DATUM U120

Advanced Pump & Level Control System

Specification DataFile

- ■ **Advanced pump control strategies**
  - – menu driven, makes optimization of your pumps quick and easy

- ■ **6-digit backlit l.c.d. and bargraph**
  - – clear display of the measured level

- ■ **Echo Processing using 'DATEM' software**
  - – true level measurement, overcoming obstructions in your well or tank

- ■ **Differential level measurement**
  - – dedicated for measurement across screens or filters

- ■ **Logging of pump usage**
  - – ideal for planned maintenance and pump cycling

- ■ **Isolated analog output and five alarm relays as standard**
  - – extras built-in as standard

- ■ **High accuracy and resolution**
  - – measurement accuracy 6mm (0.24 in.) or 0.25% of measured range
  - – with resolution to 2mm (0.08 in.) or 0.1% of measured range

- ■ **Wall-mounting 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 continued accuracy with varying temperatures

DATUM U120 –
taking control to a new level

ABB
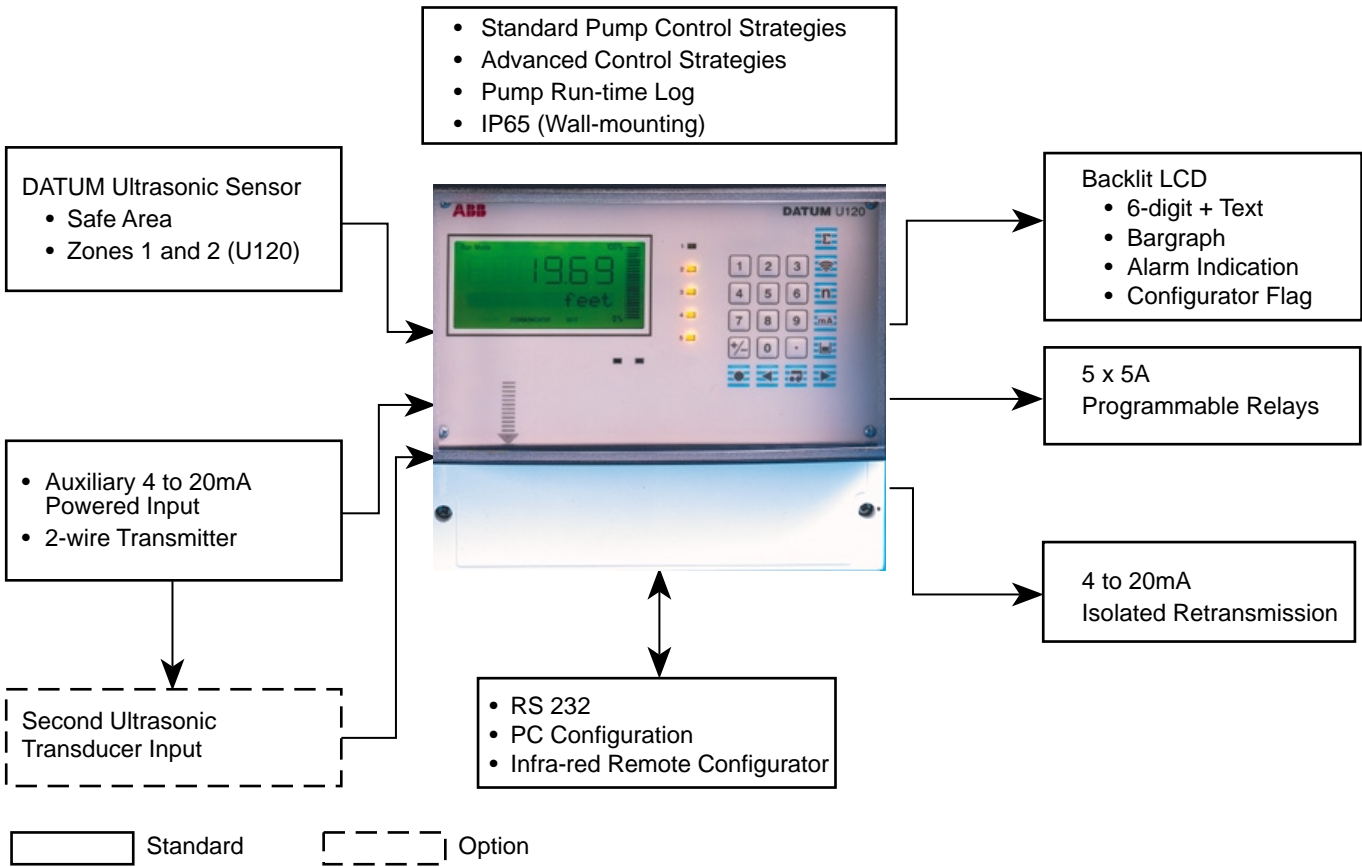
DATUM U120
Advanced Pump & Level Control System

