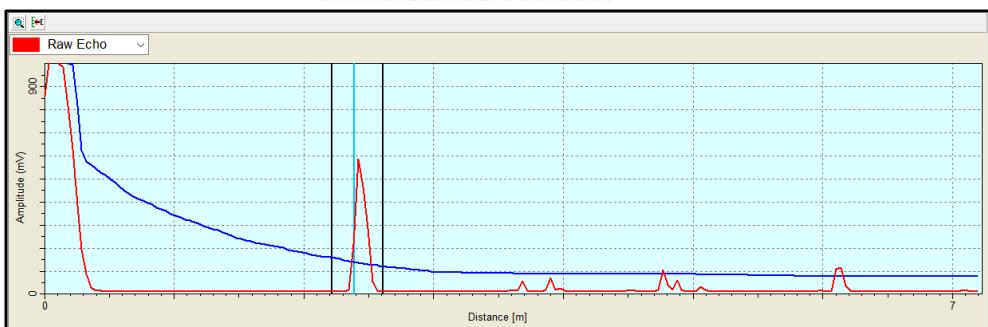




HART
COMMUNICATION PROTOCOL



Pulsar HART DTM

Instruction Manual

HART DTM INSTRUCTION MANUAL

Pulsar DTM Instruction Manual (SECOND EDITION REV 1)

February 2021

Part Number M-150-0-002-1P

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CHAPTER 1: START HERE...

Congratulations on your purchase of Pulsar's DTM software. This quality system has been developed over many years and represents the latest in high technology ultrasonic level measurement and control.

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.

Tips



TIP: Look for this icon throughout your Pulsar Measurement manual to find helpful information and answers to frequently asked questions.

Additional Information

Additional Information

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

About the Pulsar DTM Software

The Pulsar DTM Software is a powerful tool that can be used in conjunction with Pulsar's HART devices. Once installation is complete of the Pulsar DTM you will have the capability to communicate with a Pulsar device with FDT frame applications, such as PACT ware.

Using the Pulsar DTM you will be able to the following:

- Parameterization of the Pulsar device.
- Diagnostic echo trace.
- Measured-value information display.
- Trend graph function.
- Calibration of device.
- Printing of parameter values.

The Pulsar HART Device Type Manager (DTM) is used to parameterize Pulsar devices with HART capability. The universal and common practice commands of the HART protocol 7 are supported, which are processed by most HART devices.

Important Information

For optimum results using the Pulsar DTM with our products, please contact Pulsar for identification of the range of products available to be used in conjunction with the Pulsar DTM.

System Requirements

Operating System: Windows 7 (latest service pack installed), 8 & 10.

Disk Space required: 15MB approx.

Permissions: Administrator privileges required for installation.

CHAPTER 2 INSTALLING THE PULSAR DTM

Installing the Pulsar DTM

Installation of the DTM software is simple, it can be downloaded from our website:

www.pulsar-pm.com/Instrumentation/Support/Downloads/Software

After downloading the software on to a PC select the Windows Installer package icon  **Pulsar dBiHart**.

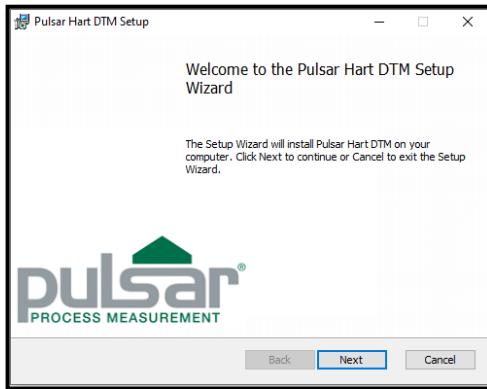
Upon selecting this you will then be taken through the process of installing the DTM on to a local PC by a series of information windows.



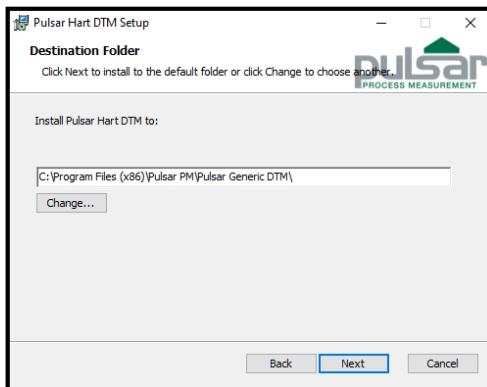
If you have a previous version of the Pulsar DTM that is older than the version being downloaded, you will need to first uninstall this older version.

You will now be prompted with a series of installation windows. Please follow the prompt windows below to install the DTM successfully.

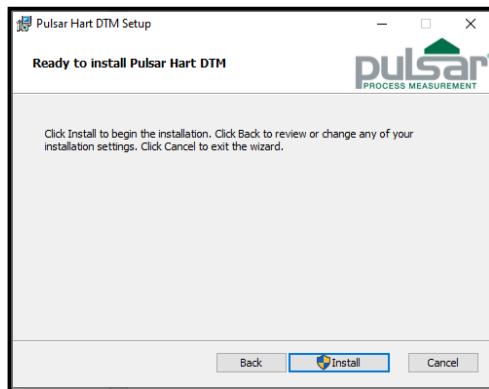
1. First screen of the installation. When ready to begin installation please select 'Next'.



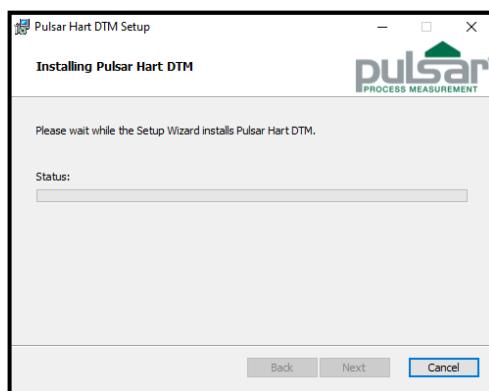
2. This next window asks you to select the destination folder of where the DTM files will be stored on the local PC.



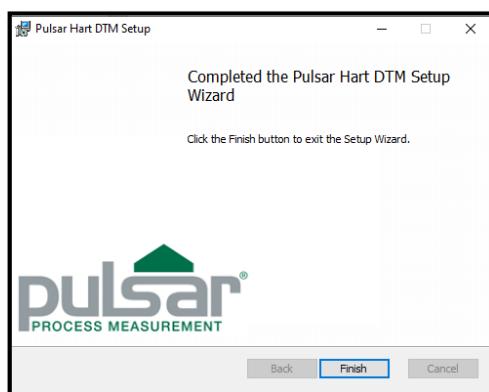
3. Selecting 'Install' will begin the DTM download, and a progress bar will appear.



