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Introduction

Thank you for choosing an HWM data device, we trust it will provide you with many years of service.

This manual has been written using the PermaNetPlus version 2.41 and PermaNetPlus LLC version 3.11, and as such the figures may look different to your installation.

Overview

Pipeline leaks are a constant burden to water and gas industries, which can affect the efficiency of the individual company's performance. As well as reducing the amount actually being delivered, leaks also impact the financial side of the business, and the longer the leak is left, the larger the economic, and potentially environmental, consequences. It is therefore safer and more beneficial to detect a leak and repair the damage to the pipes before it causes more damage to the business. At HWM, we pride ourselves in designing the best leak detection equipment at an affordable price for the benefit of the water and gas companies.

Our Permalog+ product family (yellow) aims to detect when a leak is found, and it has successfully done so for the last ten years of service. The Permalogs are functioning microphones that can detect the sounds emitted from a potential leak. To conserve battery life and increase their life expectancy, the loggers take one reading every 24 hours, and once deployed, the Permalogs can be programmed and read locally through radio communications.

Our SoundSens and Aqualog product ranges record the sounds detected along the pipeline and correlate them to determine where the leak is located. They have successfully detected leaks with a high accuracy, and helped companies find and repair leaking pipes. In the past, these products were used when there may have been leaks in pipes.

Our new PCorr+ system (Blue) combines the Permalog+ family with the SoundSens and Aqualog products to not only detect, but also localise the leak. By combining these products, the amount of hardware required for leak detection and localisation is reduced.

The software has also been combined to deliver fast readouts from the loggers, and also determine the location of the leak. With the new software you will be able to:

- Determine whether a leak has been detected,
- Configure the loggers to read and record sound data at a specified time,
- View a map of the locations of the loggers,
- Correlate the recorded sounds to determine a location of the leak, and
- Analyse the sound recordings manually.

This document has been produced to help guide you through the features available within this powerful software. Please read through this manual to understand how the software works. Should you have any questions that are not covered by this manual or FAQs provided online, please contact the HWM Technical Support team on +44 (0) 1633 489479 and selecting option 2, or email <u>cservice@hwm-water.com</u>.

PermaNetPlus P+ PermaNet+ \times _ File Setup Function Help -1 DMA Management Fast Patrol Patrol Deploy Aq 16 R 0 Data Analysis Lift + Shift Aqualog History 52 P+ Setup Patroller Setup Connections Backup / Restore Modem About Maps Functions

The **Main Screen** contains a set of icons that will lead to the different functions of the PermaNetPlus software. They can also be accessed by the Function menu.



The functions displayed in the picture will now be outlined.

Patrol

The **Patrol** function reads data from the Loggers. When **Patrol** is clicked, a window will open.

Drive-By Display	Sensitivity :					ŀ	Rx Tx ● ●
Start Patrol	Normal	Clear Lo	g				
Ref Number	Location	Level	Spread	Leak			
							-
Patrol Stopped	0 loggers showr	, ,		onnected to Patroller	(LISB Wireless)		

For this function to work, either a mobile Patroller unit or a wireless USB module must be used.

Note: for the Patroller unit to be used, the computer must have Bluetooth enabled, and must be connected to the Patroller unit.

If the computer does not detect either the Patroller or the wireless USB module, an error message will appear. This means no logger can be read to the PC.



Once connected, the message box at the bottom right of the window will display Connected to Patroller (USB Wireless) if connected to the USB module or the Patroller. If the

local loggers' data are not read automatically, upon clicking on the Start Patrol button, the loggers' data will be read.

	r Help					
Drive-By Display	0.000					Rx Tx
Stop Patrol	Sensitivity : Normal	Clear Lo	g			• •
Ref Number	Location	Level	Spread	Leak	 	
02165013		21	3	L		
02165016		20	4	L		
02165015		25	23	N		
05160016		26	17	N		
02165017		31	3	L		
02165018		25	22	N		
12345678		0	1	N		
02165014		22	3	L		
02165011		26	21	N		
02165012		19	3	L		
10131774		28	4	L		

Note: for the Patroller unit (whether mobile or USB) to detect the logger, the radio frequencies of Patroller or USB transceiver must match.

Note: some sections will appear blank (locations, GPS, Address etc). This is because the loggers have not been configured with these details (see section **Deploy** on how to configure).

Note: if the logger does not appear, try swiping the logger with a magnet along the square ridge on the side of the case. **Warning**: Swiping the logger will invalidate synchronisation for any sound recordings not yet downloaded.



More options and information from the loggers can be seen by clicking on File -> Options, and selecting the information of interest. The checkbox "Colour-code loggers" introduces a colour bar denoting leak (red) or no leak (green) detected.

Patrol File Patroller Logger Options ensitivity : Exit Normal Ref Number Location 02165018 Image: State Sta	Options × Select columns to show : Image: Ref Number Image: Ref Number Image: Location Image: Norm Image: Colour-code loggers Image: Norm Image: Connected to Parceler (USH Winger	
-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	--

Clicking on the Stop Patrol button will freeze the logger data in place. This will allow the user to gather additional information about individual loggers by doubleclicking the logger of choice.

Logger Details					-		×
Ref Number :	12345678		Leak History				
Deployed :	08-Aug-16, 08:23		Sensitivity :				
Logger Type :	Permalog5		Normal				_
DMAs :	<none></none>		Patrol Time	Level	Spread	Leak	
DWD3 .	<none></none>		08-Aug-16, 08:23 04-Aug-16, 10:27 15-Jun-16, 14:09	0 0 0	1 1 1	N N N	
Location :	I						-
Address 1 :							
Address 2 :							
GPS :	<none></none>						
Additional Info :		~					
Show Map					Graph	X C	lose
	atrol Stopped	13 loggers shown		Connected to Pa	troller (LISB \u/i	releas)	

On the **Patrol** window, clicking on the Clear Log button will clear the screen of all data.

Drive-by Mode

By selecting Drive-By Display, the window will split between the loggers' data screen and the latest received logger leak information.



Fast Patrol

The **Fast Patrol** function allows for a fast drive-through patrol of the loggers in a specific DMA, and functions in a similar way as the **Patrol** function in that it scans for detectable loggers. However, **Fast Patrol** tends to be used for quick check-ups on the loggers. It may be useful to turn Drive-By Patrol on.

