Using this Document

- Read sections 1-8 before performing any installation of Hydromx.
- The Appendices contain supplementary information to help with an installation, including DOs and DON'Ts and a sample installation checklist.

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1. Energy Efficiency with Hydromx

Hydromx transfers heat more efficiently within a heating system and for this to translate into energy savings there must be thermostatic controls that operate when comfort temperatures are reached. There are many buildings where there is no thermostatic control and we recommend installing appropriate controls with Hydromx.

Part L of the Building Regulations 2010 in England and Wales recommends:

- All new systems in dwellings that aren't open plan must have at least two heating zones, each controlled by a thermostat and zone valve. In addition, all radiators must have Thermostatic
- Radiator Valves (TRVs) fitted except those in rooms with a room thermostat and those in bathrooms. When replacing a boiler in an existing system it is now good practice to install TRVs on all radiators except those in rooms with a room thermostat and those in bathrooms while the system is drained down.

For information on domestic applications BEAMA's heating controls group (TACMA) provides guidance on the use of controls in boiler based, gas and oil fired domestic central heating installations within the revised Building Regulation Part L1 that came into force on 1st October 1 2010. At the time of writing this could be found on the BEAMA website here.

Energy savings achieved by each application of Hydromx will vary due to the boiler, system configuration, system controls and insulation condition of the building. Furthermore savings achieved may be impacted by changes in weather, lifestyle, use of the building and other energy efficiency measures. For example, changing thermostat settings, opening windows, or a change in the number of residents will change energy consumption.

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2. Typical Equipment

- Centrifugal Pump (for pressurised systems)
- Portable Refractometer
- Clean Glass Jar/Plastic container (for collecting samples)
- pH Meter
- Spill Pads / Containment
- Drum spill containment pallet (for larger works)
- Non-return/Isolating Valves
- Pressure Reducing Valve
- 3M Sealing Tape or alternatives
- Mixing tank
- Measuring Bucket
- Suitable pipe work, hoses and tools for the works

NOTE: This is not an exhaustive list and other items may be required for the works.

3. Preparation

Before enhancing a heating system through the application of Hydromx it is essential to ensure that the system is in good working order. In particular, all boilers, pipe-work, fancoils and radiators should be inspected for leaks and any repairs carried out in order to make the system robust and fully operational. All the radiators/fancoils should be checked to ensure heat distribution is even, and the customer should be made aware of any cold spots or circulation problems (e.g. stuck thermostatic valves, or blocked radiator sections). Where there are signs of historical corrosion these should be carefully noted and brought to the customer's attention. Any repairs or corrections should be agreed with the customer and performed prior to the installation of Hydromx. Failure to do this could result in leaks or circulation problems appearing later in the process which could affect the resulting energy efficiency of the system and most importantly damage customer satisfaction.

We recommend that before installation these pre-installation checks are logged and a damages/leaks disclaimer is signed by the customer.

The heating system characteristics should also be assessed to see if there are any special requirements for pH (see Appendix B).

Once the tamper proof seal of the Hydromx packaging is broken, the Reseller or Installer is responsible for ensuring the Hydromx contents are not contaminated. Any contamination may reduce the efficiency of Hydromx and shall void any warranty given or implied by PBA Energy Solutions Ltd. No chemicals or liquids, other than water or another Hydromx product, should be added to the system.

We recommend the installation of a non-return or isolation valve to use as a filling point and to have either a suitable centrifugal pump, or manual pump to charge the system with Hydromx.

Note: A manual pump alternative may be best for "topping up" and increasing concentration when required (for example after minor repairs).

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4. Estimating and Measuring the Water Volume

Prior to installation the water volume should be estimated, e.g. by estimating the amount of water in the boiler, tanks, expansion vessels, radiators/emitters and associated pipe work. This is necessary so that the correct amount of Hydromx to be applied can be calculated. The recommended and most effective energy saving ratio of Hydromx to water is 50:50 by volume (50% concentration) although Hydromx will work effectively in a concentration ratio of between 60% to 45%, i.e. 50:50 +10%/- 5%.