4. A status bar will now fill across the window indicating the progress of the installation.



5. After a few moments the DTM will be successfully installed on to the local machine. Clicking Finish will complete the DTM installation and allow it to be utilised with configuration software.



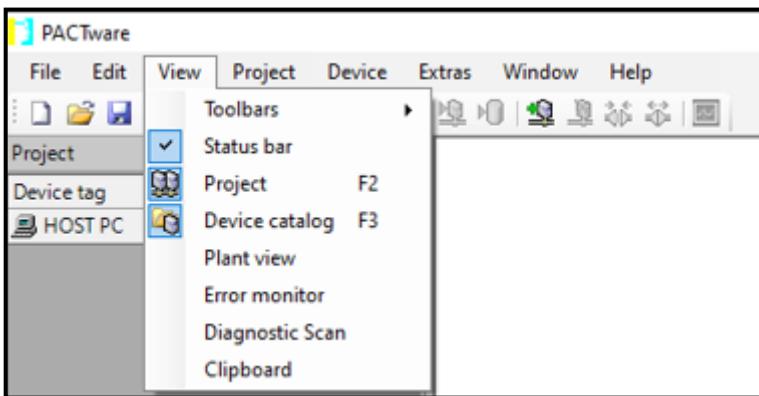
CHAPTER 3 CONNECTING TO THE PULSAR DTM

Pulsars DTM can now be used with proprietary software such as PACTware. This section gives an example of how to install and use the Pulsar DTM using PACTware software.

Adding the DTM

After opening the PACTware software the default home screen is displayed. To add the Pulsar DTM to the software you must first update the device catalogue so that the software can allow it to be used.

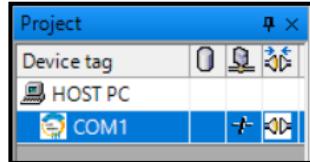
Select the option 'View' on the top tool bar and when the drop-down menu opens, select Device Catalog, as shown below:



This will then open up a screen displaying all listed devices, to add the Pulsar DTM select 'Update Device Catalog' and select yes to the question asked in the pop-up window. When completed, open the Device Catalog once again and the Pulsar DTM has been added to the list of available devices.

Return to the top menu bar and select the option 'Device', and from the drop-down menu select 'Add device'. You will now have a window appear to allow you to select the pulsar DTM.

Highlight the Pulsar DTM option and click OK, the project window should now look like this:



Selecting the correct Comport

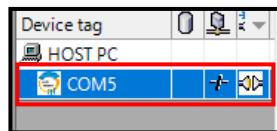
Prior to connecting to the Pulsar device, you will need to identify the comport that a HART modem is assigned to.

The comport can be changed within the HART communication DTM parameter settings.

Once the comport has been selected, you now need to add the Pulsar device you are intending to connect to. For this example, a dBi HART sensor is used.

Selecting and connecting to a Pulsar device

To select the Pulsar device, highlight the Comport number so it is solid blue (as shown below):

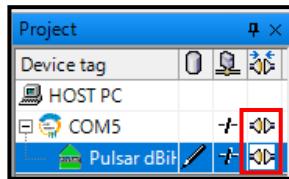


From the top menu bar select 'Device' and from the options now available, select 'Add device'. You will now be presented with a popup window, select the Pulsar device, and click OK. An example of the information in the window is shown below:

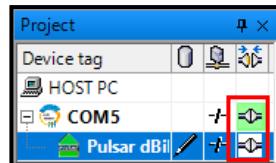
Device	Protocol	Vendor	Group	Device Vers	FDT version	DTM version
Pulsar dBiHart	HART	Pulsar Process Measure	not specified	3.1 / 2020-01-20.0.0	1.0 / 2019-08-09	

The Pulsar device has been added in the project window underneath the Comport number, indicating that it has been added successfully to the project.

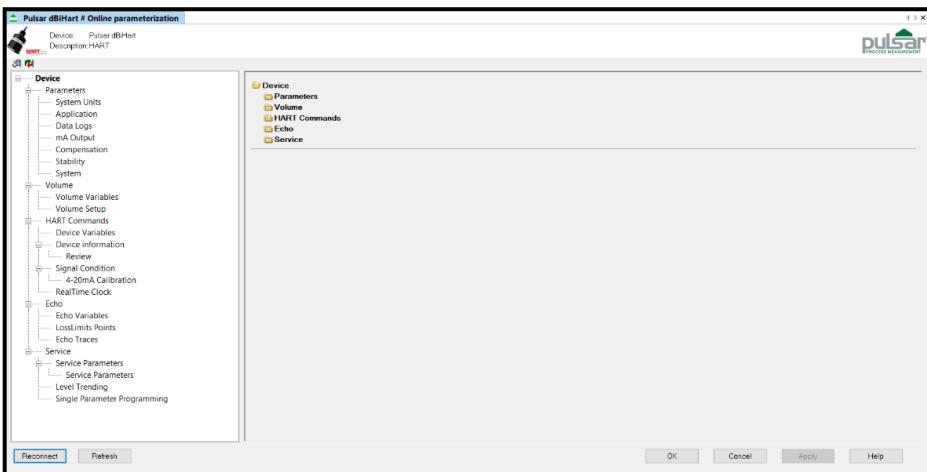
Connecting to the Pulsar device is simple, you will notice that the two icons highlighted are apart meaning that there is currently no connection to the device or to the comport.



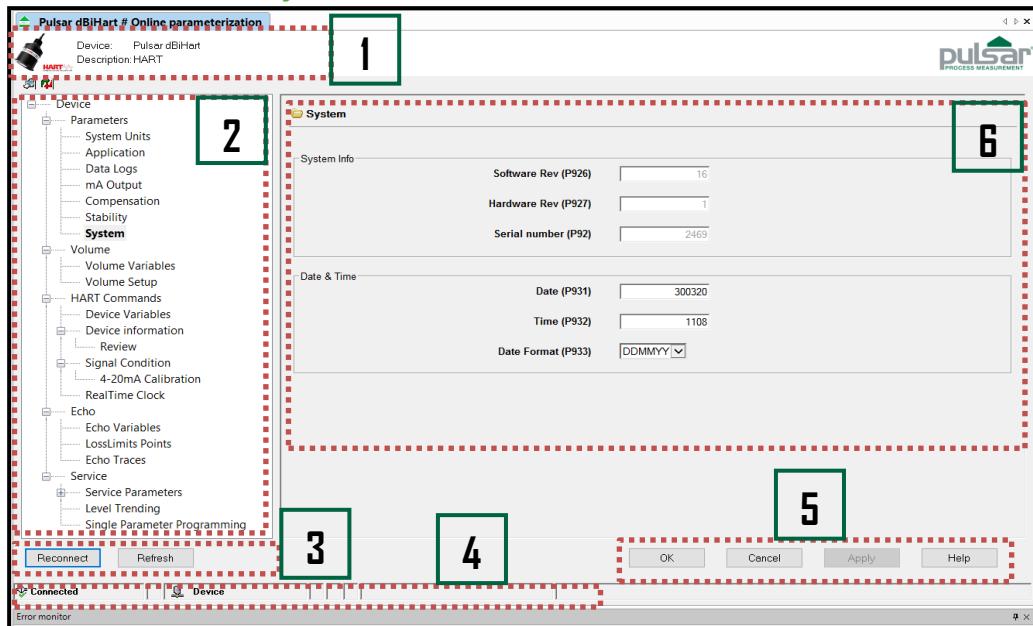
Ensuring that the Pulsar device is highlighted, from the top menu select 'Device' and choose 'Connect'. The icons will now change to indicate a connection to the Comport and Pulsar device and will now look like the below picture:



Double click on the Pulsar device to open the parameterisation window. This will display the user interface navigation window that will allow you to view and change parameters/Hart commands and look at echo traces from the Pulsar device. The below screen is now displayed:



User Interface layout



1. Shows the current Pulsar field device connected.
2. Navigation window to switch between each section of the device to view/change information.
3. Connection options. Select '*Reconnect*' if a drop in communication happens. Or '*Refresh*' to refresh the options available and information held on the device.
4. Status bar indicating uploading/downloading of information and if a device is successfully connected/disconnected. No further changes can be made whilst this is in progress.
5. These buttons allow certain actions to take place:
 - Selecting '*OK*' will apply changes made and reload the application window and a new parameterisation window will need to be opened.
 - Selecting '*Cancel*' will cancel any request made by the user.
 - Selecting '*Apply*' will action any change requested by the user and keep the application window open.
6. Application area which displays the parameter and echo trace information.

CHAPTER 4 ONLINE PARAMETERISATION

The online parameterisation navigation window for the device is split into five main categories: **Parameters**, **Volume**, **HART commands**, **Echo** and **Service**. Each of these categories have subsections where relevant parameters can be changed to suite the application. Using the navigation window to view and change parameters you will come across symbols identifying certain actions, these are explained in the below table:

Symbol Key

SYMBOL	DESCRIPTION
	This is displayed when a parameter value box is being changed.
	Parameter box is yellow, indicating that the value is changed from its previous value. If satisfied with the change(s) made to that page press Apply. The parameter box will then turn white to indicate a successful change.
	The software is currently downloading the parameter value.
Up or download running. No change is possible	The software is currently performing a task, meaning the ability to change another parameter or navigate to another section is temporarily unavailable until the task has ended.
	Communication running. Live information updated approx. every 6 seconds.
	At least one parameter is being changed.

Parameters

This section allows you to view and change the most common parameters required to setup the device ready for use with the application. Within this section there are seven subsections to help program the Pulsar device:

System units, **Application**, **Data Logs**, **mA output**, **Compensation**, **Stability** and **System**.

System Units

Selecting this section will display parameters that allow you to change the measurement and volume units used and displayed for level and volume. The options are shown below:

System Units

Meas. Unit (P104)

Volume Unit (P605)

P104 Measurement Units

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

OPTION	DESCRIPTION
m (Default)	All units of measurement are Metres
cm	All units of measurement are Centimetres
mm	All units of measurement are Millimetres
ft.	All units of measurement are Feet
in	All units of measurement are Inches

P605 Volume Unit

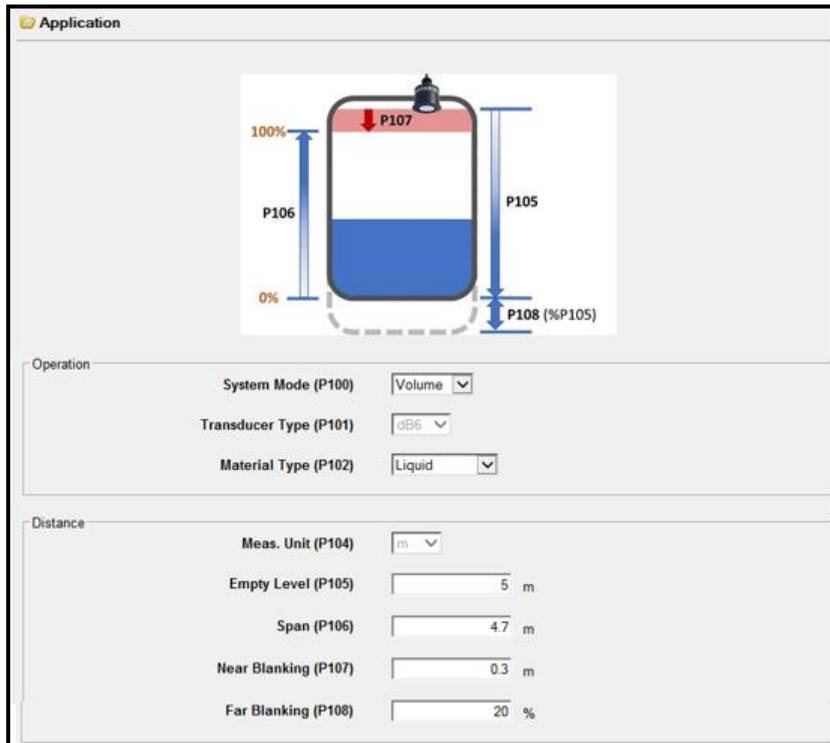
This parameter determines the units that are to be used and displayed, for volume conversion. It is used in conjunction with **P607 (maximum volume)**.

The choice of volume units is shown in the table below:

OPTION	DESCRIPTION
None	No Volume will be calculated or displayed
Tons	Volume calculated and displayed in Tons
Tonnes	Volume calculated and displayed in Tonnes
m3	Volume calculated and displayed in Cubic metres (default)
Litres	Volume calculated and displayed in Litres
UKgal	Volume calculated and displayed in UK Gallons
USGal	Volume calculated and displayed in US Gallons
Cubic feet	Volume calculated and displayed in Cubic feet

Application

This section has parameters to set the mode of operation and define the range of the application.



Operation

P100 System Mode

This parameter sets the mode of operation when the device is running and obtaining measurements.

OPTION	DESCRIPTION
Distance	Displays the distance from the transducer to the surface measured.
Level	Display shows how full the vessel is (Default).
Space	Display shows how empty a vessel is.
Volume	Display shows the volume of the vessel.

P101 Transducer Type

This parameter is read only and displays the transducer type currently used for measurement.

P102 Material Type

This parameter should be set to the type of material being monitored in the vessel:

OPTION	DESCRIPTION
Liquid	Use for liquids and flat solid materials (Default)
Solid	Use for solid material that is heaped or at an angle.
Closed Tank	Use for an application within a closed vessel or where a secondary echo response may become focused to create a larger echo than the first.

