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

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



Figure 11 – Leica SteerDirect ES Plus MDU Release Latch

2. Fit the 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.

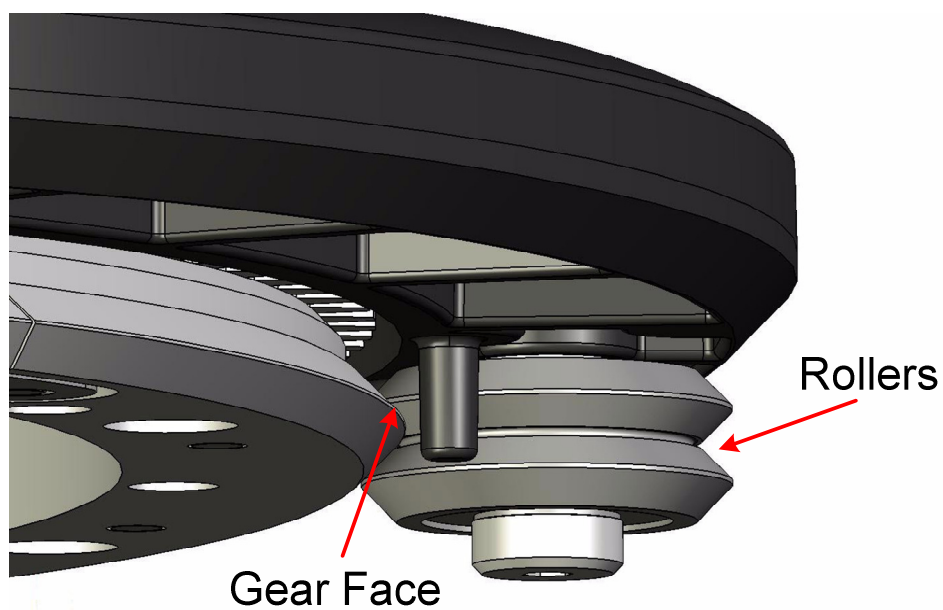


Figure 12 – Leica SteerDirect ES Plus MDU Alignment

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



Caution

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 Plus and steering wheel while the Steering System is operating.

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

9. 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 Anti-rotation bracket is required to complete the Leica SteerDirect ES Plus 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 vehicle-specific bracket kit. Vehicle-specific kits currently available are listed below. Contact your dealer for details.

818503	NEW HOLLAND TVT/TV FORD NEW HOLLAND VERSATILE 9000, BUHLER VERSATILE 2000
818504	JD 47X0/48X0/7930/7630/77X0/78X0/79X0/8XXX/8XXXT/8XXXR/9XXXR/9XXX/9XXXT
818505	CASEIH MX/STX, NH TJ/T9000
818506	JOHN DEERE 9XX0 COMBINES 8, AG CHEM XX54/XX64/XX74, MILLER, RED BALL 7830
818507	JOHN DEERE 6X10/6X20/6X30/7220/7320/7420/7520/7130/7230/7330/7430/7530 STANDARD
818508	CASE MAGNUM 71X0, 72X0, 89X0 MODELS
818509	CASE STEIGERS9XX0, NH 8XX/9XX/1150, CAT 65/75/85 C/D/E
818510	JOHN DEERE 4000-8000 4WD, AGCO ALLIS 9000 SERIES
818511	HAGIE STS ('05 AND NEWER MODELS)
818512	HAGIE STS (2000-2004)
818513	FENDT VARIO AND FAVORIT
818514	CASE 21XX/23XX/25XX/X088
818515	CNH AFX, CAT, BUHLER, NH GENESIS, VERSATILE, AG-CHEM CRENLO CAB '00 AND NEWER
818516	INTERNATIONAL 14XX/16XX
818517	CASE IH MXU/MAXXUM/PUMA, NH T60XX0/T70XX0/T80XX0
818518	CASE SPX/FLX/TITAN, NH TG,T80X0
818519	CASE HYDRO/XX86/3X88/5X88
818520	MASSEY FERGUSON, AGCO ALLIS DT, RT, CHALLENGER 500/600
818521	GLEANER RX0, MASSEY 86XX, CAT MT5XXC/6XXC
818522	GLEANER R55/R65/ R75, CHALLENGER 660/670
818523	CAT LEXION 590R
818524	CHALLENGER 670B, GLEANER R66/R76
818525	CHALLENGER 670B, GLEANER S67/S77, MASSEY 6X95 (2011 AND NEWER)
818526	APACHE SPRAYER AS SERIES 500/710/715/850/1000/1010/1210
818527	CASE MXM, JXU, NEW HOLLAND TL, TM, (TS 1997-2003)
818528	JOHN DEERE D 6230, 6330, 6430, 7130, 7230, 7330, 7430
818529	CASE MX MAXXUM 100/110/120/135/150/170, MCCORMICK MT

9.1 Universal Bracket Installation Kit Overview

To complete your Leica SteerDirect ES Plus installation and prevent the rotation of the Leica SteerDirect ES Plus 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.