At the time of installation or flushing, the volume of water in the system can be measured accurately by draining it through a suitable discharge valve via an accurate measuring device (measuring bucket or water meter) and recording the total. When using a water meter we recommend draining the water at 20ºC so that expansion of the water due to heat does not distort the meter reading.

When calculating the amount of Hydromx required add a margin for error of 10-15% to ensure enough Hydromx is on site for the actual installation volume required.

5. Emptying and Flushing the System

The discharged water should be carefully inspected and if it shows signs of rust or sludge, the system should be thoroughly flushed out. Reasonable provision would be to follow the guidance on how to prepare and commission systems given in BS7593. However, please note that chemical cleaning agents should **NOT** be used to clean the system as **the manufacturer states that no other chemicals other than water (or another Hydromx product) should be used either to clean the system, or for any other purpose, as these will affect the patented chemical formula of Hydromx and it may not function as expected.**

It is very important to ensure the system has been drained to the maximum extent and that there is minimal water left in the system. Any water that remains in the system before filling can cause temporary cold spots until it is fully mixed with Hydromx and if the concentration falls below 45% it will impair the energy efficiency of the system.

6. Mixing the Solution and Filling the System

Once the complete system has been emptied, optionally cleaned, and repaired (if required), it can be refilled using the appropriate ratio of Hydromx to water to achieve the exact concentration required to ensure maximum efficiency of the heating system.

It is recommended that any automatic water supply controls to maintain system pressure are turned off during installation works to avoid loss of the Hydromx solution and only turned on once the system is recognised as stable. If there are leaks in the system, water supply control will add water to the system and this will reduce the concentration of Hydromx.

Well, bore hole, or tap water below 7pH should not be used in applications (See Appendix B Checking the pH for the Heating System's components).

Hydromx will work effectively in a concentration ratio of between 60% to 45%, i.e. 50:50 +10%/- 5%.
To achieve the correct solution, mix a small sample of 50:50 Hydromx to water and take a reading using a Portable Refractometer (See Appendix A - Measuring the Hydromx Concentration with a Portable

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Refractometer). Enter the value shown on the G13 scale on the Installation Record and use this as a reference when mixing the solution to fill the system.

We recommend using at least a 60%:40% Hydromx to water concentration to allow for any water left in the system where is cannot be drained completely. This typically results in a 50% concentration once the higher concentration has mixed with the residual water in the system.

There are two successful methods of mixing Hydromx with water and re filling the system.

In most cases it is best to mix the Hydromx with water outside of the system in a clean tank or Hydromx drum. Check the solution is approximately 60%:40% (-45 on the G13 scale) using a portable refractometer prior to application. The mixing area can be remote from the filling point subject to the use of flexible hose/pipes to connect the pump to the filling point, e.g pump at ground level connected up to a plant room or header tank at high level.

For large systems mixing water and Hydromx outside the system may not be possible. For this kind of operation we recommend water and Hydromx are added in this order; 1 unit of Hydromx, 1 unit of water, then 1 unit Hydromx and so on.. For example, if a building requires 5 tonnes of Hydromx, apply 1 tonne Hydromx + 1 tonne water + 1 tonne Hydromx + 1 tonne water and 500 kg Hydromx and 500 kg water. Full mixing of Hydromx and water typically takes 24-48 hours.

Care should be taken when mixing Hydromx with water to minimise bubbles and foaming as this takes some time to leave the system and can extend the amount of installation time required to bleed air out of the system, and can temporarily reduce efficiency if left in the system.

Fully pumped systems with a header tank

If the system has a Header Tank for topping up the water in the heating system, this can be used as the filling point. After draining the system completely (See 3 Emptying and Flushing the System), close the drain valves, then either pump or pour the Hydromx: water solution into the tank carefully, to avoid foaming.

Notes:

- to minimise the costs of Hydromx ensure that the header tank does not hold an excessive amount of header fluid.
- the tank must be properly covered, lagged and sealed to avoid any contamination of the Hydromx solution in the tank. This should also be recorded on the Hydromx Record.

