




**dBi Series () PA
Intelligent Transducer
INSTRUCTION MANUAL**

dBi SERIES (PROFIBUS PA) INTELLIGENT TRANSDUCER (FIRST EDITION REV 2)

November 2016

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Please contact Pulsar Process Measurement Limited for technical support.

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Chapter 1 Start Here...

Congratulations on your purchase of a Pulsar **dB_i Series Intelligent Transducer** Level Monitoring Device. This quality product has been developed over many years and represents the latest in high technology ultrasonic level measurement. It has been designed to give you years of trouble-free performance, and a few minutes spent reading this operating manual will ensure that your installation is as simple as possible.

About this Manual

It is important that this manual is referred to for correct installation and operation.

There are various parts of the manual that offer additional help or information as shown:

Additional Information

Additional Information

At various parts of the manual, you will find sections like this that explain specific items in more detail.

About the dBi Series (PROFIBUS PA) Intelligent Transducer



Functional Description

The **dBi Series Intelligent Transducer** is a highly developed ultrasonic level measurement device which provides non-contacting level measurement for a wide variety of applications in both liquids and solids. Its unique design gives unrivalled performance in echo discrimination and accuracy in a Profibus PA device.

Easy calibration and maintenance free “fit and forget” performance mean that you can install the **dBi Series Intelligent Transducer** Level Monitoring Device rapidly and with confidence, with calibration being achieved either by the use of a Profibus master or via a PC utilising the Pulsar dBi Profibus PA Modem and PAPC software.

The **dBi Series Intelligent Transducer** operates on the principle of timing the echo received from a measured pulse of sound transmitted in air and utilises “state of the art” echo extraction technology.

dBi Series Intelligent Transducer comes in four models:

1. dBi 3 with a range from 0.125m (0.41 feet) to 3.00m (9.84 feet).
2. dBi 6 with a range of 0.3m (0.98 feet) to 6.00m (19.69 feet).
3. dBi 10 with a range of 0.3m (0.98 feet) to 10.00m (32.81 feet).
4. dBi 15 with a range of 0.5m (1.64 feet) to 15.00m (49.213 feet).

All models can be mounted via a rear, 1” BSP/NPT, thread (Standard), a model with alternative front thread mounting is available, in addition there are flange mount and PVDF options. See Chapter 2 Installation for further details.

All model types are available for use in hazardous area installations with Ex ia ATEX & FISCO certification.

The **dBi Series (PROFIBUS PA) Intelligent Transducer** must be connected to a Profibus network, it can not be used in any other way.

Product Specification

Physical

Model	Housing Material	Mounting Connection	Overall Diameter	Overall Height	Nominal Weight
dBi 3 metre	Valox 357 PBT	Rear 1" BSP or NPT	77 mm (3 inches)	134 mm (5.3 inches)	1.0Kg
dBi 6 metre	Valox 357 PBT	Rear 1" BSP or NPT	86 mm (3.4 inches)	121 mm (4.8 inches)	1.2Kg
dBi 10 metre	Valox 357 PBT	Rear 1" BSP or NPT	86 mm (3.4 inches)	121 mm (4.8 inches)	1.3Kg
dBi 15 metre	Valox 357 PBT	Rear 1" BSP or NPT	86mm (3.4 inches)	135mm (5.3 inches)	1.4Kg
dBi 3 metre	Valox 357 PBT	Front 1½" Thread	77mm (3 inches)	160mm (6.3 inches)	1.0Kg
dBi 6 metre	Valox 357 PBT	Front 1½" Thread	77mm (3 inches)	160mm (6.3 inches)	1.2Kg
dBi 10 metre	Valox 357 PBT	Front 2" Thread	77mm (3 inches)	160mm (6.3 inches)	1.3Kg
dBi 3 metre	PVDF	Rear 1" BSP or NPT	77 mm (3 inches)	134 mm (5.3 inches)	1.0Kg
dBi 6 metre	PVDF	Rear 1" BSP or NPT	86 mm (3.4 inches)	121 mm (4.8 inches)	1.2Kg
dBi 10 metre	PVDF	Rear 1" BSP or NPT	86 mm (3.4 inches)	121 mm (4.8 inches)	1.3Kg
dBi 15 metre	PVDF	Rear 1" BSP or NPT	86mm (3.4 inches)	135mm (5.3 inches)	1.4Kg
dBi 3 metre	PVDF	Front 1½" Thread	77mm (3 inches)	160mm (6.3 inches)	1.0Kg
dBi 6 metre	PVDF	Front 1½" Thread	77mm (3 inches)	160mm (6.3 inches)	1.2Kg
dBi 10 metre	PVDF	Front 2" Thread	77mm (3 inches)	160mm (6.3 inches)	1.3Kg

Environmental

- Temperature range -40 to +80°C. Ambient Electronics
- Temperature range -40 to +80°C. Transducer in process
- IP rating IP68

Performance

- Digital signal processing
- Frequency
 - dBi 3 125KHz
 - dBi 6 75KHz
 - dBi 10 50KHz
 - dBi 15 41KHz
- Beam Angle
 - dBi 3, 6 and 10 $<10^\circ$
 - dBi 15 $<8^\circ$
- Measurement range
 - dBi 3 0.125m (0.41 feet) to 3.00m (9.84 feet)
 - dBi 6 0.3m (0.98 feet) to 6.00m (19.69 feet)
 - dBi 10 0.3m (0.98 feet) to 10.00m (32.81 feet)
 - dBi 15 0.5m (1.64 feet) to 15.00m (49.213 feet)
- Accuracy
 - dBi 3 2mm (0.08 inch)
 - dBi 6 4mm (0.16 inch)
 - dBi 10 3mm (0.12 inch) up to 6m (20ft) range
6mm (0.24 inch) over 6m range
 - dBi 15 5mm (0.2 inch) up to 10m (33ft) range
10mm (0.39 inch) over 10m range
- Resolution
 - dBi 3 1mm (0.04 inch)
 - dBi 6 2mm (0.08 inch)
 - dBi 10 3mm (0.12 inch)
 - dBi 15 5mm (0.2 inch)
- Accuracy $\pm 0.25\%$ of measured range or 6mm whichever is greatest.
- Temperature compensation via internal digital temperature sensor with $\pm 0.5^\circ\text{C}$ accuracy.
- Current consumption 20mA

Communications Protocol

- Profibus PA profile 3.02

PC interface

- All parameters can be accessed and changed via Profibus PA Modem and P APC software.
- Echo trace viewing ability and parameter upload/download capability via Profibus PA Modem and P APC software.

Pulsar Process Measurement Limited operates a policy of constant development and improvement and reserve the right to amend technical details as necessary.

And therefore complies with all of the relevant essential requirements of those other directives.

The following Notified Body has been involved in the conformity assessment process:

Notified Body TRaC Global Ltd
Notified Body No. 0891
Role: Issue of ATEX EC Type Examination certificate
Certificate No. TRaC12ATEX0022X

Additional information:

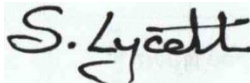
ATEX coding II 1 G Ex ia IIC T4 Ga & II 1 D Ex ia IIIC T130°C Da
Tamb -40°C to +80°C & FISCO Field device

Limitations on use

1. Electrostatic hazard – The dBi transducers must only be wiped with a damp or antistatic cloth
2. Special condition of safe use: (i) ' The profibus PA transducer must be powered by either an ATEX approved barrier or FISCO ATEX approved power supply that meets the following parameters:
3. ATEX approved barrier: $U_o \leq 28V$, $I_o \leq 250mA$, $P_o \leq 2.5W$ or FISCO: $U_o \leq 17.5V$, $I_o \leq 380mA$, $P_o \leq 5.32W$.
4. The dBi transducers must be routinely inspected to avoid the build up of dust layers when installed in a Zone20, 21 & 22.
5. The power supply cable to the transducers shall meet the relevant installation requirements of clause 9 EN 60079-14:2008.
6. The equipment is considered suitable for use in a FISCO system only when it is installed in accordance with EN60079-25

Name and position of person binding the manufacturer or authorised representative:

Signature



Name Steve Lycett
Function Authorised Person
Location Pulsar Process Measurement Ltd, WR14 1JJ
Date of issue 14th August 2013

Power Supply Requirements

The **dBi Series (PROFIBUS PA) Intelligent Transducer** must be connected to a Profibus network to function.

For use in hazardous areas they must be connected via a suitable interface/barrier meeting the following specification: ATEX approved barrier: $U_o \leq 28V$, $I_o \leq 250mA$, $P_o \leq 2.5W$ or FISCO: $U_o \leq 17.5V$, $I_o \leq 380mA$, $P_o \leq 5.32W$

All electronic products are susceptible to electrostatic shock, so follow proper grounding procedures during installation.

