

# Product Guide



Level and Flow Measurement

# dB Series Transducers

# pulsar

## Transducers



### Standard Range

A range of compact high acoustic output, non contacting transducers designed for liquids or solids level measurement use. All have ATEX EEx m as standard for use in zone 1 flammable atmospheres.



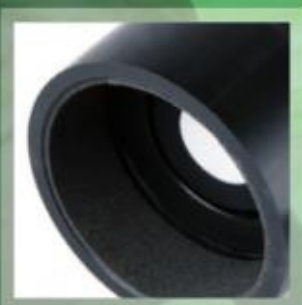
### Threaded Range

These incorporate the performance features of the standard products, but additionally offer a front thread mount option to suit threaded nozzles or flanged tank entries.



### Accessories

Various transducer options can be provided to suit specific applications, such as submergence shields, foam faced transducers, sanitary flanges, blind flanges and a choice of transducer mounting brackets.



# Transducers:

## Standard Range

### Features

- Encapsulated ATEX (EEx m) for zones 1 and 2 as standard
- On NPT threaded versions, FM/FMC Class I, Div 1, Group A, B, C and D. Class II, Div 1, Group E, F and G. Class III.
- I.S. ATEX (EEx ia) for zone 0 (option)
- Integral temperature compensation
- Narrow beam angles
- Robust IP 68/NEMA 6P
- PZT ceramic transducer element
- Standard 2 or 3 core screened cable extensions to 1000m
- High acoustic power output
- Patented

Pulsar's main dB series of non contact ultrasonic transducers offer compact, robust measurement and an innovative approach to transducer design.

Previously, users had a choice between high-voltage, frequency dependent transducers that were susceptible to electrical noise and needed special, protected interconnecting cables, and weak, low-power transducers that had good hazardous area performance but performed poorly in any but the simplest application.

The dB range has changed all that, creating a compact, low power transducer design that can be I.S. certified and uses standard interconnecting cables, yet produces extremely high acoustic power to give exceptional results in a wide variety of challenging situations.

Team a dB transducer with any of Pulsar's Ultra, FlowCERT, Zenith, Quantum or Blackbox control units to create the perfect solution for your application. All transducers have flammable atmosphere approval as standard.

Standard transducer bodies are made from Valox 357 PBT with a special foam radiating face. Some are available with both body and sealed front face in PVDF for corrosive applications.

(all beam angles defined as 3dB or half power inclusive)

#### **dB3 – short range solids and liquids measurement**

Range – 125mm – 3m (0.41ft-10ft), 125kHz, 19mm (0.75in) diameter radiating face, <10° beam angle. All dB3 versions are fitted with a shallow drip shield.

#### **dBMACh3 – short range for accurate open channel flow measurement**

Range – 0 – 2.425m (0-7.95ft), 125kHz fitted with cone and sun shield (see p5)

#### **dB6 – short range solids and liquids measurement**

Range – 300mm – 6m (0.98ft-20ft), 75kHz, 30mm (1.18in) diameter radiating face, <10° beam angle.

#### **dB6 – short deadband version, solids and liquids measurement**

Range 200mm – 6m (0.66ft-20ft), at 50kHz, 45mm (1.78in) radiating face, <10° beam angle.

#### **dB10 – solids, powders and liquids measurement**

Range – 300mm – 10m (0.98ft-33ft), 50kHz, 45mm (1.78in) diameter radiating face, <10° beam angle.

#### **dB15 – narrow beam transducer for solids, powders and liquids**

Range – 500mm – 15m (1.64ft-50ft), 41kHz, 60mm (2.36in) diameter radiating face, <8° beam angle.

#### **dB25 – narrow beam, mid-range transducer for solids, powders and liquids**

Range – 600mm – 25m (1.97ft-82ft), 30kHz, 78mm (3.07in) diameter radiating face, <6° beam angle.

#### **dB40 – narrow beam, long range transducer for solids, powders and liquids**

Range – 1.2 – 40m (3.94ft-130ft), 20kHz, 160mm (6.30in) diameter radiating face, <5° beam angle.

#### **dB50\* – narrow beam, long range transducer for solids, powders and liquids**

Range – 2m – 50m (6.56ft-164ft), 20kHz, 160mm (6.30in) diameter radiating face, <5° beam angle.



