

Grade Support Arm

Installation Guide



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About Grade Support Arm Installation Guide

Content and structure

This Installation Guide has been developed for operators to provide the necessary information to install the Grade Support Arm.

The Installation Guide is a practical guide for the installation of the Grade Support Arm. This manual has been divided into colour-coded sections, enabling the user easily look up the potential subject of interest.

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Grade Support Arm



Grade Support Arm

The Grade Support Arm ensures the optimal position of a grade sensor. The support arm keeps the grade sensor in a fixed position and reduces the influence of the vibrations induced by the screed.

The Grade Support Arm is easily adjusted, so the position of the grade sensor can adapt to changes on the paving site.

The Grade Support Arm comes with two mounting plates for permanent mounting. The two mounting plates makes it easy to move the Grade Support Arm from one paver to another or between the two sides of the paver.

Symbol overview

This user manual uses a range of symbols and warning notifications throughout the manual to make the operator aware of important safety measures or information regarding operation. The following symbols are used in this manual:



Warning!

Indicates important information the operator must be aware of to avoid dangerous situations which can result in death or serious personal injury



Caution!

Indicates important information the operator must be aware of to avoid dangerous situations which can result in death or serious personal injury



Tip

Indicates information regarding efficient and failure-free operation of the equipment



Step-by-step instructions

Indicates a step-by-step instruction, where a particular order of actions is required or recommended

About the Grade Support Arm

The location of the sensor is very important for the grade control of the screed. With the use of the Grade Support Arm, the location of the sensor can be adjusted to the conditions of the paving job at hand.

When paving with a grade and slope control system with millimetre precision such as Mini-Line®, it is important for the sensor to be positioned directly above the surface (the reference) throughout the paving process, so that the level measurement is correct.

To ensure a smooth finish, it is also important for the sensor to be located at the optimum distance from the front edge of the screed.

The Grade Support Arm can adjust the position of the sensor in three dimensions, thereby ensuring that the Mini-Line® grade sensor is optimally positioned, when paving asphalt with a single grade sensor.

