Thermal Integration
District and Renewable Systems
Thermal Integration, District and Renewable Systems

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At Thermal Integration we design and manufacture pre-fabricated hot water and central heating cylinders, thermal stores and heat interface units to suit almost any domestic or commercial application. We have been doing this since the 1980s, so our range of products is the end result of over thirty years of continuous development, experience, and improvement in heating technology. We hold a significant number of patents in the fields of water storage, heat exchange, and the networking of communal heating systems, and continue to push the boundaries of the industry.

We hold to the philosophy that all customers deserve our best level of service for the life of the product, as well as complete honesty throughout the product selection process, be they a householder installing their ideal system, or a local authority building an entire estate.

Our extensive range, and ability to do one-off custom units with ease, puts us in the unique position as the only UK manufacturer of systems for district heating who can offer the correct product for any situation, be it HIUs, local storage, or centralised storage and heat exchange.

As well as the most comprehensive range of hot water systems in the UK, our headquarters in Sudbury also offers the UK’s largest renewables training centre, including the first HETAS training and test centre, with working solar, wood, pellet and log biomass test rigs. There is also an extensive district heating demonstration and test facility, with the factory building services running from a twin pellet biomass boiler installation, buffer storage, and HIUs to provide services. The entire facility is controlled using our in-house IHIU Control Systems that allow any of our products to be network connected, with online monitoring and dashboard facilities.
Experience, experience, and more experience.
Continuous product development over 25 years in both thermal storage and plate heat exchange gives us more experience and knowledge than anyone else in our field. Our specialty is control and utilisation of thermal energy in both domestic and district heating environments, rather than just cylinder manufacture or HIU distribution.

Our products are unique in many ways.
Being protected by numerous patents allows us to offer solutions no one else can.

We are product impartial.
Our exhaustive range means we won't sell you HIUs where cylinders fit better and we won't sell you cylinders when a central plant works better.

The HEATBANK PANDORA is the simplest high performance mains pressure hot water storage system available with thousands installed in new-build, where their unique and patented discharge free design allows them to be installed in minutes rather than hours, and in places other systems simply could not work.

The HEATBANK XCEL range of thermal stores is without a doubt the most versatile multi-fuel system on the market, used in numerous high profile installations and thousands of domestic installations over the years. It is the only thermal store approved by most wood burner manufacturers, and with good reason - it's by far the safest and most efficient system around.

Our AMAZON Unvented range generates more hot water per hour than any other unvented cylinder on the market, providing commercial outputs from domestic priced systems. If you simply cannot afford to run out of hot water then look no further.

We are Uk partners and distributors of one of Europe's most successful HIU manufacturers, which when combined with our own range allows us to offer the most extensive and efficient range of HIUs on the market. So advanced that the latest UK standards for HIUs found it hard to cope with all our features, but finally we have independent test data to prove our systems do what we say.

UK based manufacturing, training and service backup.
Years of dealing with contractors all over the UK has provided us with an invaluable network of skilled engineers, meaning we never leave a customer without support. We also have the UK's largest renewables training centre with HETAS and BPEC approved courses covering everything from biomass boilers to district heating and heat metering.
We have some of the most comprehensive training facilities in the UK at our Sudbury Headquarters, along with a large array of approved and less formal courses.

- BPEC Environmental Awareness Certificate
- BPEC Heat Pump Installer Certificate (QCF Accredited)
- BPEC Solar Thermal Installer Certificate (QCF Accredited)
- BPEC Vented & Unvented Hot Water Systems (Part G3) Certificate
- BPEC Water Regulations Certificate (WIAPS)
- Domestic Energy Assessor
- Green Deal Advisor Level 3 Diploma in Domestic Green Advice
- MCS Quality Workshop
- BPEC Energy Efficiency (Part L) Certificate
- MCZ/Red Fault Finding & Diagnostics Course
- MCZ/RED Commissioning and Installation Course
- MCZ/Red Product Awareness Course
- NICEIC Health & Safety Certificate
- Specflue Principles Awareness Training Course
- CPD on Multi-Fuel Hot Water and Central Heating Systems

(H001-H002) HETAS HTU02 Awareness & Retail Course
(H003) HETAS HTU03DS Dry Installer Defined Scope
(H003) HETAS HTU03R Dry Appliance Installer Refresher
(H004) HETAS HTU04 Wet Installer Course
(H005DE) HETAS HTU05 Biomass Installer
(H006) HETAS HTU06 Twin Wall Flues Course
Isokern Training (HETAS Recognised)

- Thermal Store Design
- Heat Bank Installation & Maintenance
- Advanced Storage Management
- CPD on Explaining Modern HIU Technology
- CPD on HIUs and Storage
- 2 Day District Heating Design Course
- HIU Installation, Commissioning & Maintenance
- Advanced Control Strategies for District Heating
- Monitoring and Metering Awareness
Recent Advances

Recent advances in our understanding of how heat networks function has now shed a clear light on the reasons why historically they have performed so badly.