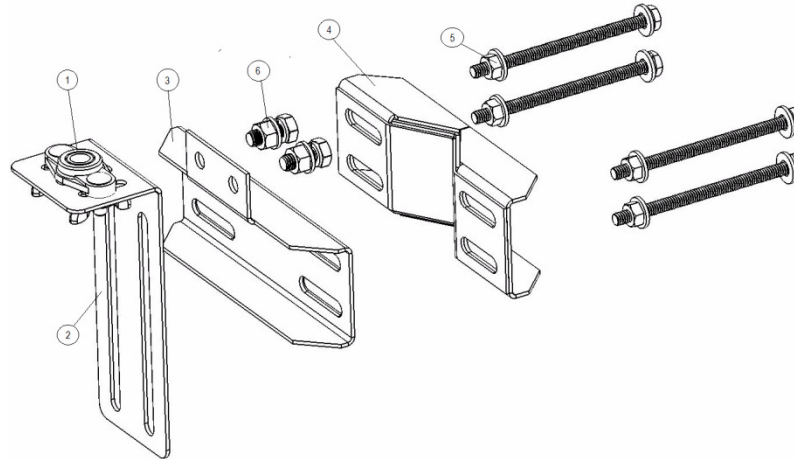


Figure 13 – Universal Bracket Kit

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

9.2 Universal Bracket Installation Procedure

Note: The Leica SteerDirect ES Plus 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.

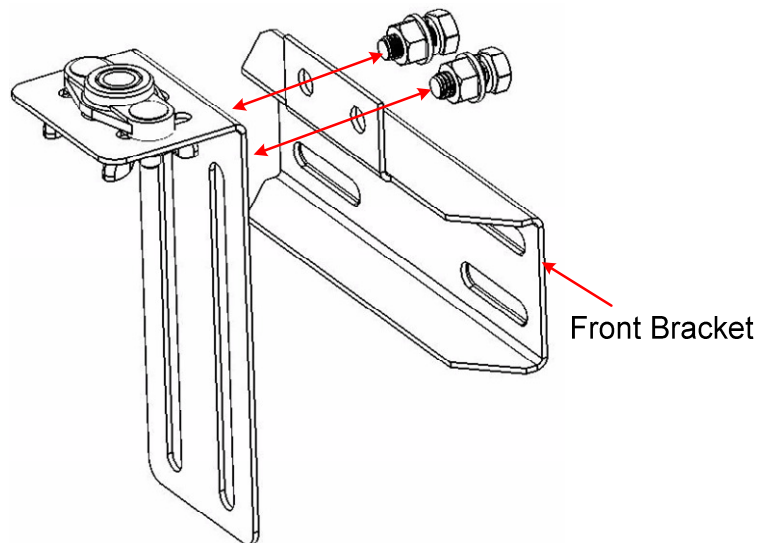


Figure 14 – Fifth Wheel Slider Attachment

3. Place the flange bearing assembly over anti-rotation pin. Figure 15

Note: It is important that the anti-rotation pin is placed through the flange bearing before attaching the Fifth Wheel Bracket.

