DATUM U110 & U111

Ultrasonic Level System

Specification DataFile

- **6-digit backlit l.c.d. and bargraph**
  – clear display of measured level
- **Echo Processing using 'DATEM' software**
  – true level measurement, overcoming obstructions in your tank
- **10 pre-programmed tank shapes**
  – easy to configure for volumetric level, menu driven
- **Isolated analog output and five alarm relays**
  – extras built-in as standard
- **High accuracy and resolution**
  – measurement accuracy 6mm (0.24 in.) or 0.25% of measurement range
  – with resolution to 2mm (0.08 in.) or 0.1% of measured range
- **Wall-mounted, IP65 enclosure**
  – ideal for wet and hose-down areas
- **Configurable via a PC**
  – RS232 port for connection to PC Configurator
- **Temperature compensation as standard**
  – for improved accuracy with varying temperatures
- **Auxiliary analog input**
  – additional input for alternative measurement device



DATUM U110 – the only ultrasonic level system you will need

Datum U110 Ultrasonic Level System

The **DATUM U110** system provides non-contacting, maintenance-free level control and indication in liquids, slurry and solids.

The DATUM U110 is the most versatile ultrasonic level measurement system available. It can be used in the diverse level measurement applications found in food, chemical, pharmaceutical, quarrying, power generation and many more industries.

The unit has been designed for **'fit and forget'** performance in **advanced measurement and control routines** (which include volume conversion with pre-programmed tank shapes).



- 10 Pre-programmed Tank Shapes
- 32-point Custom Linearizer
- Multiple Alarm Functions
- Fill and Empty Control

DATUM Ultrasonic Sensor
Safe Area
- Zones 1 and 2 (U110)
- Zone 0 (U111)

Backlit LCD
- 6-digit + Text
- Bargraph
- Alarm Indication
- Configuration Flag



3 x 5A Control Relays – U111
5 x 5A Control Relays – U110

- Auxillary Input
- 2-wire Transmitter

4 to 20mA
Isolated Retransmission

- RS 232
- PC Configuration
- Infrared Remote Configurator

Sensor Choice to Suit Application

Any transducer from the DATUM range can be connected to the DATUM U110 System to meet the needs of diverse applications in different industries.

The level controller,which must be mounted in a safe area, is available with transducers suitable for mounting in flammable atmospheres:
DATUM U110 is suitable for Zone 1 and Zone 2 (EEX m); DATUM U111 extends the capability to Zone 0 (EEx ia).

Display

A high-clarity back-lit l.c.d. is fitted as standard. This has a 6-digit level indicator, a 12-character text display and a bargraph with direction indicators. The clarity of the display makes reading the level easy and setup from the front of the unit is very simple using the integral keyboard.



Isolated Outputs

The DATUM U110/U111 is fitted as standard with an analog output (either 4 to 20mA or 0 to 20mA) and a full duplex RS232 digital output for PC configuration. The U111 has 3 and the U110 has 5 form 'C' (SPDT) volt-free contacts rated 5A at 240V a.c.

Echo Processing

The DATUM U110 utilizes in-built 'DATEM' technology (Digital Adaptive Tracking and Echo Mapping). This technology has been developed to give the DATUM range the advantage when identifying the 'true target level' where there are obstructions in whatever vessel you are measuring.

Hot Keys

There are 3 'Hot Keys' on the keypad which are used to view parameters (e.g. pump usage, signal strength) quickly whilst in the run mode. This also enables an operator or engineer to display the level in different units.

- Echo confidence/echo strength/average noise/ peak noise
- Instantaneous mA output
- Space/level/distance/rate of change of level

Alarm Functions

A number of standard alarm functions are included to simplify control of your plant and tell you when a problem has occurred.

- High or Low level
- In or Out of band
- Rate of Filling or Emptying
- High or Low Temperature
- System Failed
- Fill and Empty control (initiation and switch off)

High Accuracy

A small blocking distance of only 300mm (11.8 in.) and a narrow beam angle of 10°, give an **overall accuracy** of:

0.25% of measured range
or 6mm (0.24 in.), whichever is the greater

and a **resolution** of:

0.1% of measured range
or 2mm (0.08 in.), whichever is the greater

Volumetric Conversion

Conversion of level measurements into volumes is achieved using one of 10 pre-programmed standard tank shapes or a user-defined shape created with the in-built 32-point custom linearizer.

