IMP Lite

INSTRUCTION MANUAL

IMP Lite (FIRST EDITION REVISION 4)

February 2020

Part Number M-082-0-001-4P

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Contents

Chapter 1 Start Here

Congratulations on your purchase of a Pulsar IMP Lite Level Monitoring System. 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

**At various parts of this manual you
will find tips to help you.**

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 IMP Lite Level Monitoring System

Functional Description

The IMP Lite level monitoring system is a highly developed ultrasonic level measurement system which provides non-contacting level measurement for a wide variety of applications in both liquids and solids.

Easy calibration and maintenance free "fit and forget" means that you can install the IMP Lite Level Monitoring System rapidly and with confidence.

The IMP Lite 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. The IMP Lite comes in three models:

- Lite 3 with a range from 0.20m (0.66 feet) to 3.00m (9.84 feet).
- Lite 6 with a range of 0.3m (0.98 feet) to 6.00m (19.69 feet).
- Lite 10 with a range of 0.3m (0.98 feet) to 10.00m (32.81 feet).

The IMP Lite can show **level**, **space, distance**, on the display. There is an isolated 4-20 mA output that can be connected to a remote chart recorder or PLC, to monitor level, space or distance, dependant on the measurement mode selected, and provides a 'fault condition' alarm of either 3.5mA or 22mA.

The IMP Lite lid has an integral LCD display and 4 buttons which are used for programming purposes when in Program Mode and as hot keys providing additional information whilst in Run Mode.

Product Specification

Physical	
Dimensions	O/A height 186mm (5.24 inches x O/A diameter 133mm (7.32 inches)
Mounting	1.5" BSP/NPT (IMP3 and 6 models) 2" BSP/NPT (IMP10)
Weight	Nominal 1kg
Cable entry	2 off cable glands 4.5 – 10mm. (torque to 2NM)

Environmental	
IP Rating	IP67
Min & Max Temperature (Ambient)	-40 to +65°C (-4 to 149°F)
Min & Max Temperature (Transducer)	-40 to +80°C (-40 to 176°F)

Approvals	
CE Approval	See EU Declaration of Conformity

Performance	
Beam angle (-3dB half power)	<10° inclusive
Operating frequency	Lite 3 125kHz, Lite 6 75kHz, Lite 10 41kHz
Range	Lite 3 0.2 – 3m (0.66 – 10ft)
	Lite 6 0.3 – 6m (0.98 – 20ft)
	Lite 10 0.3 – 10m (0.98 – 33ft)
Digital echo processing	
Current output	3.5 – 22mA
Accuracy	± 0.25% or 6mm (0.24 inches) whichever is greater
Resolution	± 0.1% or 2mm (0.08inches) whichever is greater
4-20mA output	Resolution 5µA
Temperature compensation	Via internal temperature sensor (± 0.5°C accuracy)
Response time	Power up to stable reading = 10 seconds

Programming	
PC Programming	via RJ11 port to RS232 using IMP PC software
On-board programming	via 4 button keypad and 4 digit LCD display

Supply	
Operating voltage	11 – 30V DC

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

EU Declaration of Conformity

EU DECLARATION OF CONFORMITY

P U L S A R *Imp series*

This declaration of conformity is issued under the sole responsibility of the manufacturer

Relevant Directive(s)	2014/30/EU - EMC Directive and its amending directives
	2011/65/EU - RoHS Directive and its amending directives
Manufacturer's Name	Pulsar Process Measurement Ltd
Manufacturer's Address	Cardinal Building, Enigma Business Commercial Centre, Sandy's Road, Malvern, Worcestershire, WR14 1JJ, UK
Apparatus	Pulsar Imp, Imp Lite, Imp i.s.
Type of Equipment	Measurement and process control
Standards Applied	EN 61326:2013 Equipment class, industrial

Signed	Date:
PR Allan	20th June 2017
	Rev 3.2
Name: Jeff Allan (BSc.) Engineer	
Pulsar Process Measurement Ltd	

Unpacking

Important Information

All shipping cartons should be opened carefully. When using a box cutter, do not plunge the blade deeply into the box, as it could potentially cut or scratch equipment components. Carefully remove equipment from each carton, checking it against the packing list before discarding any packing material. If there is any shortage or obvious shipping damage to the equipment, report it immediately to Pulsar Process Measurement Limited.

