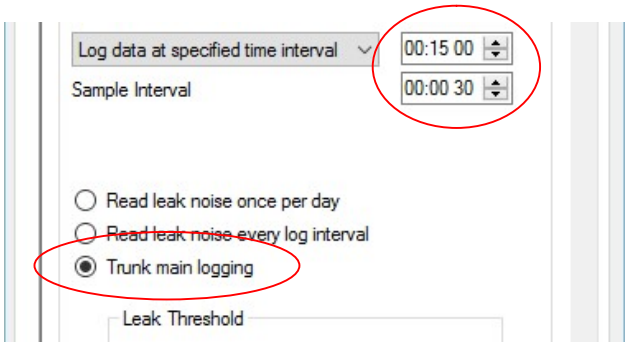
Ref: FAQ0368	Version: 1.0
Title – PermaNet+ TM	
Made By: AE 02/02/18	(Issue 2)

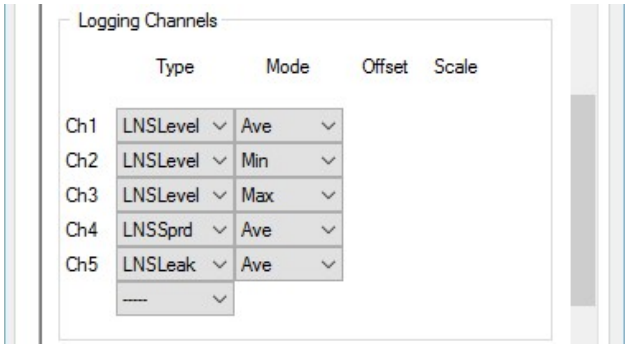
Trunk Main Logging with the PermaNet+TM

The HWM PermaNet+TM system allows the user to frequently monitor the noise levels in water pipes, allowing the user to be notified of bursts as soon as they happen.
When installing this data logger it is important to run it for a period to obtain a baseline noise level and spread before attempting to configure alarms, otherwise you may have many false alarms.

- **How to switch on Trunk Main logging?**
  Set your logging interval and the sample rate depending on how often you wish to take an audio sample. In the example, the logger would sample every 30 seconds and average this over the 15 minute log interval.



- **What settings do I need to adjust?**
  Channels:



Channel 2 and 3 are derived from the main audio channel (LNSLevel)
In the example, the **Min** value logged is the **lowest** value from the 30 second samples in the 15 minute period, so lowest of 30 samples taken. The **Max** value is the **Highest** value measured.
Channel 4 is the difference between the Max and Min values
Channel 5 is the result of a check that the difference between the LNSSprd and LNSLevel is greater than the Leak Threshold.

Above example explained:
The logger measures the LNS sound level every 30 seconds.
Every 15 minutes it stores the 5 channels.
Channel 1 = The average of the 30 samples (1 sample every 30 seconds for 15 mins = 30 samples)
Channel 2 = The lowest value from the 30 samples
Channel 3 = The highest value from the 30 samples

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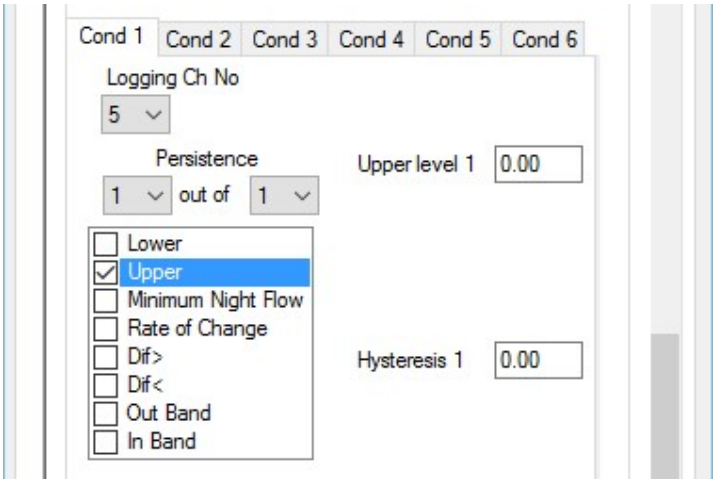
Channel 4 = The spread between lowest & highest samples (Ch3-Ch2)
Channel 5 = A status value '0' or '1' indicating if the value of Level-Spread (Ch1-Ch4) is greater than the **Leak Threshold**

- **How do I set alarms?**
  Bursts can be detected as a larger than normal difference between the average spread and average level of sound levels recorded.
  It is essential to run the logger at the site for a while and slowly adjust the **Leak Threshold** to a point where no false alarms are shown on channel 5, then set an Upper Level alarm of value '0' to send an alert if the Leak Threshold is crossed.