There have been very few records kept of how heat networks have performed over the years, and the difference between design efficiencies and delivered efficiencies is written off as almost a mystery. Poor installations are a common problem, as well as windows being left open, letting the heat out. Where heat meter data has been analysed on existing networks and compared to heat generation, efficiency figures as low as 50% are no surprise, with some networks as poor as 25% efficient.

Now, with the data from recent tests funded by DECC, we know why, and how to solve it. We have independent test data on most of the common HIU manufacturers, and we have calculation tools to work out the heat losses from pipework relative to energy used on hot water and central heating based on the test data.

The reality is the design and operation of systems has been as much, if not more, of an issue than installation, and occupants often need to keep windows open to get rid of the excessive quantities of heat pumped into buildings by inefficient networks. A cool hallway or HIU cupboard would normally be seen as a fault - when actually it should be normal. Even the recent SAP proposals for heat networks detail efficiencies as low as 30%. That’s £2.30 wasted for every £1 used. If district heating were a regulated industry, a lot of systems would have a lot to answer for.

Using test data and calculation tools we can establish exactly where the 50% (or more) losses go, and more importantly they demonstrate the means to increase efficiency levels up to 85%.
Who to Believe

Certainly, you shouldn’t only be taking the word of a manufacturer such as ourselves. It is in our interest to have you believe our products are the best on the market. Once you get to know us you will discover we always give unbiased advice and our products and service levels really are quite revolutionary.

But until then, we would instead refer you to the independent tests carried out at the Swedish Institute of Technology. They were funded by DECC to ascertain how HIUs actually perform, and to provide hard test data in real life operating conditions that can then be used to work out real world efficiency. The tests were taken from the existing Swedish standard and modified to suit UK operating conditions, and it was agreed by all manufacturers taking part for the results to be made public. The standard can therefore be used as part of a specification.

The following graph shows the results of recent tests, on many of the biggest makes of HIU. The height of the bars represents average annual network return temperatures (by volume), the width represents annual volumes used, and the area represents the volume of energy returning to the plant-room.

The difference in size between the bar on the left, a typical HIU in London, and the bar on the right, the best modern HIU, is startling. Some people have jumped to the conclusion that the tests have been manipulated, or performance has been sacrificed. However the independent tests cover performance, and show that the modern HIU not only improved efficiency dramatically, it also had the highest performance of any HIU tested, reaching full tap temperatures in the fastest time, and delivering higher outputs. They are also carried out at one of the most respected test houses in Europe, the Swedish Institute of Technology, to a rigorous test procedure.

Making use of this test data we can now calculate efficiencies of networks using online tools, providing detailed and thorough operational heat loss figures throughout the year, to arrive at seasonal efficiencies.

So now that we have independent testing and heat network efficiency is no longer a mystery, ensuring your heat networks are capable of running efficiently becomes a matter of running the calculations, and then specifying an HIU that has undergone testing and achieved the necessary performance level.
Solving Common Problems

Even with the most efficient HIU in the world, we would still argue that you are not safe. There is still a lot that can go wrong on the ground, for example:

- Dirt and blockages in pipework
- Flushing bypasses left open
- Inadequate flow around network due to poor pump control
- Wrongly commissioned HIUs
- Lack of balancing on radiators
- Leaks in pipework
- Lack of dosing
- Missing insulation
- Tampering

It may be a surprise to learn that every single one of these problems can also be solved using the latest HIU technology.

In short, HIUs send out a wealth of sensor data, calculated parameters relating to network performance, and alarms when things are not perfect. These can be channeled through a network - the same network used for billing and metering - and used to confirm 100% performance, without setting foot on site. Indeed, the whole process can be automated so one receives an email the second something goes wrong.

Where you have historically relied on the competence and honesty of consultants, manufacturers and installers, you can instead confirm for yourself how everything is working by simply referring to a browser based dashboard with live performance information.

This is the kind of technology you may expect to see managing a plantroom using modern BMS systems, however applied over the entire network.

Revisiting our list of problems we can now offer some specific solutions...

- Dirt and blockages in pipework - differential pressure readings from the HIU can be compared to the design pressure drops. If the pressure drops are too high it means there is a blockage and an alarm can be raised.

- Flushing bypasses left open - again, differential pressure readings give an indication, while it is also measurable by comparing flow rates from plant to the sum of flow rates from HIUs. Again, alarms can be raised.

- Inadequate flow around network due to poor pump control - once again, differential pressure measurement is the key. Linking the signals from the furthest HIUs to pump control will ensure proper function.

- Wrongly commissioned HIUs - the HIUs tell us what they are set to, and can be altered remotely. In fact, when a new HIU is plugged in, the system sets it up automatically.

- Lack of balancing on radiators resulting in elevated return temperatures - the HIU limits return temperatures to protect the network, and return temperature readings can be used to flag an alarm that a system is poorly balanced.

- Leaks in pipework - pressure sensor readings in the central heating circuits tell us if pressures are dropping.

- Lack of dosing - achieved by linking in pH sensing.