DMA Management

Refer to **FAQ 376** on the HWM website for details on creating and editing DMAs using the **DMA Management** function.

Deploy

The **Deploy** function allows the loggers' details to be modified.

😭 Deploy	- 0	\times
File Loggers Help		
Filter Data		
Ref Number	12345678 • to 12345678 •	
Location	v to v	
	<no dma=""></no>	
Add New Logger	Edit Logger Details	
Ref Number		
12345678		- 11
09140012		
09130250		
12999999		
02165013		
05160013		
02165014		
02165011		_
07162004		
10131774		_
07162009		- v
36 entries shown		//

Any unrelated loggers can be filtered out by using the options in the Filter Data subbox. If a box is unchecked, that filter will not be applied. The current version of PermaNetPlus (v2.41) only filters by Reference Number (serial code), alphabetical location, and DMA:

ReferenceShow loggers whose reference number lies within the given
range.Location:Show loggers whose location lies within the given range.Location:Show loggers whose location lies within the given range.DMA:Show loggers within the specific DMA deployment information.

Add New Logger

To add a new logger to the database, click the Add New Logger ... button. In the new window, add a reference number of choice. This may be the serial number or the phone number associated to the logger, and it is the minimum required to add a new logger to the database.

Edit Existing Logger

By selecting a specific logger and clicking the Edit Logger Details ... button, a window will open to allow the logger's details to be edited.

😭 Edit Logger			-		×
Ref Number :	12345678				
Deployed :	04-Aug-16, 15:01:23				
Logger Type :	Permalog5				
Location :					
Address <u>1</u> :					
Address 2 :					
GPS Latitude :		•	GPS S Disable	tatus : ed by us	er
GPS Longitude :]			
Additional Info :					^
	1				~
		ок		🗙 Car	icel

Any desired details can now be added.

:	Ref Number : 1234567 Deployed : 08-Aug-16,00 Logger Type : Permalog5 Location : HWM Wate Address 1 : Cwmbran Address 2 : Wales GPS Latitude : Image: Compare Additional Info : This is a term	08:26:32	● GPS Status : Disabled by us Cwmbran.	er	
			✔ OK X Can	cel	
Iick OK onfirmed by dou Ref Number : Deployed : Logger Type :	ble-clicking a log	ger.	e details c	an be ch	

Note: the GPS latitude and longitude coordinates must be relative to the map server used in **Maps**. For example, if the map server uses Google Maps, the GPS coordinates must be of the same structure and format as those used for Google Maps.

Data Analysis

The **Data Analysis** function looks at filtering out any unwanted loggers, and leaving behind the loggers and their data that will be analysed. On opening **Data Analysis**, a window will open up with the option to filter data.

Defined DMAs								Loggers
DMA Name	# Loggers	Created	Grid Referenc	e Postc	ode Co	mment	[Loggers
<none> HWM Test DMA</none>	35 8	08-Aug-16 1			Tes	at DMA		
K							>	
Filters	Database							
		Sensitivity :	🗆 Last	Patrol Onl	v			
Logger Type Permalog+	Filter Data	Normal	▼ Late	st Data On	ly		Export [Displayed Data
	Ref Number	Level	Spread	Leak	Patrol			
DMA Name	12345678	0	1	N	08:12			
<none> -</none>	12345678	0	1	N	10-Au			
	12345678	0	1		09-Au			
Ref Number Start	12345678	0	1		08-Au			
00000000 -	12345678	0	1		04-Au			
	12345678	0	1		15-Ju			
Ref Number End	09140012	22	11		09-Au			
	09140012	12	10		08-Au			
00000000 -	09140012	18	9		04-Au			
			<u> </u>	N	25-Jul			
Leak State	09140012	18 21	6 30		25-Jul 15-Ju			

Under 'Defined DMAs', DMAs can be chosen to see which database loggers belong to. Loggers that do not belong to any DMA will be under <None>.

Under the 'Filters' section, loggers can be filtered out using the specific filter options. To enable a chosen filter, tick the checkbox next to the filter name. Current filters that can be enabled are: Logger type, DMA Name, Reference number range, Leak state, and active Patrol date range.

Under the 'Database' section, chosen filters can be applied to the list of loggers and their data by ticking the checkbox next to "Filter Data". More columns can be added to the list of t loggers to give more information for each logger by clicking on File -> Options, and selecting the information desired.

The tabulated data can be exported to a .csv file by either clicking the Export Displayed Data button, or by clicking File -> Create CSV File -> Export Currently-

Displayed Loggers.

Lift + Shift

The **Lift+Shift** function is used for loggers who do not stay in the same place, and take one measurement only at various locations. If at any point the list of loggers does not appear, try the following:

- Ensure the correct database is selected. To do this click the Database parameter, and select the correct database.
- Go to File -> Options, and ensure the Ref Number checkboxes are ticked for both Lift Screen and Shift Screen.

	Options		\times
nift	Select columns to sho	w:	
		Lift Screen	Shift Screen
r:	Ref Number	\checkmark	
	Location		
	Status		
	Address 1		
	Address 2		
	Additional Info		
inate	Logger Type		
	GPS Co-ordinates		
	In Drive-by screen sho	w:	
	Ref Number		
dep	C Location		
	For Auto-Increment :		
	Sort by Ref Number	r	
	O Sort by Location		
		🗸 ок	🗶 Cancel

Lift

To withdraw a logger to move it, select the Lift tab, and select the desired database.

🧏 Lift + Shift		-		×
File Patroller Help				
Lift Shift				
Start Patrol	Database HWM Test DMA Loggers in database Loggers Remaining		F	
Ref Number	Status			
02165011 02165012 02165013 02165014	Deployed Deployed Deployed Deployed			
Connected to Patroller	atroller 05122589			

Double-click the logger to withdraw.

Ref Number :	02165011	Leak History			
Deployed :	09-Aug-16, 16:07	Sensitivity :			
	u	Normal			
Logger Type :	Permalog+	Patrol Time	Level	0	Leak
DMAs :	HWM Test DMA	09-Aug-16, 09:48	23	Spread 26	N
		08-Aug-16, 08:23	15	4	N
		04-Aug-16, 10:29	26	21	N
		25-Jul-16, 13:37	23	28	N
Location :					
Address 1 :	Cwmbran				
Address 2 :	Wales				
GPS :	51.634186 / -3.016557				
Additional Info :	Shift:09-Aug-16 16:07				
, additional line .	Shin.05-Aug-10 10.07				
		~			
Un-deploy	Show Map		isten	Graph	
Un-deploy	Show Map	<u>L</u>	Isten	Graph	X Clos
1					

Click on the <u>Un-deploy</u> button, and click <u>Close</u>. Un-deploying the logger will clear its location data, including any GPS and address data.