ALL BEAM ANGLES ARE INCLUSIVE, BUT GIVE AN EFFECTIVE BEAM ANGLE OF <3 DEGREES ON OUR CONTROLLERS. RANGE ON POWDERS AND SOLIDS DEPENDS ON APPLICATION.

\* dB50 - not ATEX (flammable atmosphere) approved, and works with modified Ultra 3 and Ultra 5 controllers only

# Transducers:

## Flanged Transducers

### Flanged transducers

Flange options are available for dB3, dB6, dB10 and dB15 transducers, ANSI or DIN specification, all featuring full PTFE coating on the process wetted side. Various flange sizes are available. Maximum vessel pressure on flanges is 0.5bar (7ps). See technical specifications for more details. These incorporate the performance features of the standard products, but additionally offer a front thread mount option to suit threaded nozzles or flanged tank entries.

These integral flange options are available with the standard family of transducers, up to the dB15 size.

### Features

- Full PTFE face on flange
- ATEX and optional FM flammable atmosphere units
- I.S. Intrinsically Safe versions available
- Rugged construction and IP68



UNDERSIDE OF THE  
FLANGED TRANSDUCER



FLANGED TRANSDUCERS SHOWN ON TANKS



# Transducer Options:



## Foam Face

A foam faced option is available for all the standard range transducers to provide more acoustic power output in dry, dusty environments. This higher acoustic power output increases return echo strength in these dry applications. Not available on dB3 versions.



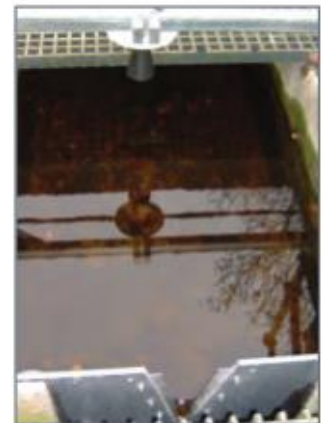
## Submergence Shield

A shield can be fitted to keep the transducer face clean and dry in applications at risk of submergence. In case of submergence the controller can be asked to fail high, low or hold the last reading. When the level drops back below the shield it allows the controller to resume operation with a clean transducer face. The shield can be fitted to the dB3, dB6, dB10 and dB15 dB25 standard transducers. Note: All dB3 transducers are fitted with a shallow drip shield.



## dBMACH3 – high accuracy open channel flow transducer

Featuring unique sun and submergence shields, the dBMACH3 transducer is designed specifically for open channel flow applications. dBMACH3 is the first ultrasonic transducer with zero effective blanking distance beyond the nose cone, allowing it to be sited as little as a few mm from the high flow level. One of the critical factors affecting ultrasonic accuracy is the measurement distance, so by minimising this distance, accuracy is maximised. Operating at 125kHz frequency the transducer provides high resolution and accuracy. Essential in open channel flow applications. The dBMACH3 is used with Ultra 3 or 5 and TWIN when in open channel flow mode, or can be paired with FlowCERT all of which provide a typical accuracy of  $\pm 1$ mm, resolution  $\pm 0.5$  mm, Range: 0 - 2.425m



## Sanitary Flanged Transducers

For standard transducer from dB3 to dB10 an option of a sanitary flange construction exists. The flange has a full face PTFE (dB3) or PVDF seal for use in hygienic applications. The flange is available in 2" or 3" (on dB3) and 3" on the dB6 and dB10 units. These flanges allow Tri-Clamp fittings to be used onto tanks or vessels.



# Transducers:

## Threaded Range

dB3, dB6 and dB10 transducers are available with threaded noses for easy mounting. dB3 and dB6 models feature 1.5 inch universal thread while dB10 has a 2" universal thread. Standard transducer bodies are made from Valox 357 PBT with a special foam radiating face. All are available in optional PVDF version for corrosive applications. All performance parameters of the transducers remain unchanged.

**dB3 – solids, powders and liquids measurement to 3m (10ft)**

Range 0.15 - 3m (0.49ft-10ft), 125kHz operating frequency, <math>10^\circ</math> beam angle (-3dB inclusive).