If you have different tanks on site you still only need to keep one unit as a spare.

Configuration

The DATUM U110 can be configured in one of three ways:

- the front panel via the integral keypad
- an external infrared communicator
- via a PC using the RS232 port

All settings are password protected to prevent tampering.



Auxiliary Input

A second analog input is available for connection to other external 4 to 20mA devices, enabling the DATUM U110/U111 to work with other 2-wire level transmitters.

Built to Last

The **wall-mounting** version, protected to IP65 (NEMA3) as standard, is housed in a tough, polycarbonate, flame resistant case making it ideally suitable for use in harsh industrial environments.

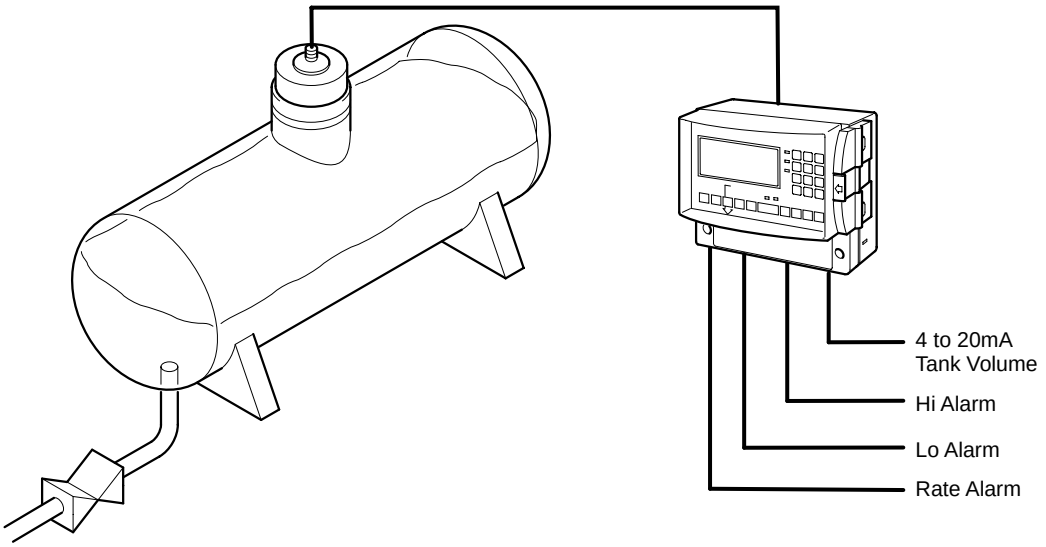
Temperature Compensation

As the temperature of surrounding air varies, its density also changes. Once a system is calibrated, any variation in air density also affects its accuracy. The transducer, with integral temperature compensation, takes these changes into account and modifies the calibration automatically.

Power Supply

The unit can be supplied suitable for either a 115V or 230V a.c. 50/60Hz power supply. As standard, a battery back-up facility is built-in to allow the unit to continue to operate in the event of a mains supply failure.

Applications



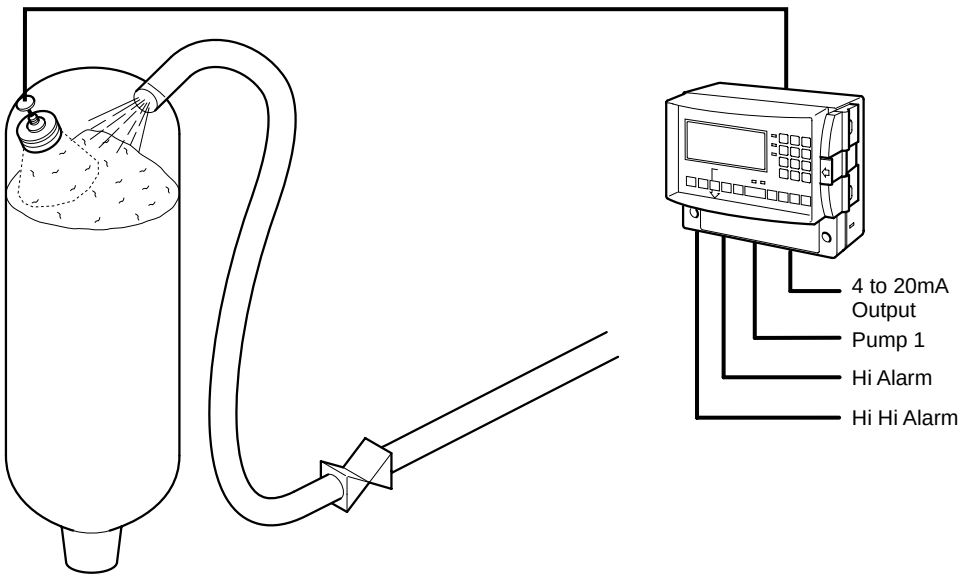
The measurement of level in a tank can be one of the simplest applications (e.g. water in a vertical tank) or one of the most difficult (e.g. granules in a tank with cross struts).