Shift

To deploy a logger, select the Shift tab, and select the logger that would be deployed from the list of loggers available.

🧏 Lift + Shift			-	
File Patroller Help				
Lift Shift				
Database :	HWM Test DMA			
Ref Number :	02165011	Loggers in database : Loggers not deployed :		
Location :		Loggera not deployed .	J	
Address <u>1</u> :			_	
Address 2 :				
GPS Co-ordinates :		 GPS Status : Disabled by user 		
	Back Skip			
	Update Database			
Loggers not deploye	ed :			
Ref Number				
02165011				
02165015				
02165016				
02165017 02165018				
02103018				

Select the desired logger, and fill in the details as required, and click the Update Database button.

18 Lift + Shift		-	. [Х
File Patroller Help					
Lift Shift					
Database :	HWM Test DMA				
Ref Number ·	02165011	Loggers in database : 8			
		Loggers not deployed : 5			
Location :					
Address <u>1</u> :	Cwmbran				
	Wales			_	
Address 2 :	·	GPS Status :			
GPS Co-ordinates :	51.634187 -3.016557	Disabled by user			
	Back Skip				
	omp				
	Update Database				
Loggers not deploy	ed :				
Ref Number					
02165011					
02165015					
02165016 02165017					
02165017					
02100010					
Connected to Patroller p	atroller 05122589				,
					- //

Aqualog

The **Aqualog** function is used to program and configure the loggers to either Aqualogs or perform sound recordings. This varies from product to product.

On clicking the **Aqualog** icon, a window will open.

Ă⊈ Aqualog File Patroller Help		- 🗆 X
		Rx Tx ● ●
Permalog+ (13)	Program Read Status Histogra	ams
□ 02165013 □ 02165014	Program • Aqualog • Sound Recording Start Time : • 15 • 00 • Saturday • 15 • 00 • Log Duration : Log Interval :	Set Defaults
02165015	5 minutes I minute	1
 02165017 02165018 02260001 05160016 	Logs per Day : # Days : 10 1 1 1	Start : Sat, 13-Aug-16, 15:00 Finish : Sat, 13-Aug-16, 15:59
□ 10131774 □ 12345678	Logger Status	
12345078		
All None		
Leak DMA		
Selected : 0		
	Database read OK	Connected to Patroller (USB Wireless)

Under Permalog+, a list of detectable loggers will be continuously updated. This may be in the form of the logger's serial number or phone number. Once a logger becomes unavailable or out of range, it will automatically be removed from the list.

To program or read one (or more) logger, the desired logger(s) must be ticked in the checkbox.

Permalog+ (13)	
02042009	Not selected
02165011	Not selected
02165012	Selected

Program

Under the Program tab, any logger can be programmed for Aqualog, but only some can be programmed for Sound Recording. **Note**: if Aqualog has been selected, the third tab will display Histograms; if Sound Recording has been selected, the third tab will read Download Sound. Below is an outline what each parameter setting does.

Start Time:	Sets the starting date and time of the logger (Note : Start Time cannot be set in the past).
Log Duration:	Sets the length of time over which readings are taken.
Log Interval:	Sets the time between readings (Aqualog only).
Logs per Day:	Sets the number of logs taken per day (Aqualog only).
# Days:	Sets the number of days to be active for (Aqualog only).

Upon selecting the logger of choice, and setting the desired parameters, clicking the

Program button will start the programming sequence. The logger's number and programming status will appear in the table.

Ă⊈ Aqualog File Patroller Help		– 🗆 X
		Rx Tx ● ●
Permalog+ (13)	Program Read Status Downlo	ad Sound
□ 02042009 □ 02165011 □ 02165012 □ 02165013 □ 02165014	Abort C Aqualog C Sound Recording Start Time : Tuesday V 01 V 00 V	Set Defaults
□ 02165015 □ 02165016 □ 02165017 □ 02165017 □ 02165018 □ 02260001 □ 05160016	Log Duration : 10 seconds Record Automa	tically on New Leak Start : Tue, 09-Aug-16, 01:00
□ 10131774	Logger Status	
□ 12345678	02165011 Wait	
All None		
Leak DMA		
Sending requests to Patroller	Database read OK	Connected to Patroller (USB Wireless)

IMPORTANT: For accurate correlation of sound recordings, the loggers <u>must</u> be programmed together at the same time, and <u>not</u> separately. The loggers can be programmed and downloaded separately, but this will introduce an error of typically 5m per minute of time difference.

Once the logger has been programmed, the status will change from "Wait" to "Initialising" to "Programmed", and the message box in the bottom left corner will display "Reading 100% successful".

Aqualog	– 🗆 X
<u>File</u> <u>Patroller</u> <u>H</u> elp	
	Px Tx
Permalog+ (14)	Program Read Status Download Sound
□ 02042009 ✓ 02165011	Program C Aqualog C Sound Recording
0216501202165013	Start Time : Tuesday • 01 • 00 • Set Defaults
 02165014 02165015 02165016 	Log Duration : 10 seconds
 02165017 02165018 02260001 	Start : Tue, 09-Aug-16, 01:00
□ 05160016 □ 10131774	Logger Status
□ 10131775 □ 12345678	02165011 Programmed
All None	
Leak DMA	
Selected : 1	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,

Read Status

Under the Read Status tab, a table shows the relevant logger details that would be

displayed. Select the logger(s) that would be read, and click the Read Status button. The logger's parameters will be displayed.

								Rx Tx
Permalog+ (15)	Program	Read S	tatus Do	wnload Sound]			••
02042009	Read Sta	atus (Sou	Ind Recording)				
 ✓ 02165011 □ 02165012 	Logger	Start Day	Start Time	Log Duration	Log Interval	Logs per Day	# Days	Status
	02165011	Tuesday	01:00	10 seconds				Pending
02165014								
02165015								
02165016								
02165017								
02165018								
02260001								
05160016								
09140012								
 10131774 12345678 								
12999999								
12999999								
All None								
Leak DMA								
Selected : 1								

A logger with "--" in the columns "Log Interval", "Logs per Day", and "# Days" has been previously programmed for Sound Recording. Otherwise, it has been programmed for Aqualog.