Distance

P104 Measurement Units

This parameter is read only, if required to be changed please refer to the **System Units** section.

P105 Empty Distance

Sets the maximum range of the application from the transducer face. For Level/Volume measurement, the distance from the sensor face to the bottom of the vessel.

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.

P107 Near Blanking

This parameter is the distance from the face of the transducer in which measurement is not possible and is pre-set to the minimum value dependant on the transducer being used. It should not be set to less than this figure but can however be increased. For further assistance with this please consult your local Pulsar distributor.

P108 Far Blanking Distance

This is the distance (as a percentage of the **empty level P105**) beyond the empty point that the unit will be able to measure, and by default is pre-set to 20% of the empty level.

If the surface being monitored can be extended beyond the **empty level (P105)** then the far blanking distance can be increased to a max. of 100% of the empty level, provided it does not exceed the max range of the transducer being used. This parameter is always entered as a % of the empty level.

Data Log parameters

This section contains the temperature and system logs of the Pulsar device.

Data Logs	
Temperature Logs	
Min.Temperature (P580)	20.3081 °C
Min.Temp Date (P581)	10420
Min.Temp Time (P582)	1015
Max.Temperature (P583)	21.5619 °C
Max.Temp Date (P584)	10420
Max.Temp Time (P585)	1212
Temp (P586)	21.5619 °C
System Logs	
No.of Starts (P940)	72
Last Power Down Date (P941)	310320
Last Power Down Time (P942)	1559
Last Run Time (P943)	436 mins
Total Run Time (P944)	252 hrs

Temperature Logs

These parameters are read only and show temperature conditions seen by the **Temperature source (P852)** in °C. If P852 is changed they will be reset.

P580 Minimum Temperature

This parameter displays the minimum temperature recorded.

P581 Minimum Temperature Date

This parameter displays the date when the minimum temperature was recorded.

P582 Minimum Temperature Time

This parameter displays the time when the minimum temperature was recorded.

P583 Maximum Temperature

This parameter displays the maximum temperature recorded.

P584 Maximum Temperature Date

This parameter displays the date when the maximum temperature was recorded.

P585 Maximum Temperature Time

This parameter displays the time when the maximum temperature was recorded.

P586 Temperature

This parameter displays the current temperature.

System Logs

The below parameters are read only and display information on when the device was last powered and how long it was running for.

P940 No. of Starts

This displays the number of times the device has been powered up since leaving the factory.

P941 Last Power Down Date

This displays the last date on which the power was removed from the device.

P942 Last Power Down Time

This displays the last time on which the power was removed from the device.

P943 Last Run Time (Minutes)

This displays how long the device was running for, in minutes, prior to its last power down.

P944 Total Run Time (Hours)

This displays the accumulated number of hours that the device has been in operation (powered up) since leaving the factory.

mA Output

This section allows adjustment of the mA span and the fail mode parameters for the Pulsar device.

The screenshot shows a software interface for configuring mA output parameters. It includes the following fields:

- mA Output** section:
 - mA Low Level (P834)**: Value 0 m
 - mA High Level (P835)**: Value 5.7 m
- Fail Mode** section:
 - FailSafe Mode (P808)**: Set to **Known**
 - Fail Time (P809)**: Value 2 mins

P834 mA Low Level

This parameter sets the level (in **Measurement Units P104**), at which 4mA will occur, depending on the selected **Mode of Operation (P100)**.

P835 mA High Level

This parameter sets level (in **Measurement Units P104**), at which 20mA will occur, depending on the selected **Mode of Operation (P100)**.

Failed Mode

P808 Failsafe Mode

This parameter sets the action of the mA output during a failsafe condition:

OPTION	DESCRIPTION
Known	Remain at the last Known value (Default)
High	Will fail to the High value (100% Span / 20mA)
Low	Will fail to the Low value (Empty / 4mA)
Very High	Will fail to an output value of 22mA
Very Low	Will fail to an output of 3.75mA

P809 Failsafe Time

In the event of a loss of echo condition the failsafe timer determines the time before a failsafe mode is activated. **Default** = 2 minutes.

If the timer expires, the device will go into failsafe, as determined by **P808**. However, when a valid measurement is obtained then the displayed reading and mA output will be restored, and the failsafe timer is reset.

Compensation

Displays parameters that can be changed to compensate for variations in temperature, sound velocity and vapour, as well as applying offsets to the measurement.

Compensation	
Meas. Offset (P851)	0 m
Temperature Source (P852)	Internal <input checked="" type="checkbox"/>
Fixed Temperature (P854)	20 °C
Sound Velocity (P860)	342.72 m/sec
Vapour Compensation (P645)	0.606

P851 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 including the reading displayed and the mA output.

P852 Temperature source

This parameter determines the source of the temperature measurement (in °C). Internal (**Default**) uses the integrated temperature sensor, fixed uses a constant temperature value set in P854 Fixed Temp.

P854 Fixed Temperature

This parameter determines the temperature (in °C), to be used if **P852 Temperature Source** is changed to Fixed. **Default** = 20°C.

P860 Sound Velocity

This parameter allows for the velocity of sound to be changed according to the atmosphere the transducer is operating in. The default setting allows the sound to travel in air at an ambient temperature of 20°C.

Default = 342.72 m/s.

In order to obtain optimum results, calibration should be carried out when the level is as near empty as possible and when any vapour has stabilised.

P645 Vapour Compensation

Sound velocity in air decreases/increases at a uniform rate of 60cm/s per °C. In atmospheres other than air this rate of change will be different.

This parameter allows for the rate of change in cm/s per °C to be set according to the atmosphere and temperature present.

The level seen should be compared to the actual level reading, several times to allow the parameter to correctly adjusted to obtain an accurate reading.

Default = 60 cm/s per °C.

Stability

This section has parameters to adjust the measurement damping, and filters for tracking the moving echo.

Damping

Stability	
Damping	
Fill Damping /min (P870)	10 m
Empty Damping /min (P871)	10 m
Filter	
Fixed Distance (P881)	0.2 m
Peak Percent (P884)	50 %

Damping is used to damp the displayed reading, to enable it to keep up with the application process but ignore minor surface fluctuations.

P870 Fill Damping

This parameter determines the maximum rate at which the device will respond to an increase in level. Should be set slightly higher than the vessel fill rate. **Default** = 10.00 m/min (32.81 ft/minute).

P871 Empty Damping

This parameter determines the maximum rate at which the device will respond to a decrease in level. Should be set slightly higher than the vessel empty rate. **Default** = 10.00 m/min (32.81 ft/minute).

Filter

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.

P884 Peak Percent

When **P102** = 2 (Solids), this parameter can be used to determine the point at which 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.