These applications are found in diverse industries such as solids manufacturing, pharmaceuticals and food & beverage.

The DATUM U110 has been designed to work in any of these applications and can be used for simple indication of tank level or volume. The in-built conversion software with 10 standard tank shapes makes setup quick and easy for almost any application. A 32-point linearizer for complex tank shapes is also included.

Five alarm relays are provided as standard to advise the operator of any problems with the process, together with a retransmission signal for connection to a supervisory system.

Application 1 – Tank Level



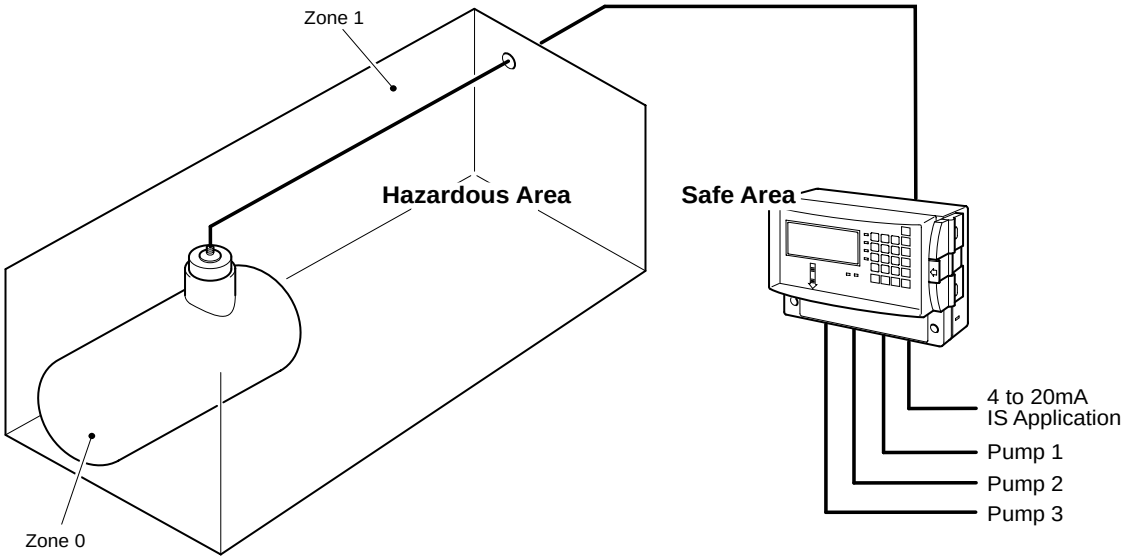
In all types of industry, from pharmaceutical to agriculture, measurement of solids (e.g. pellets or grain) in storage silos is necessary.

With these types of application, the accuracy and repeatability of the measurement can be affected by dust in the atmosphere. Furthermore, the surface of the material is not normally level.

The narrow beam angle and optional beam aiming kit enable the DATUM U110 to target an average point in the vessel and measure this point with excellent repeatability.