The **DATUM U120** Level & Pump Controller provides non-contacting, **maintenance-free** level control and indication in liquid and slurry applications.

As a **dedicated control** unit it offers a wide range of extra features such as a **pump usage log**, **pump optimization strategies** and the ability to vary pump **duty and standby** cycles.

The unit has been designed for maintenance-free **'fit and forget'** performance in applications where its advanced control routines, which include **differential** and **penstock** control, provide real end-user benefits.

Five user-definable relay set points ensure maximum versatility.

- Standard Pump Control Strategies
- Advanced Control Strategies
- Pump Run-time Log
- IP65 (Wall-mounting)

DATUM Ultrasonic Sensor
- Safe Area
- Zones 1 and 2 (U120)

- Auxiliary 4 to 20mA Powered Input
- 2-wire Transmitter

Second Ultrasonic Transducer Input

- RS 232
- PC Configuration
- Infra-red Remote Configurator

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

5 x 5A Programmable Relays

4 to 20mA Isolated Retransmission

Standard ☐   Option ⌐ ─ ─ ┐

Sensor Choice to Suit Application

Any transducer from the DATUM range can be connected to the DATUM U120 in order to meet the needs of diverse applications and different industries. The DATUM U120 is also available with transducers suitable for mounting in flammable atmospheres. DATUM U120 is suitable for Zone 1 and Zone 2 applications (EEX m).

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 U120 is fitted, as standard, with an analog output (either 4 to 20mA or 0 to 20mA), five form 'C' (SPDT) volt-free contacts rated 5A at 240V a.c. and a full duplex RS232 digital output for PC configuration.

Echo Processing

The DATUM U120 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.

Pump Control

Up to 9 different pumping strategies are available to simplify control of your plant:
- Fixed duty assist
- Fixed duty back-up
- Alternate duty assist
- Alternate duty back-up
- Duty back-up and assist
- Two-pump set
- Service ratio duty assist
- Service ratio duty back-up
- FOFO (alternate First-On-First-Off) duty assist

Alarm Functions

A number of standard alarm functions are included to 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)
- Temperature
- Low voltage supply

Specialist Pump Control Features

As well as normal pump control optimization, the unit also has the ability to control pumps based on time. For example: for cleaner wells, allow a pump to run-on for a fixed time after the level has passed the 'off' point; power-on delay to stop relay switching after power failure; pump start delay to stop pumps switching 'on' too quickly; pump exercising to switch on pumps after a period of idle time.

The DATUM U120 can also identify storm conditions for which it has predefined pump regimes. You can also vary the set point to stop build-up of material on the walls (e.g. soap and fats). It also includes aeration control to automatically set a pump to inject air into a wet-well to maintain the oxygen level.

Data Logging of Pump Activity

The unit logs the number of hours a pump has been running, the number of starts each pump has had, the number of individual pump 'run-on's' and the minimum and maximum temperature recorded at the point of level measurement on site.

This makes the DATUM U120 ideal for planned maintenance of pumps, making pump-cycling decisions easy.

High Accuracy

A small blocking distance of 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

Hot Keys

There are 4 'Hot Keys' on the keypad which are used to view parameters quickly (e.g. pump usage, signal strength) 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/transducer temperature

- Instantaneous mA output

- Space/level/distance/rate of change of level

- The number of starts and the number of hours run for each pump

Auxiliary Input

A second analog input is available for connection to other external 4 to 20mA devices, enabling the DATUM U120 to work with other 2-wire transmitters for level or pressure measurement.

Configuration

The DATUM U120 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.