Power Supply Requirements

The IMP Lite operates from a DC supply of 11 –30V and will typically draw less than 0.06A.

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

The compact one-piece construction of the IMP Lite can be mounted easily using the integral nose thread (1.5" or 2" BSP/ NPT, dependent on model).

When choosing a location to mount the Imp, bear in mind the following:

- For access to the LCD display and programming buttons it is recommended that you mount it in an area which is easily accessible.

- The ultrasonic signal path should be free of falling material and obstructions such as pipes, beams etc.

- The IMP 3 should be mounted at least 20cm (0.66 feet) above the maximum level of the material and be perpendicular to the surface. Whilst the IMP 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.

- The ambient temperature is between -20ºC and 65ºC.

- There should be no high voltage cables or electrical inverters close by.

Dimensions

The dimensions of the *IMP Lite* are as shown below.
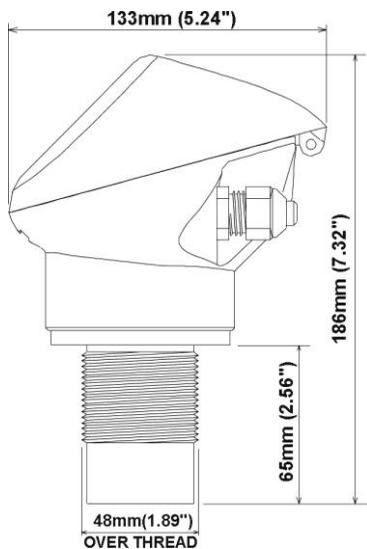
1.5" BSP/NPT – IMP Lite 3 & 6
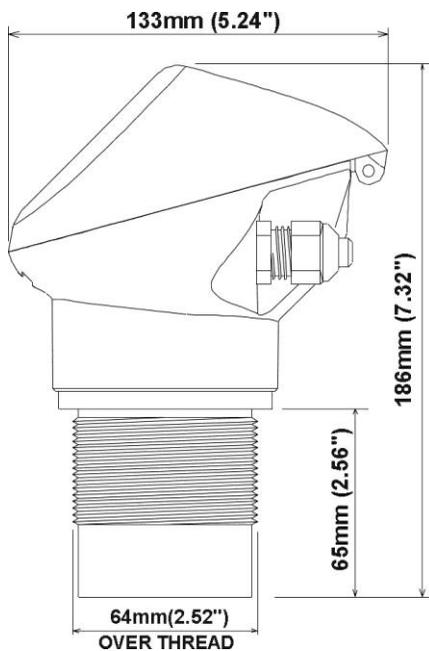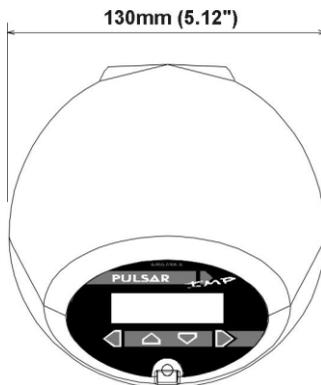
2" BSP/NPT – IMP Lite 10

Outdoor and Open Vessel Installation

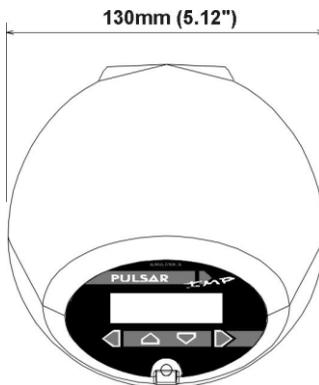The IMP Lite can be simply mounted on a bracket, suitable for the application and secured using the thread located at the top of the transducer (2"BSP/NPT).

Care should be taken to ensure that the IMP Lite 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.
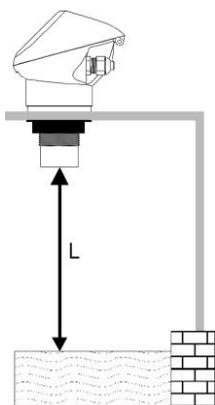
IMP Model	Range	L = Blanking
Lite 3	3 metres (9.84 feet)	200mm (0.66 feet)
Lite 6	6 metres (19.69 feet)	300mm (0.98 feet)
Lite 10	10 metres (32.18 feet)	300mm (0.98 feet)

"L" should as a minimum be at least that as detailed in the table above but can be greater if required.