Application 2 – Solids Measurement in Storage Silo

…Applications

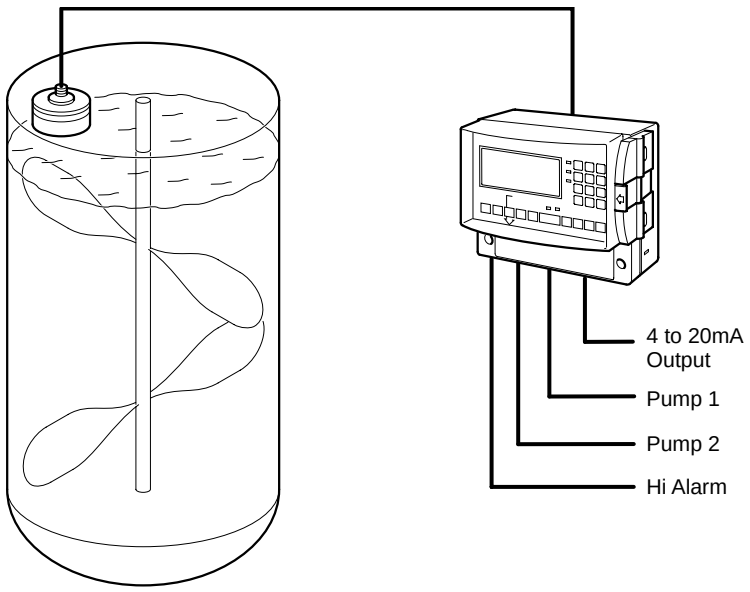


The DATUM U110 & U111 are designed for use in hazardous areas; U110 in Zone 1 / Zone 2 (EEX m) and U111 in Zone 0 (EEx ia). As standard, the sensors are certified and there is no need for external barriers – just order the control unit relevant to your safe area.

This makes the DATUM U110/U111 ideal for use in Pharmaceutical and Chemical plants.

No special cables are required (a standard twin-screened cable can be used) thereby reducing installation costs.

Application 3 – IS Application



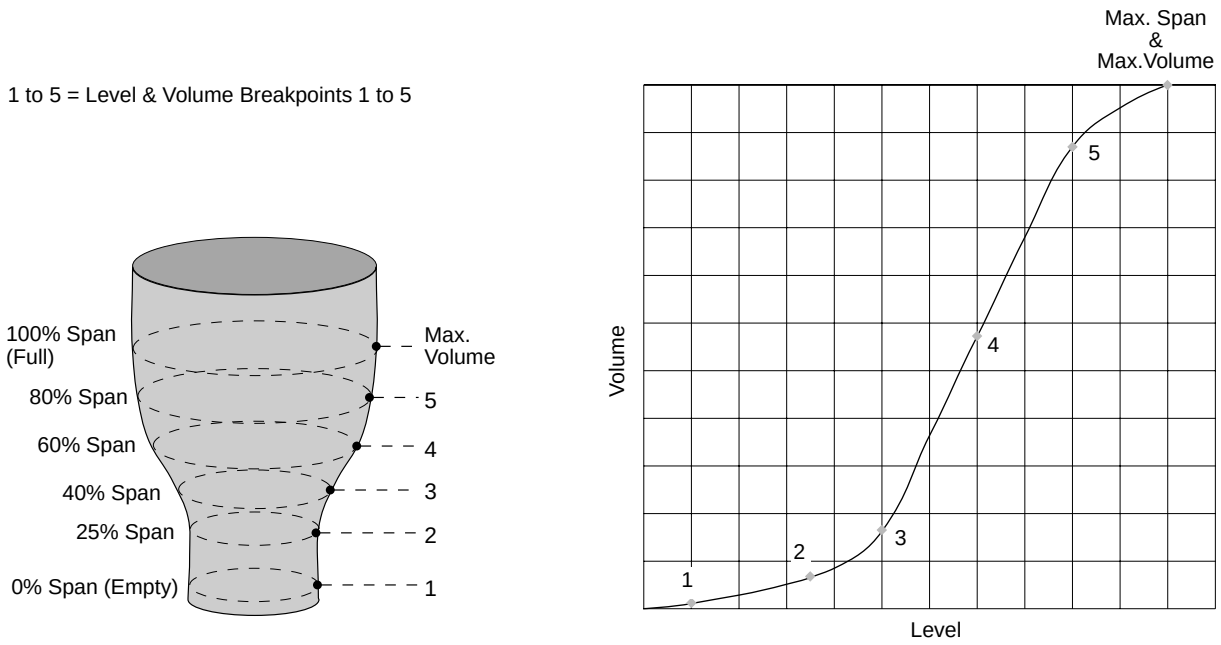
In many applications, the use of stirrers is very common when mixing product in batches. These stirrers can cause ordinary ultrasonic units to give false readings.