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.
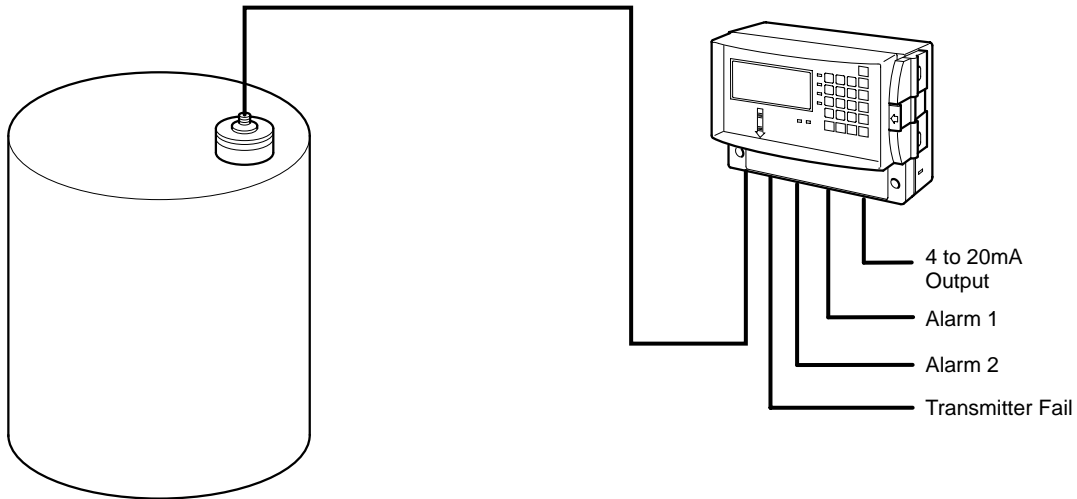
Temperature Compensation

As the temperature of surrounding air varies, its density also changes. Once a system is calibrated, any variations 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 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

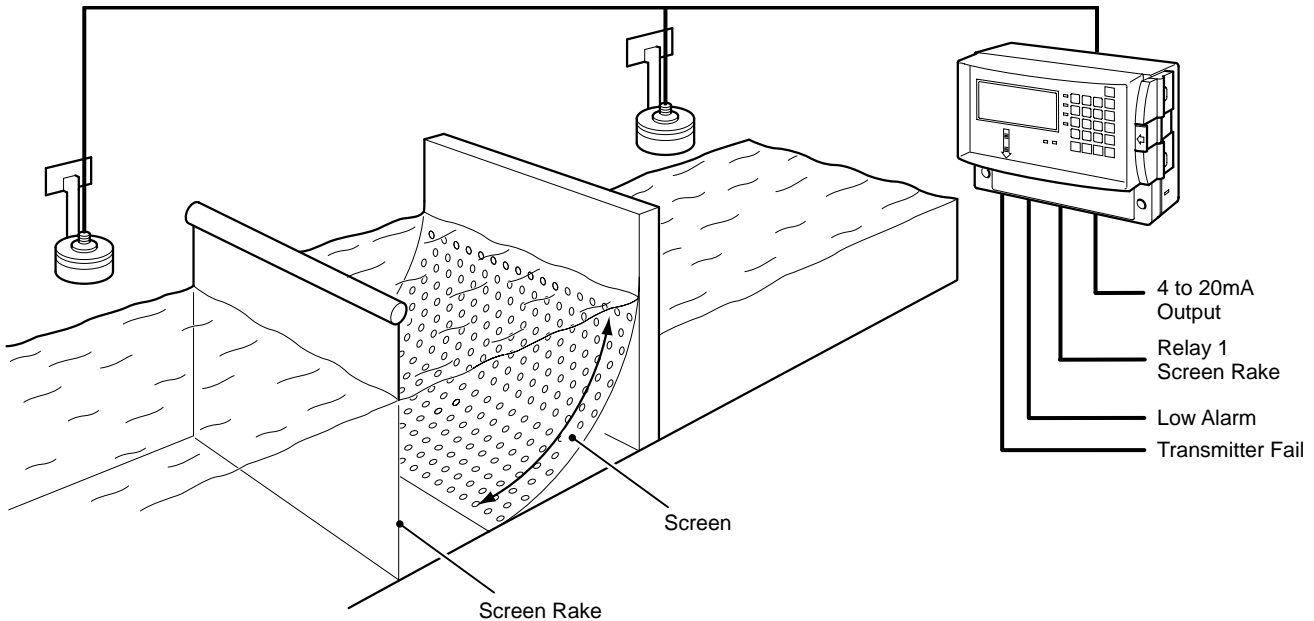4 to 20mA
Output

Alarm 1

Alarm 2

Transmitter Fail

The control 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. deep narrow wetwells with crowded areas of pipes, ladders or other obstructions).

