3DLevelScanner

APM

Changing the market from level to volume

Technical Data Sheet

APM`s 3DLevelScanner™ incorporates advanced technology for accurately measuring bulk solids and powder stored in silos and open bins of all types.

Overview

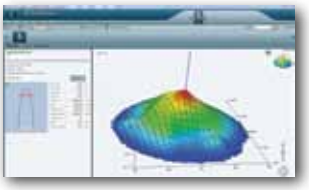
Theory Of Operation

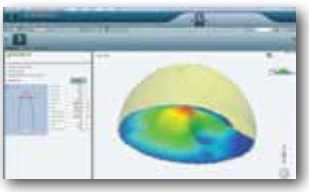
The APM 3DLevelScanner is the only device presently available that delivers accurate measurement of bulk solids and powders - regardless of the type of material or product characteristics, type and size of storage silo, bin or container, and harshness of the storage environment.

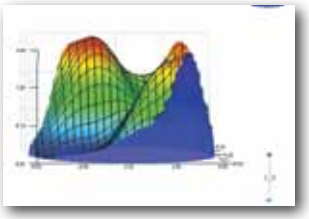
The 3DLevelScanner employs an array of three antennas to transmit low frequency pulses and to receive echoes of the pulses from the contents of the silo, bin or other container. Using three antennas the unit measures not only the time/distance of each echo but also its direction. The device`s Digital Signal Processor samples and analyzes the received signals to provide very accurate measurements of the level and volume of the stored contents, and generates a 3D representation of actual allocation of product within the container for display on remote computer screens. It incorporates APM`s unique dust-penetrating technology to achieve an unrivalled degree of process measurement and inventory control.

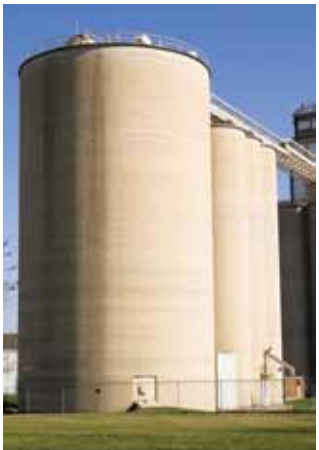
3D Mapping

- This unique device measures practically any kind of material stored in a large variety of containers, including silos, large open bins, bulk solid storage rooms, stockpiles and warehouses. It maps build-up loads and other irregularities that randomly form over time, offering solutions for this and many other previously inaccessible challenging applications.
- 3D representation of the stored contents for display on a remote computer screen.









Key Specifications

Preferred application:	Solids
Measuring range:	70 m (230 ft)
Process fitting:	Thread, Flange, Angel Adaptor
Process temperatures:	–40...+180°C (–40...+350°F)
Process pressure:	–0.2...3 bar (–2.9...43.5 Psi)
Communication:	Active 4...20mA/HART/RS485/Modbus
Emitting frequency:	2 KHz to 10 KHz

Technical Data

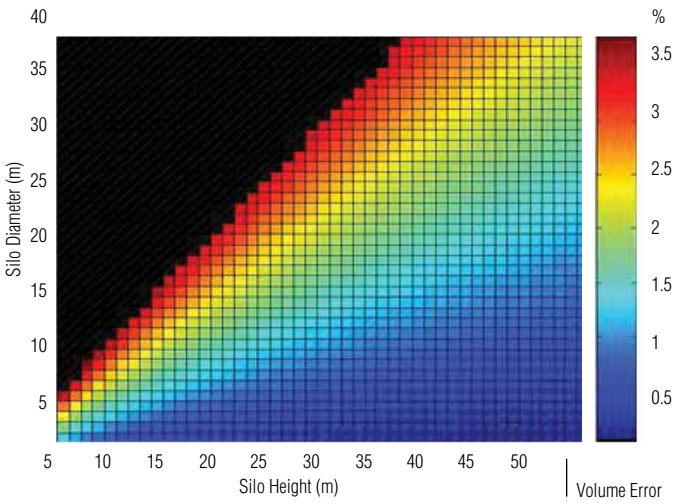
Materials, non-wetted parts		
Housing		Painted aluminum die casting
Inspection window in housing		Polycarbonate
Antenna		Painted aluminum die casting / ETFE
Weight		
3DLevelScanner		5.6 Kg (12.35 lb)
Output variable		
Output signal		Active 4...20mA/HART/RS485/Modbus
Resolution		10 µA
Fault signal		Current output unchanged, 22 mA, >3.6 mA (adjustable)
Current limitation		22 mA
Maximal Load		400 Ohm
Communication		
Type		RS485/Modbus/HART
Ambient conditions		
Ambient, storage and transport temperature		-40...85°C (-40...+185°F)
Process conditions		
Vessel pressure		-0.2...3 bar (-2.9...43.5 PSI)
Process temperature		
Measured on the process fitting		-40...+180°C (-40...+350°F)
Vibration resistance		Mechanical vibrations with 2g and 5...200 Hz
Electromechanical data		
Cable entry/plug		1 x M20x1.5 (cable-Ø 8...12mm), 1 x blind stopper M20x1.5
	Or	2 x cable entry ½" NPT
Display panel		
LCD		4 lines x 20 characters
Adjustment elements		4 keys