The DATUM U110 incorporates the 'DATEM' software which can map the profile of the tank and blank out any false echoes created by the stirrer or other pipework.

Even the noise created by the filling process can be blanked-out, ensuring the operation of the DATUM U110 is not affected.

Application 4 – Mixing

…Applications



The level measurement is converted to volume using one of the 10 pre-programmed standard shapes. However, in some industries, different tanks have been designed for specific applications and these tanks are not included in the standard shapes.

To overcome this problem, the DATUM U110 has a 32-point linearizer which allows the profile of the tank to be entered so that the volume of the tank can still be calculated.

No matter what your requirements, the DATUM 110 has the solution.

Application 5 – Non-standard Tank Shapes

Specification

Performance

Accuracy
0.25% of measured range or 6mm (0.24 in.), whichever is greater

Resolution
0.1% of measured range or 2mm (0.08 in.), whichever is greater

Max. range
6m (19.5 ft) (dB6 transducers),
10m (32.5 ft) (dB10 transducer),
15m (48.75 ft) (dB15 transducers)

Min. range
Dependent on transducer

Reading response
Fully adjustable

Echo Processing

'DATEM' (digital adaptive tracking of echo movement)

Outputs

Analog output
Isolated output of 4 to 20mA or 0 to 20mA into 500Ω (user programmable and adjustable) 0.1% resolution

Digital output
Full duplex RS232

Volt-free contacts

Number	U110 – 5 form 'C' (SPDT)
	U111 – 3 form 'C' (SPDT)
Rating	5A at 240V a.c.

Display
6 digits plus 12-character text, plus bargraph with direction indicators, remote communication identifier and program/run/test mode indicators

Analog Input

0 to 20 or 4 to 20mA for pressure sensor, velocity sensor

Programming

Remote
By optional infrared communicator

On-board
By integral keypad (Wall- or Fascia-mounting)

PC programming
Via RS232 port

Programming security
Via password (user-selectable and adjustable)

Programmed data integrity
Via non-volatile RAM, plus backup

Power supply

18 to 36V d.c. included as standard with either
115V a.c. +5%, –10%, 50/60Hz
or
230V a.c. +5%, –10%, 50/60Hz

Physical

Overall dimensions (wall-mounting version)
240 x 185 x 120mm (9.5 x 7.3 x 4.7 in.)

Weight
Nominal 1kg (2.2 lb)

Case material/description
Polycarbonate, frame resistant to UL91 (Wall-mounting)

Transducer cable requirements

Standard version:	Twin-screened
IS Version:	3-core screened

Maximum separation
500m

Cable entry detail

Standard version
Cable entry 'knock-outs', 2 x PG11, 1 x PG9,
1 x M20 underside, 4 x PG11 at rear

IS Version
11 cable entry 'knock-outs', 4 x PG11, 1 x PG9,
1 x 13.5 underside, 5 x PG11 at rear

Environmental

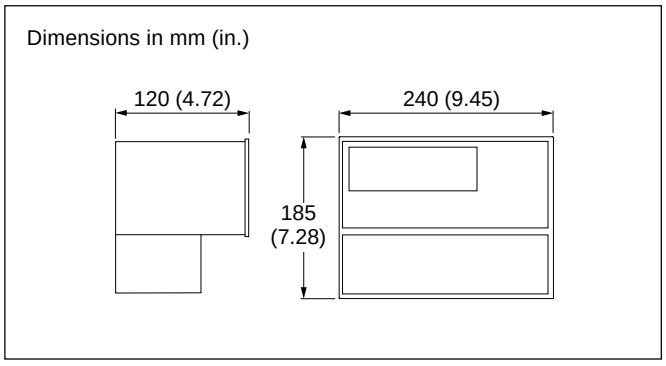
IP rating (wall-mounting version)
IP65

Max. & min. temperature (electronics)
–20° to 60°C (–4° to 140°F)