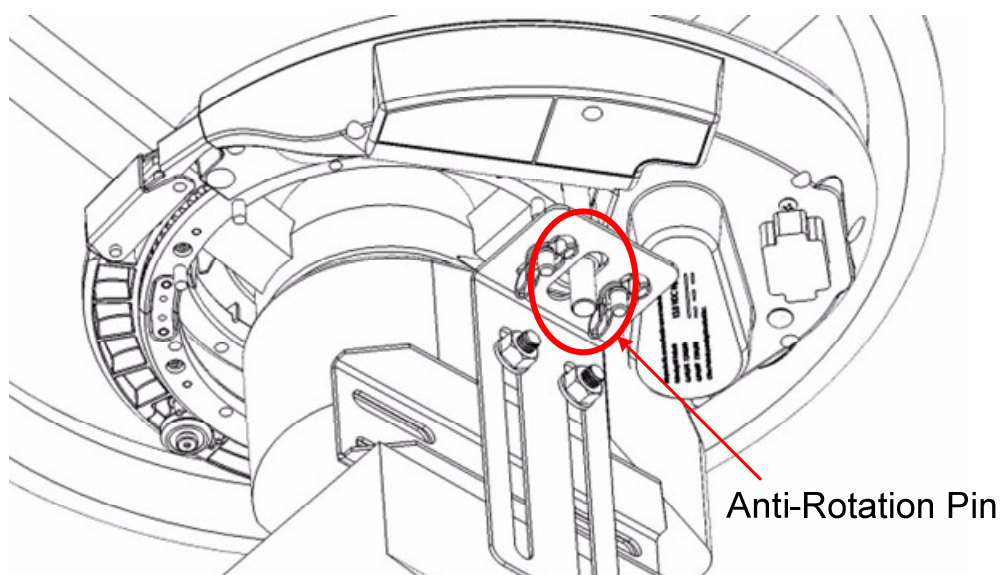


Figure 15 – Side Flange Bearing

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

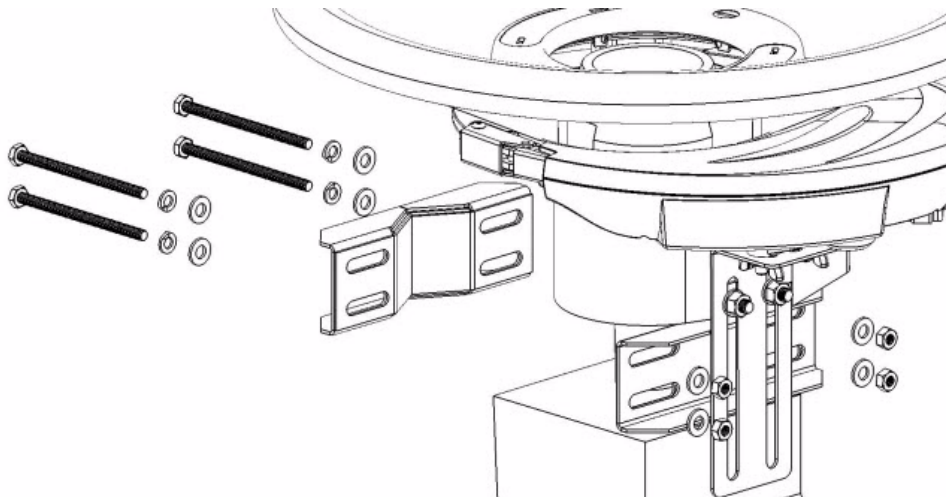


Figure 16 - Attaching the Brackets

5. Tighten the clamping assembly.



Caution

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).

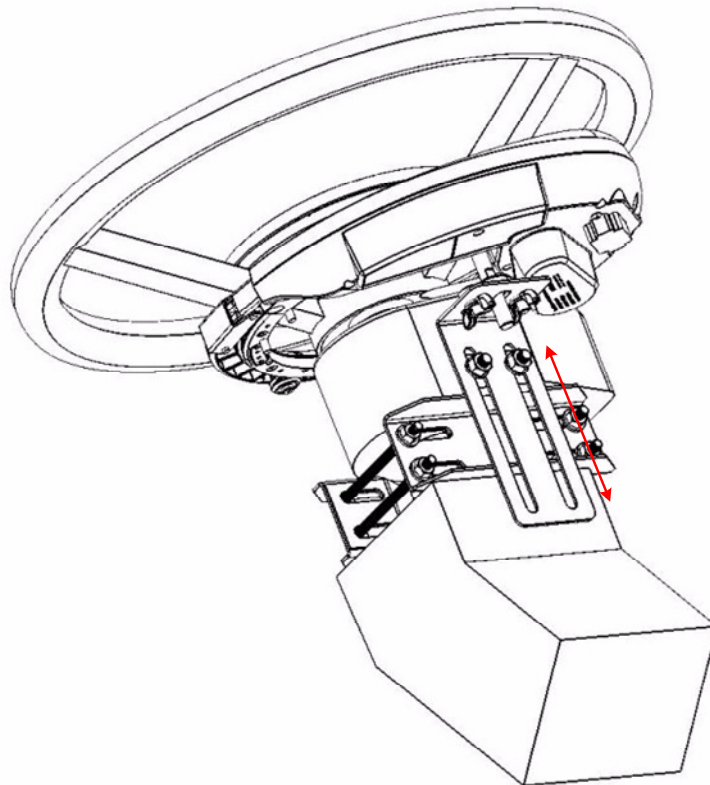


Figure 17 - Fifth Wheel Slider Adjustment

7. The bracket installation is complete.

10. Cable Installation



Caution

All cabling must be secured away from operator controls.

