

# Technical Data Sheet

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## Non-Contact, Multiple-Point Measurement

The 3DLevelScanner is a non-contact, dust-penetrating bin measurement device that detects irregular surfaces in powder or solid materials and then calculates highly accurate bin volume estimates.



## 3DLevelScanner™ Level Sensor



**BINMASTER**®

[www.binmaster.com](http://www.binmaster.com)

# Overview

## Accurate Volume Measurement

The BinMaster 3DLevelScanner uses non-contact, dust-penetrating technology to provide unsurpassed bin volume accuracy. Unlike conventional single point devices, it works by measuring multiple points within the bin. The 3DLevelScanner uses a very low frequency acoustical signal to penetrate dust and take measurements which are determined by how long the signal takes to “travel to” solid or powder material and “return to” the device. This technology is proven to perform in powders and bulk solids, determining a highly accurate volume of materials contained in tanks, silos, and warehouses.



### Key Specifications

Preferred Applications	Powders and Solids
Measuring Range	200 feet (61 meters)
Process Fitting	Thread, Flange, Mounting Strap
Process Temperatures	-40 to +185°F (-40 to +85°C)
Process Pressure	-0.2 – 1 bar (-2.9 to 14.5 psi)
Signal Output	4-wire 4 - 20 mA/HART/RS-485/Modbus
Emitting Frequency	3 KHz to 10 KHz



Display

Easy navigation  
LCD with 4-button operation

4-wire  
4 - 20 mA/HART/  
RS-485/Modus

Same housing  
for all versions



# Technical Data

## Materials, Non-Wetted Parts

Housing	Painted aluminum die casting
Inspection Window in Housing Cover	Polycarbonate
Antenna	Painted aluminum die casting
Flange	Steel

## Weight

12.3 lb (5.6 kg)	Thread version
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## Output Variable

Output Signal	4 - 20 mA/HART, RS-485, Modbus RTU, TCP/IP
Resolution	10 $\mu$ A
Fault Signal	Current output unchanged, 22 mA > 3.6 mA (adjustable)
Current Limitation	22 mA

## Load

4-wire sensor	Max. 500 Ohm
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## Ambient Conditions

Ambient, storage and transport temperature	-40 to +185°F (-40 to 85°C)
Relative humidity	20% to 85%
Altitude	16,400 ft (5,000 m)

## Process Conditions

Vessel Pressure	-0.2 to 1 bar (-2.9 to 14.5 psi or -20 to 100 kPa)
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## Process Temperature

Measured on the Process Fitting	-40 to +185°F (-40 to +85°C)
Vibration Resistance	Mechanical vibrations with 2 g and 5 to 200 Hz

## Electromechanical Data

Cable Entry/Plug	1 x cable entry M20x1.5 (cable- $\varnothing$ 8 to 12mm)
	1 x blind stopper M20x1.5
	OR
	2 x cable entry 1/2 NPT

## Display Panel

LCD	4 lines x 20 characters
Adjustment Elements	4 keys
Protection	IP67

# Technical Data

## Power supply - 4-wire instrument (Active) 4 - 20 mA / HART

Supply Voltage	20 to 32 VDC
Power Consumption	Max 4VA; max 3 W

## Electrical Protective Measures

Protection	IP67 according to IEC 60529
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## Approvals

ATEX	ATEX II 1/2D, 2D, Ex ibD/iaD 20/21 T110°C ATEX II 2G Ex ia/ib IIB T4
FM	FM Intrinsically Safe Class I, II, Division I, Groups C, D, E, F, G (CFM pending)
IECEX	IEC EEx ia IIC T6 (pending)

## CE

EMC	
Emission	EN 61326:1997 (Class B)
Susceptibility	IEC / EN 61326:1997 + A1:1998 + A2:2001 + A3:2003
NSR (73/23/EWG)	EN 61010-1:2001