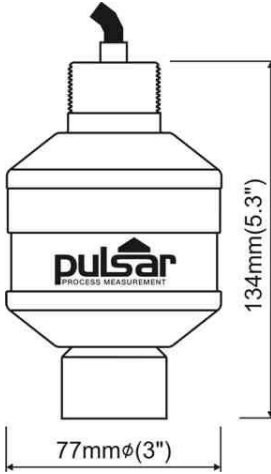
The compact one-piece construction of the **dBi Series Intelligent Transducer** can be mounted easily using either the 1" BSP/NPT rear mounting thread or the integral 1.5" or 2" BSP/ NPT nose thread, dependent on model.

When choosing a location to mount the **dBi Series Intelligent Transducer**, bear in mind the following:

- The ultrasonic signal path should be free of falling material and obstructions such as pipes, beams etc.
- The dBi 3 should be mounted at least 12.5cm (0.41 feet) above the maximum level of the material and be perpendicular to the surface. While the dBi 6 and 10 should be mounted at least 30cm (0.98 feet) above the maximum level of the material and be perpendicular to the surface. And the dBi 15 should be mounted at least 50cm (1.64 feet) above the maximum level of the material and again should be perpendicular to the surface
- The ambient temperature is between $-40^{\circ}C$ and $80^{\circ}C$.
- There should be no high voltage cables or electrical inverter wiring in close proximity to the transducer cabling.

Dimensions

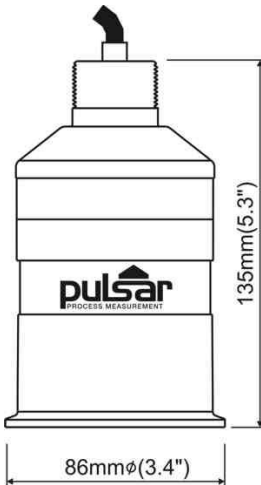
Rear Thread Mount



dBi 3

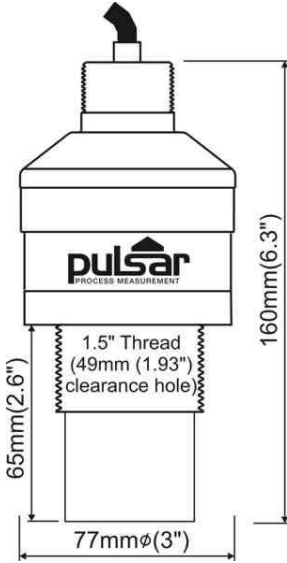


dBi 6 & 10

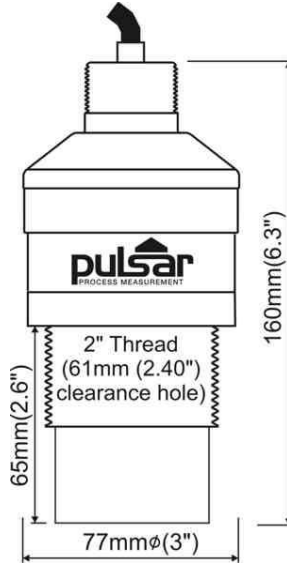


dBi 15

Front Thread Mount



dBi 3 & 6



dBi 10

Outdoor and Open Vessel Installation

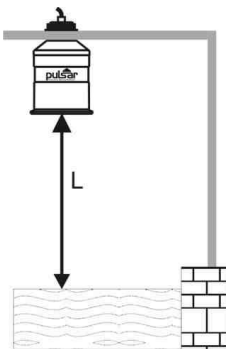
The **dBi Series Intelligent Transducer** can be simply mounted on a bracket and secured using either the 1" BSP/NPT rear thread or via the 1½" or 2" front thread, dependant on model.

Care should be taken to ensure that the **dBi Series Intelligent Transducer** is not installed in direct sunlight, in order to avoid errors in the measurement of ambient temperature.

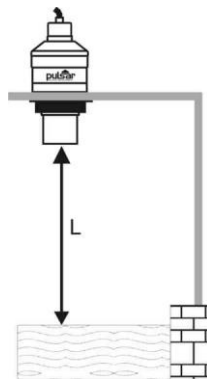
Attention should also be taken, when mounting the unit, to ensure that strong windy conditions are avoided, wherever possible, to prevent abnormal operation.

dBi Model	Range	L = Blanking
dBi 3	3 metres (9.84 feet)	125mm (0.41 feet)
dBi 6	6 metres (19.69 feet)	300mm (0.98 feet)
dBi 10	10 metres (32.18 feet)	300mm (0.98 feet)
dBi 15	15 metres (49.21 feet)	500mm (1.64 feet)

‘L’ (Blanking) should as a minimum be at least that as detailed in the table above, but can be greater if required.



Mounted via Rear 1" BSP NPT Thread



Mounted via optional Front Thread

Closed Vessel Installation

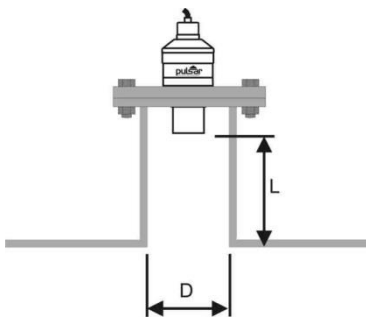
“L” should as a minimum be at least that as detailed in the table above, but can be greater if required. The **dBi Series Intelligent Transducer** can be simply screwed into a flange and secured using the rear 1" BSP/NPT rear thread or via the 1½" or 2" front thread, dependant on model.

Where possible use a flange made of a synthetic material such as PVC, in cases where a metal flange is used it is advisable to fit a suitable gasket between the flange of the **dBi Series Intelligent Transducer** and the connection to the vessel.

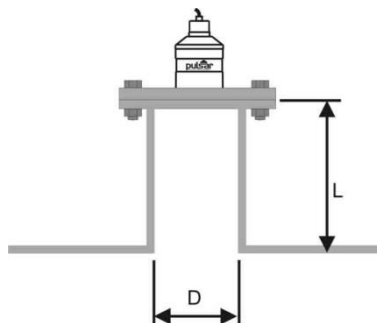
Stand Pipe Installations

When mounting the **dBi Series Intelligent Transducer** to a standpipe care should be taken to ensure that the standpipe is of sufficient diameter with reference to its length, see the table below for details:

Dia. (D)		Max Length (L)	
mm	inches	mm	inches
80	3	220	8
100	4	300	12
150	6	420	16
200	8	560	22



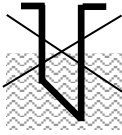
dBi Flange mounted via Front Thread



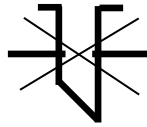
Optional Flange Mounted dBi

When using a standpipe, fixed to the top of a vessel, ensure that the open end of the standpipe is clear of any obstructions such as weld seams, gaskets etc. in order to avoid unwanted signal returns.

If using standpipes which extend in to the vessel, beyond the blanking distance, but not as far as the empty level, then the open end of the standpipe should be cut to an angle of 45°.



The maximum level (100% of Span) is inside the Blanking Distance



Pipe should be free of obstructions such as weld seams



Correct standpipe installation

When using the **dB*i* Series Intelligent Transducer** to measure ‘aggressive, materials such as ‘alkaline’ and ‘acids’ it is recommended that either a PVDF or an optional PTFE faced Flanged Transducer is used. Please consult Pulsar for full availability of options.

Cable

The **dB*i* Series Intelligent Transducer** comes with a fitted integral cable, if this cable is extended then the total capacitance must not exceed the limits for the voltage applied.

The dB*i* transducers cable is a twisted pair with overall cable screen. The twisted pair are red and black, connect the red to B +ve and the black to A –ve. The screen should go to Earth.

Important Information

If the cable is extended then it is important that the capacitance and inductance of the cable is not too great for the voltage applied.

Preparation for Operation

Before switching on, check the following:

- ✓ The **dB*i* Series Intelligent Transducer** is mounted correctly.
- ✓ The unit is correctly wired to your Profibus PA network.

Maintenance

There is no user serviceable parts inside your **dB*i* Series Intelligent Transducer**, if you experience any problems with the unit, then please contact Pulsar Process Measurement for advice.

To clean the equipment, wipe with a damp cloth. Do not use any solvents on the enclosure.

Hazardous Area Installation

Information specific to Hazardous Area Installation

(Reference European ATEX Directive 94/9/EC, Annex II, 1.0.6.)

