

MSP900GH & MSP400RH family of Ultrasonic Level Transmitters

Important Information : Please read in conjunction with
product manual IP2045/IM and IP2046/IM



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INTRODUCTION

MSP900GH and MSP400RH family of Ultrasonic Level Transmitters has been improved with new features. The new enhanced software is version V3.20. In terms of HART communications it is device revision 5. A Device Description is available for DD-enabled hosts.

1. Reduced Blanking Distance

The minimum value of P023 Upper Blanking Distance for the MSP900GH and MSP400RH has been reduced from 0.45m to 0.3m. The default value is 0.3m.

2. Additional Units

Added support for units of MegaGallons/Day. The transmitter can now display units of MGD as “m ga”. The built-in Parshall flume power law calculations now have additional “k” factors and Max Flows for MGD.

3. Flow Profiles

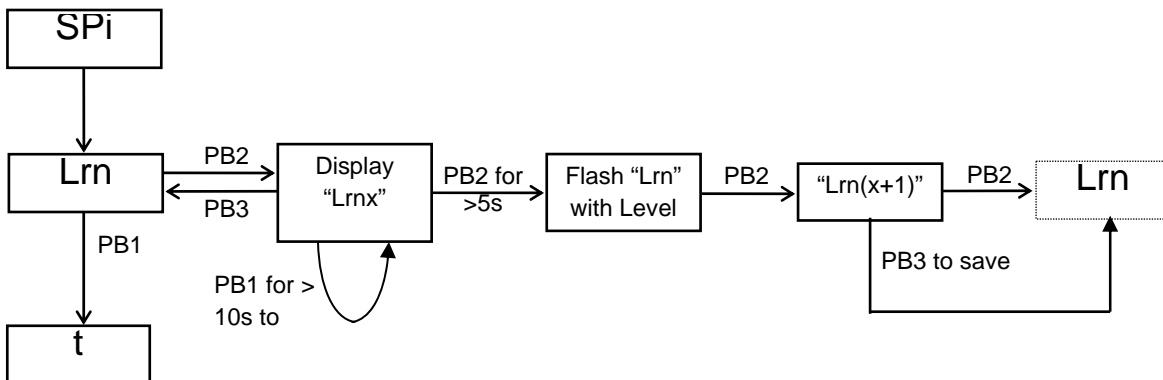
The range of Parshall Flumes supported as standard has been extended to include 1”, 2”, 3”, 6”, 9”, 1.5’ and 10’.

If the Base Units are Metric then the flow units are set to m³/hr. If the Base Units are Imperial then the flow units are MGD or GPM as specified by the User.

4. Tank Mapping / False Echo Rejection

Added Tank Mapping and False Echo Rejection. The transmitter can record the size and distance of up to 4 false echoes and ensure that they are not treated as the liquid surface.

Learning of the false echo data may be implemented via the local HMI or via HART communications. Using the local HMI, the “Lrn” function is accessed via Engineering Setup (“Eng”) as shown in the diagram:



Clearing False Echoes via the local HMI clears all of the stored echoes. However, they may be cleared or edited individually via HART communications.

5. “Present Depth” / “Set as Empty” Commands

5.1. “Present Depth” Command

Traditionally, users set the Bottom Reference by entering the specific value they require. In some circumstances the User does not know that value but he does know the present depth of liquid. Sending the “Present Depth” Command causes the transmitter to adjust its Bottom Reference parameter such that its level reading equals the value entered by the User.

5.2. “Set as Empty” Command

Sending the “Set as Empty” Command causes the transmitter to adjust its Bottom Reference parameter such that its level reading equals zero.

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6. Initial Threshold

The initial threshold is now user-programmable via HART communications for amplitude and duration. This can assist in ignoring echoes from close targets such as the end of a standoff.

6.1. Parameter P043 Threshold 1 Time sets the duration of the initial threshold level. Its default value is 2.9ms and it can be set up to 28ms.

6.2. Parameter P048 Threshold 1 Size sets the minimum amplitude of the initial threshold. Its default value is 4%.

7. Revised Damping / Smoothing Time

Improves the settling time of the level indication.