These applications are found in diverse industries including general manufacturing, water & waste, pharmaceuticals and food & beverage.

The DATUM U120 has been designed to work in any of these applications. In-built pump cycling software and datalogging of individual running times and usage enable simple low-cost pump control of up to five separate pumps. For more complex applications the 'DATEM' software can be used to remove false echoes from pipes or reflective surfaces.

Application 1 – Tank Level

4 to 20mA
Output

Relay 1
Screen Rake

Low Alarm

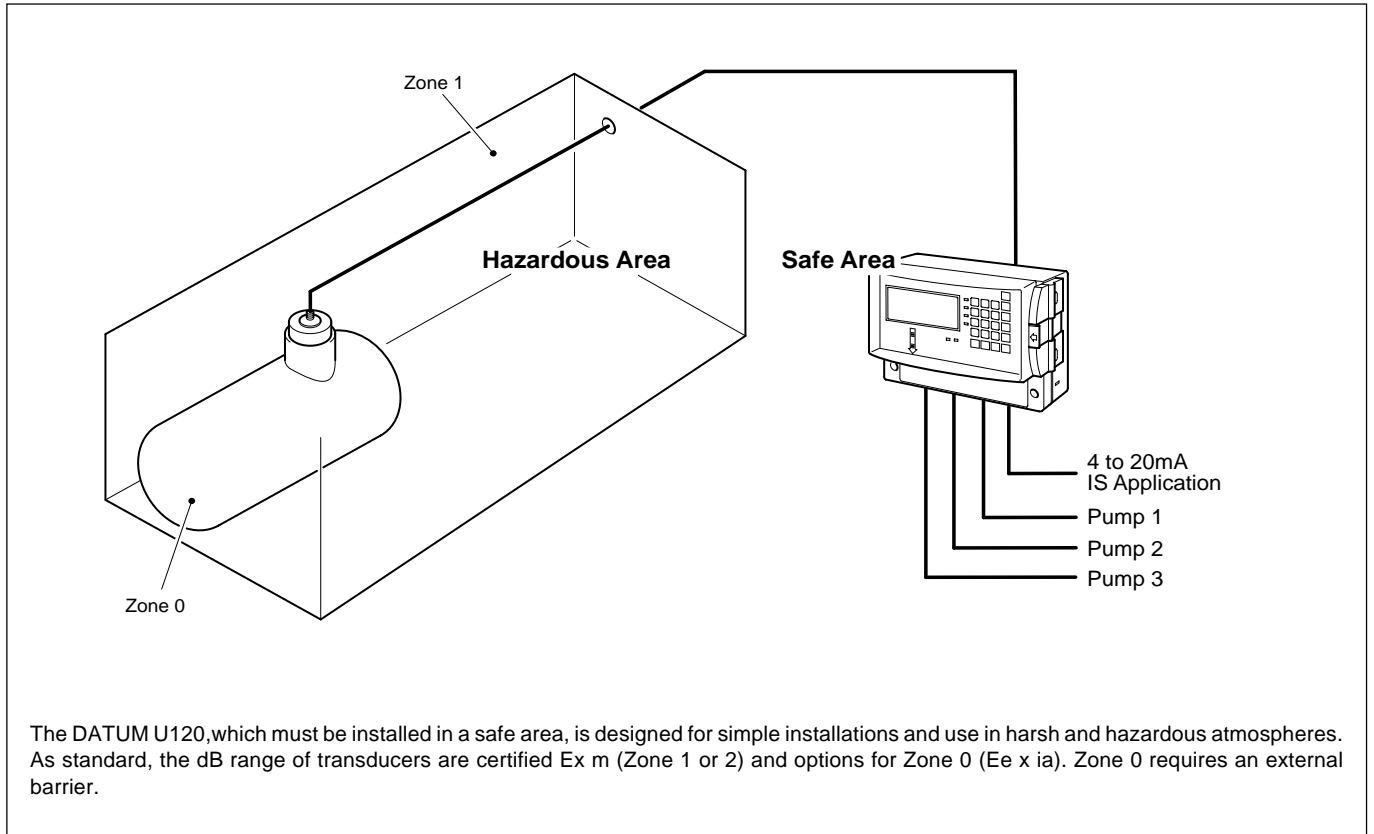Transmitter Fail