The following instructions apply to equipment covered by certificate number TRAC 12ATEX0022X

1. The equipment may be used with flammable gases and vapours with apparatus groups IIC, IIB, and IIA with temperature classes; T1, T2, T3, T4 maximum ambient temperature range -40°C to +80°C.
2. The equipment is only certified for use in ambient temperatures in the range -40°C to +80°C and should not be used outside this range
3. Installation shall be carried out in accordance with the applicable code of practice by suitably-trained personnel
4. Repair of this equipment shall be carried out in accordance with the applicable code of practice.
5. Certification marking as detailed in drawing number D-804-1023-B.
6. If the equipment is likely to come into contact with aggressive substances, then it is the responsibility of the user to take suitable precautions that prevent it from being adversely affected, thus ensuring that the type of protection is not compromised.

Aggressive Substances - e.g. acidic liquids or gases that may attack metals or solvents that may affect polymeric materials.

Suitable Precautions - e.g. regular checks as part of routine inspections or establishing from the material's data sheet that it is resistant to specific chemicals.

7. The certificate number has an 'X' suffix that indicates that the following special condition of certification applies; In the case of dBi transducer range due to the housing and labels being non-conductive plastic care needs to be taken with regards electrostatic charge. The equipment shall not be installed if the conditions are conducive to the build up of electrostatic charge. Additionally the equipment should only be cleaned with a damp cloth.
8. The manufacturer should note that, on being put into service, the equipment must be accompanied by a translation of the instructions in the language or languages of the country in which the equipment is to be used and by the instructions in the original language.

Hazardous Area barrier Requirements

The dBi PROFIBUS PA transducer operates on a Profibus PA network and should be connected in accordance with ATEX and FISCO standards.

In the case of Ex ia version the unit must be powered from an approved barrier with the following limits:

$U_o \leq 28V$, $I_o \leq 250mA$, $P_o \leq 2.5W$

The FISCO variant is deemed safe when connected to FISCO barriers:

$U_o \leq 17.5V$, $I_o \leq 380mA$, $P_o \leq 5.32W$

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Chapter 3 How To Use Your dBi PROFIBUS PA Intelligent Transducer

The dBi PROFIBUS PA Intelligent Transducer can only be used on a Profibus PA network.

It is available as a 3, 6, 10 or 15m maximum range device, the maximum span details are shown below:

	dBi 3	dBi 6	dBi 10	dBi 15
0% of Span - max. distance from dBi Face in metres	3.000	6.000	10.000	15.000
100% of Span – min. distance from dBi Face in metres	0.125	0.300	0.300	0.500

Accessing Parameters

In order to view or change parameters values one of the following methods must be used:

Profibus Network

The dBi PROFIBUS PA transducer can be addressed/setup via a Profibus master.

dBi PROFIBUS PA modem and PAPC software

If you have purchased a dBi PROFIBUS PA modem then you will have received the PC software called PAPC. This combination will allow you to configure, diagnose and update the firmware of any of dBi Profibus PA range.

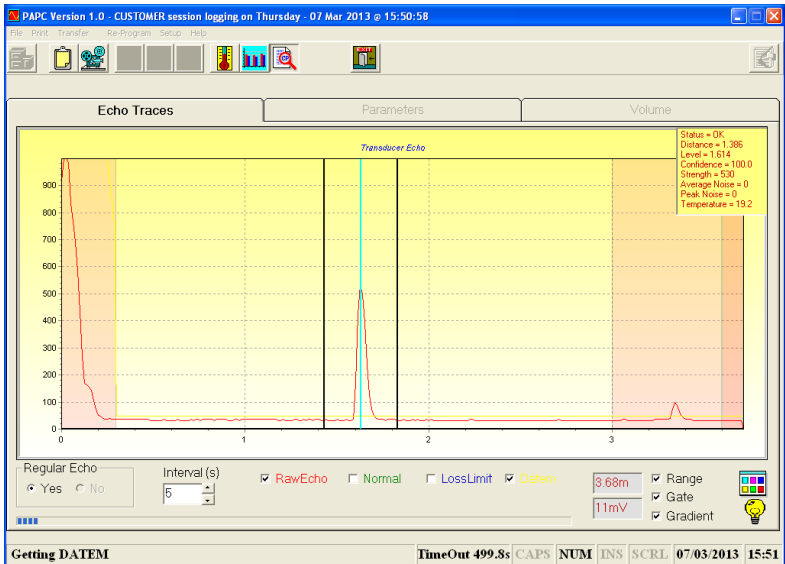


The modem is connected to the PC via USB, this powers the modem and the dBi Profibus PA transducer, when connected, via the two spring terminals.

The modem appears on the PC as a serial port and if you look in Device Manager on the PC for “USB Sreial Port (COM ‘X’)” in PORTS (COM & LPT) you will find the COM port you are using. When you open PAPC for the first time go into SETUP from the top menu and set COM port to COM ‘X’(‘X’ is the value found from device manager).

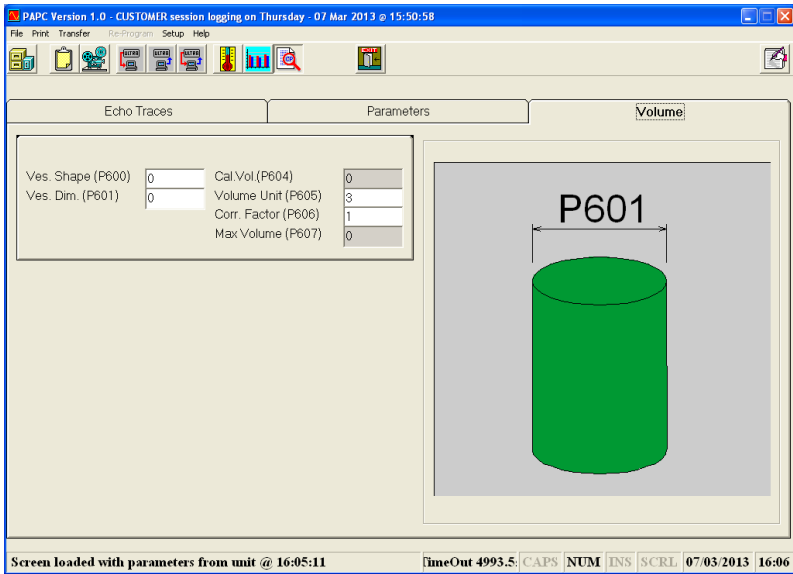
The modem is simple to use and has the following:

- Mini USB connector on top to connect to a PC
- Sprung terminals on top to connect your dBi Profibus PA transducer
- Switch – Off, Normal or Boot. ‘Off’ switches off the power to the transducer, ‘Normal’ is for use with PAPC for setup/diagnostics and ‘Boot’ for upgrading the firmware.
- Power LED – Green is on if the USB is connected
- Boot LED – Red On when the switch is in Boot position
- Normal Led – Green ‘On’ when the switch is in Normal position
- Data Led – Green is on when data is flowing between the Modem and the dBi Profibus PA transducer.



Display of the target echo

Parameter Tab



Volume Tab

Chapter 4 Getting Results With dBi s Intelligent Transducer

This chapter explains how to undertake the various functions of your **dBi Series Intelligent Transducer**. Where specific parameters are used, consult Parameter Guide in Chapter 5.

Setting up Your Application

Empty Distance

Empty Distance (P105) is the distance from the face of the transducer to the material at the bottom of the vessel.

Span

Span (P106) is the distance from the empty level (0% full) to span (100% full).

Near and Far Blanking

Near blanking (P107) is the distance from the face of the transducer that the **dBi Series Intelligent Transducer** will not record a level nearer than. A typical reason to increase this from the default value would be if you wish to ignore close in obstructions.

Far blanking (P108) is the distance (as a percentage of empty level) beyond the empty level that the **dBi Series Intelligent Transducer** will read, the default is plus 20% of empty level. If you wish to monitor further than the **empty level**, then increase this figure, so that the **empty level** plus the **far blanking** figure (as % of empty level) is greater than the surface being measured, within the capability of the transducer being used.

Setting Security Passcodes

A passcode is used to protect parameter entries and will be required when accessing parameters with certain PC Software's.

You can set a new passcode to prevent anyone changing any of your settings within your **dBi Series Intelligent Transducer**. The default **passcode** is **1997**, but this may be changed as follows.

Additional Information

The passcode is also used for remote access using certain PC Software's, so if this is being used, ensure any additional equipment using this feature is changed accordingly.

Changing The Passcode

You can set the **passcode** to any number from 0000 to 9999. To do this, select **P922** which is the **Passcode** parameter which can be changed as required.