Sealed systems and combination boilers

For pressurised systems, a filling point must be identified and a suitable connection made to a pump. The pre-mixed Hydromx solution should then be pumped into the system to attain the correct pressure.

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7. Post Installation Checks

Depending on the size of the system and the Hydromx solution used, full circulation will be achieved after 30 minutes to 48 hours.

A sample of the fluid in the system should then be tested using a portable refractometer. The refractometer has automatic temperature correction, but the fluid should be allowed to cool down before taking a reading. This should match the test solution established prior to installation and any corrections should be made to the solution to achieve a match within +10%/- 5% tolerance.

The system should be closely checked again for leaks and good heat distribution, as normal best practice. Hydromx has a red organic pigment so that leaks are more visible. Therefore, this may highlight leaks that have previously gone undetected and may not "appear" for a few days if they are very small.

All radiators/fancoils/emitters should be checked to ensure heat distribution is even and cold spots or circulation problems rectified.

A **Hydromx Installation Record** (see Appendix C) must be completed:

A) Customer copy should be kept with the system and associated operating manuals
B) Installer should retain a copy for their records.
C) PBA Energy Solutions copy should be returned to register the start of the product warranty.

A **Hydromx Installation Sticker** (see Appendix C) should be completed and placed on EACH boiler.

Ensure customer is aware Hydromx is a valuable asset which is most effective at saving energy in the correct concentrations. Therefore any works on the heating system should be completed by a suitably qualified plumber or heating engineer and any Hydromx solution taken out of system during maintenance activity should be stored and re-installed/re-cycled.

8. Regular Maintenance

During regular maintenance of the heating system the Hydromx solution should be checked, typically annually. No chemicals or liquids, other than water or another Hydromx product, should be added to the system.

A sample of the Hydromx: water solution in the system should be tested using a portable refractometer and compared with the amount recorded at installation. If the measure does not match the record and concentration is 45% or less, additional Hydromx should be added to bring the measure back to the installation recorded 50% optimum level.

Note: Concentration should not be more than 60% or less than 45%.

9. Health and Safety

- To avoid risk to man and the environment, these instructions for use must be complied with.
- Wear suitable protective clothing, gloves and goggles.
- Keep out of the reach of children.
- Store in a secure location and protect against tampering.

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- Empty packaging should be disposed of as hazardous waste.
- Do not use empty Hydromx containers for any other purpose.
- Do not solution Hydromx with any other chemicals other than water.
- Do not use Hydromx with acids.
- Do not drink Hydromx.
- Do not put Hydromx in any containers that have been used with other chemicals or may contaminate the patented formula.

As normal best practice installers should make themselves familiar with the full advice given in the Material Safety Data Sheet which can be downloaded from www.pbaenergysolutions.co.uk, *About Hydromx, Installer Information*.

In case of medical emergency following exposure to a chemical, the public should call the NHS 111 service in England or Wales – dial 111, NHS 24 in Scotland 08454 24 24 24 (UK only), Republic of Ireland 01 809 2166.

In Case of a Spill:

Accidents do sometimes happen, there could be a leaking valve or air vent, a container of Hydromx could be dropped or tipped over or simply spilled while transferring from one container to another. Like all industrial liquids, safety goggles, work boots and rubber (nitrile) gloves should always be worn when handling Hydromx. Hydromx is safe when handled properly.

If Hydromx is spilled in small amounts, for example a small puddle around a valve or pipe, use liquid absorbent pads or paper to soak up the spill. If Hydromx is spilled on carpet it can be removed with a reasonably strong solution of liquid soap/detergent and water.

It is good practice to spread several pads around and under the valves, tanks and pumps during works in the equipment / plant room and to consider spill control prior to installation.

Light weight chemical absorbing pads

Spill Containment Pallet

The manufacturer and UK distributor are not liable for damage or performance wherever these instructions are not carried out in full. We recommend that these checks are recorded before and after installation. If in doubt please contact the UK Distributor or the Manufacturer.