- Missing insulation - with flow temperatures monitored second by second, a 3m length of missing insulation results in a visible dip in flow temperature readings, and can be spotted remotely.

- Tampering - the moment a sensor is unplugged, an alarm is logged and raised.
Costs and Risks

Are Modern HIU Systems Costly?

The short answer is no.

Modern electronic HIUs are no more expensive than good quality mechanical HIUs. That said, you will always be able to find something cheaper. It is indeed one of the reasons we see independent testing as so important. Without it a manufacturer can always sacrifice efficient operation for cost, and deliver something cheap that delivers target hot water and heat outputs. These are the tactics used to value engineer, or break specifications by offering a saving. The problem is if you take into account the effect on running costs, something manufacturers and installers care little for usually, then the savings evaporate and one is left with a legacy of a heat network that potentially costs double to run than it should.

What about the cost of the hardware for monitoring?

Again, the modern world has come up with a solution - open source Linux systems. Many will have heard of the Raspberry Pi. A £25 computer used in education with built in WiFi, Ethernet, Bluetooth (old and new), USB Ports, and HDMI desktop output. Well it can also be used to send data or alarms from heat meters and modern HIUs. They can also provide Mbus and Modbus connectivity, and as such offer a low cost means to bridge HIUs to other systems, monitor and control them.

With many billing platforms making use of the same software languages, the software functions developed on a Linux system, such as a Raspberry Pi or Arduino Yun, can be implemented on them also. This means that no additional hardware needs to be used at all to connect to HIUs.

Is there not a risk of being locked into a bespoke system?

Certainly not.

We have based our communications technology on standard protocols that can be replicated on other systems, and the benefits of an intelligent HIU come as standard - you just need to make use of them.

We also assist in the connection of HIUs to 3rd party systems. As an example, to assist in the delivery of Ofgem's MMSP - Monitoring and Metering Service Package - we worked with the Energy Saving Trust to develop and publish Python code to send data from heat meters and HIUs to the Trust's EMBED database, and thereby enable contract-free monitoring of RHI installations using low cost electronics.

Carbon Costs

With the new requirements for zero carbon domestic hot water in London, one needs to also consider the costs of offsetting carbon.

Given there is potential in many instances to save 50% of the energy required to deliver DHW over a heat network, by using the right controls strategy, that's one huge step towards achieving zero carbon. It makes the percentage of any zero carbon generated on site twice as effective, with less carbon to offset.

It will also impact on CHP sizing. As CHP is sized to deliver the baseline load, so they run continuously all year, we are talking about the DHW loads as well as the heat lost from keeping the network hot at all times for DHW response. With 50% or more of this load gone, the CHP sizing should drop accordingly.

With average annual return temperatures from a heat network below 25°C now possible, the percentage of waste heat that can be used on a network increases significantly, as does the effectiveness of technologies such as heat pumps. Return temperatures this low enable a proper bivalent system to be used, with heat pumps raising temperatures from 25C to 50C, and gas boilers or CHP raising it further, typically to over 60C in the Summer and to 75C in the Winter. There goes another chunk of carbon and the costs associated with it.
The aim of a heat network is to deliver hot water and central heating into properties, in a more efficient manner than using individual heating systems in each property.

If energy costs to the end user are to be comparable to other forms of heat, then the savings made from a central plant must outweigh the additional heat losses introduced by a heat network.

There are very few figures ever published on how efficient heat networks actually are in practice, and as a result very little accountability. There has been a lack of design tools available to model and analyse network performance, a lack of data fed back from sites, and to top it all a complete lack of standards or published performance figures for different HIUs - Heat Interface Units.

The Heat Network Calculator has been built to provide as accurate model as we can of how a heat networks performs, using recognised data to work out where energy goes, how much is wasted, and how the situation can be improved.
At the core of the calculator is a model of the heat network, including every pipe and heat interface unit connected to a riser. This is subjected to pressure and heat loss calculations so that pipe sizes, flow rates and heat losses at every point in the system can be calculated, both under load and under standby conditions.

**Step 1: Model the layout.**

**Step 2:** Calculate loads based on diversity for hot water and central heating. This is done for every pipe in the system working out the peak potential downstream loads.

**Step 2:** Using available pressures, optimise pipe sizing (where selected). Smaller pipes lead to greater efficiency, and the calculator will work out the optimum size of each section of pipe.

**Step 3:** Calculate heat loss at full load. This is with flow pipework at plant supply temperatures.

**Step 4:** Calculate the flow rates and heat losses under standby conditions. This depends on the selected mode of keep warm, based on flow rate or temperature - or with no keep warm instead using a riser bypass.

Once the calculator has worked through the heat losses, these can be compared to the loads for hot water and heating, and a estimate arrived at for the annual efficiency of the system under the given loads.

With the volumes of each pipe known, it is also now possible to work out any delays in hot water to taps, resulting from pipework left to go cold for improved standby efficiency.
Calculating efficiency at the stated inputs is not enough. It is also necessary to adjust figures based on known data provided by independent tests from bodies such as the Energy Saving Trust and the Swedish Institute of Technology.