## FCC

Conformity	To part 15 of the FCC regulations FCC 47 CFR part 15:2007, subpart B, class A
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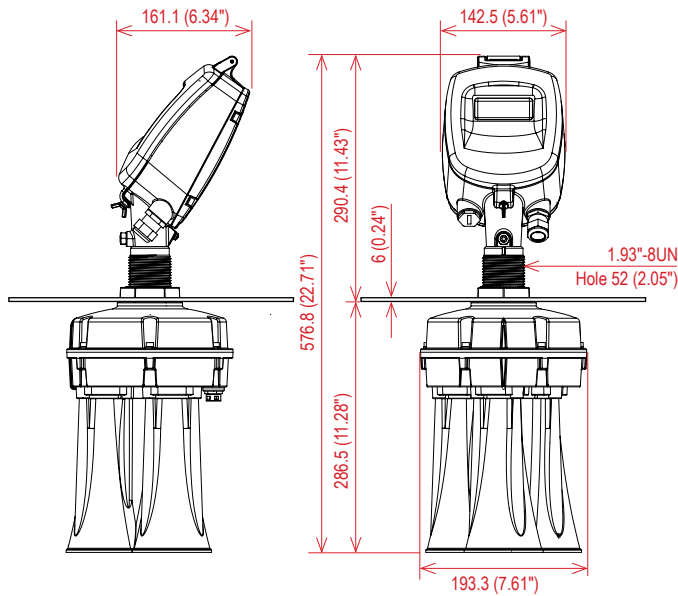
## Measurement Characteristics

Frequency	3 to 10 kHz
Beam angle	30 to 70 degrees

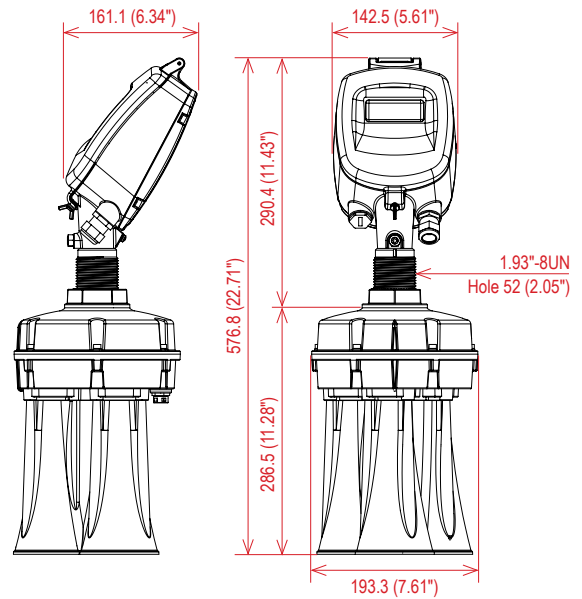


# Dimensions

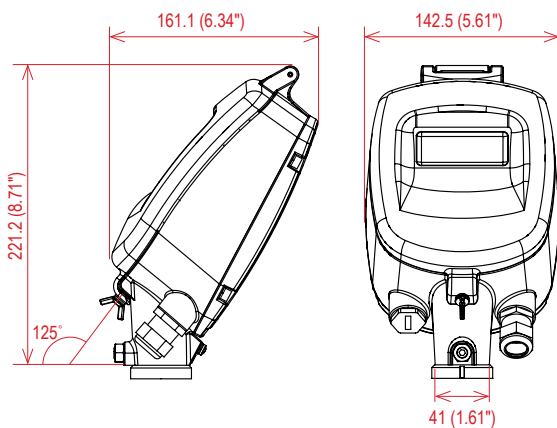
## 3DLevelScanner II with horn antenna in flange version



## 3DLevelScanner II with horn antenna in threaded version



## 3DLevelScanner II Housing



Dimensions in mm (inches)

# Electrical Connection & Wiring



## General Requirements

The power supply range can differ depending on the instrument version. See the Technical Data section for full details.

In hazardous areas, take note of the appropriate regulations, conformity and type of approval certificates of the sensors and power supply units.