**dB6 – solids, powders and liquids measurement to 6m (20ft)**

Range 0.3 - 6m (0.98ft-20ft), (0.2m deadband option available at 50kHz) 75kHz, <math>10^\circ</math> beam angle.

**dB10 – solids, powders and liquids measurement to 10m (33ft)**

Range 0.3 - 10m (0.98ft-33ft), 50kHz <math>10^\circ</math> beam angle.

### All

Operating temperatures -40°C to +90°C (-40°F to +194°F) (+75°C (+167°F) for hazardous area)  
ATEX (EEx m) II T6 as standard, ATEX (EEx ia T6) I.S. intrinsically safe optional, all are IP68.

FM approved Ex-proof FM/FMC, Class I, Div. 1, Grp. A, B, C, D; Class II,  
Div. 1, Grp. E, F, G Optional Intrinsically Safe ATEX EEx ia IICT6.

## Features

- Universal 1.5" or 2" BSP/NPT nose thread
- ATEX and optional FM/FMC flammable atmosphere units
- PVDF version option for corrosive applications
- I.S. approval versions available
- Rugged IP 68

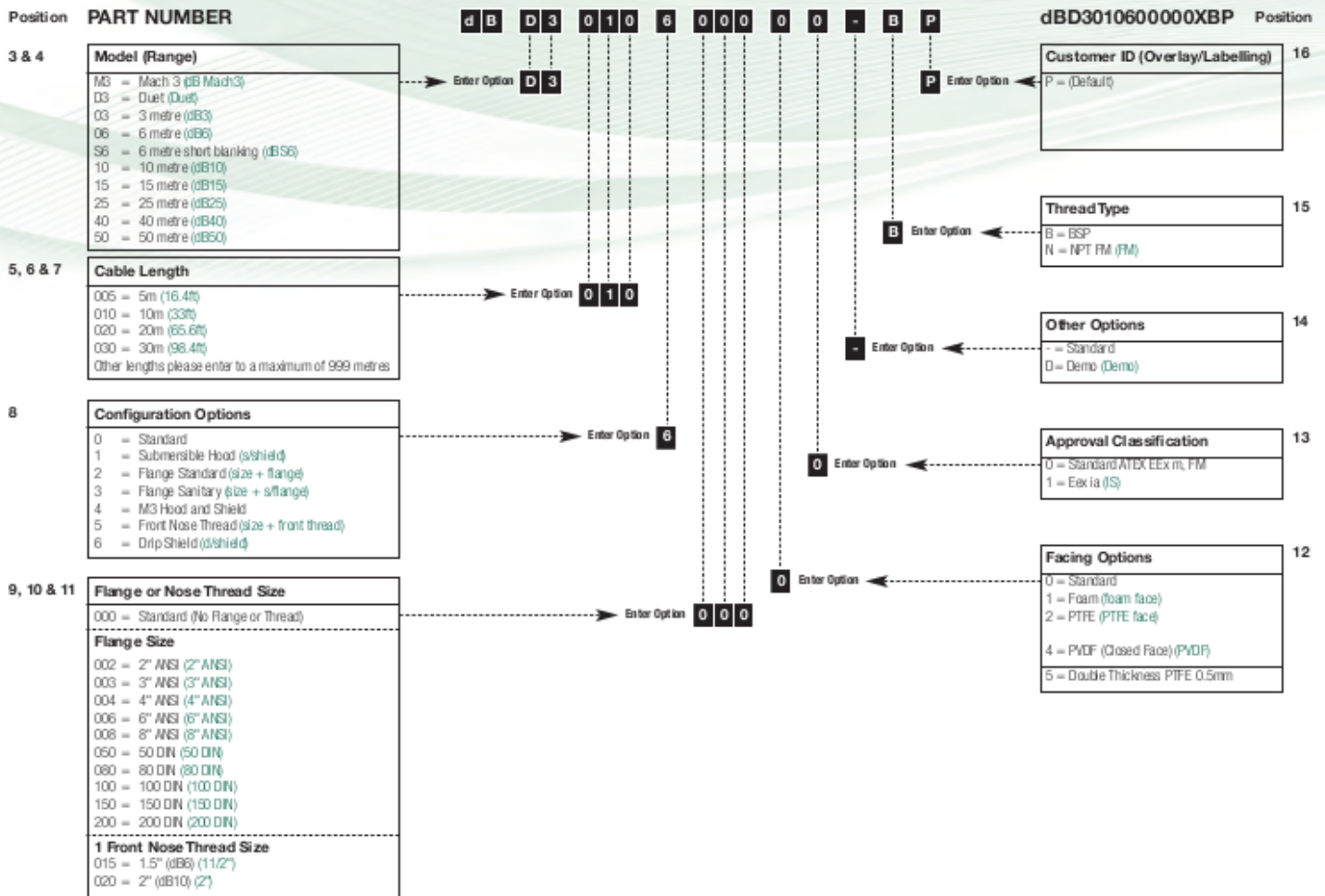


STANDARD TRANS-  
DUCER FACE

PVDF BUILD OPTION

ALL BEAM ANGLES ARE INCLUSIVE, BUT GIVE AN EFFECTIVE BEAM ANGLE OF <math>\leq 3</math> DEGREES ON OUR CONTROLLERS. RANGE ON POWDERS AND SOLIDS DEPENDS ON APPLICATION.

# Transducers:



## Technical Specification: PULSAR dB Transducers

### DATA APPLICABLE TO ALL TRANSDUCERS

<b>Operating temperature range:</b>	-40°C to +90°C (-40°F to +194°F) (Hazardous area versions +75°C (+167°F) max)
<b>Hazardous area approval:</b>	Standard ATEX EEx m II T6 or optional EEx ia T6 (FM approved available). NB: Not dB50
<b>Ingress protection (IP) rating:</b>	IP68 to BS EN 60068-2-17 : 1995 and BS EN 60529 (Nema 6P available)