Histograms

Under the Histograms tab, select the logger to retrieve graph data, and click the Download All Graphs button. The software will download information about the graph data and the graphs themselves. Please wait until this finishes. The time will depend on how much data there is to read.

Aqualog				- 🗆 X
File Patroller Help				Px Tx
				HX IX
Permalog+ (15)	Program F	Read Status Histogr	ams	
	Progress			
□ 02042009 □ 02165011	Logger: 02	165012		
□ 02165011 □ 02165012	Abo			
02165013				
02165014	Logger	Graphs Available	Graphs Downloaded	
02165015	02042009	<u>0</u>	<u>0</u>	
02165016	02165011	0 0 10		
02165017	02165012 02165015	<u>10</u> 0		
02165018	02260001		<u>0</u> <u>0</u>	
02260001	12345678		ŏ	
 05160016 10131774 		_	_	
□ 10131774 □ 10131775				
□ 10131775 □ 12345678				
□ 12999999				
1200000				
All None				
Leak DMA				
Selected : 0				
Reading	Database re	ad OK	Connected to Patroller (USB Wireless)	

When the graphs have been downloaded, a new tab will appear, and will be labelled with the logger's reference number. This will show graphs of the logged data at the time of activity.



Download Sound

Under the Download Sound tab, the logger's data can be downloaded to the PC and correlated to determine the possible location of the leak. Clicking on Select New Sound will automatically select the loggers with new sound data. Otherwise, select the logger(s) whose data should be downloaded, and click the Add to List button.

ile <u>P</u> atroller <u>H</u> elp				Rx Tx
Permalog+ (11)	Program Read Sta	tus Download Sound		
02042009	Logger	Status	Date	Select New Sound
 ✓ 02165011 ✓ 02165012 	02165011 02165012			Add to List
02165013	02103012			Remove from List
 ✓ 02165014 ✓ 02165015 ✓ 02165016 ✓ 02260001 				Download Sound
05160016				Validate
 10131774 12345678 				
12343070				
All None	<			>
Leak DMA				
Selected : 6				
Reading 100% successful	Database read OK	Connecte	to Patroller (USB Wireless)	

To remove a logger from the list, select the logger, and click the Remove from List button.

Once the **Download Sound** button is clicked, all the listed loggers' sound data will be downloaded. Please wait while it downloads all the data. Once completed, the status should display "Complete" and the date should be the start date and time of the logged data.

Clicking on the Listen button will open a window, and the sound will be played. To the right of the date parameter, clicking the up and down arrows will navigate through the downloaded sound data. A graph showing the current sound data will also be displayed.

P ⁺ Sound Recording Player		-	
Logger 02165012		Duratio	n 10
Date 05/08/2016 •		Time	11:00
Replay		[Close
Me homen			
0 500	1000 Download	1500 Sound	2000

Click on the Validate button to correlate the sound files. The sound files must be of the same time stamp for the correlation to work. Correlation is not possible if *** is seen by the logger time.

IMPORTANT: For the correlation to work accurately, the Permalogs <u>must</u> be programmed together at the same time, and <u>not</u> separately. **Warning**: Swiping the logger at any time between programming the logger and downloading the sound file will invalidate the synchronisation, and correlation will no longer be possible.

History

The **History** function allows previous level and spread data from the loggers, starting from the latest data, to be presented in the form of either 2D or 3D histograms. These histograms will show the sound and data recorded over time. Leak detection is then possible through careful observation.

Level + Spread History

Under the Level + Spread History tab, the loggers' level, spread, and leak data can be downloaded. This may span from 1 day's to 28 days' worth of historical data.

History								-		×		
File Patroller Help												
 Latest Graph (Bar) All Graphs (3-D) 										Rx Tx		
	I + Spread Histor	y Histogr	ams									
02042009	Sensitivity :											
02165011 Rea 02165012	Read History Clear Table Normal											
02165013	Latest	-1 -2	-3	4	-5 -6	5 -7	-8	-9	-10	-11		
02165014												
02165015												
02165016												
02165017 02165018												
12345678												
12010010												
										_		
٢										>		
	Database re	ad OK			Connecte	d to Patroller	(USB Wir	eless)				

Select the logger to download data, and click the Read History button. Please wait while data is downloaded.

Once data is downloaded, it will be displayed in columns, starting with the latest data, running through however many days' worth.



Histograms

Under the Histograms tab, graph data can be downloaded and analysed.

File Patroller Help					_	1
 Latest Graph (Bai All Graphs (3-D) 	r)					Px ●
Permalog+ (11)	Level + Sp	oread History Histo	ograms			
02042009	Progress					
02165011 02165012	Downloa	ad Latest Graph				
02165013 02165014	Downlo	ad All Graphs				
02165015 02165016 02165017 02165018 12345678 12999999	Logger	Graphs Available	Graphs Downloaded			
Reading 100% successfu	·	Database read OK		Connected to Patroller (USB Wireles	.e]	 _

Clicking on the Download Latest Graph button will download the latest data only, whilst clicking the Download All Graphs button will download all the graph data available in the logger. Please wait while data is downloaded.



Please refer to **FAQ 204** on the HWM website, which covers understanding and interpreting the graphical data.

These graphs can be downloaded and saved to the hard drive by clicking File -> Save as CSV.

P+ Setup

The **P+ Setup** function sets the patrol times and the logging times of the loggers. These times will determine when the loggers will be detectable by the Patroller unit, and when they log data. Refer to **FAQ 203** on configuring the logger to 'Sleep Mode'.



Program Loggers

Default settings only permit the loggers to be transmitting to a Patroller unit up to a maximum of 8 hours per day. This can be changed using the distributor's password in the Options menu of the **Main Screen**. The times loggers are available to Patroller units are denoted by the green ticks on the timetable, and can be changed by simply clicking on the green or red tiles.

Logging times are set to once per day, at quarter-hour intervals. The Logging Days parameter determines what days during the week the loggers take readings.

To program the loggers, select the desired logger by ticking the box, and clicking the

Program button. Be sure to enable or disable which parameters to program by using the checklist at the top of the window.

File Patroller Help		
Patrol V Logging	Date / Time	🗹 Set Sleep 🛛 🗌 Lift + Shift
Permalog+ (9)	Program Loggers	s Read Loggers Utilities

Read Loggers

Under the Read Loggers tab, the loggers of choice can be read, which will give their current settings laid out.