The calculator has been programmed with the tables of data from numerous studies to enable a more comprehensive month by month analysis of loads and efficiencies.

This includes adjustments for incoming cold temperatures, ambient air temperatures, dhw loads, dhw temperatures, and hot water consumption from trial data.

**Monthly Analysis by Property**

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<th>Month</th>
<th>Jan</th>
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<th>Apr</th>
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<td>456</td>
<td>789</td>
<td>101</td>
<td>232</td>
<td>454</td>
<td>676</td>
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<td>PRD</td>
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</tbody>
</table>

**A final analysis of peak hourly loads is also performed based on calculated minimum boiler sizes and minimum buffer storage sizes.** This allows one to see how central buffer storage is utilised throughout the day. Boiler sizes can be entered manually and the calculation rerun to see how this impacts on buffer store sizing.

The data calculated is output in both table format and in graph form, to make it easier to visualise.
It is surprising to some how much the efficiency of existing district heating systems can be improved simply by a few improvements to the existing HIUs. Improving insulation, modifying the control valves, and correctly commissioning a system are just some of the measures we can deploy that have a directly measurable impact on plantroom efficiency.

There are very few UK based HIU manufacturers, and none have the experience we do, so when we look at many of the HIUs that have been installed over the past decade we can immediately see what's wrong - we made some of the same mistakes many years ago. This puts us in the perfect position to work out the best ways to improve them, if possible, and to manufacture any assemblies needed for service engineers to make modifications.

In short, if you have an inefficient district heating system, let us have a look and advise what's possible.

**Case Study: HIUs in London**

As part of a DECC funded project we were called upon to use our expertise in HIU design to analyse existing HIUs in London properties that have been poorly performing. The end result has been a dramatic improvement in efficiencies.

Initially, return temperatures to plant were seen to be only a few degrees below the flow temperature. The client needed to know why, and what could be done about it.

Following site inspections, we were able to swap-out one of the guilty HIUs, taking it back to the factory where we were able to test out all sorts of possible improvements. The aim was to arrive at the best value for money approach to improve the performance of the other HIUs on the sites, short of simply replacing the HIU entirely.

The end result was a combination of measures we could demonstrate to work as desired. We then managed the contracts on site to modify systems with the results that primary return temperatures dropped consistently as works went on. Once we had finished, the primary returns had dropped nearly twenty degrees.
Heat Networks set to become efficient

The use of district heating to deliver hot water and central heating to local authority properties is becoming more and more common, offering a way to provide cheaper, low carbon heat to residents.

The energy systems are a move away from gas boilers or electric storage heaters in individual properties, as they see heat produced at a central point then distributed throughout the building, providing heat and hot water to residents.

Hailed as a solution to the UK’s energy needs, the wider rollout of heat networks does, however, face significant stumbling blocks according to a leading component manufacturer.

Thermal Integration has provided pre-plumbed hot water and central heating cylinders, thermal stores and Heat Interface Units (HIUs) to heat networks for the last 20 years. Richard Hanson-Graville, Technical Manager at the company, said: “Some heat networks aren’t performing as well as they should be and that poses a major risk to their wider rollout.

“The main reason for the lack of efficiency can often be put down to a lack of standards in the industry, as well as a lack of independent performance data on equipment.

“Unlike the gas boiler industry, where boilers are tested and given efficiency figures that allow direct comparison, HIUs – the key component of heat networks - used to deliver the hot water and central heating have never been directly comparable. This makes the job of specifying an efficient HIU far more difficult for local authorities.”

This situation looks soon to become a problem of the past, however, as a standard UK testing regime for HIUs has been developed by energy consultancy FairHeat, with a steering group of key industry stakeholders established to govern the standard going forward.

Developed as part of a project run by the Department of Energy and Climate Change (DECC), the standard evaluates the performance of different HIUs within the context of typical UK operating conditions, giving manufacturers a framework to evaluate the performance of their equipment and inform their continuous improvement development programmes.

Thermal Integration was one of the first set of companies to send its HIU to be tested by the SP Technical Research Institute of Sweden against this new standard and came out top when compared to other leading manufacturers.

Richard Hanson-Graville added: “Most of the well-known manufacturers have now signed up to this new standard, which finally provides specifiers with the performance data required to make the correct procurement decision.”

Thermal Integration is no stranger to improving the performance of heat networks. It recently lent its expertise to a project designed to diagnose heat network inefficiencies using machine learning algorithms, also funded by DECC.

Led by pay-as-you-go metering and efficiency monitoring company Guru Systems, and supported by FairHeat and Martin Crane of Carbon Alternatives, the project looked at efficiency data from three networks across the UK and used finely-grained performance data to identify site improvements.

Thermal Integration was called upon to provide its HIU expertise to the project team working on a Network Homes’ development taking part in the trial.
Using flow and return temperature data drawn from Guru Systems’ metering and billing systems, FairHeat – which oversaw the improvements on site - identified that flow rates were a long way from those required for efficient operation of the system.