System

This section contains system information of the Pulsar device and allows the date and time to be adjusted.

The screenshot shows a software interface for managing Pulsar device parameters. The top navigation bar includes a 'System' icon and a 'Logout' button. The main content area is divided into two sections: 'System Info' and 'Date & Time'.

System Info

Software Rev (P926)	16
Hardware Rev (P927)	0
Serial number (P92)	2469

Date & Time

Date (P931)	10420
Time (P932)	1511
Date Format (P933)	DDMMYY

System Info

Note: These parameters are read only.

P926 Software Revision

This parameter will display the current software revision.

P927 Hardware Revision

This parameter will display the current hardware revision.

P92 Serial Number

This displays the serial number of the device.

Date & Time

P931 Date

This parameter displays the current date, in the format as set by **P933 (Date Format)** and can be changed if required.

P932 Time

This parameter displays the current time and can be reset if required, in the format HH:MM (24-hour format). This is set initially at the factory for UK time.

P933 Date Format

This parameter allows you to alter the format that the date is displayed in, from the selection below:

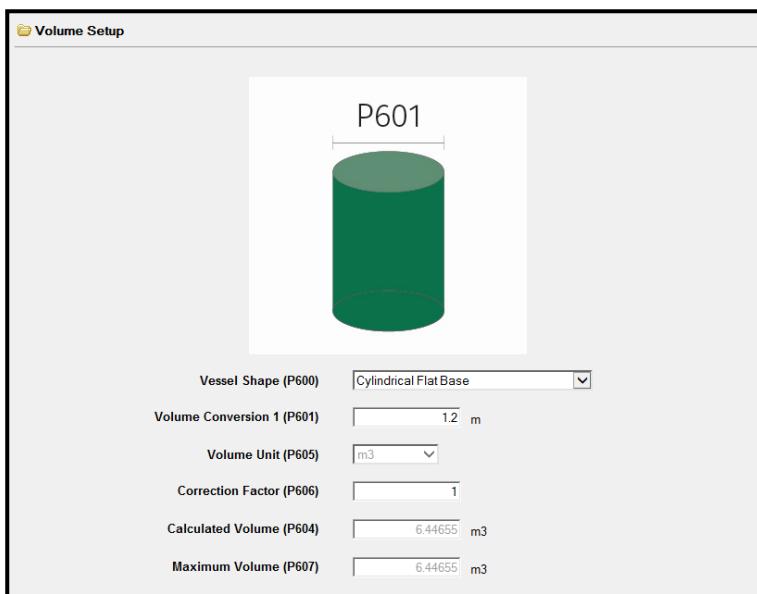
DD:MM:YY (**Default**), MM:DD:YY or YY:MM:DD

Volume

This section allows you to program the device to monitor and display volume readings from the application. Within this section there are four categories to help program the Pulsar device: **Volume Setup**, **Volume Variables**, **Level – Volume Breakpoints** and **Breakpoints Graph** (when P600 = 11 or 12).

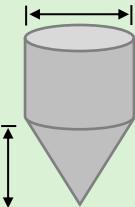
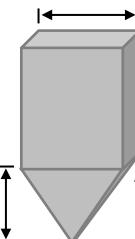
Volume Setup

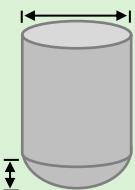
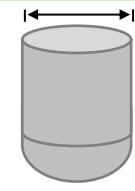
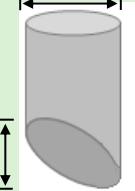
This section allows a vessel shape to be applied to the level measurement to obtain measurement of volume. There are 11 pre-programmed vessel shapes that can be programmed, and you will need to know the **vessel dimensions** in **Measurement Units (P104)** to calculate the volume which is displayed in **Volume Units (P605)** when the device obtains readings from the application. If the vessel shape does not correspond with any of the pre-programmed vessel shapes, then you can use the **universal calculations**. For this you will need a level/volume graph or chart provided by the vessel manufacturer or you can create one based on the dimensions of the vessel. You can enter up to 16 pairs of breakpoints, and the more you enter, the greater the accuracy that the volume calculation will be.

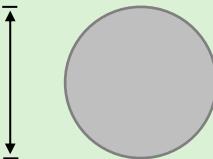
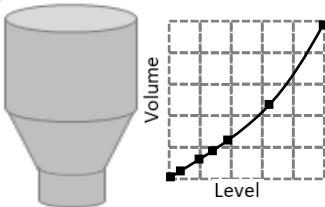
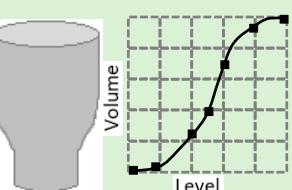


P600 Vessel Shape

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**) in **Measurement Units (P104)**. When setting up a vessel shape, a picture of the vessel shape and the dimensions required will appear above the Vessel parameter options.

SHAPE	P600 DESCRIPTION	DIMENSIONS
	Cylindrical Flat Base (Default)	P601 = Cylinder Diameter
	Rectangular Flat Base	P602 = Width P603 = Breadth
	Cylindrical Cone Base	P601 = Cylinder Diameter P602 = Height of Bottom
	Rectangular Pyramid Base	P601 = Height of Base P602 = Width of Rectangle P603 = Breadth of Rectangle

VESSEL SHAPE	P600 DESCRIPTION	DIMENSIONS
	Parabola Base	P601 = Height of Bottom P602 = Cylinder Diameter
	Rectangular Flat Base	P602 = Width P603 = Breadth
	Cylindrical Cone Base	P601 = Height of Bottom P602 = Cylinder Diameter
	Rectangular Flat Sloped Base	P601 = Height of Bottom P602 = Width of Rectangle P603 = Breadth of Rectangle
	Horizontal Cylinder Flat Ends	P601 = Cylinder Length P602 = Cylinder Diameter
	Horizontal Cylinder with Parabolic Ends	P601 = Cylinder Length

SHAPE	P600 DESCRIPTION	DIMENSIONS
	Sphere	P601 = Sphere Diameter
	Universal Linear	No dimensions required. Level and Volume Breakpoints are used.
	Universal Curved	No dimensions required. Level and Volume Breakpoints are used.

P604 Calculated Volume

This parameter displays the maximum volume that has been calculated by the Pulsar device and is a Read Only parameter. The volume displayed will be shown in cubic meters (Default) and is the total volume available between **Empty Distance (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)** and can be changed in the System Units section of the navigation window.