<b>Integral cable length:</b>	Standard 5, 10, 20 or 30 metres
<b>CE approvals:</b>	EMC tested to BS EN 50081-1 : 1992 for emissions and BS EN 50082-2 : 1995 for immunity Electrical safety tested to BS EN 61010-1 : 1993
<b>Bump, shock and vibration:</b>	To BS EN 60068-2-29, BS EN 60068-2-27 and BS EN 60068-2-6

### HOUSING DETAILS

	Housing material	Housing diameter mm/inch	Housing height mm/inch	Mounting connection
<b>dB3:</b>	Valox 357 *PBT	86mm / 3.39"	98mm / 3.86"	BSP or 1" NPT
<b>dB6†:</b>	Valox 357 *PBT	86mm / 3.39"	106mm / 4.17"	BSP or 1" NPT
<b>dB10†:</b>	Valox 357 *PBT	86mm / 3.39"	106mm / 4.17"	BSP or 1" NPT
<b>dB15:</b>	Valox 357 *PBT	86mm / 3.39"	120mm / 4.72"	BSP or 1" NPT
<b>dB25:</b>	Valox 357 *PBT	114mm / 4.49"	140mm / 5.51"	BSP or 1" NPT
<b>dB40 &amp; dB50:</b>	Valox 357 *PBT	205mm / 8.07"	215mm / 8.46"	BSP or 1" NPT

### OPTIONAL FLANGES - All have PTFE full face on process side

Flanges:	ANSI	2"	3"	4"	6"	8"	DIN	50	80	100	150	200	Sanitary	2"	3"
<b>dB3:</b>		✓	✓	✓	✓	✓		✓	✓	✓	✓	✓		✓	✓
<b>dB6:</b>		✓	✓	✓	✓	✓		✓	✓	✓	✓	✓			✓
<b>dB10:</b>		✓	✓	✓	✓	✓		✓	✓	✓	✓	✓			✓
<b>dB15:</b>			✓	✓	✓	✓			✓	✓	✓	✓			

### OPTIONS

<b>Facings:</b>	Closed cell soft foam for increased power in dry dusty environments PTFE standard on all flanged transducers for chemical compatibility
<b>Submergence shield:</b>	For continuous operation in applications at risk of submergence
<b>Beam aiming kit:</b>	Recommended for easy transducer aiming in solids applications (drawing available on request)

† Available in optional PVDF body material (Polyvinylidene fluoride)