Following analysis, the project team extracted a HIU from site and ran it through a series of tests to arrive at possible ways to improve the system. The solutions ranged from improving insulation, changing controls, and even the complete replacement of the HIUs.

In total, a comprehensive set of interventions, including valve replacement and insulation, was carried out on 44 HIUs, with a more minor programme of insulation works at a further 45 properties and the replacement of two HIUs.

Network Homes, one of the UK’s leading housing association developers, owns and manages over 20,500 homes across London and the South East, its Director of Compliance and Planned Works, Gavin Pierson, said: “An improvement was noted immediately with the introduction of the improved units, the efficiency of the systems has increased and we are currently reviewing the working data to identify further efficiencies.

“The improvements carried out by Thermal Integration have allowed us to expand our knowledge of the HIU industry and the manufacturers leading the market. In light of the findings, we have also updated our ‘Employer Requirement’ documentation, which is used by our development team to ensure that upcoming projects deliver the best possible system to our residents.

“We have a number of schemes where commercial sized boilers are servicing multiple properties with a heating and hot water supply and will be reviewing our specifications for HIUs and associated equipment in the future.”

For further information on the HIU testing regime can be found on FairHeat’s website - http://www.fairheat.com/hiu-testing/

For further information on Thermal Integration’s involvement in the trials, as well as a technical appraisal of the HIU test results for the company’s DATA HIU, please visit Thermal Integration’s website - http://heatweb.com/hiu
Suitable for wall hanging in a home or apartment, the DATA HIU is designed to provide a range of hot water and central heating outputs using two plate heat exchangers. Within the casing are all controls required for a typical property connected to a district network, including sealed central heating system components with a number of additional options such as hammer arrester, DP valve, and DHW recirculation pump.

The unit can be connected to either a radiator or underfloor heating system and is set-up during commissioning to operate at the desired temperatures.

The DATA is encased in an attractive EPP moulded compartmentalised casing with an optional decorative steel cladding panel. Heat losses are exceptionally low, allowing the unit to remain hot for rapid DHW response with minimal drain on the primary supply.

The DATA makes use of the latest electronic stepper motor control valves that allow the unit to accurately adjust district flow rates to control CH and DHW temperatures far better than any mechanical system. The electronic controls also enable the unit to carry out various intelligent functions, such as PC connectivity for set-up and commissioning, district return temperature control, Intelligent Anti-Legionella Cycle. Eco / Comfort DHW keep warm modes for continuous or intelligent pre-heat, whilst maintaining minimal return temperatures.

Possibly the best feature of the DATA, and the one that gives the HIU its name, is the ability to connect to billing systems and the internet to enable a host of functions never before envisaged.*

These functions include our patented technology for network wide domestic hot water priority, where HIU’s can communicate with each other to significantly reduce peak district network loads. They also have the ability to provide remote fault diagnostics, reporting, and remote commissioning.

* Connection to billing systems, networked domestic hot water priority and remote diagnostic functions require the optional iHIU electronics package.
One way to reduce the rate of heat loss is to insulate. The range of Thermal Integration HIUs make use of highly engineered EPP (Expanded Polypropylene) moulded enclosures that encase individual components, support assemblies, and prevent any heat bridging to the environment.

Another way to reduce losses is to allow the system to cool, or even go cold when not in use. The range of keep warm options covering times and temperatures, significantly reduces energy losses. Sterilisation cycles ensure that the system is never left cold for extended periods, preventing any build up of Legionella bacteria.

To reduce heat losses on the district system as a whole, the network can be run at lower temperatures, possibly as low as 60°C flow and 30°C return, with very close approach temperatures across the plates. This is only possible with the latest heat exchange technology, properly selected for the peak load - and not oversized.

Having worked with just about every billing company, and in every type of property, we understand that security is a headline subject that needs properly addressing. We deploy numerous methods to keep an HIU secure, including patented tamper-proof clips for meters and casing bolts.

We are one of only a handful of manufacturers who have had our HIUs tested under the new UK HIU Test Regime funded by DECC. The aim is finally stop the proliferation of poorly performing systems. It gives us independent test data to demonstrate our performance and features.

How many HIU manufacturers can offer a seamless transition from instantaneous HIUs to storage HIUs on the same development? The truth is most developments have at least some properties that would benefit from local storage, reducing loads on the network while improving performance and allowing cooler, more efficient networks.
DATA Twin Plate Electronic HIU, DHW and CH

1 - Electronic control
2 - EPP Casing
3 - Heat meter fascia pocket
4 - DHW Plate heat exchanger
5 - CH Plate heat exchanger
6 - Heat meter
7 - Y Pattern strainer
8 - District return temperature sensor
9 - Stepper motor control valves
10 - DHW flow switch
11 - Security Valve OR Differential pressure control valve
12 - DHW temperature sensor
13 - Pump
14 - DHW recirculation pump (option)