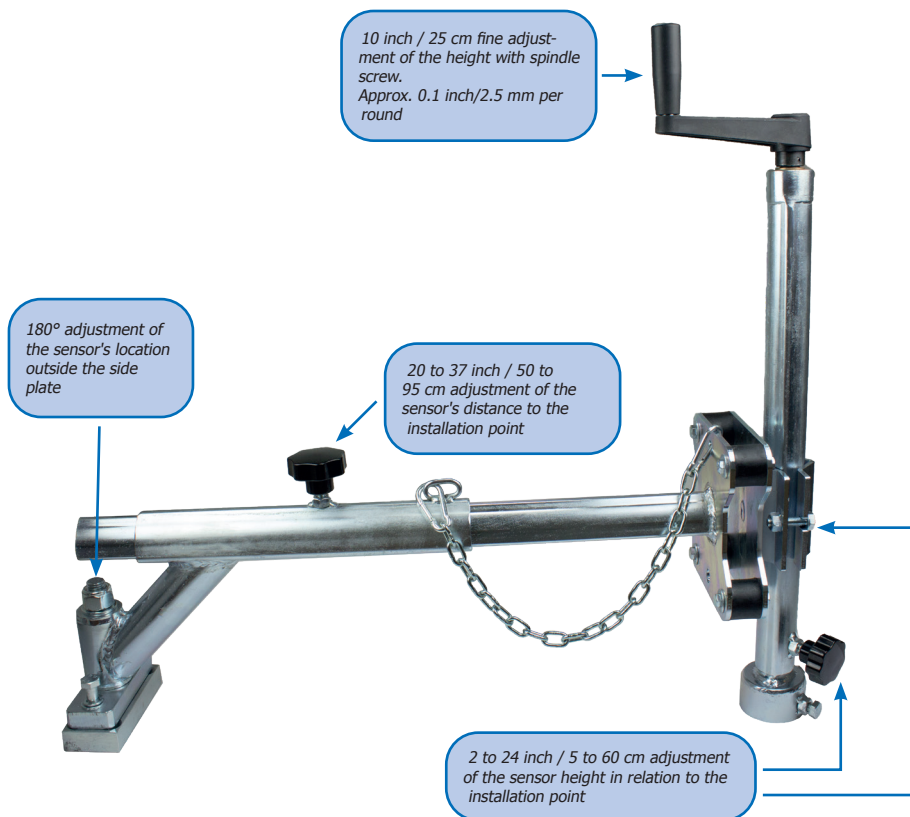


Fig. 2 - Grade Support Arm adjustments

Location of the Grade Support Arm

To be able to follow the movements of the screed, the sensor should be positioned between the tow point and the front edge of the screed. In order to achieve a rapid regulation that leaves a smooth surface, it is recommended to position the sensor aligned with the auger of the paver, as this is suitable for most paving jobs.¹

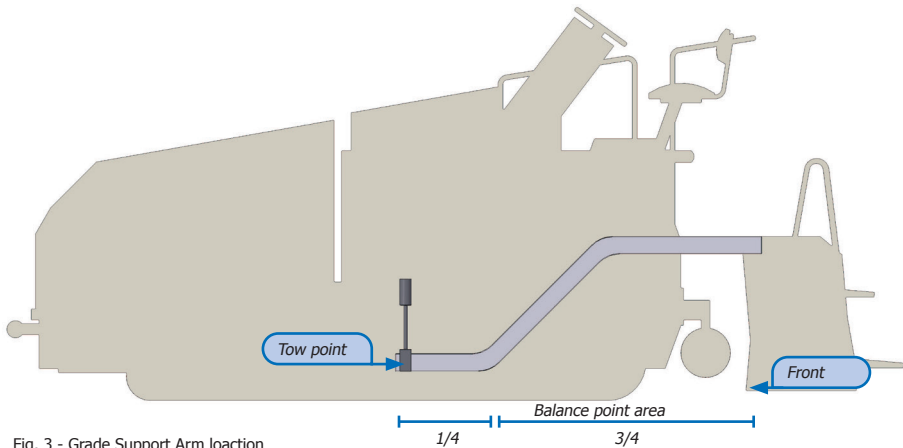


Fig. 3 - Grade Support Arm location

If the sensor is positioned too close to the tow point, regulation speed is reduced. A higher regulation speed is otherwise one of the advantages of using an automatic grade and slope control system such as Mini-Line®.

You are therefore not recommended to place the sensor inside the last $\frac{1}{4}$ of the distance between the tow point and the front edge of the screed, as this location results in overly slow regulation.

On the other hand, if the sensor is placed very close to the front edge of the screed, the regulation is very aggressive, which can result in over-compensation and produce an uneven road. In some situations, however, this can be suitable in combination with very low speed, for example when laying speed bumps according to a template. In such situations, the operator should be careful to ensure the correct setting of the control parameter Sensitivity of the controller and adapt the speed of the paver.

¹Positioning the sensor aligned with the auger is typically suitable for paving jobs with a paving speed of approx. 15 - 40 feet / 5-12 m per min. At faster paving speeds, positioning the sensor further ahead of the auger will often be more beneficial. However, the position of the sensor must always tally with the controller, and the control parameter Sensitivity may need to be adapted when the sensor position is altered. See the controller's manual

Free line-of-sight to the reference and distance to reflecting surfaces

The sensor must have free line-of-sight to the reference being used – regardless of the type of reference used (surface, kerb or wire). To ensure this, ultrasonic sensors must maintain a distance to vertical reflecting surfaces of at least 10 inches / 25 cm. For example, the sensor must be placed at least 10 inches / 25 cm from the side plate.

Distance to heat sources

The sensor must not be placed too close to major heat sources, e.g. the exhaust of the paver or an installed joint heater. Even though the grade sensors have built-in heat compensation, a position less than 20 inches / 50 cm from a major heat source can disrupt sensor measurements, as the temperature can easily change by $\pm 50^{\circ}\text{C}$ ($\pm 120^{\circ}\text{F}$) when the wind changes direction.