Resetting Factory Defaults

If you need to restore parameters to their original factory settings, then access parameter **P930**, which is the factory defaults parameter, change the value to **1** and **ENTER**, all parameters will be restored to the factory settings (including the DATEM trace).

Checking the Information Specific to your dBi Series Intelligent Transducer

There are some parameters dedicated to each individual **dBi Series Intelligent Transducer**, such as the software revision and the unit's serial number.

Checking the Software Revision and Serial Number

If you need to identify the serial number of the unit or the current level of software in your **dBi Series Intelligent Transducer**, the following parameters can be used. Select parameter **P926** to view the identity of the current software **revision** or **P928** for the **serial number** of the unit.

Chapter 5 Parameter Guide

Parameter Listing

This chapter describes all of the parameters contained within the **dB_i (Profibus PA) Series Intelligent Transducer**.

Application

Operation

P101 Transducer Type

This parameter is Read-Only indicates the type of transducer in use.

Option	Description
1 = dB3	dB3 Transducer
2 = dB6	dB6 Transducer
3 = dB10	dB10 Transducer
4 = dB15	dB15 Transducer

P102 Material

This parameter should be set to the type of material being monitored.

Option	Description
1 = Liquid (Default)	Use for liquids and flat solid materials
2 = Solid	Solid material that is heaped or at an angle

Distances

P104 Measurement Units

This parameter sets the units you want to use for programming.

Option	Description
1 = metres (Default)	All units of measure are METRES
2 = cm	All units of measure are CENTIMETRES
3 = mm	All units of measure are MILLIMETRES
4 = feet	All units of measure are FEET
5 = inches	All units of measure are INCHES

P105 Empty Level

This parameter is to be set to the maximum distance from the face of the transducer to the empty point, in **P104 Measurement Units**. Note this value affects span as well, so should be set before span. **Default: dBi 3 = 3.00m (9.84 feet), dBi 6 = 6.00m (19.69 feet), dBi 10 = 10.00m (32.81 feet) and dBi 15 = 15.00m (49.21 feet).**

P106 Span

This parameter should be set to the maximum distance from the **Empty Level (P105)** to the maximum material level. It is automatically set to be equal to the **Empty Level (P105)** less the **Near Blanking distance (P107)**, when you set the empty level. **Default dBi 3 = 2.80m (9.19 feet), dBi 6 = 5.70m (18.70 feet), dBi 10 = 9.70m (31.82 feet) and dBi 15 = 14.5m (47.57)**

P107 Near Blanking Distance

This parameter is the distance from the face of the transducer that is not measurable, and is pre-set to the minimum value dependant on the version of **dBi Series Intelligent Transducer** being used. It should not be set to less than this figure, but can be increased.

dBi Version	Near Blanking Distance
dBi 3 metre	Default Blanking Distance = 0.125m (0.66 feet)
dBi 6 metre	Default Blanking Distance = 0.3m (0.98 feet)
dBi 10 metre	Default Blanking Distance = 0.3m (0.98 feet)
dBi 15 metre	Default Blanking Distance = 0.5m (1.64 feet)

P108 Far Blanking Distance

This is the distance (as a **percentage** of empty level) beyond the empty point that the unit will be able to measure, and the **default** is pre-set to **10%** of the empty level.

If the surface being monitored can extend beyond the **Empty Level (P105)** then the far blanking distance can be increased to a maximum of 100% of empty level.

This parameter is always entered as a % of empty level.

Communication

Address

P132 Profibus Address

This parameter is used to address the device in Profibus PA communication network. **Default = 125**

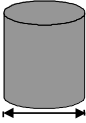
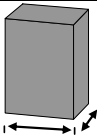
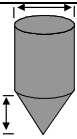
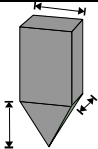
Volume

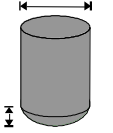
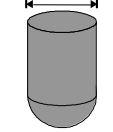
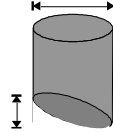
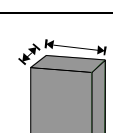
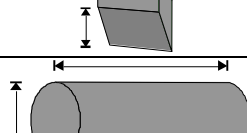
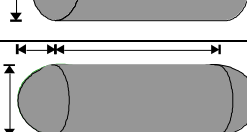
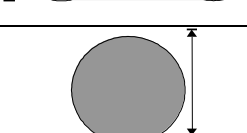
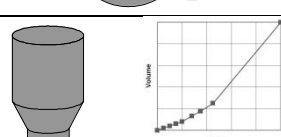
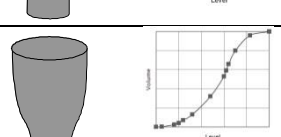
Conversion

P600 Vessel Shape

This parameter determines which vessel shape is used when utilising “Volume Conversion”.

The choices are as shown in the table below, along with the **dimensions** that are required to be entered (**P601-P603**).

Vessel Shape	P600 Value	Dimensions Required
	P600=0 Cylindrical Flat base (Default)	Cylinder diameter
	P600=1 Rectangular Flat base	Width and Breadth
	P600=2 Cylindrical Cone base	Cylinder diameter and height of bottom
	P600=3 Rectangular Pyramid base	Width and Breadth of rectangular section and height of bottom

Vessel Shape	P600 Value	Dimensions Required
	P600=4 Cylindrical Parabola base	Cylinder diameter and height of bottom
	P600=5 Cylindrical Half-sphere base	Cylinder Diameter
	P600=6 Cylindrical Flat sloped base	Cylinder diameter and height of bottom
	P600=7 Rectangular Flat sloped base	Width and Breadth of rectangular section and height of bottom
	P600=8 Horizontal cylinder with flat ends	Cylinder diameter and tank length
	P600=9 Horizontal cylinder with parabolic ends	Cylinder diameter, length of one end section, and tank length
	P600=10 Sphere	Sphere diameter
	P600=11 Universal Linear	No dimensions required, level and volume breakpoints used.
	P600=12 Universal Curved	No dimensions required, level and volume breakpoints used.

P601-P603 Vessel Dimensions

These three parameters are used to enter the dimensions required to calculate the volume. The dimensions required are as shown below.

Vessel Shape	P601	P602	P603
P600=0 Cylindrical Flat base	Cylinder Diameter		
P600=1 Rectangular Flat base		Width of rectangle	Breadth of rectangle
P600=2 Cylindrical Cone base	Height of base	Cylinder Diameter	
P600=3 Rectangular Pyramid base	Height of base	Width of rectangle	Breadth of rectangle
P600=4 Cylindrical Parabola base	Height of base	Cylinder Diameter	
P600=5 Cylindrical Half-sphere base	Cylinder Diameter		
P600=6 Cylindrical Flat sloped base	Height of base	Cylinder Diameter	
P600=7 Rectangular Flat sloped base	Height of base	Width of rectangle	Breadth of rectangle
P600=8 Horizontal cylinder with flat ends	Length of Cylinder	Cylinder Diameter	
P600=9 Horizontal cylinder with parabolic ends	Length of Cylinder	Cylinder Diameter	Length of one end section
P600=10 Sphere	Sphere Diameter		

P604 Calculated Volume

This parameter displays the maximum volume that has been calculated by the **dB*i* Series Intelligent Transducer** and is a Read Only parameter. The volume displayed will be shown in cubic meters and is the total volume available between **empty level (P105)** and 100% of **span (P106)**.

P605 Volume Units

This parameter determines the units that will be used in calculating volume conversion. It is used in conjunction with **P607 (maximum volume)**.

The choices are:

Option	Description
0 = No Units	Volume will be totalised with no units
1 = Tons	Volume will be totalised in Tons
2 = Tonnes	Volume will be totalised in Tonnes
3 = Cubic metres (Default)	Volume will be totalised in cubic metres
4 = Litres	Volume will be totalised in litres
5 = UK Gallons	Volume will be totalised in UK Gallons
6 = US Gallons	Volume will be totalised in US Gallons
7 = Cubic feet	Volume will be totalised in cubic feet
8 = Barrels	Volume will be totalised in barrels

P606 Correction Factor

This parameter is used to enter a correction factor, when required, such as the specific gravity of the material so that the volume calculated is relative to the actual amount of material that can be contained between **empty level (P105)** and 100% of **span (P106)**. **Default = 1**

P607 Max Volume

This parameter displays the actual maximum volume that has been calculated by the **dBi Series Intelligent Transducer**, i.e. **P604 Calculated Volume x P606 Correction Factor**, and is a Read Only parameter. The volume displayed will be shown in **P605 Volume Units** and is the total volume available between **empty level (P105)** and 100% of **span (P106)**.