**Specification**

- **Weight incl. Pre-plumbing Bracket**: 30kg
- **Heating**
  - **Maximum Output (@ 11° ΔT)**: 30kW
  - **Expansion Vessel**: 8 Ltr
  - **Maximum Operating Pressure**: 3 Bar
- **Hot Water**
  - **Output**
    - Std Model: 65kW
    - Plus Model: 80kW
  - **Pressure loss @ Max. output**
    - Std Model: 65kPa
    - Plus Model: 80kPa
  - **Capacity**
    - Std Model: 20.5 l/min
    - Plus Model: 25.5 l/min
  - **DHW Temperature set-point range**: 45-60°C
  - **Pressure Class**: PN10
  - **Max. district return temperature**: 40°C
- **District Heating Circuit**
  - **Max. flow temp.**: 85°C
  - **Pressure class**: PN16
  - **Minimum flow temperature**: 65°C
  - **Max. differential pressure**: 250kPa
  - **Min. differential pressure**: 50kPa

**Features**

- Fully electronic solution with PC connectivity for set-up and commissioning
- Calibrated sensors for fast DHW temperature control
- District return temperature control
- Anti-Legionella Cycle
- Eco / Comfort DHW modes for continuous or intelligent pre-heat
- Anti-fraud sealing kit for heat meter and casing
- Compact design - 490mm (W) x 640mm (H) x 271mm (D)
- Fully insulated compartmentalised casing
- Ability to connect and communicate with billing systems
- iHIU Intelligent control options to allow networked DHW priority
## Specifications

<table>
<thead>
<tr>
<th>Feature</th>
<th>The DATA HIU</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dimensions-mm</td>
<td>490W x 271D x 640H</td>
<td></td>
</tr>
<tr>
<td>Weight-Kg</td>
<td>30</td>
<td></td>
</tr>
<tr>
<td>Fully Insulated</td>
<td>EPP Insulation all round, including to rear</td>
<td></td>
</tr>
<tr>
<td>Country of Manufacture</td>
<td>Holland/UK</td>
<td></td>
</tr>
<tr>
<td>Brand</td>
<td>Optional metal wrap that can be branded</td>
<td></td>
</tr>
<tr>
<td>In-Direct HWS (Output)-KW</td>
<td>65</td>
<td>See DHW Performance</td>
</tr>
<tr>
<td>In-Direct HTG (Output)-KW</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td>Heat Meter</td>
<td>Zenner-Mbus (+3xPulse Inputs)</td>
<td></td>
</tr>
<tr>
<td>Max WP (Network)-Bar</td>
<td>16</td>
<td></td>
</tr>
<tr>
<td>Max Network Diff Pressure-Bar</td>
<td>2.5</td>
<td>Higher if DP Valve option is fitted (in place of security valve)</td>
</tr>
<tr>
<td>Integral Cold fill loop</td>
<td>Optional</td>
<td>External as standard for security reasons.</td>
</tr>
<tr>
<td>Integral Htg expansion vessel</td>
<td>8 litre</td>
<td></td>
</tr>
<tr>
<td>Unit Iso Valves -Network</td>
<td>YES</td>
<td>In first fix kit</td>
</tr>
<tr>
<td>Unit Iso Valves - Dwelling</td>
<td>YES</td>
<td>In first fix kit</td>
</tr>
<tr>
<td>Integral Htg SV</td>
<td>YES</td>
<td></td>
</tr>
<tr>
<td>Htg Temp Control</td>
<td>Electronic Stepper Valve (Htg)</td>
<td>Tracks available flow temperatures and adjusts targets accordingly</td>
</tr>
<tr>
<td>Htg Diff Pressure Control</td>
<td>Electronic Stepper Valve (Htg)</td>
<td>Self learning up to 2.5 bar DP</td>
</tr>
<tr>
<td>Integral Htg Strainer-Network</td>
<td>YES</td>
<td></td>
</tr>
<tr>
<td>Integral Htg Strainer-Dwelling</td>
<td>YES</td>
<td></td>
</tr>
<tr>
<td>CWS Pressure absorber</td>
<td>Optional</td>
<td></td>
</tr>
<tr>
<td>Integral CWS check valve</td>
<td>YES</td>
<td></td>
</tr>
<tr>
<td>Integral Htg circ Pump</td>
<td>A-Rated/var speed/Wilo</td>
<td></td>
</tr>
<tr>
<td>Integral Htg (Pump) bypass</td>
<td>No (Not required)</td>
<td></td>
</tr>
<tr>
<td>HWS Temp Control</td>
<td>Electronic Stepper Valve (HWS)</td>
<td></td>
</tr>
<tr>
<td>HWS Diff Pressure Control</td>
<td>Electronic Stepper Valve (HWS)</td>
<td>Self learning up to 2.5 bar DP</td>
</tr>
<tr>
<td>Network Circulation through unit</td>
<td>Programmed keep warm temperature 25-60°C. Optional complete shut off if not used for selected time</td>
<td>See keep-warm</td>
</tr>
<tr>
<td>Lockable Cover</td>
<td>Security bracket with tamperproof bolt</td>
<td></td>
</tr>
<tr>
<td>Connectable Prog Stat</td>
<td>YES</td>
<td></td>
</tr>
<tr>
<td>Metering/Billing connectivity</td>
<td>All can be accommodated. RS485 serial connection for interfacing.</td>
<td></td>
</tr>
<tr>
<td>Prepayment Shut off</td>
<td>Belimo Spring return 2port</td>
<td>Or as free issued by billing company</td>
</tr>
<tr>
<td>1st fix backplate</td>
<td>YES</td>
<td>As standard primary connections at top, services at bottom. Options for alternative arrangements.</td>
</tr>
<tr>
<td>Internal Pipe materials</td>
<td>Copper</td>
<td></td>
</tr>
<tr>
<td>Scaling of HWS HX</td>
<td>Positive valve closure.</td>
<td></td>
</tr>
<tr>
<td>Integral Flushing Bypass</td>
<td>YES</td>
<td>External to casing, to allow flushing without HIU in place</td>
</tr>
<tr>
<td>FAIRHEAT/Swedish Standard tested</td>
<td>YES</td>
<td>Lowest VWART figures of all units tested</td>
</tr>
<tr>
<td>WRAS Approval</td>
<td>All components</td>
<td></td>
</tr>
<tr>
<td>Major ESCO clients</td>
<td>Npower, EnviroEnergy</td>
<td></td>
</tr>
<tr>
<td>VWART (Vol weighted ave Return Temp)</td>
<td>23.2°C at 77.4 m3 pa</td>
<td>See Comparison Sheet</td>
</tr>
<tr>
<td>Primary DH Pressure Drop-KPa</td>
<td>50 (ratings down to 5 kPa)</td>
<td>To achieve specified peak loads. See datasheet</td>
</tr>
<tr>
<td>Residual Dwelling Htg Pump Pressure</td>
<td>50kPa</td>
<td></td>
</tr>
<tr>
<td>Commissioning</td>
<td>Factory set-Lap Top Access req’d</td>
<td></td>
</tr>
<tr>
<td>HWS Sterilisation</td>
<td>60°C cycle once per day</td>
<td></td>
</tr>
<tr>
<td>Return Temperature Limiting</td>
<td>Programmed keep warm temperature 30-75°C with option to disable</td>
<td></td>
</tr>
</tbody>
</table>
For too long we have lived with a complete lack of accountability for the use of badly designed or old fashioned HIUs. Until now there has been no standards against which to check an HIUs performance, and the importance of certain features to the efficiency of an entire scheme has been ignored. As a result, we live with a plethora of poorly performing district heating schemes that are so inefficient they cost the end user significantly more.