Screen

Screen Rake

A common requirement in treatment works is to measure the difference in level across the inlet filter, or screen, and use the measurement to activate the screen rake to clean the filter/screen.
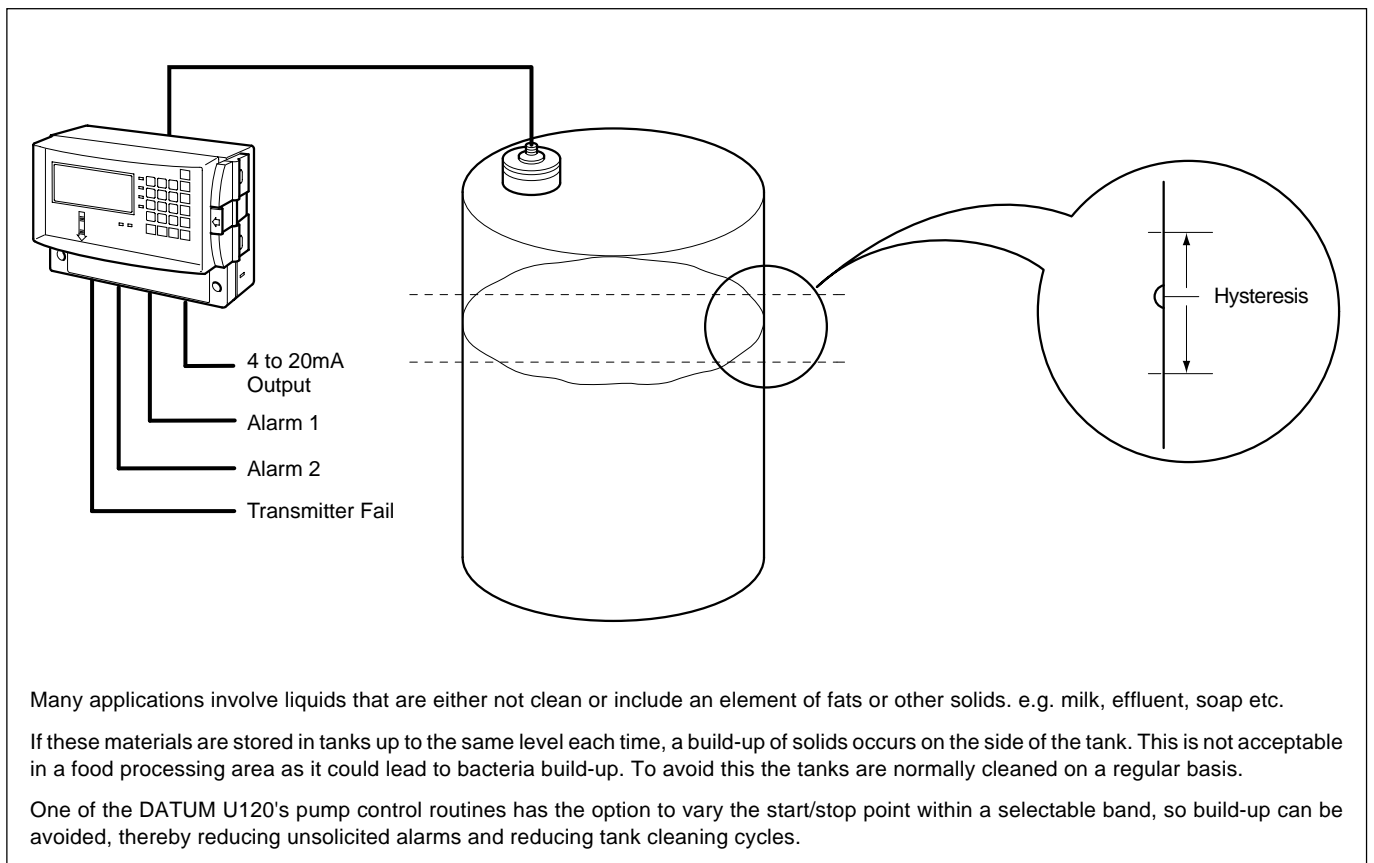
As standard, the DATUM U120 has the ability to connect to two ultrasonic transducers, measure the difference and at a predetermined differential, activate the screen rake to clean the screen. If the differential continues to increase, a second alarm is activated to signal the possible failure of the screen rake.