P+ Setup File Patroller Help		- 0
Patrol 🔽 Logging	g I Date / Time I Set Sleep □ Lift + Shift	
Permalog+ (9)	Program Loggers Read Loggers Utili	ties
02042009	Progress	
02165015	Logger Patrol Logging Time	
□ 02165016 □ 02165017		
02165018		
□ 02260001 □ 10131774		
□ 12345678		
□ 12999999		
All		
None		
Selected : 0	Read Configuration	
	Database read OK	Connected to Patroller patroller 05122589

To read the loggers' current configuration, select the desired loggers, and click Read Configuration button. This will initiate the reading process. Please wait until

this completes.

Once it does complete, there will be a new tab for every logger selected. Each tab will show the current configuration for the loggers, including the patrolling times, logging time, delay time, and their active days of the week.

₩ P+ Setup File Patroller Help		-	×
Patrol V Logging	Date / T	me 🔽 Set Sleep □ Lift + Shift	Px Tx
Permalog+ (9) □ 02042009 □ 02165015 □ 02165017 □ 02165017 □ 02165018 □ 09140012 □ 10131774 □ 12345678 □ 12999999	Program L Progress Logger 02165015 02165016	oggers Read Loggers Utilities 02165015 02165016 Patrol Logging Time Success Success Success Success	
All None Selected : 2 Reading 100% successful	Read Cont	guration Database read OK Connected to Patroller patroller 05122589	

💓 P+ Setup File Patroller Help			-	×
Patrol V Logging	Program Loggers Read Loggers Utilities			Px Tx
 02042009 02165015 02165016 02165017 02165018 10131774 12345678 	Progress 02165015 02165016 Patrol Times 00 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 Mon Image: Constraint of the second s	20 21	22 23	
All	Time: 01:00 Date: Delay: 01:00 Tuesday, August 9, 2016 Days: Time: Time: IV T F S IV IV T S IV IV IV T			
None Selected : 2	Read Configuration			
Reading 100% successful	Database read OK Connected to Patroller patroll	er 05122	589	

Utilities

The Utilities tab configures the loggers to be set in Patrol Mode or Fixed Network Mode. Patrol Mode is for loggers without a GSM option, and require a Patroller unit to scan and read their data. Fixed Network Mode is for loggers with a GSM option that do not need to be constantly scanned. These loggers can send their data to the HWM server, where their readings will be stored. Refer to **FAQ 208** on the HWM website for more information on the operating modes.

₩ P+ Setup File Patroller Help					-	×
Patrol V Logging	I Date / Time	I Set Sleep	□ Lift + Shift			Rx Tx ● ●
○ 02042009 ○ 02165015 ○ 02165016 ○ 02165017 ○ 02165018 □ 10131774 □ 12345678	Program Logge P+ Operating M Set Operating © Patrol Mode C Fixed Networ Set C Progress : Logger	lode	ggers Utilit	Read Operating Mode Read Operating M Mode	lode	00s
All None Selected : 2	 					
Reading 100% successful	Datab	ase read OK		Connected to Patroller patroller	05122589	

To set the logger's operating mode, select the logger by ticking the checkbox, select which operating mode to set, and click the Set Operating Mode button.

To see which mode a logger is set to, select the logger by ticking the checkbox, and click the Read Operating Mode button. The loggers' operating mode will be displayed in the table.

₩ P+ Setup File Patroller Help					
▼ Patrol ▼ Logging	🔽 Date / Time	Set Sleep	□ Lift + Shift		
Permalog+ (7) ✓ 02042009 ○ 02165015 ○ 02165016 ○ 02165017 □ 10131774	Program Logge P+ Operating N Set Operating © Patrol Mode © Fixed Netw	Mode g Mode		es Read Operating Mode -	
□ 12345678 □ 12999999	Set (Progress :	Operating Mode		Read Operating M	lode 1
	Logger 02042009 10131774	Tx Period 2 seconds 8 seconds	Rx Period 40 seconds 16 seconds	Mode Patrol Mode Fixed Network Mode	
All None Selected : 1					

Firmware Upgrade

Using the Main Screen, select Setup and Options (Note: the password is available through your distributor). Ensure the Firmware Update checkbox is ticked:

	Miscellaneous
	Show Flash Download Icon (experimental)
	Allow Manual Message Entry
	□ Show Message Log
	Show LED Pulse Width
4	Firmware Update

Ensure your interface is configured using the wireless USB module (refer to section Connections > Patroller/USB Wireless).

Select P+ Setup from the Main Screen.

<u>₽</u> +	PermaN	let+ 2.45				↔	- 0	×
File	Setup	Function H	elp					
	D Patrol	DMA Management	Data Analysis	Aqualog / Sound Rec	P+ Setup	Connections	Maps	
	Nout About							

Navigate to the Utilities tab, and select the logger required for upgrade from list on the left by ticking the logger's checkbox.

Click on the heir current sta	Read Ver	D	itton and v	vait for the logg	er to call I	n with
💓 P+ Setup				↔	_	
File Patroller Help						
🗹 Patrol 🛛 🗹 Loggin;	g 🔽 Date / Tin	ne 🗌 Set Sleep	✓ Lift + Shift			Rx T
Permalog+(7)	Program Lo	ggers Read Log	gers Utilitie	s		-
	P+ Operati			1		
□ 02042009 ☑ 02165011	⊢ Set Opera	-		irmware Version —		_
02165012	Patrol Mod			Abort	1	
☑ 02165013						
 02165014 07162009 		et Operating Mode		Recover Firmw	are	
□ 12999999	Re	ad Operating Mode				
	_					
	Progress :			1		125s
	Logger	Tx Period	Rx Period	Voltage	Version	
	02165011 02165013			3.48V 3.45V	2.23 2.23	
	02100010			0.101	2.20	
1						
All						
None						
Selected : 2						

If a new firmware update is available, a notification box will ask to update the firmware. Selecting "Yes" will start the firmware upgrade procedure. Selecting "No" will return to the Utilities tab.



When requested, swipe the logger to commence the firmware upgrade.