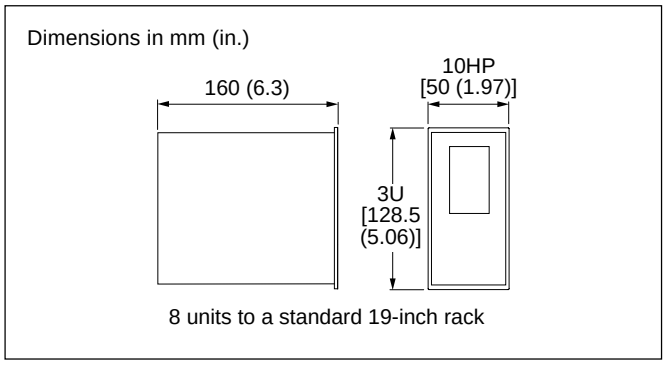
Flammable atmosphere approval
Safe area: compatible with approved dB transducers
(see Transducer specification sheet, SS/USONIC)

CE approval
EMC approval to BS EN 50081-1:1992 for emissions
BS EN50082-2:1995 for immunity
BS EN61010-1:1993 for low-voltage directive

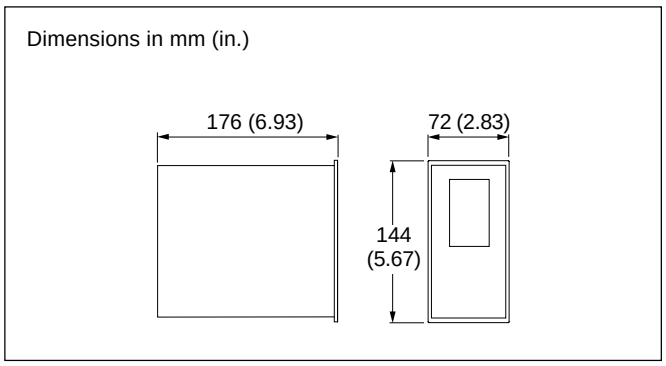
Overall Dimensions



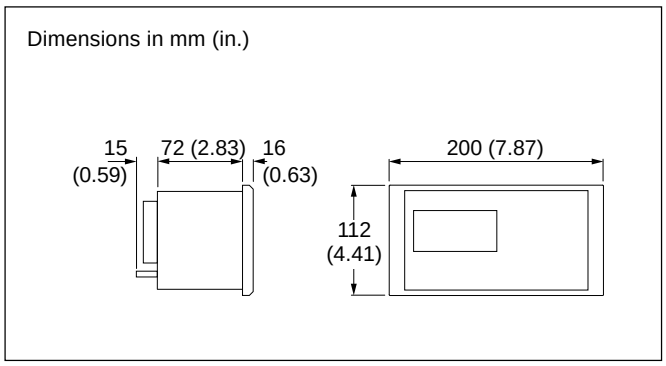
Wall-mounting Version



Rack-mounting Version



Panel-mounting Version



Fascia-mounting Version

Ordering Information

Transducer Code – see SS/USONIC for further information

DATUM U11X Series Ultrasonic Level System	**UF/P**	**0 0 0 0 0 0 0 0 0 0 0 0**	**U11**	**X**	**X**	**X**	**X**	**X**	**X**
Build									
Standard Version				0					
I.S. Version				1					
Mounting*									
None					0				
Wall-mounting					1				
Panel-mounting					2				
Rack-mounting					3				
Fascia-mounting					4				
Case Style									
Rack						0			
IP65 (Wall-mounting only)						1			
Standard (Panel-mounting only)						2			
IP65 (Panel-mounting only)						3			
IP64 (Fascia-mounting only)						4			
Keypad									
None							0		
Yes (Wall-/Fascia-mounting only)							1		
Power Supply									
230V, 50/60Hz								0	
115V, 50/60Hz								1	
Accessories									
None									0
Communicator – Infrared Remote Control									1

***Note**. The U111 is only available in a Wall-mounting format.

The Company's policy is one of continuous product improvement and the right is reserved to modify the information contained herein without notice.

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