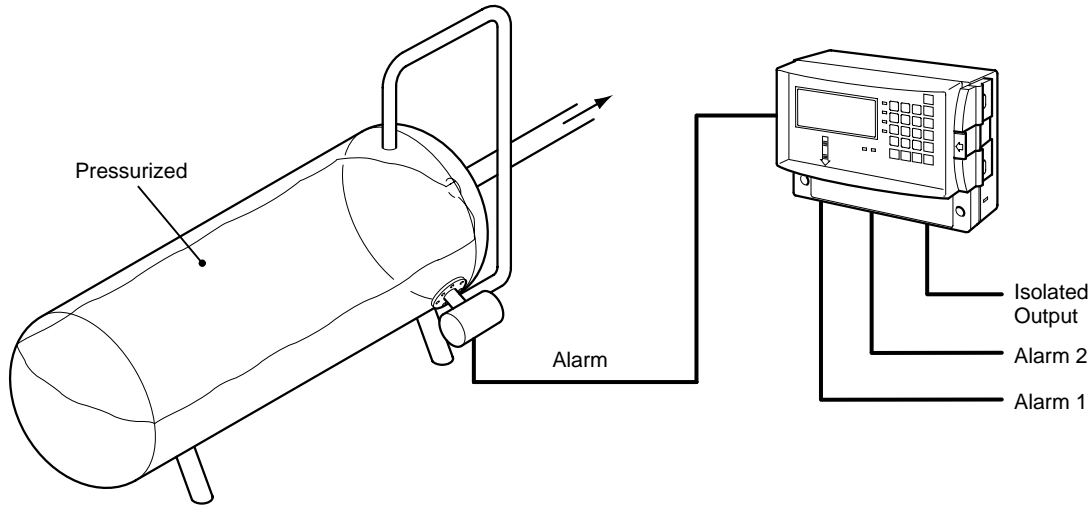*Application 2 – Differential Across Screen*

…Applications

The DATUM U120, which must be installed in a safe area, is designed for simple installations and use in harsh and hazardous atmospheres. As standard, the dB range of transducers are certified Ex m (Zone 1 or 2) and options for Zone 0 (Ee x ia). Zone 0 requires an external barrier.

Application 3 – IS Application

Many applications involve liquids that are either not clean or include an element of fats or other solids. e.g. milk, effluent, soap etc.

If these materials are stored in tanks up to the same level each time, a build-up of solids occurs on the side of the tank. This is not acceptable in a food processing area as it could lead to bacteria build-up. To avoid this the tanks are normally cleaned on a regular basis.

One of the DATUM U120's pump control routines has the option to vary the start/stop point within a selectable band, so build-up can be avoided, thereby reducing unsolicited alarms and reducing tank cleaning cycles.

Application 4 – Keeping Tanks or Wet Wells Clean

…Applications

In a number of industrial applications the tanks can be pressurized. This is not normally a suitable application for an ultrasonic measurement device.

However, the DATUM U120 has an auxiliary input which can be connected to any 2-wire, 4 to 20mA pressure transmitter (e.g. the ABB 600T Series), enabling the pump control strategies to be used in reaction to pressure changes within the tank.

Therefore, the DATUM range is extremely versatile and can be used in many applications, not only those where ultrasonic measurement is required.