Breakpoints

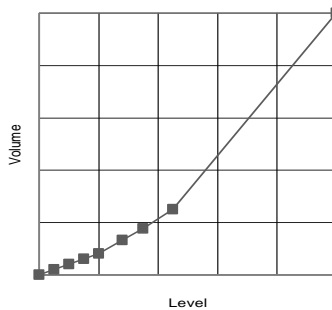
P610-P641 Level/Volume Breakpoints

These parameters are used to create a profile of the vessel when **P600=11 (universal linear)** or **P600=12 (universal curved)**. You should enter breakpoints in pairs, a reading for level and its corresponding volume. The more pairs you enter, the more accurate the profile will be. In the case of universal linear, then enter the level/volume at each of the points where the vessel changes shape. In the case of the universal curved, enter values around each arc tangent, as well as at the top and bottom.

You must enter at least two pairs, and you can enter up to 16 pairs.

Universal Linear (P600=11)

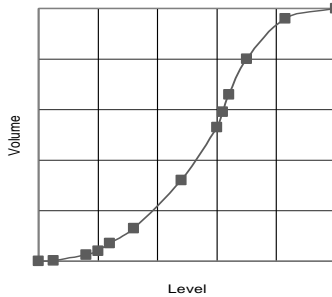
This volume calculation creates a linear approximation of the level/volume relationship, and works best if the vessel has sharp angles between each section.



You should enter a level/volume breakpoint for each place where the vessel changes direction, and numerous where the section is slightly curved (mostly linear, but has got a small arc). You can enter any number of pairs between 2 and 16.

Universal Curved (P600=12)

This volume calculation creates a curved approximation of the level/volume relationship, and works best if the vessel is non-linear, and there are no sharp angles.



You should enter 2 level/volume breakpoints at the minimum and maximum levels, and several for each place where the vessel has got an arc. You can enter any number of pairs between 2 and 16.

P696 Reset Breakpoints

This parameter allows the resetting, to the default value, of all previously set breakpoints (P610-673), without having to access them individually. When it is necessary to reset or amend particular breakpoints this can be achieved by directly accessing the desired parameter (P610-673) and changing as required.

P697 Number of Breakpoints Set

This parameter allows you to review the number of breakpoints that have been set, without the need to access each individual one in turn, this is a “Read Only “ parameter and no values can be entered.

Compensation

P841 Measurement Offset

The value of this parameter is added to the measured distance, in **Measurement Units (P104)**.

This Offset will be added to the level, as derived from the transducer, and will affect everything.

P842 Temperature Source

This parameter determines the source of the temperature measurement. By **default** it is set to internal (transducer) (**P842=1**), which will automatically detect the temperature from the transducer. If for any reason, no temperature input is received, then the **Fixed Temp** value is used, as set by **P844**.

The temperature source can be specifically set as follows:

Option	Description
1 = Automatic (Default)	Will automatically select transducer temperature sensor unless it is unavailable in which case it will use the fixed temp.
1 = Transducer	Always uses temperature reading from transducer.
2 = Fixed	Always uses fixed temperature (P844)

P844 Fixed Temperature

This parameter sets the temperature, in degrees centigrade to be used if **P842 (Temperature Source) =2**. **Default = 20°C**

P847 Temp Cal

This parameter sets the temperature calibration, in degrees centigrade to be used if **P842 (Temperature Source) =1**. **Default = 0°C**

P849 Num Temp Average

This parameter is used to set the averaging process of temperature measurements. **Default = 30 cycles**

P860 Sound Velocity

This option allows for the velocity of sound to be changed according to the atmosphere the transducer is operating in. By **default** the velocity is set for **342.72m/sec** which is the speed of sound travelling in air at a temperature of **20°C**.

The table below gives details of the velocity of sound in various gaseous atmospheres. In all cases the velocity indicated is that in a 100% gaseous atmosphere at 0°C. In atmospheres less than 100% it may be necessary to check the level indicated at near empty and near full and compare with the actual level, several times, then adjust the **Sound Velocity** accordingly to obtain an accurately displayed reading.

Gas	Sound Velocity
Chlorine	206 m/sec
Argon	308 m/sec
Oxygen	316 m/sec
Air (Default)	331.5 m/sec
Ammonia	415 m/sec
Methane	430 m/sec
Helium	435 m/sec
Neon	965 m/sec

Stability

Damping

Damping is used to change how quickly or slowly the device responds to changes in level.

P870 Fill Damping

This parameter determines the maximum rate at which the unit will respond to an increase in level. It should be set slightly higher than the maximum vessel fill rate. **Default = 10.000 metres/minute (32.81 feet/minute)**

P871 Empty Damping

This parameter determines the maximum rate at which the unit will respond to a decrease in level. It should be set slightly higher than the maximum vessel empty rate. **Default = 10.000 metres/minute (32.81 feet/minute)**

Filters

P881 Fixed Distance

This parameter determines the width of gate to be used in tracking an echo and under normal circumstances will not require changing, but it can be increased in the cases where the surface is moving extremely fast (in excess of 10m/min) to ensure smooth processing of the changing level.

P882 Process Filter

The process filter determines how many seconds before the medium is taken of the readings to output as the read value. The options are.

Option	Description
1 = Fast	Every reading is output.
2 = Medium 5	The medium readings over 5 seconds
3 = Medium15 (Default)	The medium readings over 15 seconds
4 = Medium30	The medium readings over 30 seconds
5 = Medium60	The medium readings over 60 seconds
6 = Medium90	The medium readings over 90 seconds
7 = Slow	The medium readings over 2 minutes

P884 Peak Percentage

When P102 = 2 (Solids), this parameter can be used to determine the point at which the the measurement is taken, within the established gate of the selected echo, in order to compensate for any error that maybe caused by “angles of repose” presented by the way the material settles. Please consult Pulsar, for further information and assistance on changing the value of this parameter.

P808 Fail-safe Mode

By default, if a fail-safe condition occurs, then the values are held at their last **known** values until a valid reading is obtained.

If required, then you can change this so that the unit goes to **high** (100% of span), or **low** (empty) as follows: (Table on next page)

Option	Description
1 = Known (Default)	Remain at the last known value
2 = High	Will fail to the high value (100% of Span).
3 = Low	Will fail to the low value (empty)

P809 Fail-safe Time

In the event of a fail-safe condition occurring, the fail safe timer determines the time before fail-safe mode is activated. **Default = 2.00 mins**

If the timer activates, the unit goes into **fail-safe**, as determined by **P808**.

When a valid measurement is obtained then the values will be restored and the timer is reset.

System

Password

P921 Enable Code

Enables the passcode (**P922**), which means the passcode must be entered to go into program mode. If **disabled** (set to **0**), then no passcode is required, and pressing ESC and ENTER button simultaneously will allow entry into the program mode.

P922 Passcode

This is the passcode that must be used to enter program mode. The **default** is **1997**, but this can be changed to another value.

System Information

P926 Software Revision

This parameter will display the current software revision.

P927 Hardware Revision

This parameter will display the current hardware revision. It is read only, and cannot be changed.

P928 Serial Number

This parameter will display the serial number of the unit.

P930 Factory Defaults

This parameter resets all parameter values to the original Factory Set values that were installed when the unit was tested, before despatch to you.

To **reset** parameters, set P930 to 1.

DATEM

P20 Set DATEM

This parameter allows DATEM to be reset to its default value. To reset DATEM to its default value set parameter value to 2, the trace will then be set to its default value and then update as normal.

P21 Set Dist

Allows the user or service personnel to determine which echo is to be displayed. On start up, if the unit outputs an incorrect reading then simply enter the distance from the transducer to the required level and, if an echo is present at this point, the Gate will establish itself around the chosen echo, DATEM will update in front of the Gate and reference out any other unwanted echoes.

It should be noted that DATEM will reset to default values whilst performing this function, and reform itself once it has selected an echo.

Enter distance from **the face of transducer to the target** in units of measurement P104

Values: Min. 0.000, Max. 99.00

P905 Sensitivity

This parameter is used to set the minimum setting for the DATEM trace. Please consult Pulsar for further information and assistance on changing the value of this parameter.

P906 Side Clearance

This parameter is used to set the “**distance**” by which the DATEM trace will “stand off” from around unwanted echoes such as obstructions. Please consult Pulsar for further information and assistance on changing the value of this parameter.