Two cables are used to connect the MDU to the Guidance system. The SteerDirect-ES Plus cable (807606) and the power cable (808539). Figure 18 shows the overall connection.

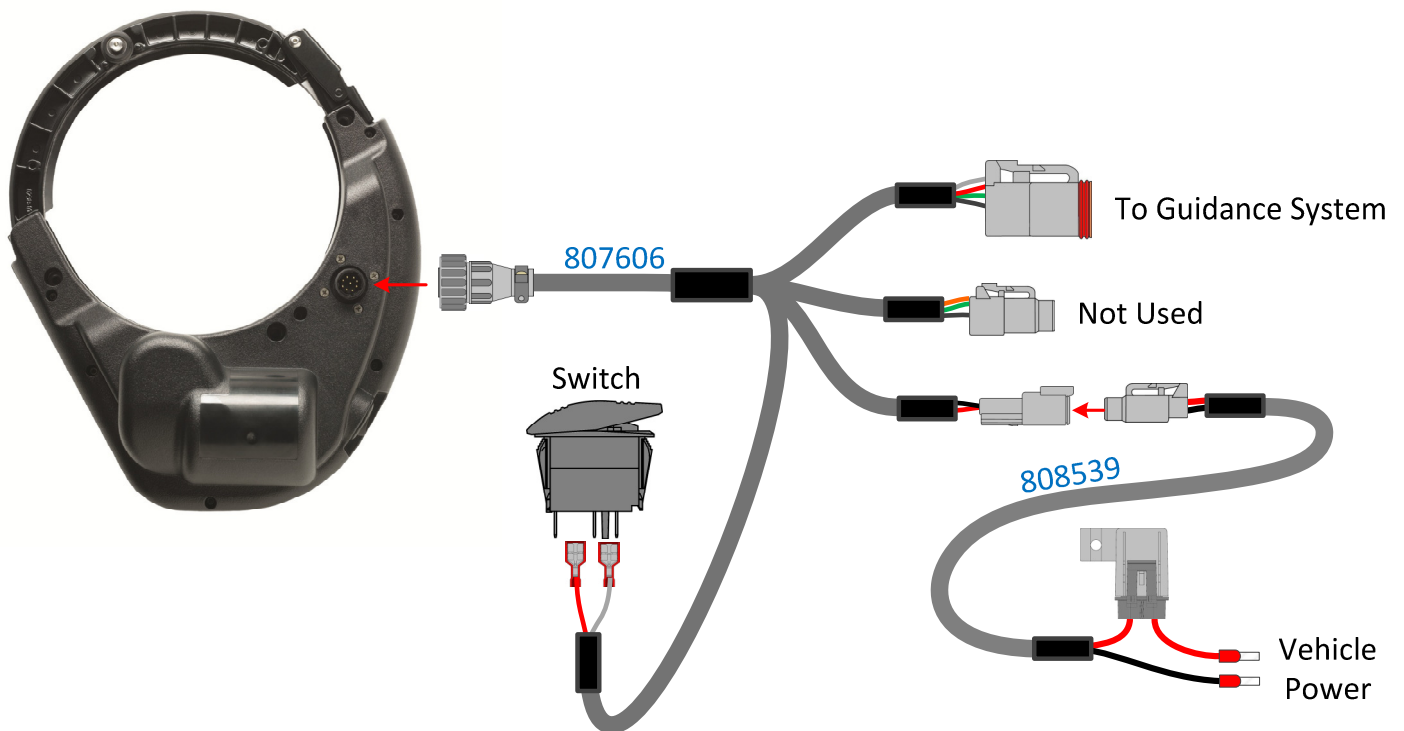


Figure 18 - Cabling Overview

10.1 SteerDirect-ES Plus Cable

1. Connect the round 9-pin connector to the bottom connector of the MDU. Rotate the coupling of the connector until it locks into place.
2. If using a mojoXact or mojoXact Plus connect the 6-pin connector labelled "CAN Bus" to the Yellow port of the port expansion cable.
3. If using a mojo3D with a Twist connect the 6-Pin connector labelled "CAN Bus" to the Twist with the other end of the twist connected to the yellow port of the port expansion cable.
4. Connect the 2-Pin connector labelled "Power In" to the power cable.