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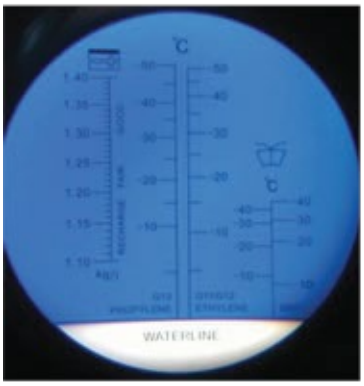
Appendix A - Measuring the Hydromx® Concentration with a Portable Refractometer

Using a Portal Refractometer

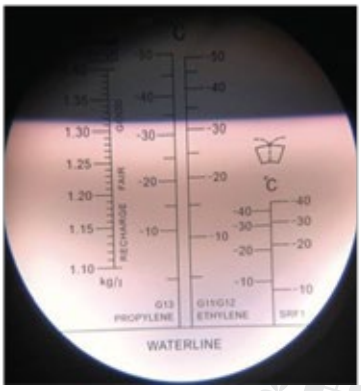
- It is important to use the correct type of refractometer and follow the refractometer manufacturer's instructions accurately. Use a Portable Refractometer with a G13 PROPYLENE scale.
- Portable refractometers often have automatic temperature compensation, but we recommend that readings are taken with the solution at 24-26 °C
- De-ionised water should be used to calibrate the refractometer to zero.

- Taking a Reading:
  - Mix the required ratio of Hydromx: water solution.
  - Using the pipette place one or two droplets on the prism and close the prism cover.
  - Look through the eye-piece.
  - Adjust the light and eye piece if necessary and focus the line between light and dark.
  - Take a reading from the G13 Propylene Scale.

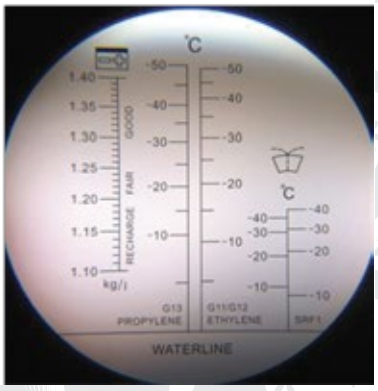
Water Only
Line is a Zero
on G13 scale



Hydromx: Water (50:50)
Line is at -33
on G13 scale



Hydromx Only
Line is off the
G13 scale



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G13 Value	Hydromx Concentration (%)	
-26	44.44	Too low, below 45%
-27	45.32	
-28	46.19	
-29	47.03	
-30	47.86	
-31	48.68	
-32	49.50	
-33	50.33	Optimum, 50%
-34	51.16	
-35	52.00	
-36	52.85	
-37	53.73	
-38	54.60	
-39	55.48	
-40	56.37	
-40	56.37	
-40	56.37	
-41	57.26	
-42	58.15	
-43	59.02	
-44	59.89	
-45	60.75	Too high, above 60%

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Appendix B - Checking the pH for the Heating System's components

The Heating System's specifications should be checked for any requirements, such as pH, that must be matched with those of Hydromx. If necessary an alternative water source should be used such that the Hydromx: water solution matches these requirements to avoid possible damage to the heating system.

Use a calibrated pH meter to check for a suitable solution with a sample of the 50%:50% Hydromx: water solution. If the pH is outside the operating specification of the system an alternative water source must be used.

Water companies provide typical water quality reports by post code and these can be used as an indication of pH likely to be experienced The Severn Trent region example is at this address:

http://www.stwater.co.uk/households/your-water-supply/water-quality-in-your-area/

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Appendix C - Hydromx® Installation Record and Boiler Sticker

Installation Record – Customer Copy

This completed Installation Record is evidence of your your warranty and should be kept in a safe place.

To register your warranty the yellow copy of this record MUST be sent to PBA Energy Solutions Ltd at the address printed on the back of this form.