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 IMP Lite can be simply screwed into a flange and secured using the thread located at the top of the transducer (1.5" or 2"BSP/ NPT, dependent 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 IMP Lite and the connection to the vessel.

Standpipe Installations

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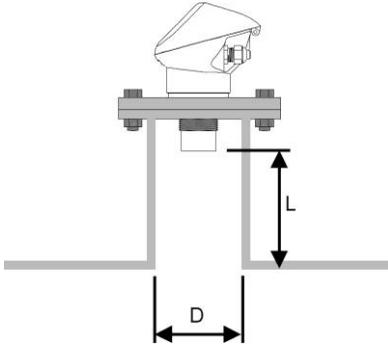
Dia. (D)		Max. Length (L)	
mm	inches	mm	inches
80	3	220	8
100	4	300	12
150	6	420	16
200	8	560	22

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 into 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

Important Information

If the equipment is installed or used in a manner not specified in this manual, then the protection provided by the equipment may be impaired.

Cable Entry

The ℐℳ𝒫 𝐿𝒾𝓉𝑒 Series has two M16 cable entries, fitted with a suitable gland, to ensure moisture protection is maintained.

Terminal Connection Details

Wiring details are also given on the terminals under the access cover.

Terminal Connections

Terminal 1   + ve: Direct Current (DC) input (11-30VDC)

Terminal 2   - ve: Current Output (4-20mA)

Loop Resistance

The maximum cable resistance allowable can be calculated from the graph below. For example, if an IMP Lite were supplied from a 24VDC, the maximum total cable resistance is 590 ohms, for a typical 77 ohm /km cable this would mean a maximum cable length of 590/77 = 7.6km, remember this is the total cable resistance, so this figure has to be divided by 2 to give 3.8km max distance.

Allowable total cable resistance for Loop-powered IMP

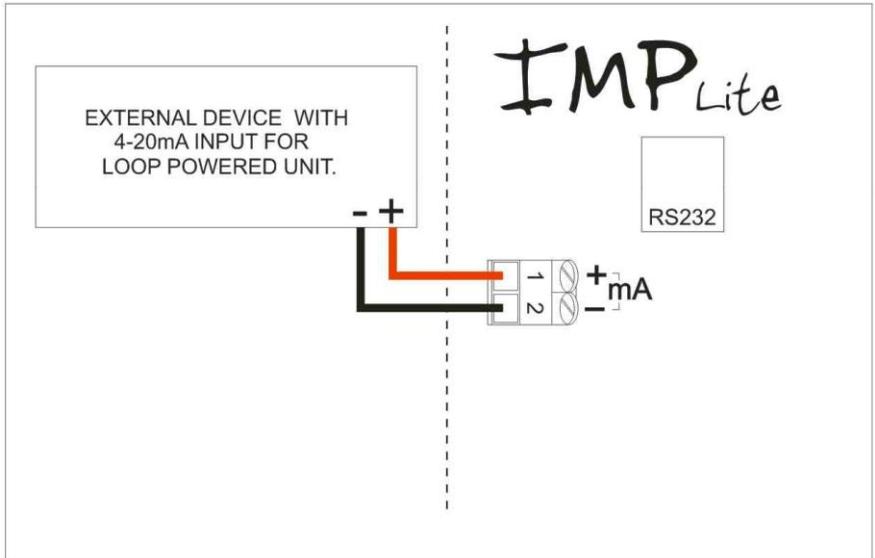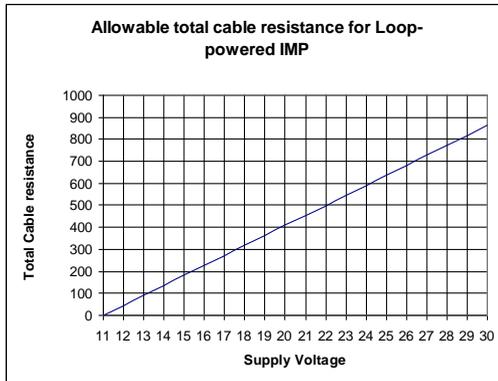**Maximum cable resistance vs supply voltage for 2 wire mode.**

Important Information

If the equipment is installed or used in a manner not specified in this manual, then the protection provided by the equipment may be impaired.