## Power Supply

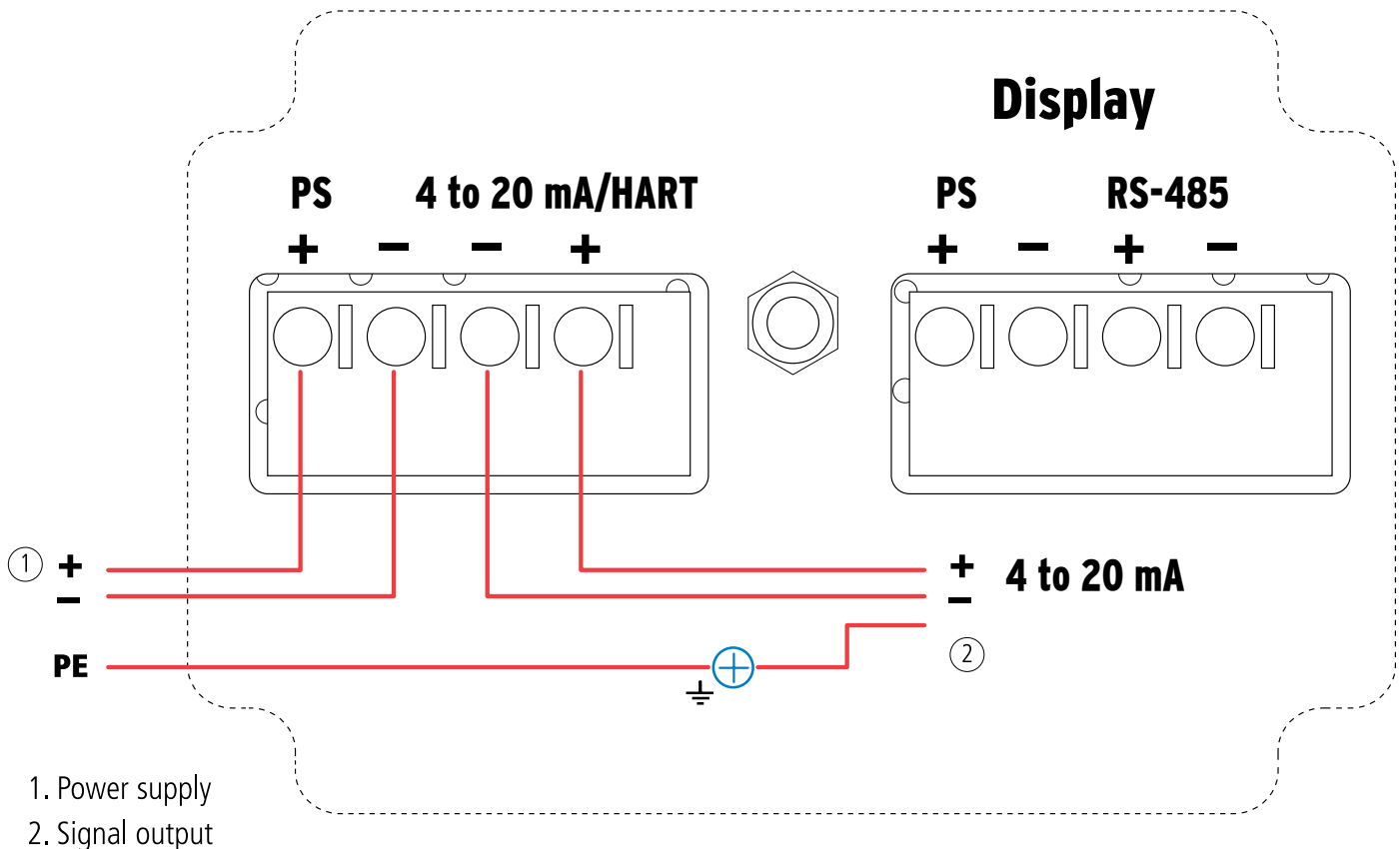
4 - 20 mA/HART 4-wire

Power supply and signal current are carried on two separate connection cables. The output signal is active. Hence, the PLC must be configured passive.

## Connection Cable

An outer cable diameter of 0.31" - 0.47" (8 - 12 mm) ensures the seal effect of the cable entry. If electromagnetic interference is expected, the use of screened cable for the signal lines is recommended.