The sensor must always have free line-of-sight to the reference



The Grade Support Arm must never obstruct the free movement of the screed



The sensor should be positioned between the tow point and the front edge of the screed



The sensor must always be positioned at least 10 inches / 25 cm from any vertical reflecting surfaces



The sensor should be positioned at least 20 inches/50 cm from heat sources, e.g. exhaust and joint heater

The components of the Grade Support Arm

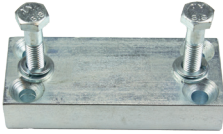


Fig. 4 - Mounting block for pivot joint



Fig. 5 - Pivot joint with guard to prevent the horizontal adjustment arm being pulled out too far



Fig. 7 - Vertical adjustment arm with spindle screw



Fig. 6 - Horizontal adjustment arm with vibration damping

Installation on paver

The Grade Support Arm is typically located on one of the side plates of the screed, so that the sensor can see the reference, even if the side plate is moved in and out while paving. The Grade Support Arm is installed on the side plate with a mounting block, which can either be welded or bolted into place.



During welding electrical equipment and battery must be removed, as significant currents can otherwise pass through the structure, which can lead to life-threatening situations

There are two mounting blocks enclosed, so the Grade Support Arm can be moved between the two sides of the paver. This is useful, for example, if you switch between using a slope sensor on one side of the paver and a grade sensor on the other side.



Figure 5: Mounting block



Figure 6: Mounting block with pivot joint



The mounting block must be placed on the screed, approx. 40 inches/1 m above the ground



The mounting block must be positioned so that it is reasonably horizontal ($\pm 5^\circ$) during paving

Installation of mounting block

1.
2.
3.

- 1** Raise the screed to a typical paving position
 - You are recommended to allow the screed to rest on a beam or similar at a height that corresponds to an average layer thickness, e.g. 3 inches / 60 mm
- 2** Find a suitable surface on the side plate that is approx. 40 inches/ 1 m above the ground² and reasonably horizontal³
 - If you cannot find a suitable surface, you are recommended to weld a spacer block onto the side plate to achieve the desired height and incline
- 3** Weld or bolt the mounting block shown in Figure 5 into place on the selected surface
 - The mounting block is made of iron and is suitable for welding
 - If the mounting block is bolted into place, the four holes in the mounting block's corners must be used
- 4** When the mounting block is securely in position on the side plate, the pivot joint can be installed with two bolts that fit the central threads in the mounting block, as shown in Figure 6

²The distances from the mounting block to the surface can be found by adding up the known partial distances: The distance from the block to the cup on the Grade Support Arm (approx. 0-24 inches/0 - 600 mm) + The distance from the top of the cup to the bottom of the sensor (approx. 3 inches/70 mm) + the height of the sensors (approx. 4-5 inches/104 - 130 mm) + the recommended sensor height (approx. 15 inches/400 mm). This gives a figure of approx. 40 inches/1m from the block to the surface, when the screed is raised to a typical paving height

³Reasonably horizontal means max. $\pm 5^\circ$ from level, as the grade sensor should ideally be vertical.

Assembling the Grade Support Arm

When the mounting block and the pivot joint are installed on the paver, only two adjustment arms are to be added.

1.
2.
3.

1 The horizontal adjustment arm is pushed into the pivot joint arm

2 The adjustment arm is secured with the thumb screw on the pivot joint

3 The chain between the adjustment arm and the pivot joint is latched.

The chain ensures that the adjustment arm cannot be pulled out too far

4 The vertical adjustment arm with the spindle screw is installed with the fitting at the end of the horizontal adjustment arm

- Only one bolt is secured in the outermost fitting, and when this is unscrewed, the outermost fitting can be removed, allowing the horizontal adjustment arm to be installed

5 The vertical adjustment arm is secured with the fitting and the two bolts at the end of the horizontal adjustment arm.





Fine-tuning of the height during paving can easily be performed with the spindle screw. This changes the height by approx. 0.1 inch / 2.5 mm per round.