8. Transmit Power Control

To improve the measurement accuracy the transmitter can automatically adjust the energy in the transmitted ultrasonic pulse to avoid saturation of the amplifier input by large, close echoes. Parameter P040 is used to enable or disable this feature

9. Alarm / Fault Conditions

The transmitter reports additional status information via HART Communications. The data is displayed in host systems which support the Device Description Language.

Bit	Meaning
AD2.2	Ultrasonic Transmit is suspended
AD2.3	Simulation (Autocycling) is Active
AD2.4	Level is Low - below the Bottom Reference
AD2.5	Above NLP Limit – the level is above the specified maximum height of the non-linear profile (tank or flow structure)
AD2.6	Threshold is Fixed by User
AD2.7	Temperature is Fixed by User
AD3.0	Level Jump Detected
AD3.1	No Echoes were Received
AD3.2	All Echoes were Rejected – by False Echo rejection
AD3.3	False Echo Rejected – one or more False Echoes were rejected
AD3.4	Poss2 Present – a farther candidate target echo is present
AD3.5	Poss1 Present – a nearer candidate target echo is present
AD3.6	Wide Rangepate in operation
AD3.7	Lost Echo Counting – no received echo satisfied the echo processor
AD4.0	Auto Tank Map – the transmitter is busy mapping the tank
AD4.1	Echo Size is Low
AD4.2	Success Rate is Low
AD4.3	Tank is Full
AD4.4	False Echoes are stored
AD4.5	Threshold is not optimum
AD4.6	Power Control is disabled
AD4.7	Power Control is Active
AD5.0	No Model Code – a fault condition
AD5.1	Temperature is Low
AD5.2	Temperature is High
AD5.3	Temperature has exceeded the Low Limit
AD5.4	Temperature has exceeded the High Limit
AD5.5	Internal Temperature sensor is in use

Bit	Meaning
AD5.6	External Temperature sensor is in use
AD5.7	Initial Value – the level has not yet been determined
AD6.0	Relay 2 is energised
AD6.1	Relay 1 is energised

10. Additional Parameters

The transmitter supports additional parameters that are only accessible via HART Communications.

Additional configuration parameters are:

- 10.1. P040 (Transmit Power Control) – see section 8 above
- 10.2. P043 (Threshold 1 Time) – see section 6.1 above
- 10.3. P048 (Threshold 1 Size) – see section 6.2 above
- 10.4. P060 (Distance Offset) – this allows for the User to reference the “distance” parameters to a point other than the front face of the transducer (see diagram in Appendix A). A positive value indicates that the transmitter is mounted higher than the User’s preferred reference point
- 10.5. P069 (Level Offset) – this allows for the User to reference the “level” parameters to a point other than the bottom of the tank (see diagram). A positive value increases the Level reading.
- 10.6. P063 (Lower Blanking) – Similar to the Upper Blanking, this controls the range at the bottom of the tank, relative to Bottom Reference, over which the transmitter looks for a target echo. A positive value of P063 reduces the range, and a negative value increases the range. With the default value of zero, the transmitter looks 0.5m beyond the programmed Bottom Reference.
Note that the ultrasonic transmit is turned off if the Upper and Lower Blanking overlap.

Additional diagnostic parameters are:

- 10.7. D917 (Threshold in Use) - this parameter reports the level of the echo detection threshold on a scale of 0 to 100%
- 10.8. D918 (Pulses in Use) – this parameter reports the number of pulses in the transmitted pulse train on a scale of 2 to 32, typically 10.
- 10.9. D919 (Transmit Power in Use) – when Power Control (P040) is enabled, this parameter reports the amount of energy in the transmitted pulse train on a scale of 0 to 9

11. Additional Display Requirements

The addition of the Level Offset parameter P069 means that the Level resultant PV can conceivably have negative values. In those rare circumstances, the magnitude of the negative value without a negative sign is flashed alternately with the message “-LO-”.

12. Positioning of Decimal Point in Scale Factor

When editing the Scale Factor parameter (P013) using the local HMI, the position of the decimal point is typically determined by the largest of the Relay and current output parameters. When the profile is Linear or Special Calculation, the decimal point maybe shifted by using the method whereby, if the most significant digit is 9 and the value is less than 90000, then a leading zero is displayed for editing.