## Wiring Plans



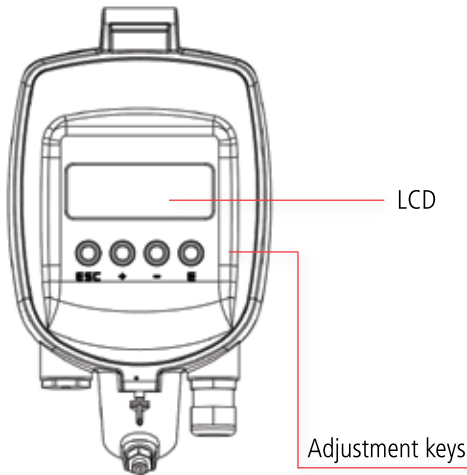
# Operation



The 3DLevelScanner can be set up and operated using one of the following:

- The LCD panel
- HART handheld
- A software tool (3DLevel Manager)

## Adjustment Using the LCD Panel

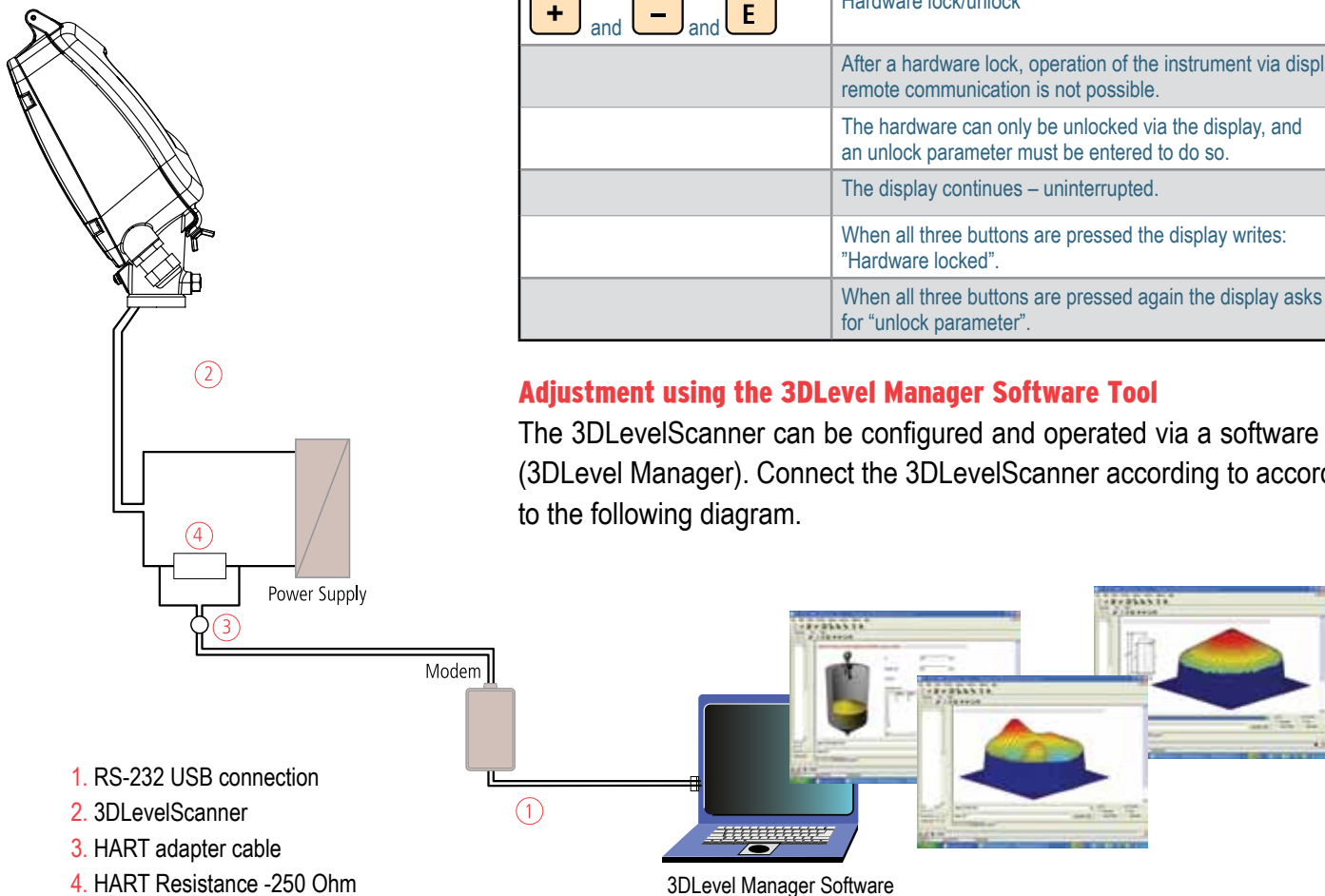


<b>Esc</b>	Navigate to the left within a function group; press ESC for 3 sec to go back to the basic screen
<b>+</b>	Navigate upwards in the selection list; edit numeric value within a function
<b>-</b>	Navigate downwards in the selection list; shifts to the right within a function
<b>E</b>	Navigate to the right within a function group; confirmation
<b>+</b> and <b>E</b>	Increase contrast settings of the LCD
<b>-</b> and <b>E</b>	Decrease contrast settings of the LCD

<b>+</b> and <b>-</b> and <b>E</b>	Hardware lock/unlock
	After a hardware lock, operation of the instrument via display or remote communication is not possible.
	The hardware can only be unlocked via the display, and an unlock parameter must be entered to do so.
	The display continues – uninterrupted.
	When all three buttons are pressed the display writes: "Hardware locked".
	When all three buttons are pressed again the display asks for "unlock parameter".

## Adjustment using the 3DLevel Manager Software Tool

The 3DLevelScanner can be configured and operated via a software tool (3DLevel Manager). Connect the 3DLevelScanner according to the following diagram.



# 3DLevelScanner™

## 3DLevelScanner™

Model	Description	Part No.
3DLS-SB	3DLevelScanner-SB, 20-36 VDC, 4 to 20 mA output/Hart protocol, and RS-485 communications. Determines the average volume of stored materials based on a 30° beam angle in silos up to 14' diameter and 40' tall. Unit comes with internal LCD display and 3DLevel Manager software is included with every unit supplied. Hazardous location approved, FM Listed for Class I, II, Division 1, Groups C, D, E, F & G. One year warranty.	730-0578