Customer Name *			
Customer Address *			
Installer Company Name*			
Installer Company Address			
Installer Company Telephone/Email *			
Installer Name		Gasafe/CIPHE ID:	
Date of pre-inspection			
Date of installation: *			
Refractometer reading *	Baseline 50/50:	Post Installation:	
PH Reading:	Pre Installation:	Post Installation:	
Measured water volume in litres: (total fluid volume:)*		Volume of Hydromx used*	
Batch number(s) of Hydromx containers used: *			
Header tank lagged & sealed: (Yes / None) *		Photographic Records (Y/N)	
Installer Signature: Date: *	Customer Signature: * Date: *		

* Mandatory

HYDROMX Energy Saving Solution

inside DO NOT DRAIN STORE & RE-INSTALL

Installer Company:

Installer Name & Gas Safe/CIPHE ID:

Hydromx Batch No/s:

Total Fluid Volume (Litres):

Refractometer Reading: Target: Actual:

Installation Date:

PBA Energy Solutions

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BUILDCERT

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Appendix D - Do's and Don'ts

DO's	DONT's
Do prepare for the installation with parts, pipe work etc.	Don't create foaming when installing Hydromx
Do plan how/when to mix the Hydromx solution and how it will be introduced to the system.	Don't allow Hydromx to become contaminated during mixing or in open vented header tanks
Do a pre-installation inspection and agree any remedial works with the customer before installing Hydromx.	Don't forget to ensure open vented header tanks are completely covered
Do ensure the customer knows that changes to heating /cooling systems can sometimes uncover leaks and get a disclaimer signed to protect you from invalid claims.	Don't forget to close all bleed valves after draining the system
Do use spill mats or other suitable protection of customer property throughout the installation	Don't leave spills, cleanup immediately
Do finish by completing the Installation Record and Warranty Registration with all data and signatures.	Don't forget to clean up and check for leaks once the system is hot.
Do complete all details on the Hydromx *Inside* installation sticker and put it on the boiler.	Don't forget to send the Installation Record and Registration form to PBA Energy Solutions to register the Warranty and leave the Customer with their copy.
Do consider leaving empty drum/s in case part or all of the system needs to be drained (e.g. to replace a radiator), or ensure the customer knows who to call in these cases.	

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Appendix E - Sample Installation Check List for Domestic Property using Radiators

Note: this is not an exhaustive list and other items may need to be considered dependent on the building and heating system involved.

	Pre-Installation inspection.
	Remedial work Identified and Customer advised.
	Sample 50:50 Hydromx: water measurement taken and entered on Installation Record.
	If required pH reading taken and entered on Installation Record.
	Turn off / Disconnect / Isolate water feed into heating system.
	Connect drain hose(s).
	Drain system, open Radiator air bleed valve until empty and ensure closed again on each.
	Measure water drained from system (if required).
	Double check all Radiators empty and bleed valves closed.
	Remedial works carried out to customer satisfaction.
	Add a filling point to the system with isolation valve (if required).
	Connect the pump to the heating system.
	Pressure Relief Valve set to level suitable for the system or suitable pump used to avoid over pressurisation of the system.
	Hydromx mixed ready for installation; typically 60% concentration to allow for residual water in the system.
	Spill mats or suitable measures are in place to protect the customers property from any spills or leaks of Hydromx during installation.
	During filling with Hydromx each radiator is bled to remove air and any water in the top of the radiator, i.e. until pink fluid is visible.
	Any Hydromx split during filling the operation is wiped up immediately to avoid any risk of staining, or immediately washed with soapy water to remove from soft furnishings.
	The amount of Hydromx solution installed matches the expected amount for the system, and this is entered onto the Installation Record.
	Disconnect Pump
	Turn on / Reconnect water feed into heating system.
	Once the system is switched back on and warmed up, good heat distribution is confirmed to all radiators.
	System is checked for any leaks and remedied if found.
	The site is cleaned up and left tidy.
	Installation Record is completed and signed by the customer and installer.
	Hydromx *Inside* installation sticker is completed and put on the boiler in a prominent place.
	Customer is made aware that any future work on the heating system should take into account the fact that Hydromx is installed.
	If appropriate/requested empty Hydromx container(s) left with the customer.

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