This is set to change, with the first set of HIU tests now completed using a new UK standard derived from the Swedish HIU standards, but amended to better suit our own climate. A significant portion of the well known manufacturers have undergone independent testing and the results have now been published.

The chart below compares the results from the HIUs that went through testing, and is accurate as of January 2017.

The height represents the return temperature over ambient 20C. The width represents the volume of primary water used each year. The area represents the energy returning to plant (i.e not used) each year.

### Independent Test Figures for Twin Plate HIUs

<table>
<thead>
<tr>
<th>Manufacturer</th>
<th>VWART</th>
<th>Return Temperature over 20°C</th>
<th>Volume of primary water each year</th>
<th>Area = Return Energy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pegler Yorkshire</td>
<td>44.6</td>
<td>167.5 m³ pa</td>
<td>67.0 m³ pa</td>
<td>23.2 m³ pa</td>
</tr>
<tr>
<td>Evinox MTP 15-50SN</td>
<td>43.6</td>
<td>144.1 m³ pa</td>
<td>50.0 m³ pa</td>
<td></td>
</tr>
<tr>
<td>SAV Twin VMA HP 1.5</td>
<td>34.5</td>
<td>116.7 m³ pa</td>
<td>35.0 m³ pa</td>
<td>10.5 m³ pa</td>
</tr>
<tr>
<td>Alteneic GAV022505 HC LTD</td>
<td>29.4</td>
<td>124.5 m³ pa</td>
<td>25.0 m³ pa</td>
<td>7.5 m³ pa</td>
</tr>
<tr>
<td>Thermal Integration</td>
<td></td>
<td>22.7 m³ pa</td>
<td>50.0 m³ pa</td>
<td></td>
</tr>
</tbody>
</table>
THE DATA HIU

Trickle-Flow Functionality

How we managed to obtain the Industries best efficiency results is not magic. Nor is it a misrepresentation of the facts, or just theory. It is the result of using modern methods of control and by applying a more advanced trickle-flow functionality.

It is common for HIUs to include a trickle flow to maintain heat across the domestic hot water plate heat exchanger at all times, to help minimise delays in hot water supply when a tap is opened. The problem is, this requirement leads to heat networks running at near full temperatures all the time, increasing heat loss and energy costs.