Technical Data

Power supply – 4-wire instrument (Active) 4...20 mA / HART	
Supply voltage	18...32 VDC
Power consumption	max 1.5 W @ 24VDC
Electrical protective measures	
Protection	IP67 according to IEC 60529
Approvals	
ATEX	ATEX II 1/2D, 2D, Ex ibD/iaD 20/21 T110˚C
	ATEX II 2G Ex ia/ib IIB T4
cFMus	cFMus Intrinsically Safe CL I,II, DIV I, GP CDEFG
NEPSI	II 2G Ex ia/ib IIB T4
	II 1/2D Ex ibD/iaD 20/21 T110°C
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
Measurement characteristics	
Frequency	2 KHz to 10 KHz
Beam angle	30 - 70 degrees

Accuracy

Volume Accuracy - 3DLevelScanner II M/MV



Test Case:

Silo dimensions:

Diameter = 10m, height = 20m

The material is cone sloped with 45°

Accuracy tolerance less than 3%

Electrical Connection

General Requirements

In hazardous areas you should take note of the appropriate regulations, conformity and type of approval certificates of the sensors and power supply units.
When multiple scanners and/or 3DLinkPro are connected with the same power supply, the total power consumption should be taken into account.

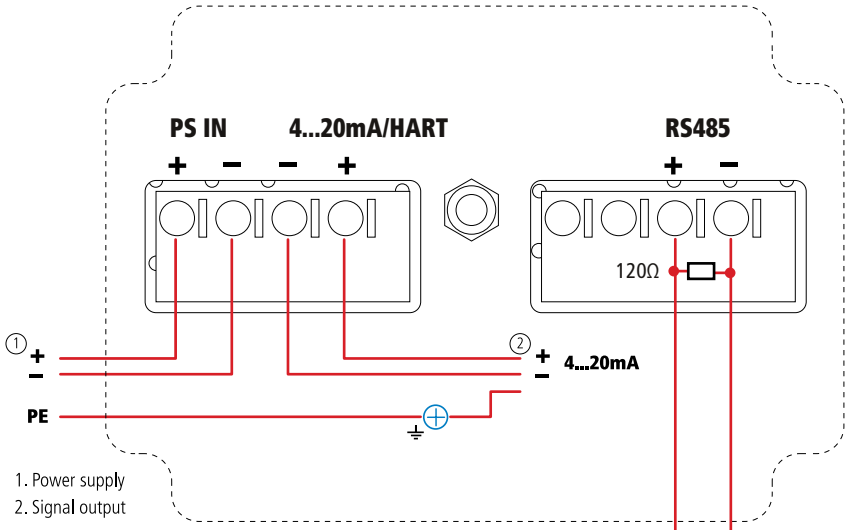
4...20 mA/HART 4-wire

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

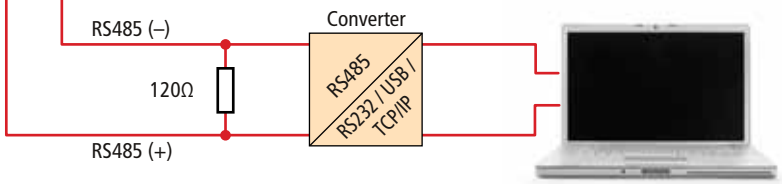
RS485 cables should be shielded, twisted pair with 120 Ohm impedance, terminated by 120 Ohm resistors on both ends.
Avoid star topology wiring when connecting multiple scanners with on RS485 bus.
An outer cable diameter of 8 ...12 mm ensures the seal effect of the cable entry. If electromagnetic interference is expected, we recommend the use of screened cable for the signal lines.