\*PBT - Polybutylene terephthalate

# Accessories:

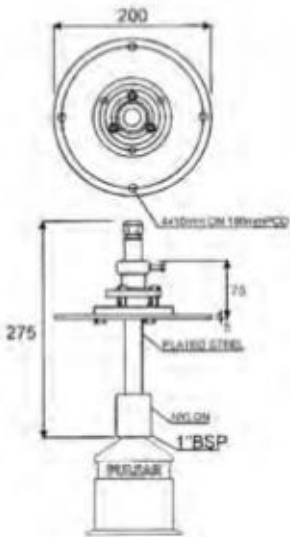
Various transducer mount options can be provided to suit specific applications, such as blind flanges and a choice of transducer mounting brackets.

## Cable Options

Transducer cable lengths are supplied as a standard in 5m, 10m, 20m or 30m. Longer lengths can be supplied as required in 10m steps. It is important to note that the supplied transducer cable may be extended by using standard 2 or 3 core screened cable for up to 1000m or beyond if needed. No separation is required between transducer and other cables as they are not susceptible to cross talk and significant costs can be saved on site.

## Aiming Kit

Pulsar's robust and effective aiming kit allows the transducer to be aimed towards the material draw off point at the bottom of the silo or tank, ensuring that the returning echo is as strong as possible and that the ultrasonic system is able to measure right down to the true empty point of the silo. The location of the aiming kit should be as far away from the fill point as possible to avoid seeing falling material. It should be aimed to coincide with the material's angle of repose, ensuring a more powerful signal return to the transducer. The rotational ball mechanism allows up to 20 degrees off vertical and 360 degrees of rotation.



WE RECOMMEND THE INSTALLATION OF AN AIMING KIT WHEN MEASURING SOLIDS MATERIAL



## Features

- Allows rotation to suit silo conditions
- Coincide with angle of repose of material being measured
- Follow material level down to draw off point
- Easy aim and lock system



AIMING KIT ON A CRUSHER APPLICATION

## Blind Flanges

A range of blind PVC flanges with central 1" BSP or NPT hole is available. These are for mounting transducers within a standpipe or tank using rear thread or dB3 front thread mounting. These available in 2", 3", 4" and 6" ANSI or DIN 80, DIN 100, DIN 150 and DIN 200 patterns.



## Features

- Selection of DIN or ANSI patterns
- Excellent corrosion resistance
- Choice of 1", 1.5" and 2" Universal centre thread

1/5" OR 2" UNIVERSAL CENTRE THREAD FLANGES AVAILABLE



# Brackets:

## Angled Bracket



### Pulsar Fixed Angle Transducer Bracket

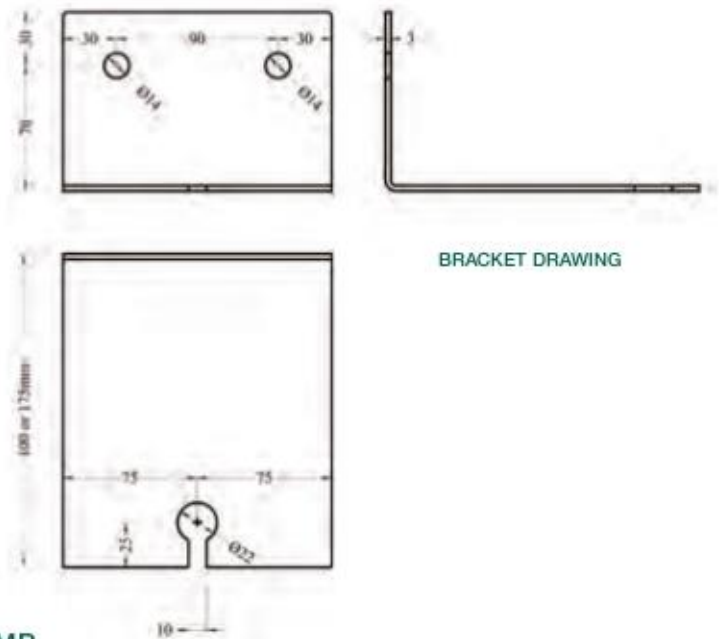
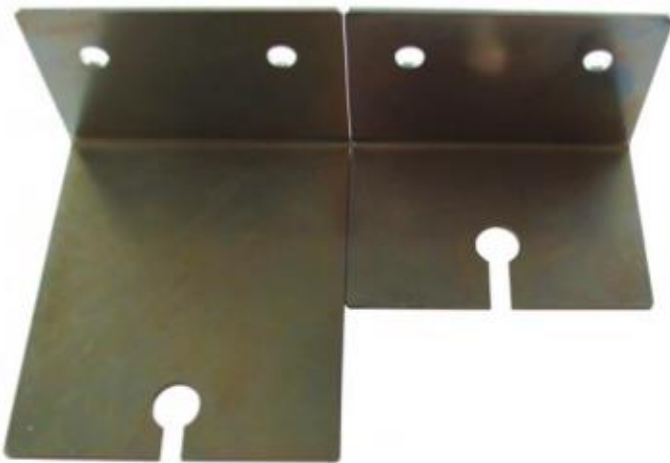
Fixed angle bracket made from steel with a BZP (bright zinc passivate) coat. Ideal for mounting against a wall where there is an under-hang under a manhole or similar. 2 x 14mm holes allow rigid fixing into a vertical surface using suitable bolts.