HWM Lo	gger Loader - V4.04 COM10	_		×
_	FW-061-002V2_23 (Permal Code = 000000 -> 00	DFFF		-
F	Serial Number 02165	011		
02165011			2 /01/	

🔮 P+ Setup				↔	_	\Box \times
ile Patroller Help						
🗷 Patrol 🛛 🗹 Logging	🔽 Date / Tim	e 🔲 Set Sleep	🔽 Lift + Shift			Rx Tx
Permalog+ (5)	Program Log P+ Operatin		gers Utilitie	s		
02042009 02165011	Set Operat	ing Mode	F	irmware Version —		
02165013	Patrol Mode	9	•	Read Versi	on	
□ 07162009 □ 12999999	Se	t Operating Mode		Recover Firm	ware	
	Rea	d Operating Mode				
	Progress :					337s
	Logger	Tx Period	Rx Period	Voltage	Version	
	02165011 02165013			3.48V 3.45V	Success Success	
All None						
Selected : 0	<u> </u>					
leading 100% successful	D	atabase read OK	1	Connected to Patroller (USB	Wireless)	

Patroller Setup

On clicking the **Patroller Setup** icon, a window will open up.

Sounder Sound on Leak Sound on No-Leak Set Sounder
Sounder Sound on Leak Sound on No-Leak
☐ Sound on Leak ☐ Sound on No-Leak
Sound on No-Leak
Set Sounder
Firmware Version
Version
<not read=""></not>
<nul read=""></nul>
Read Version

Clicking the Read Region button will detect the operating radio frequency, and therefore the area which the loggers and Patroller unit are in use.

Clicking the Set Sounder button will configure the Patroller unit to toggle an alarm when there is a leak and/or when there is not. This is not compulsory, and can be left blank.
Clicking the Read Battery button will give details of the Patroller unit's battery.

Read Version button will give the current version of the Patroller unit's Clicking the firmware.

Note: the Patroller Setup is only available with a mobile Patroller unit, and not the USB wireless module.

Connections

The **Connections** function sets up the connection between loggers and the software. The logger data my come from the logger, the DataGate, or from a file stored on the computer's hard drive. The **Connections** window allows connections to be tested to make sure data would be transmitted to the software, depending on the interface.

Patroller/USB Wireless

The Patroller/USB Wireless interface uses either the Patroller unit or the USB Wireless module.

Note: to connect to the Patroller unit, a Bluetooth connection must be made, and may take several attempts at pairing before a successful connection is made.

To confirm there is a successful connection, select the port number of the communications interface, GPS module (if used), and GSM modem (if used), and

Detect USB Wireless click either the button (if using the USB Wireless Test Patroller

button (if using the Patroller unit).

module), or the Upon successfully connecting, a message should appear in the bottom left of the window saying, "Connected to XX", where XX is either the Patroller unit or the USB Wireless module.

Connections			- 🗆 🗙
Patroller / USB Wireless		•	✓ OK ★ Cancel
Patroller Interface	GPS Module F Enable GPS COM27 4800	•	GSM Modem Cable GSM Modem COM27 19200
Detect USB Wireless	Test GPS		Auto-Detect Test Modem

DataGate

The DataGate interface uses the logger data available on the HWM server to gather data.

Note: there must be an active internet connection to access the HWM server.

Enter the Server URL, Account Name, Password, and Current Message ID. Configure the proxy settings, if required, and check the connection is successful by pressing the **Test Settings** button. On successfully connecting, the message

"Connected to Datagate" will appear in the bottom left corner of the window.

Connections		- 🗆 X
Interface	•	✓ OK X Cancel
⊤ Datagate Server URL https://radwin.hwmonline.com/api		
Account Name	Password	
Current Message ID	Proxy Configuration	Test Settings

Local Folder (Toran)

The Toran interface uses locally stored data to process the logger data. Enter the path of the folder containing the data into the Data Folder parameter, and the path of the folder containing the necessary commands into the Command Folder parameter.

A backup of the original data can be made if "Backup After Processing" is ticked. Enter the path of where the backup will be saved.

Connections			- 🗆 X
Interface Local Folder (Toran)		•	✔ ОК
			X Cancel
Local Folders			
Data Folder			
			Browse
Command Folder			
			Browse
Backup Location	Backup After Processing		
			Browse

Backup/Restore

On clicking the **Backup/Restore** icon, a window will open, prompting to either backup or restore the database.

Backup

Select the Backup tab, and enter the folder location of where the backup will be saved in the Backup Folder parameter. Alternatively, click the _____ button and navigate to the desired folder. The database may be cleared after the backup by ticking the "Empty database after backup" checkbox.



Restore

Select the Restore tab, and enter the folder location of where the restore is saved in

the Restore Folder parameter. Alternatively, click the _____ button and navigate to the desired folder. The new database may completely replace, or it may be merged with the existing database.

💫 Backup / Resto	re		-		×
Backup Restor	e				
Restore Folder : C:\HWM\Permal	letPlus\Database\				
	atabase with backup file :kup file into database :tore Folder :				
Backup Date	Patrol Range	# Loggers	First L	ogger	
	15-Jun-16 - 09-Aug-16	38	12345	5678	
<					>
			Restore	Databa	ise

The window will also display the databases present in the current folder. The correct database must be chosen for the correct set of loggers.

Click the

Restore Database

button to restore the database.

Maps

The **Maps** function shows the loggers' locations on Google Maps. From there, the loggers' details may be retrieved.

On clicking the icon, a window will open.

P ⁺ Maps	-	×
File DMA Reload Map		
Logger Selection		
	Select a DMA	
Remove from List		
Clear List		
Validate		
Set to Record		

For **Maps** to work, it needs a DMA (see section **DMA Management**). Select the dropdown menu under "DMA", and choose the DMA of choice. Upon selecting it, a map will be generated with the loggers' sites listed in the DMA.

Note: loggers will need a set of GPS coordinates to appear on the map. See section **Deploy** to edit and configure loggers.

HWM Test DMA		- 🗆 X
DMA HWM Test DMA	n Map Satellite nents	Show Level/Spread
Reload Map	Llantarnam Park Way Llantarnam Park Way	Level - Spread All Patrol Data
Logger Selection	an	Llantarnam Park Way
Remove from List		
Clear List]	*
Validate		+
Set to Record		- /
Loggers: 4	Google Map data ©2016 Google	Terms of Use Report a map error

Sites in yellow denote no leak detected, whilst sites in red denote a possible leak. Selecting "Show Level/Spread" will display the current level and spread at each site. Selecting a site will give more details.

uten					Hide
	No Leak				Le All Patr
	Level: 15 Sprea	ad: 4			
	02165011				1
	Deploy date: 08	Aug 20	016		
Corr	Date 08 Aug 2016 04 Aug 2016 25 Jul 2016	10:29	15 26	Spread 4 21 28	
m	Listen Ac	d to Li	st		tarr
2		L	n data @2	16 Google	Terms of U

If the logger at the site has data, and the data has been downloaded in **Aqualog**, it can be listened to by clicking the Listen button.