13. PC Software Support

Previous versions of the MSP900 family are supported by PC-based configuration tools H-CONF401 and DDCONF. From this software revision onward the MSP900 is supported by AMS (Suite – intelligent device manager).

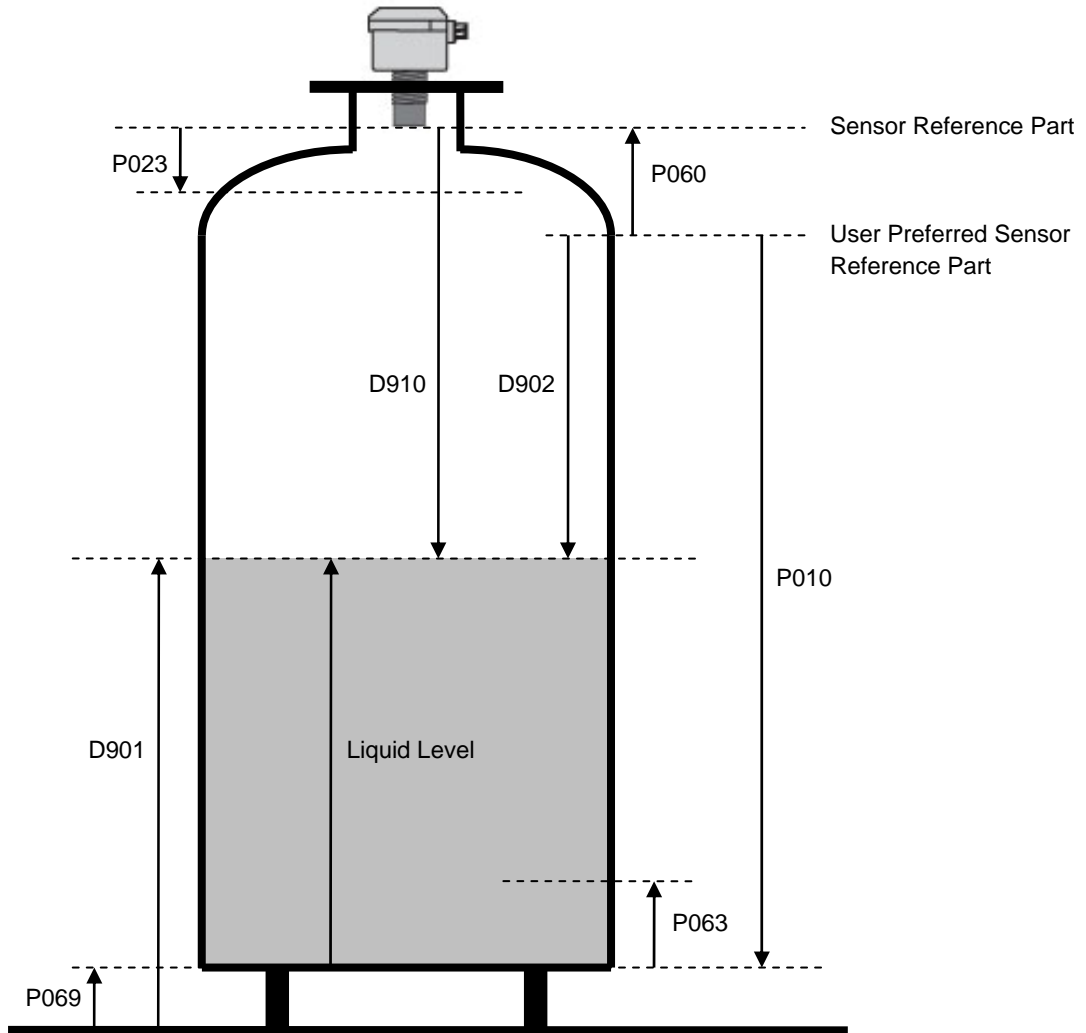
14. Handheld Configurator Support

Previous versions of the MSP900 family are supported by handheld configuration tools HPC301 and HPC401. From this software revision onward the MSP900 is supported by the Rosemount 375 Field Communicator.

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Appendix 1 – Parameters for Typical Application

The diagram of a tank shows the meaning of the various transmitter parameters.



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