PA Communication

This chapter describes all of the remote operation of Pulsar dBi Profibus PA transducers. It is a Class A, Profile 3.02 device which fully supports Class 1 master for cyclic and acyclic communications and Class 2 for acyclic services. Full details of Profibus PA protocols and Profile specification can be obtained from PROFIBUS International at www.profibus.com.

GSD File

To configure a Profibus PA master, a GSD file will be needed. The GSD file (Puls0D20.gsd) is available for download from the support page of our web site at www.pulsar-pm.com

Profibus Address

The Profibus device is shipped with address 125 as default. The address can be set via a PA Modem without the Profibus network or via a PLC using Set_Slave_Address services

Bus Termination

Bus termination should be terminated at both ends of the network cable. Refer to PROFIBUS PA User and Installation Guidelines (order number 2.092), available from www.profibus.com

Loop Power

Pulsar dBi Profibus Transducer operates at constant current of 20mA with FISCO model

Cyclic Communication and Condensed Status

When regular input information is required, user needs to set up cyclic communication data. The standard FBOU (slot 1, index 10) will return 5 bytes of data, a floating point value (4 bytes) and a status (1 byte)

Floating Point

Status

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5

The first 4 bytes are the floating point (IEEE) presentation of the primary variable. The last byte is the condensed status byte as defined below

Quality	Status	Description
Bad		
	0x00	Bad – non specific Proxy determines that device does not communicate
	0x23	Bad – passivated (diagnostic alert inhibited) Configured fail safe value is used accompanied by this status. No further diagnostic events are mapped to the Slave_Diag service.
	0x24-0x27	Bad – maintenance alarm (diagnostics available) No measurement available because of failure. The detailed diagnostic can be indicated with DIAGNOSIS_EXTENSION parameter
	0x28-0x2B	Bad – process related, no maintenance No measurement available because if invalid process conditions.
	0x3C-0x3F	Bad – function check, local override Indication of cross over to MAN or LOCAL override
Uncertain		
	0x4B	Uncertain – substitute set Caused by a PV or simulated value with status BAD-maintenance alarm, more diagnosis available or BAD-function check. Caused by a communication loss or initiate fail safe state. Affect status of output parameter FB_OUT
	0x4F	Uncertain – initial value. Default value as long as no measured value is available or until diagnostic is made that affects the value and its according status
	0x68-0x6B	Uncertain –maintenance demanded Output value is potentially invalid. Short-term maintenance is needed to guarantee the availability

	0x73	<p>Uncertain-simulated value starts</p> <p>Indicates the start of a simulation. Mode changes from AUTO to MAN. This status will remain active for 10 seconds</p> <ul style="list-style-type: none"> • After enabling the simulation • After setting FB to MAIN mode • After a restart (eg. Power down cycle) if the simulation is enabled or the FB is in MAN mode • After passivation is cleared if the simulation is enabled or the FB is in MAN mode <p>In MAN mode the status remains until subsequent write command overwrites the OUT value after the 10 seconds are expires.</p> <p>In case of simulation mode the written status is buffered and appears in the OUT value after 10 seconds. However, the new written SIMULATE parameter with its status can be read out before the 10 seconds will expire</p>
	0x74-0x77	<p>Uncertain-simulated value ends (limit apply)</p> <p>Indicates the end of a simulation. Simulation of a measured value is disabled or input FB changes from MAN to AUTO. This status remains for 10 seconds after simulation ends. While this status active there is no reliable measurement value. Actual measured value and its status are updated afterwards</p>
	0x78-0x7B	<p>Uncertain-process related, no maintenance</p> <p>The device conditions are out of the specified operating range. The value may have reduced quality or accuracy</p>
Good		
	0x80	Good-ok
	0x81-0x8E	<p>Good (limit check apply), update events</p> <p>This status remains active for 20 seconds.</p>
	0xA0-0xA3	Good-initial fail safe (limit check apply)
	0xA4-0xA7	<p>Good-maintenance required (limit apply)</p> <p>Value is valid. Maintenance is recommended within a medium-term period</p>

	0xA8-0xAB	Good-maintenance demanded (limit apply) Value is valid. Maintenance is strongly recommended within a short-term period
	0xBC-0xBF	Good-function check (limit apply) Device performs internal function check without influencing the measurement process. Value is valid

Cyclic Diagnostics

Cyclic diagnosis is available via the GET_DIAG message with SAP 50 indication. During DPV0 cyclic data exchange, the device may inform the master when an error occurs. The master then initiates a Diagnosis request. The reply may contain two parts. The first part is normal diagnostics and the second part is extended diagnostics.

The diagnosis information is specified in Profile 3.02 as followed

Byte	Bit	Diagnosis	Description
1	0..7		Reserved
2	0		Reserved
	1		Reserved
	2		Reserved
	3	Warm start	Set after power on or factory reset
	4	Cold start	Set after factory reset
	5	Maintenance	Maintenance required
	6		Reserved
	7	Ident violation	Set to 1 if Ident_Number of PB does not match IDENT_SELECTOR. If IDENT_SELECTOR=127 (adaptation mode) then the diagnosis bit is cleared
3	0	Maintenance alarm	Failure of device
	1	Maintenance demanded	Maintenance demanded
	2	Function check	Device is in function check mode or in simulation or under local control e.g. maintenance
	3	Invalid process	The process do not return a valid measurement. No maintenance

Byte	Bit	Diagnosis	Description
	4..7		Reserved
4	0..6		Reserved
	7	Diagnosis extension	0: no more information available 1: more diagnosis information is available in DIAGNOSIS_EXTENSION

Acyclic Communication

Pulsar Profibus PA device can support up to two simultaneous connections by a Class 2 Master (C2 connection) and one connection by a Class 1 Master (C1 connection).

For a Class 1 Master to read parameters from the sensor, it needs to address the slot and absolute address of the parameter. Full list of device addresses can be found in Chapter 8 with reference to the block indices.

To get the absolute address for any parameter, add the index offset for the appropriate block to the relative index for that parameter. The parameter takes the slot number of the located block.

Extended Diagnostics

The extended diagnostics of the Pulsar Profibus PA consists of 4 bytes which are triggered by the following conditions

Byte 3	Byte 2	Byte 1	Byte 0
Bit 63 Bit 32	Bit 31 Bit 16	Bit 15 Bit 8	Bit 7 Bit 0

Byte	Bit	Diagnosis	Set	Reset
0	0	Loss of returned echo	Echo loss	Echo found
	1	Transducer fault	Hardware error	Hardware fix
	2	-		0
	3	Temperature out of range	T<-40 or T>85	T>-40 & T<85
	4	-		0
	5	Failed safe	Failure of 2 min	Failure fix
	6	-		0
	7	-		0
	8	-		0
	9	Supply voltage low	Supply too low	Supply fix

Byte	Bit	Diagnosis	Set	Reset
1	10	-		0
	11	Warm start	After warm boot	After 10s
	12	Cold start	After cold boot	After 10s
	13	Maintenance required		0
	14	-		0
	15	Ident violation	Wrong ident	Ident correct
2	0..7	-	Reserved	0
3	0..7	-	Reserved	0

Chapter 7 Profibus PA Modules Lists

Module 1 : Measurements (integer)

Variable Name	Data Type	Unit
Level	16-bit unsigned integer	mm
Distance	16-bit unsigned integer	mm
Calculated volume	16-bit unsigned integer	m ³
Percentage volume	16-bit unsigned integer	x 0.01 %

Module 2 : Measurements (float)

Variable Name	Data Type	Unit
Level	32-bit float	MU (see note 1)
Distance	32-bit float	MU (see note 1)
Calculated volume	32-bit float	VU (see note 2)
Percentage volume	32-bit float	%

Module 3 : Echo Info

Variable Name	Data Type	Unit
Temperature	8-bit byte	Degree Celcius
Status	8-bit byte	
Echo confidence	8-bit byte	%
Echo strength	8-bit byte	x 10 mV (dB)
Echo HALL	8-bit byte	x 10 mV (dB)
Average noise	8-bit byte	x 10 mV (dB)
Peak noise	8-bit byte	x 10 mV (dB)

Note:

- 1) MU denotes Measurement Unit as programmed in P104
- 2) VU denotes Volume Unit as programmed in P604

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Chapter 8 Asynchronous Data Map

Directory

Slot	Index	Value	Description
1	0	0	Directory Header
		1	0 – Directory ID (not used)
		1	1 – Revision number
		6	1 – Number of entries
		1	6 – Directory entries
		3	1 – First composite list 3 – Number of composite lists
1	1	List Directory	
		Index Offset No.of blocks	
		1,4,0,1	1 4 1 (1 PB, at index 4)
		1,5,0,1	1 5 1 (1 TB, at index 5)
		1,6,0,1	1 6 1 (1 FB, at index 6)
		Directory	
		Slot Index No.of parameters	
		0,16,0,52	0 16 52 (Physical Block)
		1,110,0,109	1 110 109 (Transducer block)
		1,16,0,88	1 16 88 (AIFB block)