P606 Correction Factor

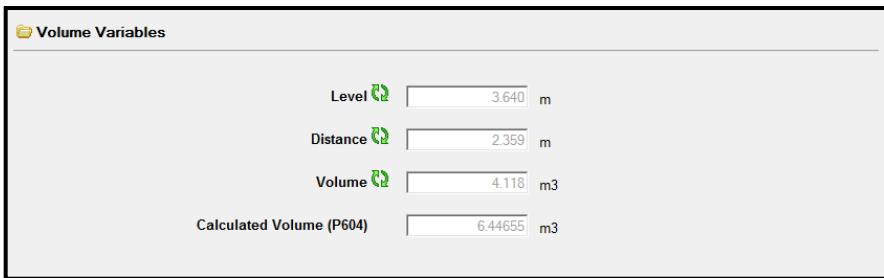
This parameter is used to enter a correction factor, when required, such as the specific gravity of the material so that the volume calculated is relative to the actual amount of material that can be contained between **Empty Distance (P105)** and 100% of **b (P106)**. **Default = 1**

P607 Max Volume

This parameter displays the actual maximum volume that has been calculated by the Pulsar device, 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 Distance (P105) and 100% of Span (P106).

Volume Variables

These parameters are read only, and gives live values of level, distance and volume.



Level

Displays the current level recorded by the device of the vessel.

Distance

Displays the current distance recorded by the device of the vessel.

Volume

Displays the current volume recorded by the device of the vessel (if **P100** is set to **Volume**).

P604 Calculated volume

Displays the maximum volume that has been calculated by the device and is a Read Only parameter. The volume displayed will be shown in cubic meters and is the total volume available between **Empty Distance (P105)** and 100% of **Span (P106)**.

Level / Volume Breakpoints

P6100-614 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 a maximum of 16 pairs.

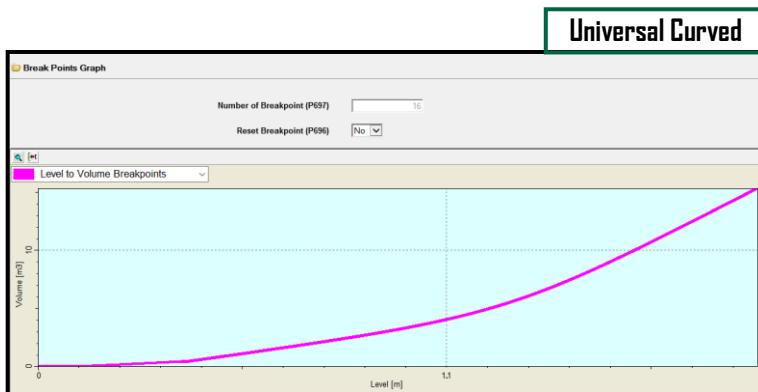
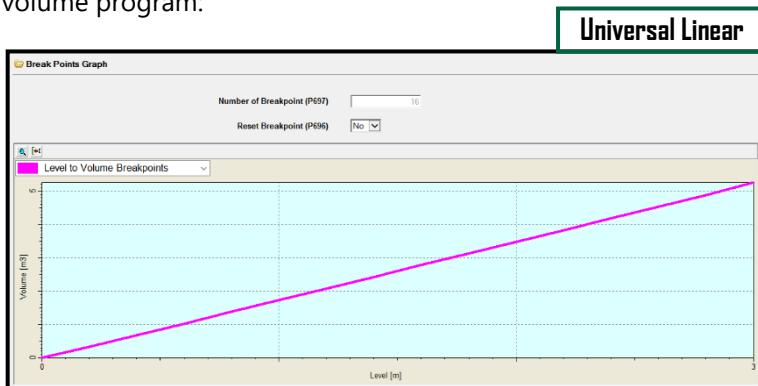
Level Volume BreakPoints			
Level	Volume		
Lev 1 (P610)	0 m	Vol 1 (P611)	0 m ³
Lev 2 (P612)	0 m	Vol 2 (P613)	0 m ³
Lev 3 (P614)	0 m	Vol 3 (P615)	0 m ³
Lev 4 (P616)	0 m	Vol 4 (P617)	0 m ³
Lev 5 (P618)	0 m	Vol 5 (P619)	0 m ³
Lev 6 (P620)	0 m	Vol 6 (P621)	0 m ³
Lev 7 (P622)	0 m	Vol 7 (P623)	0 m ³
Lev 8 (P624)	0 m	Vol 8 (P625)	0 m ³
Lev 9 (P626)	0 m	Vol 9 (P627)	0 m ³
Lev 10 (P628)	0 m	Vol 10 (P629)	0 m ³
Lev 11 (P630)	0 m	Vol 11 (P631)	0 m ³
Lev 12 (P632)	0 m	Vol 12 (P633)	0 m ³
Lev 13 (P634)	0 m	Vol 13 (P635)	0 m ³
Lev 14 (P636)	0 m	Vol 14 (P637)	0 m ³
Lev 15 (P638)	0 m	Vol 15 (P639)	0 m ³
Lev 16 (P640)	0 m	Vol 16 (P641)	0 m ³

Breakpoints Points Graph

After all level/volume breakpoints have been entered into **Level/Volume Breakpoints**, opening this section will display a line graph of the level/volume breakpoints that have been programmed, how many breakpoints (pairs) have been programmed and also the ability to reset all breakpoints set.

Depending on whether the vessel shape selected is either **Universal Linear** (straight line) or **Universal Curved** (curved line) will depend on the shape of the graph displayed.

Examples shown below of the **Break Points** Graph screen displaying graphical representations of a **Universal Linear** and **Universal Curved** volume program:



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.

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 individual breakpoints this can be achieved by directly accessing the desired parameter (P610-673) and changing as required.

HART commands

This section displays the generic common parameters common to all HART certified devices. It is split into four main categories **Device Variables**, **Device Information**, **Signal Condition** and **Real Time Clock**. If familiar with the use of HART protocol, then it can be programmed following normal HART procedures.

Device Variables

The parameters displayed in this section are read only.

Device Variables	
Level	0.973
PV % range	32.398 %
PV LRV	3.300
PV URV	0.300
Loop current	9.184 mA
AO Alarm typ	Hold last out val
Channel flags	Analog Output Channel
Snr temp	22.514 °C
Volume	1.45914 m3
Serial	2469

Device Information

The parameters displayed in this section display the details of the connected Pulsar device which can be changed via a HART device.

Device information

Review

Model	Pulsar Hart
Dev id	2469
Cfg chng count	5
Tag	TEST
Long tag	Intelligent transducer
Date	19.11.2012
Write protect	No
Descriptor	PULSAR
Message	PULSAR INTELLIGENT TR.
Final asmbly num	0

Review

This section shows the device information and identity tags of the Pulsar device.

Review

Protocol Info		Device Info	
Universal rev	7	Poll addr	0
Fld dev rev	3	Loop current mode	Enabled
Software rev	16	Write protect	No
Num req preams	5	Cfg chng count	5
Num resp preams	5	Max dev vars	4
Model	Pulsar Hart	Tag	TEST
Dev id	2469	Long tag	Intelligent transducer
Descriptor	PULSAR	Descriptor	PULSAR
Final asmbly num	0	Message	PULSAR INTELLIGENT TR.
		Date	19.11.2012

Signal Condition

This section shows the programmed range of the sensor.