**65mm (2.56in) reach p/n dBA004**

Bracket size is 100L x 100W x 150Hmm (3.9L x 3.9W x 5.9Hin).

**150mm (5.9in) reach p/n dBA005**

Bracket size is 175L x 100W x 150Hmm (6.9L x 3.9W x 5.9Hin).



### Pulsar Fixed Angle Bracket for IMP and Transducers p/n 080A0008

Designed to allow fastening to a vertical wall or hatch where clear access to the target is available. Made of 'Hot Dipped Galvanised' steel with 2 x 14mm holes for wall fixing and a 22mm hole and slot for a transducer adaptor to mount through. It has both a 61mm dia hole and a 49mm dia hole to mount the IMP3 or IMP6. Bracket size is 340L x 150W x 100Hmm.



### Pulsar Fixed Angle Bracket for T-Comp and dB/dBi Transducer p/n dBA006

Designed to allow fastening to a vertical wall or hatch where clear access to the target is available. The bracket is made from 'Hot Dipped Galvanised' steel with 4x12mm holes for wall fixing, a 22mm hole and slot for the transducer adaptor and a 40mm hole to mount a remote temperature sensor and sunshield. Bracket size is width 200mm (7.9in) x height 102mm (4in) x length 250mm (9.8in).



# Brackets:

## Pulsar Hinged Transducer Bracket p/n dBA003

Pulsar's hinged transducer bracket is an easy-mounting solution for any of the dB series transducers, providing a stable method of positioning a transducer above an application. The bracket is made from hot dipped galvanised steel and is hinged to allow the transducer to be swivelled up for cleaning or to allow access. The transducer can then be returned to the original position with no need to recalibrate.

### Features

- Rugged construction
- Galvanised or BZP coated
- Hinge allows easy lift cleaning
- Drain holes in channel prevent liquid build up
- Simple to fit on site



The dB series transducer is mounted to one of the 22mm holes in the bracket using the 1" to 20mm adaptor provided. If one of the inner holes is used and the excess bracketry removed, the retaining thro-nut with the steel pull cable attached easily slides to a new position. The bracket is supplied with the plastic channel seal.