Physical Block: PB

Ind	Name	Acc	Setup	Structure	Par
0	Block Object	r		Reserved	
				Block object	
				Parent Class	
				Class	
				DD Reference	
				DD Revision	
				Profile	
				Profile Revision	
				Execution Time	
				Number of Parameters	
				Index of View 1	
1	ST Revision	r	Y	Unsigned Integer (2)	
2	Tag	r/w	Y	ASCII (32)	
3	Strategy	r/w	Y	Unsigned Integer (2)	
4	Alert Key	r/w	Y	Unsigned Integer (1)	

Ind	Name	Acc	Setup	Structure	Par
5	Target Mode	r/w	Y	Unsigned Integer (1)	
6	Mode Block	r		Unsigned Integer (3)	
7	Alarm Summary	r	Y	ASCII (8)	
8	SW Revision	r		ASCII (16)	
9	HW Revision	r	Y	ASCII (16)	
10	Manufacturer ID	r	Y	Unsigned Integer (2)	
11	Device ID	r	Y	ASCII (16)	
12	Serial Number	r	Y	ASCII (16)	92
13	Diagnosis	r		Unsigned Integer (4)	
14	Diagnosis Extension	r		BYTE (6)	
15	Diagnosis Mask	r		Unsigned Integer (4)	
16	Diagnosis Ext Mask	r		BYTE (6)	
17	Device Certification	r		ASCII (32)	
18	Security Locking	r/w	Y	Unsigned Integer (2)	
19	Factory Reset	r/w	Y	Unsigned Integer (2)	88
20	Descriptor	r/w	Y	ASCII (32)	
21	Device Message	r/w	Y	ASCII (32)	
22	Installation Date	r/w	Y	ASCII (16)	
24	PROFIBUS Ident	r	Y	Unsigned Integer (1)	
51	Reset Counter	r/w	Y	Unsigned Integer (1)	
52	Self Check	r/w		Unsigned Integer (1)	

Physical Block View Object

Ind	Name	Acc	Structure
1	ST Revision	R	Unsigned Integer (2)
6	Mode Block	R	Unsigned Integer (3)
7	Alarm Summary	R	ASCII (8)

Analog Input Function Block: AIFB

Ind	Name	Acc	Setup	Structure	Par
0	Block Object	r		Reserved	
				Block object	
				Parent Class	
				Class	
				DD Reference	
				DD Revision	
				Profile	
				Profile Revision	
				Execution Time	
				Number of Parameters	
				Index of View 1	
				Number of views	
1	ST Revision	r	Y	Unsigned Integer (2)	
2	Tag	r/w	Y	ASCII (32)	
3	Strategy	r/w	Y	Unsigned Integer (2)	
4	Alert Key	r/w	Y	Unsigned Integer (1)	
5	Target Mode	r/w	Y	Unsigned Integer (1)	
6	Mode Block	r		Unsigned Integer (3)	
7	Alarm Summary	r	Y	ASCII (8)	
8	Batch Information	r/w	Y	ASCII (10)	
10	OUT	r/w		Float (4)	
				Unsigned Integer (1)	
11	PV Scale	r/w	Y	Float (8)	
13	Linear Type	r/w	Y	Unsigned Integer (1)	
14	Channel	r/w	Y	Unsigned Integer (2)	
16	Failsafe Time	r/w	Y	Float (4)	808
17	Failsafe Mode	r/w	Y	Unsigned Integer (1)	809
19	Limit Hysteresis	r/w	Y	Float (4)	
21	Upper Limit Alarm	r/w	Y	Float (4)	
23	Upper Limit Warning	r/w	Y	Float (4)	
25	Lower Limit Warn	r/w	Y	Float (4)	
27	Lower Limit Alarm	r/w	Y	Float (4)	
30	Fail HiHi Alarm	r		BYTE (16)	
31	Fail Hi Alarm	r		BYTE (16)	
32	Fail Lo Alarm	r		BYTE (16)	
33	Fail LoLo Alarm	r		BYTE (16)	
34	Simulate	r/w	Y	BYTE (6)	

Ind	Name	Acc	Setup	Structure	Par
45	Enable Code	r/w	Y	Unsigned Integer (1)	921
46	Passcode	r/w	Y	Unsigned Integer (2)	922
47	Vessel Shape	r/w	Y	Unsigned Integer (1)	600
48	Volume Conv 1	r/w	Y	Float (4)	601
49	Volume Conv 2	r/w	Y	Float (4)	602
50	Volume Conv 3	r/w	Y	Float (4)	603
51	Volume Unit	r/w	Y	Unsigned Integer (1)	605
52	Correction Factor	r/w	Y	Float (4)	606
53	Maximum Volume	r/w	Y	Float (4)	607
54	Calculated Volume	r/w	Y	Float (4)	604
55	Reset Breakpoints	r/w	Y	Unsigned Integer (1)	696
56	No of Breakpoints	r	Y	Unsigned Integer (1)	697
57	Level 1	r/w	Y	Float (4)	610
58	Volume 1	r/w	Y	Float (4)	611
59	Level 2	r/w	Y	Float (4)	612
60	Volume 2	r/w	Y	Float (4)	613
61	Level 3	r/w	Y	Float (4)	614
62	Volume 3	r/w	Y	Float (4)	615
63	Level 4	r/w	Y	Float (4)	616
64	Volume 4	r/w	Y	Float (4)	617
65	Level 5	r/w	Y	Float (4)	618
66	Volume 5	r/w	Y	Float (4)	619
67	Level 6	r/w	Y	Float (4)	620
68	Volume 6	r/w	Y	Float (4)	621
69	Level 7	r/w	Y	Float (4)	622
70	Volume 7	r/w	Y	Float (4)	623
71	Level 8	r/w	Y	Float (4)	624
72	Volume 8	r/w	Y	Float (4)	625
73	Level 9	r/w	Y	Float (4)	626
74	Volume 9	r/w	Y	Float (4)	627
75	Level 10	r/w	Y	Float (4)	628
76	Volume 10	r/w	Y	Float (4)	629
77	Level 11	r/w	Y	Float (4)	630
78	Volume 11	r/w	Y	Float (4)	631
79	Level 12	r/w	Y	Float (4)	632
80	Volume 12	r/w	Y	Float (4)	633
81	Level 13	r/w	Y	Float (4)	634
82	Volume 13	r/w	Y	Float (4)	635
83	Level 14	r/w	Y	Float (4)	636
84	Volume 14	r/w	Y	Float (4)	637

Ind	Name	Acc	Setup	Structure	Par
85	Level 15	r/w	Y	Float (4)	638
86	Volume 15	r/w	Y	Float (4)	639
87	Level 16	r/w	Y	Float (4)	640
88	Volume 16	r/w	Y	Float (4)	641

Function Block View Object

Ind	Name	Acc	Structure
1	ST Revision	r	Unsigned Integer (2)
6	Mode Block	r	Unsigned Integer (3)
7	Alarm Summary	r	ASCII (8)
8	Batch	r/w	ASCII (10)

Transducer Block: TB

Ind	Name	Acc	Setup	Structure	Par
0	Block Object	r		Reserved	
				Block object	
				Parent Class	
				Class	
				DD Reference	
				DD Revision	
				Profile	
				Profile Revision	
				Execution Time	
				Number of Parameters	
				Index of View 1	
	Number of views				
1	ST Revision	r	Y	Unsigned Integer (2)	
2	Tag	r/w	Y	ASCII (32)	
3	Strategy	r/w	Y	Unsigned Integer (2)	
4	Alert Key	r/w	Y	Unsigned Integer (1)	
5	Target Mode	r/w	Y	Unsigned Integer (1)	
6	Mode Block	r		Unsigned Integer (3)	
7	Alarm Summary	r	Y	ASCII (8)	
8	PV Value (Level)	r		Float (4)	
				Unsigned Integer (1)	
9	PV Unit	r/w	Y	Unsigned Integer (2)	
10	SV Value (Volume)	r		Float (4)	
11	SV Unit		Y	Unsigned Integer (2)	
12	Distance	r		Float (4)	