Preparation for Operation

Before switching on, check the following:

✓ The IMP Lite is mounted correctly.

✓ The power supply is correctly installed.

Maintenance

There are no user serviceable parts inside your IMP Lite 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.

Operating the Controls

Display

Whilst in the Run Mode, the 4-digit LCD, by default, will display the current level reading in metres, the display will also alternate between the reading and "LOE" when a fault condition (Loss Of Echo) is detected. When in the Program Mode the display is used to read information on the Menu Options and the values entered.

There are two operating modes for your IMP Lite, **Run Mode** and **Program Mode**.

Run Mode

This mode is used once the IMP Lite has been set up in program mode. It is also the default mode that the unit reverts to when it resumes operation after a power failure.

When the IMP Lite is switched on for the first time, it will display, in P104 Measurement Units, the distance from the transducer face to the target.

Program Mode

This mode is used to set up the IMP Lite or change information already set, this is achieved by using the 4 push buttons located below the display.

Entering a value for each of the menu options that are relevant to your application provides all the programming information.

Button Functions

There are 4 push buttons located under the display. Their name and functions are as follows:

Button	Run Mode	Program Mode
ESC ◀	Displays details of unit Serial No. and Software Version	Used to Navigate out of the Menu System and return to Run Mode. Also used to Cancel a Parameter Value entered in error.
UP ▲	Displays Current Temperature	Used for Navigating around Menu System and Increasing Menu Option Values.
DOWN ▼	Displays Current Echo Strength (dB's)	Used for Navigating around Menu System and Decreasing Menu Option Values.
ENTER ▶	Displays current mA output	Used to confirm an action such as entering a Menu Option or Enter a Parameter Value.

How to Access Program Mode

To access the **Program mode,** press the "**ESC**" and "**Enter**" button simultaneously, where upon the display will show **PASS** on the LCD display briefly, to prompt you to enter the password, the display will now show **0000**, and the left-hand digit will flash.

By using the UP and DOWN keys to increment or decrement the digit, and the ENTER key to shift the flashing digit to the next position. Assuming the passcode is the default 1997, you should then enter this.

The ESC key can be used to go back to the previous digit. Finally, when you have selected all digits pressing the ENTER key again will input the selected pass code to the IMP Lite; if successful the display will show APP (Application). If however you input the wrong pass code the IMP Lite LCD display will show Fail for 2 seconds and will revert back to run mode.

Using the Menu System

The menu system has been designed to make the changing of parameters very simple. Once in the **Program Mode** the display will show a line of text that displays the menu system. Pressing the **Up** and **Down** buttons will scroll the display between the menu items, (as shown below, starting at APP).

As you press the UP and DOWN buttons to scroll left and right between the menu options, you can press ENTER at any time to select a specific menu which will then take you to the parameters within the selected menu.

Once you have reached the relevant menu, scroll through the parameters, and enter the necessary information. To enter the information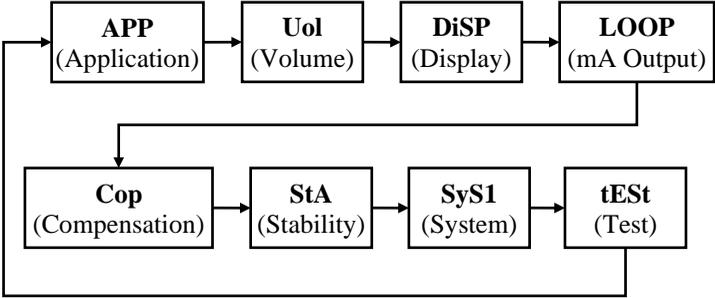, use the UP and DOWN keys to increment or decrement the digit, and the ENTER key to shift the flashing digit to the next position, once you have completed entering the value required pressing the ENTER button again will save the value.

When you have finished, press CANCEL to go back to the previous level. When you have reached the top level, then the ᴵᴹᴾ Lite will ask for confirmation before allowing you to go back into run mode. This is done by pressing ENTER at the display prompt.

Parameter Defaults

Factory Defaults

> **Factory Defaults**
>
> When first installing the 𝕴𝕸𝕻 𝓛𝓲𝓽𝓮, or subsequently moving or using the unit on a new application, before proceeding to program the unit for its intended application it is recommended that you ensure that all parameters are at their default values by completing a **Factory Defaults P930,** as described in Chapter 5 **Parameter Guide**.