On clicking the Add to List button, the logger at the site will be added to the Logger Selection box for validation and correlation.

About

The **About** icon gives the current information about the PermaNetPlus software package. It also contains the End User Software & Firmware License Agreement.

PermaNetPlus LLC

The PermaNetPlus LLC (Leak Location & Correlation) software is an addition to the PermaNetPlus software which uses the data obtained by the loggers to determine where a possible leak is. This section will outline the basics of the software and how to interpret the results.

Prerequisites

In order for the LLC to function accordingly, recordings and data must have been downloaded from the loggers prior to opening and running the software. Without the data, the software will not be able to implement the loggers' data.

Main Screen

On opening the LLC, a new untitled project will automatically open. If it does not, click on File -> New.



Importing Sound Data

To import data to cross correlate, click on Tools -> Import.



Select the data to import, and click Open. Multiple files may be selected by holding down the Ctrl key and selecting the files.

Open Look in:	Data		▼ ← Ē	〕 ┌ं* Ⅲ▼	×
Quick access Desktop Libraries This PC	Name 2016-07-19_121500_02165015 2016-07-19_121500_02165016 2016-07-19_121500_02165018 2016-07-19_121500_02165018 2016-08-05_110000_02165018 2016-08-05_110000_02165012 2016-08-05_110000_02165011 2016-08-05_110000_02165011	#	Title		Contributir
	<				>
	File name:			•	Open
	Files of type: PermaNet+ Record	ding File (*.ssr)	•	Cancel

This data will be put into the Recording menu, under PemaNet+ Organiser.

File Comms Correlation View Tool	s
] 🗅 📽 🖶 🚑 🚓 👎	
Untitled	
PermaNet+ Organiser	
Pipe Layout	
Erecordings	
i Aug 05 2016, 11:00:00	

Creating a Pipe Layout

The LLC software can create pipe layouts for analysis. To create a pipe layout, double-click Pipe Layout under PermaNet+ Organiser.



A window will open, with a pipe layout interface.

] 🗅 🐸 🔒 🎒	👻 🐺 🐺 🔊 🐇 🙀 📝	
Pipe Layout		
🔣 🛤 🛤 😣	L H	
		^
		×
<	A	>
Nipe Join	Text Comment	
1.00	TOR CONTRACT	<i>h</i>

Below is an explanation of the buttons:

	Map/Background . Sets the background image. The pipe layout will overlay this image, and may make it easier to draw the layout with a map image of the location. This is an optional feature.			
<u>k</u> ±3	Add/Remove Components . Gives you the option to add/remove loggers, pipes, pipe joints, and text comments.			
***	Move Components. Moves components to desired locations.			
æ	Zoom. Zooms in and out.			
1	Cross Correlate . Performs a cross-correlation analysis on two or more loggers. See section Cross Correlation for more information.			

Click on the button. If logger data has not been imported, import logger data. See section Importing Sound Data for further information.

Once imported, loggers will appear as components that can be placed in the layout.



To add components, click on the component icon, and then click on the layout.

🖂 Pipe Layo	ut					• ×
🔣 😥	8 😥 😣) 📇				
						^
<						>
	600	A				
Pipe	Join	Text Comment	02165011	02165012		
Place Logger	02165011					11.

] Pipe Layout	
🍇 🅦 🎘 🗶 片	
and the second second second	
60(53)00	
¢	>
🗞 🔊 A⁄ 👗	

Note: placing loggers will remove them from the components menu. This is because loggers can only be placed once.

Once two or more loggers have been placed, a pipe can be drawn. Select the Pipe icon and draw a line from one logger to the other. On releasing the mouse button, a configuration box will appear.

Pipe Proper	ties	×
🕻 🔽 Select f	rom materials databa:	se
Material:	Ductile Iron	•
	Length:	750.00 Metres
X	Sound Velocity:	1320.00 mtrs/sec
Diameter:	75mm 💌	[
		OK Cancel

Select the material the pipe is made from, the length of the pipe, and the diameter of the pipe. Click OK.

Now the pipe has been drawn and configured.

	Pipe Layout	- • •
×		
		^
	021 <mark>25000 021550</mark> 02	
<		>
< For	So So A	
	Pipe Join Text Comment	
Fo	Help, press F1	11.

Note: It is not necessary for the pipe layout to be a 1:1 scale. The pipes' lengths are set in the Pipe Properties box upon drawing a pipe, and can be changed by right-clicking on the pipe, and selecting "Pipe Properties".

Exporting Pipe Layouts

Once a layout has been drawn, it can be exported into a single file. Click Tools -> Export Pipe Layout.

w	Tools	Window Help
\$		Options
		Import
_		Export
4		Import Pipe Layout
		Export Pipe Layout
		Edit Pipe Layout Id's

Save the file in a directory of choice.

Importing Pipe Layouts

If a previous pipe layout design was created and exported, it can be imported by clicking Tools -> Import Pipe Layout.



Select the desired pipe layout, and click Open.

🚱 Open						×
Look in:			_	•	- 🗈 💣 💷	÷
Quick access	Name	ayout	#	Title		Contributir
Desktop						
Libraries						
This PC						
Network						
	<					>
	File name:	*.sst			-	Open
	Files of type:	SoundSens Topo	graphy Fi	le (*.sst)	•	Cancel

Under PermaNet+ Organiser, double-click "Pipe Layout".



The pipe layout will appear.

] 🗅 🐸 🖬 4) 🔄 🕂 👬 🌇 🐺 🍞	
E Pipe Layout		
ذ 🛤 🔊		
		^
	10.00 m	
	a terre	
<		×
Sa 🗞	A	
Pipe Join	Text Comment	
		h.

Note: logger data will <u>not</u> be imported.