Wiring Plans



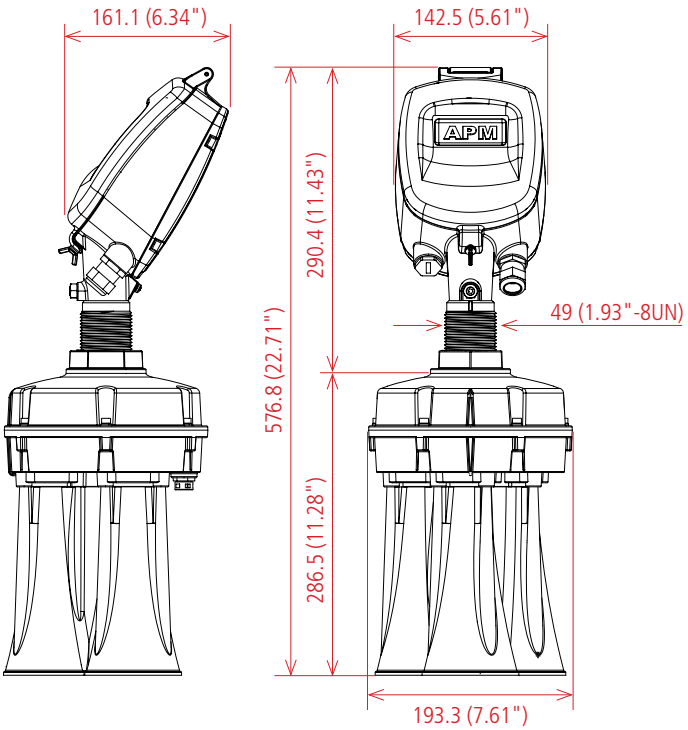
Adjustments using the 3DLevelManager Software Tool

The 3DLevelScanner can be configured and operated via APM's software tool (3DLevelManager). Connect the 3DLevelScanner according to the above diagram.