When you first switch the 𝕴𝕸𝕻 𝓛𝓲𝓽𝓮 on, it will be reading the **distance** from the face of the transducer to the material surface. It will be indicating in **P104 Measurement Units**, as shown on the display.

TIP

In some applications, it is simplest to empty the vessel, take a reading from the Imp for distance and then setup the empty level to this figure.

Once you are satisfied with the installation, and the 𝕴𝕸𝕻 𝓛𝓲𝓽𝓮 is reading what you would expect in terms of distance from the face of the transducer to the material level, then you can proceed with programming, for the intended application. It is sensible to program all of the required parameters at the same time. The system will be then set-up.

Note The span is automatically calculated from the empty level, so the empty level should be entered first.

This chapter explains how to undertake the various functions of your IMP Lite. 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 Imp 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 Imp 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.

Using the 4-20 mA Output

The mA output can be used to monitor remotely what the IMP Lite is showing, so it can be displayed remotely, integrated into a PLC, or used to generate a record using a chart recorder or similar.

By default, the IMP Lite will provide a 4-20 mA output that represents what is displayed on the Imp, but these parameters can be overwritten as follows.

By default, the 4-20 mA will represent the empty level (4mA) and 100% of the operational span (20mA), but you may wish to only represent a section of the operational span. For example, the application may have an operational span of 6 metres, but you may only wish to represent empty level to 5 metres. If so, change **P834 (Low Value)** to **0**, and **P835 (High Value)** to **5.0.**

If the device connected to the mA output is out of calibration, and cannot be calibrated, then the low and high current levels can be trimmed by altering **P838 (Low Trim)** and **P839 (High Trim)**. To do this, simply enter the value that ensures that 4 mA or 20 mA respectively are shown on the remote device. You can use the left/right menu keys to alter the value until the correct reading is shown on the remote device, rather than typing in a value.

Setting Security Passcodes

A passcode is used to switch the 𝐼𝑀𝑃 𝐿𝑖𝑡𝑒 from **Run Mode** into **Program Mode**.

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

Additional Information

The passcode is also used for remote access using the RS232, so if this is being used, be sure to ensure any additional equipment using this feature is changed accordingly.

Using A Passcode

If you don't want to use a passcode, you can disable it as follows. First, enter **Program Mode** and go to the **SyS1** (System) menu. Select **P921** which is the **passcode enable** parameter.

As shown on the display, setting the passcode enable to '**0**' will **disable** it, or '**1**' will **enable** the use of passcode.

Additional Information

If the use of a passcode has been disabled, then you can move straight into Program Mode from Run Mode by pressing the ESC and ENTER button simultaneously.

Changing the Passcode

You can set the **passcode** to any number from 0000 to 9999. To do this, enter **Program Mode** and go to **SyS1** (System) menu. 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 enter **Program Mode** go to the **SyS1** (System) menu and **ENTER**. Using the UP and DOWN buttons, go to parameter **P930**, and **ENTER**, **P930** is the factory defaults parameter, change the value to **1** and **ENTER** , all parameters, with the exception of the mA trims, will be restored to the factory settings (including the DATEM trace) and on completion 'Stor' (Store) will be displayed after which you can ESC out of this parameter and continue programming the IMP Lite for the required application.

Checking the Information Specific to your IMP Lite

There are some parameters dedicated to each individual IMP Lite, 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 IMP Lite, whilst in **Run Mode** press the **ESC** button and the serial number along with the software revision will be displayed. Alternatively enter **Program Mode** and select **SyS1 (**System**)** menu and **ENTER**. Select parameter **P926** to view the identity of the current software **revision** or **P928** for the **serial number** of the unit.

Using the RS232 Serial Interface

The RS232 serial interface is used to communicate between the IMP Lite, and a PC using the optional Pulsar IMP PC software, this software is used to obtain information from the IMP Lite so that echo traces can be viewed, parameters can be uploaded, downloaded and saved.

To do so, the settings for communications control are set as follows and cannot be changed: **baud rate 19,200**, **8 data bits**, **no parity**, **1 stop bits**.

Connection between the IMP Lite and the PC is made via RJ11 connector located under the lid of the IMP Lite.

> **Note**
>
> When connecting to the RS232 (RJ11) port this will cause the IMP Lite to draw 20mA, this is necessary to ensure correct operation of the RS232.