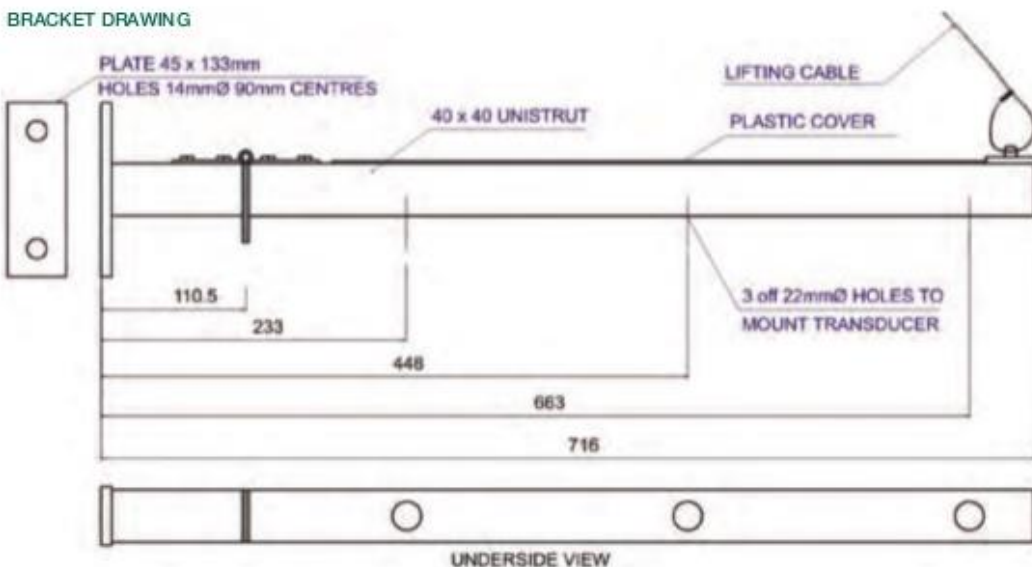
STEEL CABLE WITH KARABINER AND NON-SLIP CONNECTORS



HINGED BRACKET OVER A WET WELL



### BRACKET DRAWING



# DATEM Software:

## Ultrasonic level measurement and DATEM digital echo processing Digital Adaptive Tracking of Echo Movement

### Features

- Superb echo discrimination
- Most accurate ultrasonic level measurement system in the world
- Easy application set-up
- Locks onto the true echo, ignores interference from other signals
- Trouble free operation

As a technique, ultrasonic level measurement has been around for decades, working on the 'time of flight' principle that if you know the speed of sound, then the time that a sound pulse takes to travel from a transducer and back again may be used to calculate the distance that pulse has travelled. Divide by two and you have the distance to the 'target'.

Early analogue instruments, while they were fine for simple applications, were easily 'confused', they had to be carefully set up and the path to the target had to be clear and unobstructed, because the success of the measurement depended on the true echo returning from the target being 'louder' than any competing echo. As time went on, more sophisticated digital echo processing allowed for more discrimination of echoes, but still depended on blocking out competing echo traces and using software to identify the true echo from among the competing traces.

Pulsar is a pioneer in ultrasonic level echo processing technology. As microprocessors have improved, Pulsar has continued to develop and improve echo processing software, so that it is now possible to make successful measurements in situations that would

have been far beyond the units of even a decade ago. Pulsar's echo discrimination system, DATEM, works on the basis that it first identifies the true, moving echo from the background noise, then follows it, ignoring all of the competing echoes as it does, so DATEM allows Pulsar equipment to work in a cluttered sewage wet well, or in a noisy stone silo, an agitated tank or even through a grid. DATEM also looks for echoes within a very small frequency range, which helps to make it especially good at ignoring both acoustic and electrical noise. The high power of Pulsar's dB series transducers makes sure that all the echoes from an application can be easily monitored. The end result is highly reliable level measurement in applications which previously could not be considered.

19m STORM TANK WITH WET WELL AT BASE



BLOCKED CHUTE DETECTION OVER 1.2m



WET WELL 6m WITH LADDER AND FLOAT



WET WELL 4.5m WITH LADDER AND FAT RING



Pulsar® Process  
Measurement Ltd.

Cardinal Building  
Enigma Commercial Centre  
Sandy's Road  
Malvern  
Worcestershire  
WR14 1JJ  
England

Tel: +44 (0) 1684 891 371  
Fax: +44 (0) 1684 575 985  
Email: info@pulsar-pm.com

[www.pulsar-pm.com](http://www.pulsar-pm.com)

Pulsar® is a registered trademark of Pulsar Process Measurement Ltd. in the UK and USA.

Pulsar® Process  
Measurement Inc.

P.O. Box 5177  
4565 Commercial Drive  
Suite 105  
Niceville  
FL 32578  
USA

Tel: +1 850 279 4882  
Fax: +1 850 279 4886  
Email: info.usa@pulsar-pm.com

Pulsar operates a policy of constant  
development and improvement and reserves the  
right to amend technical details as necessary.