The Grade Support Arm must never obstruct the free movement of the screed, as this can result in dangerous situations

Installation of Snap Connector

At the end of the vertical adjustment arm there is a cup that is used to install the Snap Connector, which holds the sensor in place.

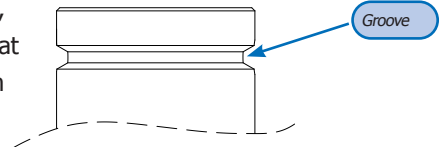
The Snap Connector, like the Grade Support Arm, is designed for the harsh environment on a paver, and can be permanently installed in the cup on the Grade Support Arm.

1.
2.
3.

- 1** Undo the two screws on the cup to allow the Snap Connector to be inserted in the cup and travel right to the bottom
- 2** Tighten the two screws on the cup so that they hold the Snap Connector in place.
When the Snap Connector is in place, the screws in the cup of the adjustment arm are aligned with the groove in the Snap Connector



The Snap Connector contains a groove, which can catch the screws in the cup at the end of the vertical adjustment arm



Installation of grade sensors

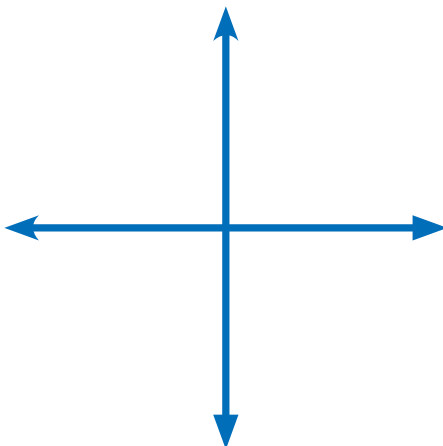
The Snap Connector has a locking mechanism that gives a firm grip on the sensor and locks it in a fixed angle, so the display can be orientated towards the operator. This can be used to ensure that the display of the sensor is visible during paving.

All Mini-Line® grade sensors have a display or indicator that indicates the condition of the sensor, and it is therefore important that the display/indicator is visible to the operator. G221 and G224 also provide an indication of the movement of the screed in relation to the selected reference point.

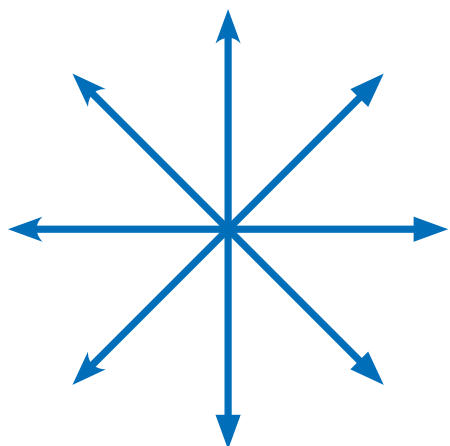
G220 and G221 can be secured in four positions, while G224 can be secured in eight positions.



There is a locked position aligned with screw holes in the Snap Connector. To ensure the availability of a locked position in the direction the operator requires the display/indicator to point, the Snap Connector should simply be installed so that one screw hole points in that direction.



G220/G221 locks in four positions



G224 locks in eight positions



Step-by-step instructions for installation of grade sensor in Snap Connector



1.
2.
3.

1

Retract the outer cover and insert the sensor, while still holding onto the sensor so that it does not fall out

2

Turn the sensor to one of the locked positions

3

Release the outer cover and lock the position. It is important that the Snap Connector has locked correctly before letting go of the sensor



When a grade sensor is mounted in the Snap Connector, the outer cover should conceal the $\frac{3}{4}$ spring clip



Visible $\frac{3}{4}$ spring clip
- not locked correctly



Concealed $\frac{3}{4}$ spring clip
- locked correctly

Technical Specification (data sheet)



Grade Support Arm

Mini-Line®

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The Grade Support Arm is easily adjusted, so the position of the grade sensor can adapt to changes on the paving site.