Signal Condition

4-20mA Calibration

PV LRV: 3.300

PV URV: 0.300

PV % range: 51.119 %

Transfer Func.: Linear

4-20mA calibration

This section shows the current live mA value and provides controls to test and trim the output current loop.

4-20mA Calibration

Analog output

Loop current: 12.189 mA

AO Alarm typ: Hold last out value

Channel flags: Analog Output Channel

Loop current mode: Enabled

4-20mA Loop Test

4-20mA Trim

4 – 20mA Loop Test

The loop test is used to verify the mA output of the Pulsar device. With an Ampere meter or Digital Multi Meter connected in series you can determine if the fixed current output being generated is correct or requires trimming.

Selecting the Loop Test option will discontinue live readings from the Pulsar device by disconnecting it from automatic control. A reference meter should be placed in the circuit to monitor the mA readings. You can select to output 4mA, 20mA or a current value of your own selection.

If the readings on the reference meter do not match those being output, then you can use the 4-20mA Trim feature to bring them to the correct value. When finished testing the output select 'End', this then restores automatic control and live readings from the device will continue.

4 – 20mA Trim

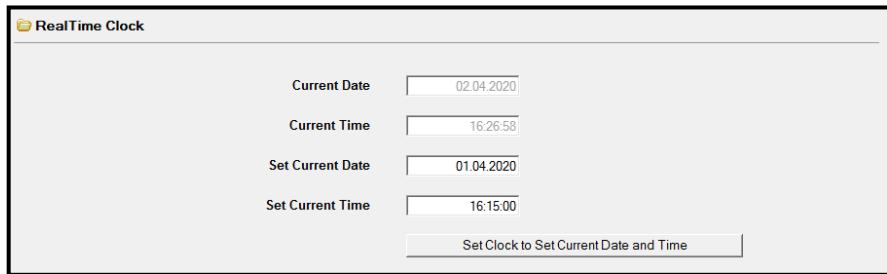
The raw 4mA and 20mA values of the output current loop can be calibrated to an input device by altering **4mA** and **20mA**.

Selecting the 4-20mA Trim option will discontinue live readings from the Pulsar device by disconnecting it from automatic control. A reference meter (Ampere Meter, Digital Multi Meter or input device such as a PLC) should be placed in the circuit to monitor mA readings.

The Pulsar device will begin forcing out 4mA and when correctly trimmed it will move on to 20mA. To trim the output, simply enter the value that ensures that 4mA or 20mA respectively are shown on the remote device and select OK.

Real time Clock

This section allows the user to set the time and date for Pulsar devices clock. This may be important if trending is being monitored.



Current Date	02.04.2020
Current Time	16:26:58
Set Current Date	01.04.2020
Set Current Time	16:15:00

Set Clock to Set Current Date and Time

Set Current Date

This format is set in DD:MM:YY, if changed it must be set in the format displayed in the box. When finished select 'Set Clock'.

Set Current Time

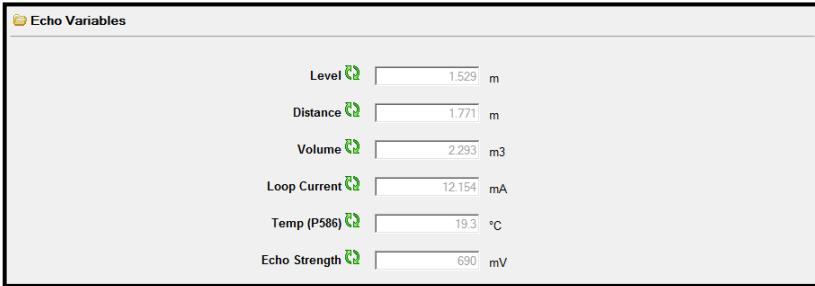
This format is set in HH:MM:SS, if changed it must be set in the format displayed in the box.

Echo

This section displays real time information from the Pulsar device, view diagnostic echo trace information and manipulate loss limits.

Echo Variables

This section displays the real time information being obtained from the Pulsar device, measuring the vessel. The  symbol represents that the real time value displayed is being constantly monitored and updated.



Loss limits

This section allows you to manipulate the loss limit line, to overcome any unwanted echo measurements that are being seen by the Pulsar device.

There are 12 Level and 12 Loss limit parameters that are set as default in a Pulsar device. However, these parameters can be changed.

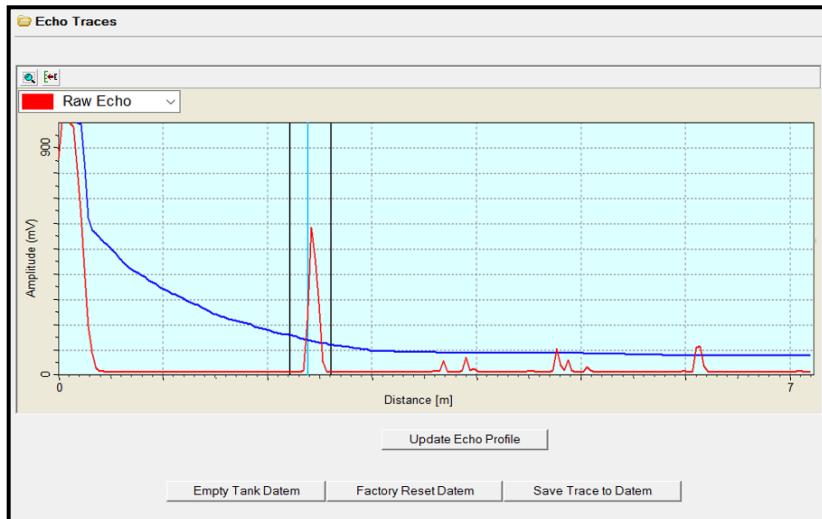
LossLimits Points	
Level	Limit
Level 1 (P109)	LossLimit 1 (P110)
0.21 m	1000 mV
Level 2 (P111)	LossLimit 2 (P112)
0.29 m	582 mV
Level 3 (P113)	LossLimit 3 (P114)
0.68 m	420 mV
Level 4 (P115)	LossLimit 4 (P116)
1 m	340 mV
Level 5 (P117)	LossLimit 5 (P118)
1.5 m	240 mV
Level 6 (P119)	LossLimit 6 (P120)
2 m	180 mV
Level 7 (P121)	LossLimit 7 (P122)
2.5 m	130 mV
Level 8 (P123)	LossLimit 8 (P124)
3 m	100 mV
Level 9 (P125)	LossLimit 9 (P126)
4 m	90 mV
Level 10 (P127)	LossLimit 10 (P128)
5 m	90 mV
Level 11 (P129)	LossLimit 11 (P130)
6 m	80 mV
Level 12 (P131)	LossLimit 12 (P132)
7.2 m	80 mV

Important Information

The Loss Limits should only be changed under the guidance of a Pulsar engineer.