Note: The connector labelled "Wheel Angle Sensor" is not used.

10.2 Engage Switch Mounting

Note: Use of the engage switch is optional but recommended for remote engaging of the steering system and ease of use. If not used the guidance display must be used to engage steering.

1. Select a location for the Engage Switch; it should be close to the operator controls. The switch is a standard size and fits most spare switch locations.
2. Route the crimps from the main cable to the desired switch location.
3. Connect the crimps to the underside of the switch. The connection orientation is not critical.
4. Press the switch into the selected location.

10.3 Power Source

Connect the power cable to a 12Vdc switched (accessories) power source capable of supply up to 4A current. The red wire is positive, the black wire is GND.



Warning

Only Connect the power cable to a 12Vdc power source. The Leica SteerDirect ES Plus is not suited for 24V machines. The Acceptable power range is 11-15Vdc.



Caution

Do not bypass the fuse on the power cable.



Only connect the SteerDirect ES Plus to an accessories power source. Direct battery connection may result in draining of the machine's battery when in storage.

11. Power Switch

The Leica SteerDirect ES Plus is equipped with a power switch as shown in Figure 19 this allows the operator to disable the steering system. Position the switch with the 0 to disable the Leica SteerDirect ES Plus



Figure 19 - Power Switch

The Leica SteerDirect ES Plus has two LED lights as shown in Figure 20.

- When the system is powered LED1 will stay constant green.
- When the MDU is active LED2 will flash yellow.



Figure 20 - MDU LEDs



Warning

When driving on a public road the Leica SteerDirect-ES Plus must be switch off. Ensure the power light is turned off and the guidance system can't communicate with the steering system.

12. Safety Directions

12.1 General



The Leica SteerDirect ES Plus 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 Plus is exclusively developed for usage in agriculture or forestry by persons in control.
 - The Leica SteerDirect ES Plus 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 Plus is not suitable for applications on narrow dikes or on steep hillsides, where danger of vehicle roll over exists.



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.



Warning

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.



Danger

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

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.
-



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



Warning

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.



Warning

While steering or navigating the machine accidents may occur due to a) the operator not paying attention to the surroundings (persons, ditches, traffic, etc.), or b) malfunctions (...of a system component, interference, etc).

Precautions:

The operator assures that the machine is operated, guided and monitored by a qualified user (e.g. driver). The user has to be able to take emergency measures, for example an emergency stop.



Warning

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

Precautions:

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



Warning

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

Precautions:

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



Warning

Inadequate securing of the 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.



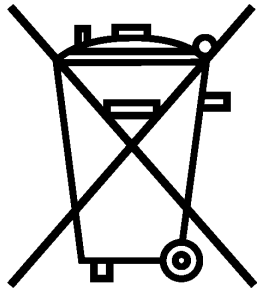
Warning

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

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.

 **Warning**

On public roads and drives always disengage the Leica SteerDirect ES Plus 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 Plus at speeds over 6 mph (10 km/h). In case of malfunction you are able to take action immediately.

 **Warning**

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

 **Warning**

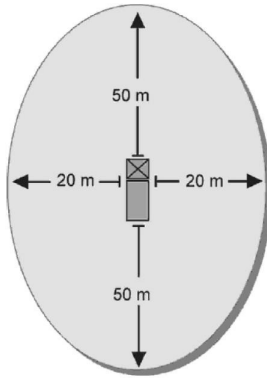
The presence of a rider on a passenger seat is only acceptable for brief observations or for training purpose. The passenger seat is never considered a children seat. Only persons especially experienced, with the operation of the machine, should be considered for schooling on a machine which is fitted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

 **Warning**

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

 **Warning**

Before starting field work make yourself comfortable with the use of the Leica SteerDirect ES Plus and the vehicle. As soon as the Leica SteerDirect ES Plus 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 Plus 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 Plus system is activated. At any sign of danger the operator should deactivate the Leica SteerDirect ES Plus 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 Plus 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 Plus 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.

Prepare for possible emergencies

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

13. Care and Maintenance

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

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- when it has to be **right**



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