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Parameter Listing

This chapter describes all of the parameters contained within the IMP Lite.

Application (APP) Menu

P100 Mode of Operation

This parameter sets the mode of operation, when in run mode, and can be set to one of the following:

Option	Description
1= **Distance (Default)**	Display shows the distance from the transducer face to the surface.
2= Level	Display shows how full the vessel is.
3= Space	Display shows how empty a vessel is.
4= Volume	Display shows volume of material in the vessel

P104 Measurement Units

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

Option	Description
1 = metres	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: IMP 3 = 3.00m (9.84 feet), IMP 6 = 6.00m (19.69 feet)** and **IMP 10 = 10.00m (32.81 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 IMP 3 = 2.80m (9.19 feet), IMP 6 = 5.70m (18.70 feet)** and **IMP 10 = 9.70m (31.82 feet).**

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 IMP Lite being used. It should not be set to less than this figure but can be increased.

IMP Lite Version	Near Blanking Distance
Lite 3 metre	Default Blanking Distance = 0.2m (0.66 feet)
Lite 6 metre	Default Blanking Distance = 0.3m (0.98 feet)
Lite 10 metre	Default Blanking Distance = 0.3m (0.98 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.
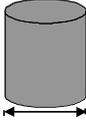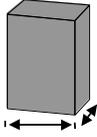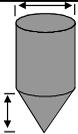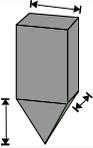
This parameter is always entered as a % of empty level.

Volume (UoL) Menu

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
	P600=4 Cylindrical Parabola base	Cylinder diameter and height of bottom
	P600=5 Cylindrical Half-sphere base	Cylinder Diameter
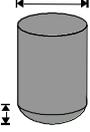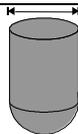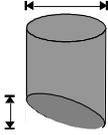
Vessel Shape	P600 Value	Dimensions Required
	P600=6 Cylindrical Flat sloped base	Cylinder diameter and height of bottom
	P600=7 Rectangular Flat sloped base	Width and Breadth of rectangular section and height of bottom
	P600=8 Horizontal cylinder with flat ends	Cylinder diameter and tank length
	P600=9 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. **Entered via IMP PC**
	P600=12 Universal Curved	No dimensions required, level and volume breakpoints used. **Entered via IMP PC**
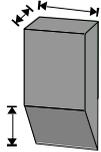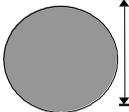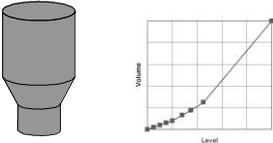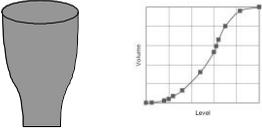
P601-P603 Vessel Dimensions

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

Vessel Shape	P601	P602	P603
P600=0 Cylindrical Flat base	Cylinder Diameter	Not Used	Not Used
P600=1 Rectangular Flat base		Width of rectangle	Breadth of rectangle
P600=2 Cylindrical Cone base	Height of base	Cylinder Diameter	Not Used
P600=3 Rectangular Pyramid base	Height of base	Width of rectangle	Breadth of rectangle
P600=4 Cylindrical Parabola base	Height of base	Cylinder Diameter	Not Used
P600=5 Cylindrical Half-sphere base	Cylinder Diameter	Not Used	Not Used
P600=6 Cylindrical Flat sloped base	Height of base	Cylinder Diameter	Not Used
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	Not Used
P600=9 Horizontal cylinder with parabolic ends	Length of Cylinder	Cylinder Diameter	Length of one end section
P600=10 Sphere	Sphere Diameter	Not Used	Not Used

P604 Calculated Volume

This parameter displays the maximum volume that has been calculated by the IMP Lite 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**), please note that there is no provision for the volume unit's descriptor to be shown on the display.

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	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 ꟷꟷꟷ, 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**).

Display (DiSP) Menu

P800 Display Units

This parameter determines whether the reading displayed is in **Measurement Units** (**P104**), or as a **percentage of span.**

Option	Description
1 = **Measured (Default)**	Display is in **Measurement Units** (P104)
2 = Percentage	Display is in **percentage** of span.