Echo Traces

This screen displays the diagnostic trace from the Pulsar device and allows a user to adjust the echo viewed to obtain optimum results. The layout of the screen is as follows:



OPTION	DESCRIPTION
	This allows you to zoom in and out of the echo trace
	This switches between single line and multiple line information on the trace screen.
Raw Echo Raw Echo Datem Gate Peak	This selects the wave form/line information to be displayed in single line mode. Each line is represented by a colour, choose between; Raw Echo, Datem, Gate or Peak.
Amplitude (mV)	This axis represents the signal strength (in millivolts).
Distance [m]	This axis represents the distance in the measurement units as defined by the Pulsar device.
Update Echo Profile	Select this to display echo trace information.

OPTION	DESCRIPTION
Empty Tank Datem	Select this when the tank is empty, Empty Tank Datem will result in all unwanted echoes from noise or obstructions to be referenced out and leave the true echo visible, when it comes back into range.
Factory Reset Datem	Select this to reset the Datem line to its factory set default values. A window will be displayed when selected to ensure the operation is to be carried out.
Save Trace to Datem	Select this to change the trace so that it utilises the points set in Loss Limit Points. A window will be displayed when selected to ensure the operation is to be carried out.

Service

This section allows the use of service parameters in the Pulsar device, view live trend information, and change individual parameters.

Service Parameters

Echo Process

Breakpoint (P43) m

Slope (P44)

Num Average (P45)

Outside Count (P47)

Scale First (P49) %

Inside Gate Count (P841)

Datem Custom

Peak Clearance (P905) dB

Side Clearance (P906) m

UltraSound

Auto Ping Width (P28)

Noise Floor Clamp (P35)

Ping Interval (P86) sec

Display Resolution (P42)

Debug (P85)

Datem Flags

Echo Source (P67)

Material Type (P102)

Datum Enable (P71)

Save Trace on Loss (P950)

Save Trace on Alarm (P953)

Datem Averaging (P70)

mA Mode

Enable 4-20mA Current (P5)

Level on First Ping (P6)

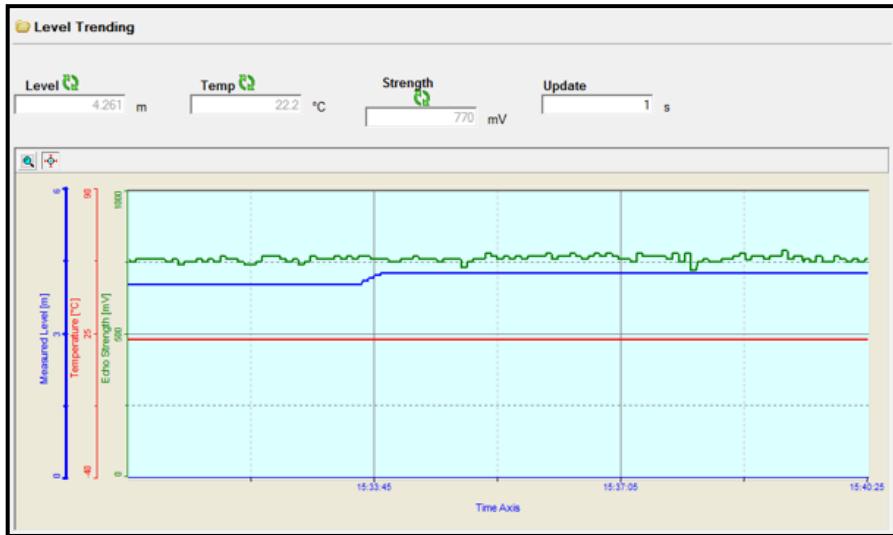
Startup Current (P87) mA

Important Information

The above service parameters should only be changed under the guidance of a Pulsar engineer.

Level Trending

This screen shows live trending information for the Level, Temperature and Signal strength.



The level, Temperature and Signal strength are updated at each interval and this can be set in the Update box. This value is in seconds and is can be changed to a different value if required. If the trending screen is left and returned after viewing another section, the trending information will begin again. When the trending line reaches the end of its time period (as depicted on the Time axis), the trending data will begin again and overwrite the old trending information.

Single parameter programming

This screen allows a single parameter to be viewed or changed.



Enter the parameter number that is required to be viewed and select 'Read from Device'. The current value of the parameter and a brief description of it will then be displayed on the screen.

To change a parameter, select the parameter required and obtain its current value. In the value box type in the new value required, the box will turn yellow to indicate a change is requested. Press 'Write to Device' then 'Apply' to permanently send that change to the Pulsar device.

CHAPTER 5 TROUBLESHOOTING

This section describes many common symptoms, with suggestions as to what to do. If the issue persists, please contact your local Pulsar distributor.

SYMPTOM	WHAT TO DO
Transducer not firing.	Check power supply
mA out is displaying a failed condition, very low (3.8mA) or very high (22mA).	No valid echo being received, and unit has gone into fault condition. Check material level is not out of range, sensor is perpendicular to material surface.
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.
4-20mA current fixed even though level is changing.	Poll address is above 0 and is in multi drop mode.
Material level is consistently incorrect by the same amount.	Check that the empty distance (P105) has been correctly entered.
Unable to load DTM onto software	Check that you have administrator rights on the PC being used and re-install the DTM. A PC restart may be required after installation as some PC's require a restart after software is installed.
 Separated icons	No communication between the DTM and Pulsar device. Check that all connections are sound and there is power to the device. Check current revision of DTM is correct, contact Pulsar for more information regarding this.
 Disturbed	Communication interrupted between DTM and Pulsar device. Check power supply to device.
	At least one parameter value is faulty. Check parameter settings to locate issue.

CHAPTER 6 DISPOSAL

Incorrect disposal can cause adverse effects to the environment.

Dispose of the device components and packaging material in accordance with regional environmental regulations including regulations for electrical \ electronic products.

Transducers

Remove power, disconnect the Transducer, cut off the electrical cable and dispose of cable and Transducer in accordance with regional environmental regulations for electrical \ electronic products.

Controllers

Remove power, disconnect the Controller and remove battery (if fitted).

Dispose of Controller in accordance with regional environmental regulations for electrical \ electronic products.

Dispose of batteries in accordance with regional environmental regulations for batteries.



EU WEEE Directive Logo

This symbol indicates the requirements of Directive 2012/19/EU regarding the treatment and disposal of waste from electric and electronic equipment.



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