

RIMIK PTY LTD

# CP Instruments

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## Too Close - Troubleshooting

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## "Too Close" Error

This document relates specifically to the error "Too Close" which is encountered at the start of an insertion.

All Rimik CP instruments since the CP10 use the return flight time from the Ultrasonic transducer to the target to calculate the distance to the target. The spacing between the top of the target (resting on the cone) and the top of the cone is fixed in the firmware. In addition the height of the target is entered during calibration. As a result the instrument can determine the depth of the top of the cone in relation to the soil surface. Of course, this assumes the bottom of the target is resting on the soil surface.

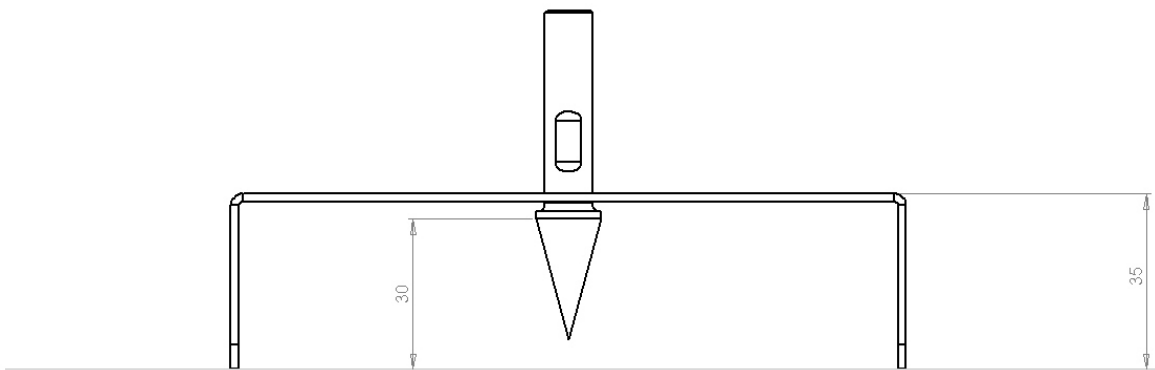


Figure 1: Cone and Target Configuration at the start of an insertion

In order to start an insertion we recommend that the target is gently resting on the ground with the cone lifted until just touching the target bush. This will place the tip of the cone just above the soil surface as above. In this position the depth reading on the CP instrument will be approximately negative 30mm i.e. the top of the cone is 30mm **above** the soil surface (see Figure 1).

The depth result is important at the start of an insertion. If it is zero or higher i.e. non negative, the system is designed to halt the insertion at this point as it determines that the cone is already under the surface of the soil. In this situation it has not recorded a starting value i.e. zero depth and zero load and will present an error "Too Close".

If you are encountering the "Too Close" warning regularly, the following table lists a number of causes and solutions which you could investigate:

<b>Potential Cause</b>	<b>Solution</b>
The top of the cone is already in the soil	Lift the instrument until the cone is resting just under the target bush
The target is severely tilted up and the starting distance to the target has been affected	Remove obstruction such as rocks or clumps of soil so that the target is level and the cone is not in the soil.
The target is resting on grass well above the soil surface	Remove or flatten the grass so that the target is resting on the soil surface
Long grass close to the target is interfering with the initial distance measurement.	Check the area against the reflection zone and remove or flatten long grass to a circle of 300mm diameter so that it is below the top of the target.
Plant surfaces inside the reflection zone are reflecting signals rather than the target	Remove plant leaves from within the volume of the reflection zone (see Figure 2). If this doesn't appear to fix the problem, perform a "Distance Check" and see if the instrument is still picking up something inside the zone. Use the "Check Distance" result to determine its distance from the instrument.
Tops of boots or shoes are reflecting the ultrasonic signal	Widen your stance to shoulder width so that your feet are outside of the base of the reflection zone (see Figure 3).
The target is not fitted during use	Refit the target and perform a "Check Distance" to make sure the instrument is operating correctly.
The calibrated distance measurement has shifted	Perform a "Check Distance" with the instrument lifted and the target resting on the cone. The measured distance should be within +/-2mm of the same measurement following a distance calibration. For a CP40II this distance is 957mm. Re-calibrate the distance if the deviation is higher than +/- 2mm.
The unit will not read the distance or depth nor will it undertake an insertion	Perform a "Calibrate Distance" and then a "Check Distance" to make sure the Ultrasonic system is operating correctly.
The ultrasonic transducer has been obstructed or damaged	Check that the circular transducer with the mess cover is free of obstructions such as electrical tape or other items used in the field as temporary fixes. Ensure the surface of the transducer has not been damaged.
The Instrument is not clicking when undertaking any distance measurements and insertions	Inform Rimik and seek advice regarding repair of the instrument.

## Zone of Reflection

Ultrasonic reflection can occur from any flat surface within the reflection zone provided the signal is reflected upward and into the Ultrasonic receiver. Non-horizontal surfaces will generally have no effect as the reflected signal moves out of the zone.

The reflection zone is a cone which is centred at the Ultrasonic transducer fitted underneath the instrument. The cone angle is approximately  $15^\circ$  (see Figure 2). The transducer transmits its signal perpendicularly downward. CP instruments are designed to be used in conjunction with a target which provides a very effective reflection surface and sits above its surroundings (see Figure 1). To achieve the best reflection surface, the target should be positioned so that its short side is parallel with the handles (see Figure 3).

The base of the zone is approximately 300mm in diameter (see Figure 3) centred 50mm in front of the instrument cone. Provided there are no other reflecting surfaces within the zone volume, the system will work effectively. Long grass and shoes inside the 300mm diameter base, that sit higher than the target will affect the depth readings and could result in "Too Close" errors.

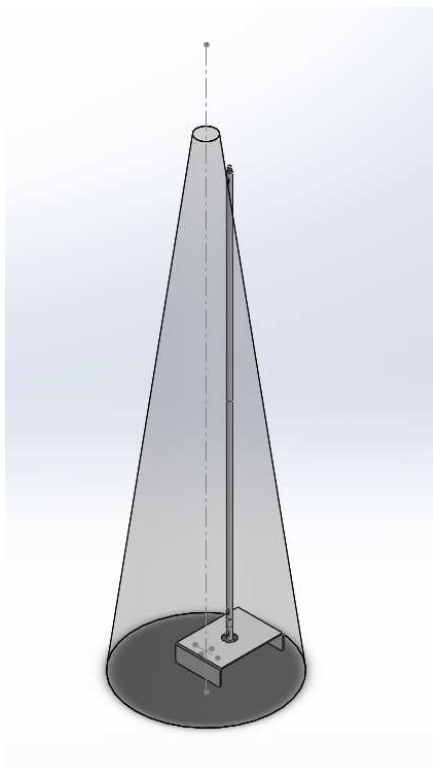


Figure 2: Shape of Reflection Zone



Figure 3: Base of Reflection Zone

## Other Solutions to "Interference"

If tall grass is an ongoing issue there are a few recommended solutions:

1. Carry a thin aluminium plate at least 350mm in diameter with a hole in the centre to allow the cone to be inserted. The plate will flatten the grass in a wide enough area to limit or eliminate reflecting surfaces and provide a flat surface for the target to sit on.
2. Make a taller target plate e.g. one that is up to 150mm high and also allows you to undertake full profile readings to your maximum depth (750mm by default).
3. Make a modified target with side tabs that you can stand on to stop the target resting well above the soil surface.

In all cases, make sure it's not your shoes providing a secondary and higher reflecting surface which restricts the starting distance to the extent that a "Too Close" error occurs. If so, turn or spread your feet so that they are outside the base of the reflecting zone.