See below for details on logger icons:

02165000	Red Icons . This means that the software does not recognise the logger, and the data must be imported. See section Importing Sound Data to import data. Ensure that the imported data times match, and that one logger's data is not newer/older than the rest.
02165011	Yellow Icons . This means the software has recognised there is a logger, but any data associated to it is not available for cross correlation, most likely due to misalignment with the recording times. Importing the correct logger data from the correct time stamp will fix this.
02155011	Green Icons . This means the software has recognised there is a logger, and data is readily available for cross correlation.

Cross Correlation

There are two methods for cross-correlation. For the first method, click on the button. Then, click and hold on one logger, and drag the cursor to the second logger.



The software will cross-correlate the data from the two loggers, and display the estimated location of a possible leak in the correlation window.



For the second method, click on the $\stackrel{\text{def}}{=}$ button. This will display the correlation between all the loggers.

	🗅 🛩 🔒 🖨	4	· 부 박 丞 쇼	à ⊿	No Scheduled Re
ľ	Exhaustive Correlation	- High Res	olution		
	💌 🛃 🛄 Distance	e Domain	•		
	Correlation	Average	(1) Aug 05 2016, 11:00:00		
	10.00 m 02165011 02165012	49.7% (1) 49.7%	<u> </u>		
				Done	
L		_		Done	16

Double-click on the correlation desired. This will open the correlation window, giving an estimate of where a possible leak is.

IMPORTANT: For the correlation to work, the Permalogs <u>must</u> be programmed together at the same time, and <u>not</u> separately.

Note: if more than two loggers are on the pipe layout, the software will cross correlation between all pairs of loggers:

🎲 PermaNet+LLC - [Pipe Layout]	↔ – □	×
File Comms Correlation View Tools Window Help	-	8 :
D 😂 🖶 🐥 👯 👯 🗱 🔊	No Scheduled Recordings	
🍇 🛤 🗶 🔛		
		í
10.00 m 👝 20.00 m		
03 <mark>(55)10 02(55)12 02(55)</mark> 13		
<		>
So & A		
Pipe Join Text Comment		

PermaNet+LLC - [Exhaustive Correlation - High Resolution]	↔ – □ ×							
Kile Comms Correlation View Tools Window Help	_ & ×							
] D 🛎 🖶 🚭 🍄 🦊 👯 🚣 🌽	No Scheduled Recordings							
X C Jistance Domain								
Correlation Average (1) Aug 05 2016, 11:00:00								
20.00 m 63.1% 02165012 02165013 (1)63.1%								
02165012 02165013 (1) 63.1%								
02165011 02165013 (1) 62.4%								
10.00 m 02165011 02165012 (1) 49.7%								
	Done							

No Leak Determined

If the software cannot determine or find a leak, a location of the highest peak detected will be shown, with the likelihood of this peak being the location of a leak.



As the text and numbers under the graphical data is in black, the software has concluded it is not a leak.

Leak Determined

If the software detects a leak, a pair of leak markers will appear on the pipe layout, highlighting between which loggers the leak is suspected, and the text on the correlation window will appear red.



The correlation window will display the results from the correlation algorithms and the probable location of a possible leak.

WARNING: the results from the correlation are an estimate, and should not be taken as the exact final result.

90.7%	<u> </u>						<u> </u>
	02165013		30.45 m			37.55 m	02165011
-	Distance	Time (Real)	Time (Absolute)	Coherence	Sampled Data	Frequency Analysis	
Correlati	ion		Rand Pass Filter (H-)			

Note the numbers on the pipe diagram. These numbers give the approximate location of the leak, with the percentage showing the leak certainty. In the image above, the software has determined there is a 90.7% chance there is a leak located 30.45m from logger 02165013.

IMPORTANT: For the correlation to work, the Permalogs <u>must</u> be programmed together at the same time, and <u>not</u> separately.

FAQs

For common queries with the software, please consult the frequently asked questions (FAQs) section on the website.

Associated FAQs:

- FAQ 037 Interfacing Google Maps to the PermaNetPlus software.
- FAQ 202 How to Discover the logger using the Patroller and software.
- FAQ 203 How to put the logger into 'sleep mode'.
- FAQ 204 Understanding and interpreting graph data.
- FAQ 206 Saving 29-day historical data.
- FAQ 208 Operating modes explained.
- FAQ 372 How to set auto data download.
- FAQ 376 Creating a new DMA.

Troubleshooting

To reduce the chances of problems occurring, please ensure the latest software has been downloaded and installed. Newer software will have bug-fixes and optimised algorithms that would not be available with older versions of the software.

The latest software can be downloaded from http://www.hwmglobal.com/help-and-downloads/ .

For any problems, or more technical queries, please contact HWM Technical Support on +44 (0) 1633 489479 and selecting option 2, or email <u>cservice@hwm-water.com</u>. Our staff will always seek to resolve any technical enquires and are fully supported by the HWM Engineering Team to guide you to a satisfactory outcome. In the rare event that a product develops a defect within the warranty period, it will need to be returned to HWM for inspection and repair.

Warnings:

FCC warning statement:

• This device complies with Part 15 of the FCC Rules.

Operation is subject to the following two conditions:

(1) This device may not cause harmful interference, and

(2) This device must accept any interference received, including interference that may cause undesired operation.

- This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. End users must follow the specific operating instructions for satisfying RF exposure compliance. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.
- Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment

Under Industry Canada regulations, this radio transmitter may only operate using an antenna of a type and maximum (or lesser) gain approved for the transmitter by Industry Canada.

To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (e.i.r.p.) is not more than that necessary for successful communication. This device complies with Industry Canada licence-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Conformément à la réglementation d'Industrie Canada, le présent émetteur radio peut fonctionner avec une antenne d'un type et d'un gain maximal (ou inférieur) approuvé pour l'émetteur par Industrie Canada.

Dans le but de réduire les risques de brouillage radioélectrique à l'intention des autres utilisateurs, il faut choisir le type d'antenne et son gain de sorte que la puissance isotrope rayonnée équivalente (p.i.r.e.) ne dépasse pas l'intensité nécessaire à l'établissement d'une communication satisfaisante.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes : (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

SIMPLIFIED DECLARATION OF CONFORMITY

This simplified EU declaration of conformity referred to in article 10(9) shall be provided as follows:

Hereby, HWM Ltd declares that the radio equipment type transceiver is in compliance with Directive 2014/53/EU.

The full text of the EU declaration of conformity is available at www.hwmglobal.com

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MAN-130-0003-F [Manual - Pcorr+ and Permalog+docx

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