The Grade Support Arm comes with two mounting plates for permanent mounting. The two mounting plates makes it easy to move the Grade Support Arm from one paver to another or between the two sides of the paver.

Grade Support Arm Specifications	
Part Number	S-50513
Application	Mounting of Grade Sensors
Compatible Sensors	G220, G221 and G224 using the S-50531 Mini-Line® Snap Connector
Weight	18.6kg
Material	Steel
Max length, from mounting point	95 cm
Max depth, from mounting point	60 cm
Range of precision-adjustments	25 cm (with handle)

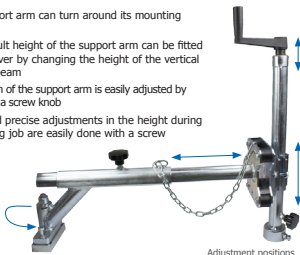


Grade Support Arm

Adjustment

The support arm is easily adjusted to the optimal position of a grade sensor.

- The support arm can turn around its mounting points
- The default height of the support arm can be fitted to the paver by changing the height of the vertical support beam
- The length of the support arm is easily adjusted by loosening a screw knob
- Small and precise adjustments in the height during the paving job are easily done with a screw handle



Adjustment positions

Sensor Mounting



Snap Connector in the sensor cup

The sensor cup on the Grade Support Arm fits an S-50531 Mini-Line® Snap Connector. The Snap Connector has a locking mechanism that gives a firm grip on the sensor and locks it in a fixed angle, so the sensor display can be orientated towards the operator.

The Snap Connector makes it easy to attach and detach Mini-Line® sensors and reduces installation time.

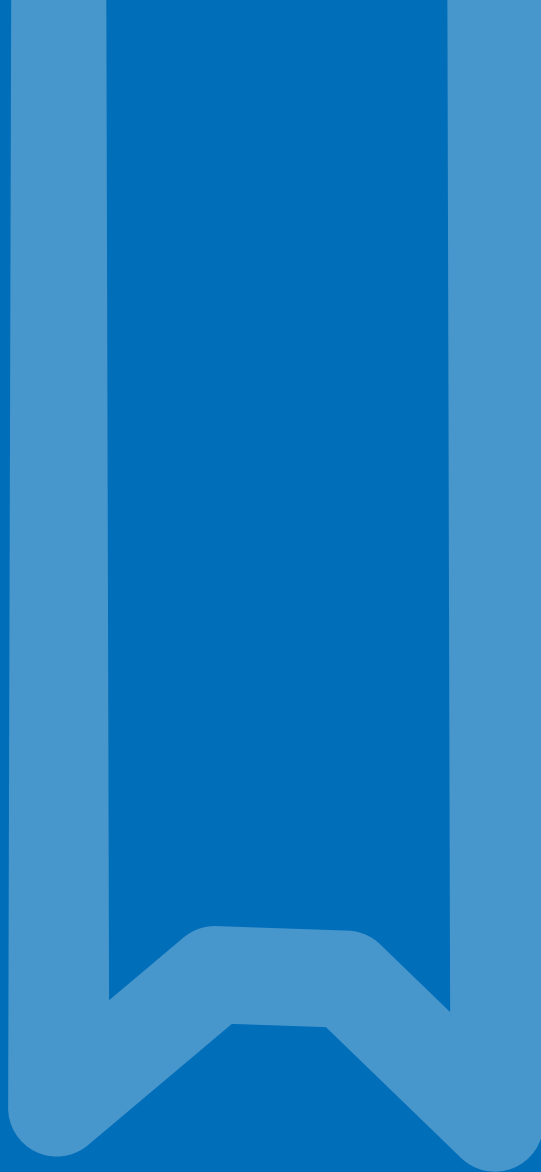
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