If you still get false alarms, you can adjust the sensitivity by changing the Persistance.
e.g. set 6 out of 9 to only set the alarm if 6 thresholds out of 9 consequetive ones are crossed, however this will increase the time between a suspected burst and the alarm being triggered so careful choice of logger interval vs persistance should be made.

- **How do I make recordings?**
  Currently automatic recordings are not possible in trunk main mode, to schedule a manual recording use PermaNet+ software to set a recording.

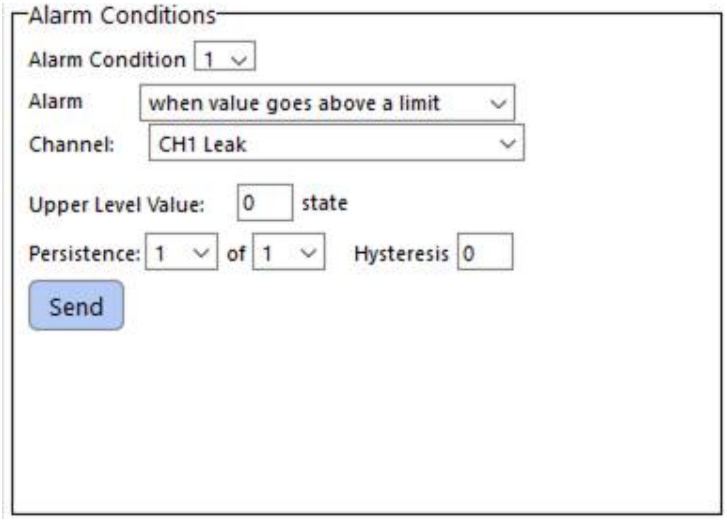
How do I interpret the data and set appropriate alarm levels?

- The purpose of trunk main logging is to provide as early alarm as possible in the event of a burst to reduce the impact on consumers and the massive loss of water and potential flooding that can occur as a result. Using several loggers on the main can help to rapidly pin point the area of the leak if it is not immediately obvious.

  It is suggested that the loggers are run for a minimum of 7 days (but preferably 14 days) with no alarms set so that 'ambient' noise Level and Spread graphs can be examined in order to see what would be a logical alarm level. In the case of a leak situation it is generally the noise level which is most affected (it goes up significantly in the case of a leak). So, the min and max graphs can be used to understand the nature of the ambient noise – the max graphs will enable you to accurately set an alarm just outside the top level of the graph. The Min graph will demonstrate the spread of min / max noise level which will help to determine whether you alarm is going to give the true burst alert. The bigger the band between the max and min graphs the higher the background noise level is which means it is less likely to give a good indication of a burst. The narrower the band between max and min levels the more likely and alarm will reflect a burst.

The alarm is set by the leak threshold setting – by default this is set to 15 which means that when the noise Spread value is subtracted from the noise Level Value, if the result is greater than 15 a leak situation is determined and Omnicoll/Datagate will move the Leak value from Zero to one – this would activate the alarm if it is set as below (but adjust the Persistence and Hysteresis to suit the installation). From the two weeks of baseline graph data you have you can now look at the max noise Level graph against the noise Spread graph and adjust the leak threshold level to suit the installation by looking at worst case Level minus Spread values and setting the threshold accordingly.

Each installation is going to be different so the above must be carried out for each one to ensure the determination threshold is correctly set so that 'false alarms' are minimised / eliminated.



If the Level and spread graphs demonstrate a recognised and regular profile then it would be possible to set a profile alarm on the Level and/or spread values rather than using the simple calculation outlined above. Over the week that you are reviewing, you could set the profile, so if something out of the ordinary happens you can trap that. In some circumstances it might be better than a simple Determination style alarm, however in the limited number of applications we have reviewed we've not seen a regular enough profile to risk this.

Document History:

Edition	Date of Issue	Modification	Notes
1st	08/07/16	Release	
2nd	02/02/18	Added data interpretation	

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