3DLS-S	3DLevelScanner-S, 20-36 VDC, 4 to 20 mA output/HART protocol, and RS-485 communications. Determines the average volume of stored materials based on a 30° beam angle in silos up to 14' diameter and 200' tall. Unit comes with internal LCD display and 3DLevel Manager Software is included with every unit supplied. Hazardous location approved, FM Listed for Class I, II, Division 1, Groups C, D, E, F & G. One year warranty.	730-0559
3DLS-M	3DLevelScanner-M, 20-36 VDC, 4 to 20 mA output/Hart protocol, and RS-485 communications. Accurate readings of level and volume of stored materials based on a 70° beam angle. Wider beam angle is appropriate for silos up to 45' in diameter and 200' tall, and where improved accuracy in smaller silos is required. Unit comes with internal LCD display and 3DLevel Manager Software is included with every unit supplied. Hazardous location approved, FM Listed for Class I, II, Division 1, Groups C, D, E, F & G. One year warranty.	730-0560
3DLS-MV	3DLevelScanner-MV, 20-36 VDC, 4 to 20 mA output/Hart protocol, and RS-485 communications. Accurate readings of level and volume of stored materials based on a 70° beam angle. Wider beam angle is appropriate for silos up to 45' in diameter and 220' tall, and where improved accuracy in smaller silos is required. Identical to the Model 3DLS-M, with the addition of a special tool that allows 3D graphical representation of the stored contents for display on a remote computer screen. Unit comes with internal LCD display and 3DLevel Manager Software is included with every unit supplied. Hazardous location approved, FM Listed for Class I, II, Division 1, Groups C, D, E, F & G. One year warranty.	730-0561

**Note:** Models 3DLS-S, 3DLS-M, and 3DLS-MV can be used on silos with a larger diameter than specified, but with decreased accuracies given that the beam angle will not span the entire surface of the material. For a very accurate reading of volume and 3D profiling, it is necessary to stay within the specified diameter and silo heights.

## 3DLinkPro

Model	Description	Part No.
3DLP-R-GSM	BinMaster Remote 3DLinkPro with GPRS Cellular Modem.	730-0562

**Contact BinMaster for mounting plates, wireless transceiver and other accessories.**

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