Application 5 – Pressurized Vessels

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 port

Volt-free contacts
Number   5 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

…Specification

Programming

Remote
By optional infrared communicator

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

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)
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 version)

Transducer cable requirements
Standard version: Twin-screened
IS Version: 3-core screened

Maximum separation
500m (1625 ft.)

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

Environmental

IP Rating (wall-mounting)
IP65

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

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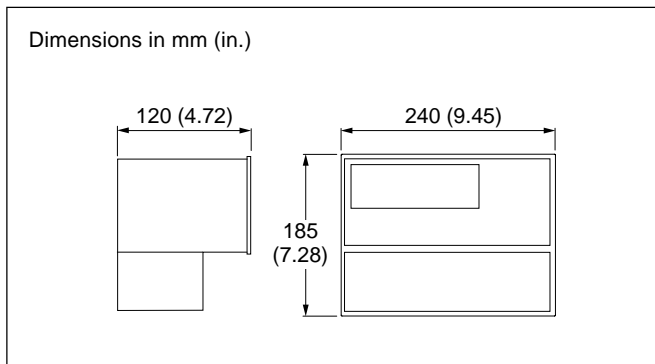(refer to Transducer specification sheet, SS/USONIC)

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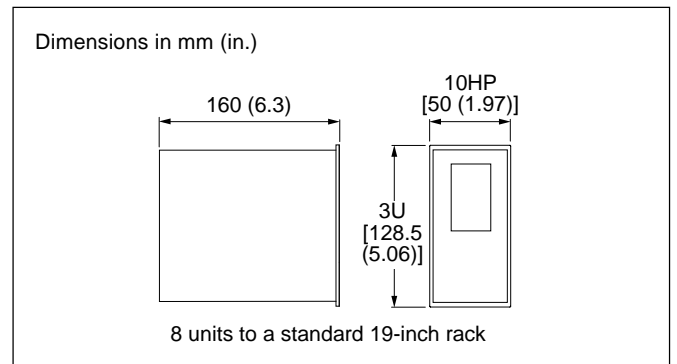EMC approval to BS EN 50081-1:1992 for emissions
BS EN50082-2:1995 for immunity
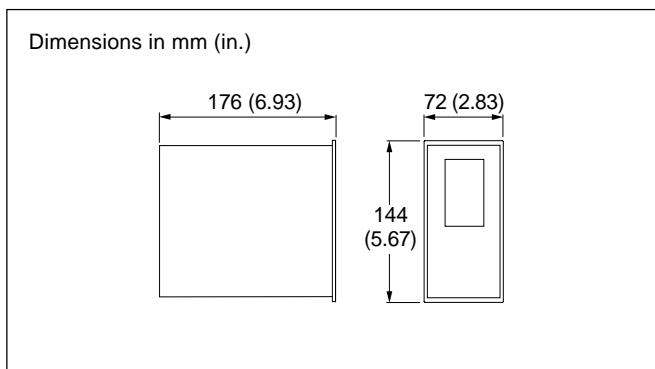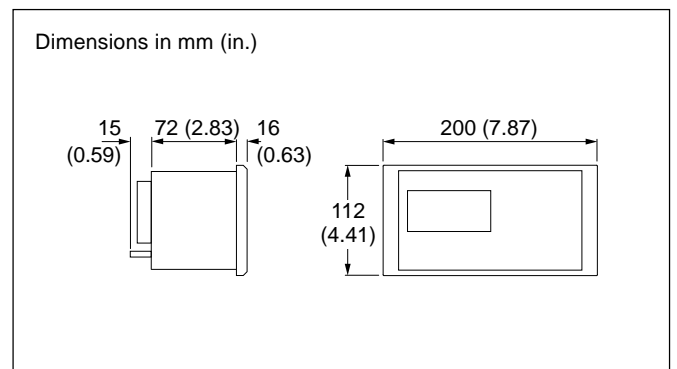BS EN61010-1:1993 for low-voltage directive

Overall Dimensions

Wall-mounting Version

Rack-mounting Version

Panel-mounting Version

Fascia-mounting Version

Ordering Information

DATUM U120 Advanced Pump & Level Control System UF/P	0 0 0 0 0 0 0 0 0 0 0 0 U120	X	X	X	X	X
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

Accessories

PC Configuration Software – U100/0700

ABB