Ind	Name	Acc	Setup	Structure	Par
13	Measurement Unit	r/w	Y	Unsigned Integer (2)	104
18	Measurement Offset	r/w	Y	Float (4)	851
32	Temperature	r		Float (4)	
34	Max Temperature	r/w		Float (4)	
35	Min Temperature	r/w		Float (4)	
36	Temperature Source	r/w	Y	Unsigned Integer (1)	852
37	Fixed Temperature	r/w	Y	Float (4)	854
53	Echo Confidence	r		Unsigned Integer (1)	
54	Echo Strength	r		Unsigned Integer (2)	
55	Echo HALL	r		Unsigned Integer (2)	
56	Average Noise	r		Unsigned Integer (2)	
57	Peak Noise	r		Unsigned Integer (2)	
58	Transducer Status	r		Unsigned Integer (1)	
60	Set DATEM	r/w	Y	Unsigned Integer (1)	20
61	Select Peak	r/w	Y	Float (4)	21
62	Update DATEM	r/w	Y	Unsigned Integer (1)	71
63	Break Point	r/w	Y	Float (4)	43
64	Slope	r/w	Y	Unsigned Integer (1)	44
65	Outside Count	r/w	Y	Unsigned Integer (2)	47
66	Scale First	r/w	Y	Unsigned Integer (1)	49
67	Echo Source	r/w	Y	Unsigned Integer (1)	67
68	Ring Down Loss	r/w	Y	Unsigned Integer (1)	41
69	Near Loss	r/w	Y	Unsigned Integer (1)	81
70	Far Loss	r/w	Y	Unsigned Integer (1)	82
71	Loss Change	r/w	Y	Float (4)	83
72	Mid Loss	r/w	Y	Unsigned Integer (1)	84
73	Transducer Type	r/w	Y	Unsigned Integer (1)	101
74	Empty Level	r/w	Y	Float (4)	105
75	Span	r/w	Y	Float (4)	106
76	Near Blanking	r/w	Y	Float (4)	107
77	Far Blanking	r/w	Y	Unsigned Integer (2)	108
78	Start Point	r/w	Y	Float (4)	109
79	Middle Point	r/w	Y	Unsigned Integer (1)	110
80	End Point	r/w	Y	Float (4)	111
81	Sound Velocity	r/w	Y	Float (4)	860
82	Fill Damping	r/w	Y	Float (4)	870
83	Empty Damping	r/w	Y	Float (4)	871
84	Fixed Distance	r/w	Y	Float (4)	881

Ind	Name	Acc	Setup	Structure	Par
85	Process Filter	r/w	Y	Unsigned Integer (1)	882
86	Sensitivity	r/w	Y	Unsigned Integer (1)	905
87	Side Clearance	r/w	Y	Float (4)	906
88	Echo Info	r		Unsigned Integer (125)	
89	Echo Raw 1	r		Unsigned Integer (125)	
90	Echo Raw 2	r		Unsigned Integer (125)	
91	Echo Raw 3	r		Unsigned Integer (125)	
92	Echo Raw 4	r		Unsigned Integer (125)	
93	Echo Normalised 1	r		Unsigned Integer (125)	
94	Echo Normalised 2	r		Unsigned Integer (125)	
95	Echo Normalised 3	r		Unsigned Integer (125)	
96	Echo Normalised 4	r		Unsigned Integer (125)	
97	Echo Datem 1	r		Unsigned Integer (125)	
98	Echo Datem 2	r		Unsigned Integer (125)	
99	Echo Datem 3	r		Unsigned Integer (125)	
100	Echo Datem 4	r		Unsigned Integer (125)	
101	Echo Loss 1	r		Unsigned Integer (125)	
102	Echo Loss 2	r		Unsigned Integer (125)	
103	Echo Loss 3	r		Unsigned Integer (125)	
104	Echo Loss 4	r		Unsigned Integer (125)	
105	Material Type	r/w	Y	Unsigned Integer (1)	102
106	Temperature Cal	r/w	Y	Unsigned Integer (1)	857
107	Num Temp Average	r/w	Y	Unsigned Integer (2)	859
108	Peak Percent	r/w	Y	Unsigned Integer (1)	884
109	Measurement Unit	r/w	Y	Unsigned Integer (1)	104

Transducer Block View Object

Rel .Ind	Name	Acc ess	Structure
1	ST Revision	r	Unsigned Integer (2)
6	Mode Block	r	Unsigned Integer (3)
7	Alarm Summary	r	ASCII (8)

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Chapter 9 Troubleshooting

This section describes many common symptoms, with suggestions as to what to do.

Symptom	What to Do
Transducer not firing.	Check power supply
Incorrect reading being obtained for current level.	Measure actual distance from transducer face to surface of material. Access P21 , via PC Software type in the measured distance , and Set Parameter .
Material level is consistently incorrect by the same amount.	Check empty level (P105) correctly entered.

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Parameter Record

APPLICATION

Parameter Details		Entered Values					
No.	Description	Default	1	2	3	4	5
P101	Transducer Type	Read Only					
P102	Material	1 = Liquid					
P104	Measurement Units						
P105	Empty Level						
P106	Span						
P107	Near Blanking						
P108	Far Blanking	20%					

COMMUNICATION

Parameter Details		Entered Values					
No.	Description	Default	1	2	3	4	5
P132	Profibus Address	125					

VOLUME

Conversion

Parameter Details		Entered Values					
No.	Description	Default	1	2	3	4	5
P600	Vessel Shape	0					
P601	Vessel Dimension 1	0.00					
P602	Vessel Dimension 2	0.00					
P603	Vessel Dimension 3	0.00					
P604	Calculated Volume	Read Only					
P605	Volume Units	Model Dependant					
P606	Correction Factor	1					
P607	Max Volume	Read Only					

Breakpoints

Parameter Details		Entered Values					
No.	Description	Default	1	2	3	4	5
P610	Level Breakpoint 1	0.00					
P611	Volume Breakpoint 1	0.00					
P612	Level Breakpoint 2	0.00					
P613	Volume Breakpoint 2	0.00					
P614	Level Breakpoint 3	0.00					
P615	Volume Breakpoint 3	0.00					
P616	Level Breakpoint 4	0.00					
P617	Volume Breakpoint 4	0.00					
P618	Level Breakpoint 5	0.00					
P619	Volume Breakpoint 5	0.00					
P620	Level Breakpoint 6	0.00					
P621	Volume Breakpoint 6	0.00					
P622	Level Breakpoint 7	0.00					
P623	Volume Breakpoint 7	0.00					
P624	Level Breakpoint 8	0.00					
P625	Volume Breakpoint 8	0.00					
P626	Level Breakpoint 9	0.00					
P627	Volume Breakpoint 9	0.00					
P628	Level Breakpoint 10	0.00					
P629	Volume Breakpoint 10	0.00					
P630	Level Breakpoint 11	0.00					
P631	Volume Breakpoint 11	0.00					
P632	Level Breakpoint 12	0.00					
P633	Volume Breakpoint 12	0.00					
P634	Level Breakpoint 13	0.00					
P635	Volume Breakpoint 13	0.00					
P636	Level Breakpoint 14	0.00					
P637	Volume Breakpoint 14	0.00					
P638	Level Breakpoint 15	0.00					
P639	Volume Breakpoint 15	0.00					
P640	Level Breakpoint 16	0.00					
P641	Volume Breakpoint 16	0.00					
P696	Reset Breakpoints	0					
P697	Number of B'points Set	Read Only					

COMPENSATION

Parameter Details		Entered Values					
No.	Description	Default	1	2	3	4	5
P841	Measurement Offset	0.000					
P842	Temperature Source	1 = Transducer					
P844	Fixed Temperature	20.00 Deg. C					
P847	Temp Cal	0					
P849	Num Temp Average	30					
P860	Sound Velocity	342.72 m/sec					

STABILITY

Damping

Parameter Details		Entered Values					
No.	Description	Default	1	2	3	4	5
P870	Fill Damping						
P871	Empty Damping						

Filters

Parameter Details		Entered Values					
No.	Description	Default	1	2	3	4	5
P881	Fixed Distance	0.2 metre					
P884	Peak Percentage	50%					

Fail Mode

Parameter Details		Entered Values					
No.	Description	Default	1	2	3	4	5
P808	Fail Mode	1 = Known					
P809	Fail Time	2.0 mins					

SYSTEM

Parameter Details		Entered Values					
No.	Description	Default	1	2	3	4	5
P921	Enable Code	1 = Yes					
P922	Passcode	1997					
P926	Software Revision	Read Only					
P927	Hardware Revision	Read Only					
P928	Serial Number	Read Only					

DATEM

Parameter Details		Entered Values					
No.	Description	Default	1	2	3	4	5
P905	Sensitivity	50 millivolts					
P906	Side Clearance	0.05 metres					