P801 Decimal Places

This parameter determines the number of decimal places on the reading during run mode.
Minimum = 0 (No decimal places), Maximum 3 = (3 decimal Places)
Default = 2

P808 Fail-safe Mode

By default, if a fail-safe condition occurs, then the display, relays and the mA output 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:

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)

P840 mA Output Fail-safe

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**, (**Display** and **P840** (**mA Output**). When this happens, you will see the message "**LOE**!" on the display.

When a valid measurement is obtained then the display, relays and mA output will be restored and the timer is reset.

mA Output (LOOP) Menu

P834 mA Low Level

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

P835 mA High Level

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

P838 mA Low Trim

If the device you are connected to is not calibrated, and not showing the low value, then you can trim it using this parameter. You can either type in the offset directly or use the arrow keys to move the output up and down until you get the expected result on the device that is connected.

P839 mA High Trim

If the device you are connected to is not calibrated, and not showing the high value, then you can trim it using this parameter. You can either type in the offset directly or use the arrow keys to move the output up and down until you get the expected result on the device that is connected.

P840 mA Fail-safe Mode

This parameter determines what happens to the mA output in the event of the unit going into fail-safe mode. The **default** is to do the same as the **system fail-safe** (**P808**), but this can be overridden to force the mA output to an independent fail-safe mode as follows:

Option	Description
0 = Default	mA output will fail as per **P808**.
1 = Hold	mA output will retain its last known value.
2 = Low	mA output will fail to its **low** condition. **3.5mA**
3 = High	mA output will fail to its **high** condition. **22mA**

Compensation (CoP) Menu

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 on the display, the relay setpoints and the mA output.

P852 Temperature Source

This parameter determines the source of the temperature measurement. By **default,** it is set to internal (transducer) (**P852=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 **P854**.

The temperature source can be specifically set as follows:

Option	Description
1 = **Internal (Default)**	Always uses temperature reading from transducer.
3 = Fixed	Always uses fixed temperature (P854)

P854 Fixed Temperature

This parameter sets the temperature, in degrees centigrade to be used if **P852 (Temperature Source**) =**3**. **Default = 20ºC**

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 **20ºC**.

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 0ºC. 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	331.5 m/sec
Ammonia	415 m/sec
Methane	430 m/sec
Helium	435 m/sec
Neon	965 m/sec

P645 Vapour Temperature Compensation

The sound velocity in air increases or decreases at a uniform rate of 60cm/sec. per ºC, however in atmospheres other than air it will change at a different rate.

This option allows the rate of change in cm/sec. per ºC to be set according to the atmosphere and temperature present. The level indicated, should be compared with the actual level, several times, then **Vapour Temperature Compensation** adjusted accordingly, to obtain an accurately displayed reading. **Default = 60 cm/sec. per ºC**

Stability (StA) Menu

Damping

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

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)**

System (SyS1) Menu

The following three parameters do not affect how the unit performs, but details, contained in them, may be required, by Pulsar, when making technical enquiries.

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.

P926 Software Revision

This parameter will display the current software revision.

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, enter **1** and press **ENTER**, all parameters, with the exception of the mA trims, will be restored to the factory settings (including the DATEM trace) and on completion Stor (Store) will be displayed after which you can ESC out of this parameter and continue programming the ɪᴍᴘ Lite for the required application.

Test (tESt) Menu

P991 Hard Test

When this parameter is selected, the unit will test the following in turn.

- **Display**. All the segments on the LCD and the backlight are lit up, so you can see if they all work. Press the **ENTER** button, to end the test.

- **Keys**. You should press each button, to confirm it works, with a counter showing how many more buttons you have to press. Press **ESC** last, as this will show if all keys were pressed or not. If they were not, then an error message is displayed.

P992 mA Out Test

This parameter will allow you to force a specified current on the mA output, to test the equipment that it is connected to, and to make sure the unit is working correctly. The figure you enter will be generated by the mA output.

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

Symptom	What to Do
Display blank, transducer not firing.	Check power supply
Display shows "L0E".	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 displayed for current level.	Measure actual distance from transducer face to surface of material. Enter Program Mode and access **SyS1** menu, go to **P21** and press **ENTER** type in the **measured distance**, press **ENTER**, wait until "**Stor**" is displayed and return to Run Mode, display should now update to correct reading.
Material level is consistently incorrect by the same amount.	Check empty level (P105) correctly entered.

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.

Notes