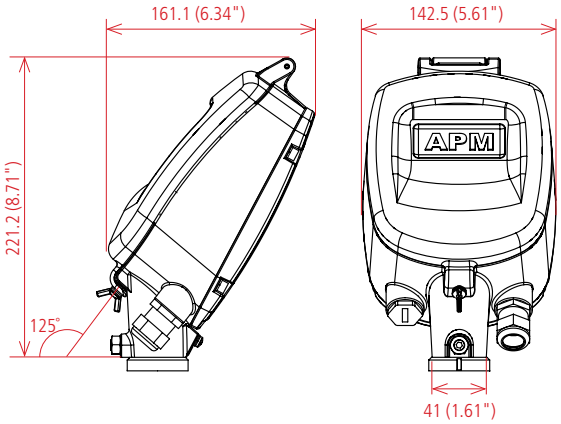


Dimensions

3DLevelScanner
with horn antenna in threaded version

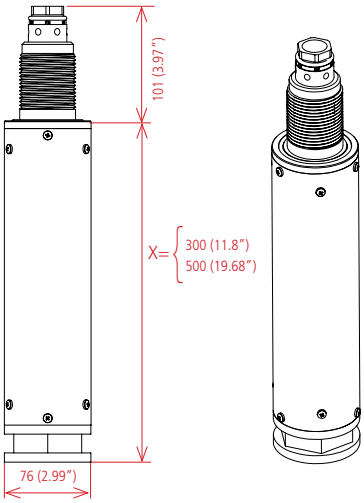


3DLevelScanner
Housing

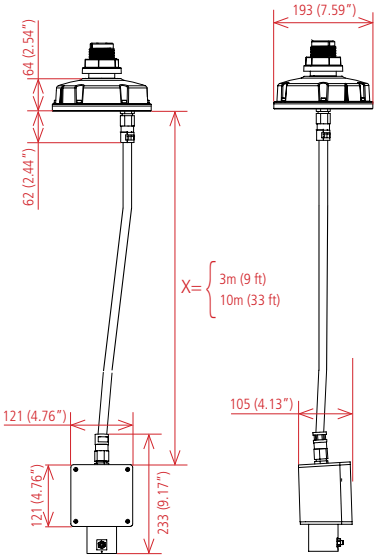


Accesories

Neck Extension

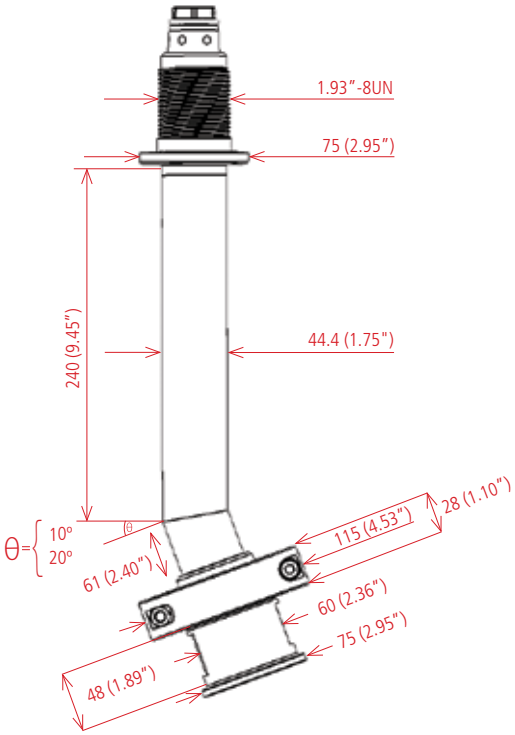


Head Body Separation Kit

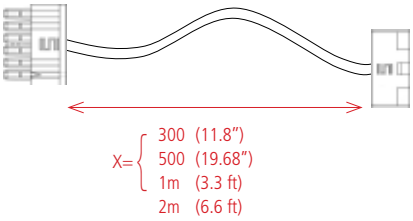


Dimensions in mm (inch)

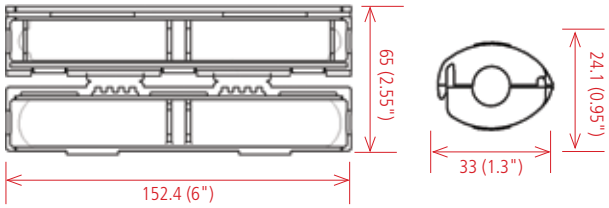
Angle Adaptor



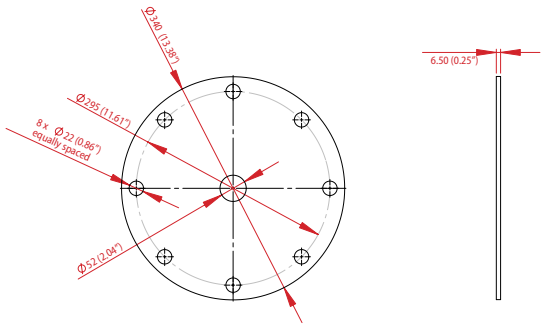
Cable Extention (for T0 only)



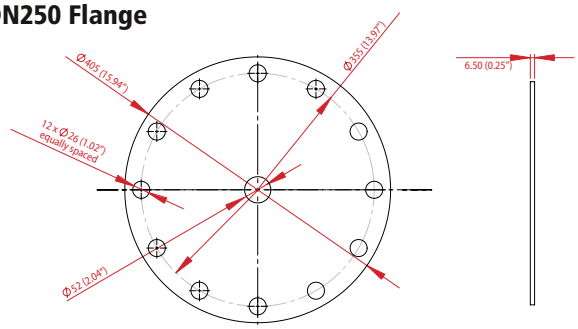
Cable Extention Conector



DN200 Flange



DN250 Flange



Dimensions in mm (inch)

3DLevelScanner

Type
S – For solid applications
M – For solid applications with mapping capabilities
MV – For solid applications with mapping capabilities and visualization graphics tool

Approvals
XX – Without

DX
- ATEX II 1/2D, 2D, Ex ibD/iaD 20/21 T110˚C
- ATEX II 2G Ex ia/ib IIB T4
- cFMus Intrinsically Safe CL I,II, DIV I, GP CDEFG
- NEPSI II 2G Ex ia/ib IIB T4
- NEPSI II 1/2D Ex ibD/iaD 20/21 T110°C

Material / Finish
B – With horn antenna @195mm/ALU
C – With horn antenna @195mm/ALU Teflon Coated

Process connection
GD – Thread 1.93" - 8 UN

Electronics
V – 4 ...20mA/HART – 4-wire/RS485/Modbus

Cable entry
M – M20x1.5 / 1/2" NPT

Temperature
T0 – Standard Version Suitable For 85°C (185°F)
T3 – Suitable For 180°C (356°F)
T3C – Suitable For 180°C (356°F) Including Extended Cable L=30Cm (11.8")
T3D – Suitable For 180°C (356°F) Including Extended Cable L=50Cm (19.7")

3DLevelScanner						

Represented by

APM Automation Solutions Ltd.
www.apm-solutions.com | info@apm-solutions.com

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