The DATA, DIGI and SLIM HIUs perform a trickle-flow function with the Economy or Comfort modes, by momentarily opening the domestic hot water stepper motor to allow small quantities of primary water to creep into the unit at regular intervals. The aim, in most cases, is to maintain enough flow through the heat network so that heat over 50°C can be supplied to an HIU within 20 seconds - the maximum time one would want to wait for heat to be generated to taps (and considerably faster than a typical combination boiler).

The diagram below is one way to explain how a very small trickle flow to each HIU, set to maintain the HIU just above room temperature, results in exactly the conditions we require, with heat maintained nearby for rapid response, but with the final branches of the network allowed to drop in temperature.

This approach has the added advantage of overcoming the need for thermal bypasses on risers.
The DIGI HIU uses the latest electronic stepper motor controls to provide both DHW and central heating. Central heating is provided directly, with a Differential Pressure Valve fitted on the CH feed.

The twin wall DHW heat exchanger provides complete protection from cross contamination in the case of a plate failure, thereby meeting the most demanding European regulations.

The unit comes in an attractive EPP casing, with overall dimensions of only 570mm (W) x 390mm (H) x 170mm (D), and remarkably low heat losses of only 2W.
DIGI

Single Plate Electronic HIU, Direct CH

1 - Electronic control
2 - EPP Casing
3 - Heat meter fascia pocket
4 - Plate heat exchanger
5 - Heat meter
6 - Y Pattern strainer
7 - District return temperature sensor
8 - Stepper motor control valves
9 - Heat meter return sensor
10 - DHW flow switch
11 - Differential pressure control valve
12 - DHW temperature sensor

**Specification**

- Weight incl. Pre-plumbing Bracket: 12kg
- Weight excl. Pre-plumbing Bracket: 11.5kg

**Heating**

- Maximum output: 42 kW
- Pressure: 10-20 kPa
- Kvs value diff. pressure controller: 2.5

**Hot Water**

- Output: 68kW
- Pressure loss @ Max. Output: 57 kPa
- Capacity @ 10-55°C: 21.5L/min
- Temperature Range: 45 to 60°C
- Max. district return temperature: 30°C

**District Heating Circuit**

- Max. flow temp.: 90°C
- Pressure class: PN10
- Minimum flow temperature: 65°C
- Max. differential pressure: 250kPa
- Min. differential pressure: 50kPa
- Max. pressure loss: <25 kPa

**Features**

- Fully Electronic HIU with PC connectivity for set-up and commissioning
- Twin wall DHW plate heat exchanger provides protection against contamination from district heating system
- Calibrated sensors for fast DHW temperature control
- District return temperature control (in DHW mode)
- Eco / Comfort DHW modes for constant or intelligent pre-heat
- Low pressure loss (<25kPa) over unit
- Adjustable differential pressure Controller (5-25kPa)
- Anti-fraud sealing kit for heat meter and casing
- Compact design
- Insulated casing
On Site

Over 25 years experience backing up customers on site with both engineers and consultancy.

Simple commissioning and diagnostics, via a mobile phone.

The worlds most efficient range of Heat Interface Units, as independently tested to the latest UK standards.
Off Site

Second by second data on heat network and HIU performance.

Alarms automatically directed to engineers.

The most advanced manufacturing and quality control in Europe.

The best design service and training centres anywhere.
The SLIM HIU is possibly the smallest and most efficient DHW generation unit on the market and uses the latest electronic stepper motor controls to provide instantaneous DHW.

A flow sensor allows the electronics to respond rapidly to changes in DHW flow rate, maintaining steady output temperatures with very little fluctuation.

As with all of our range of electronic HIUs, the SLIM provides two modes of operation which can be selected at commissioning - a Comfort Mode, where the unit keeps itself hot at all times ready for rapid DHW response, or an Economy Mode, where the unit goes cold after one hour of inactivity, with Anti-Legionella functionality provided.

The unit comes in an attractive EPP casing, with overall dimensions of only 240mm (W) x 420mm (H) x 90mm (D), and remarkably low heat losses of less than 2W.

Suitable for primary temperatures up 120°C, and pressures up to 16 bar, with outputs up to 62.4kW.

**Features**

- Highly insulating EPP casing
- Electronic control with PC interface
- Stepper motor control
- Eco / Comfort DHW modes
- Anti-legionella function as standard
- Extremely compact dimensions

All connections are bottom entry with union connection for easy installation.
The Amazon Unvented Cylinders can be used in conjunction with our SLIM Hot Water Unit, enabling heat input to be directed where it is needed the most - at the top of the cylinder - using the latest plate heat exchanger technology.

Unlike coils, which heat a fixed volume of hot water from the bottom upwards, the Amazon HXIN heats from the top down, heating only the desired quantity of water.

Essentially we have partnered a hot water cylinder with a combination boiler, giving you the benefits of both.

The plate heat exchanger provides the additional benefit of keeping boiler return temperatures as low as possible, typically below 25°C. This high temperature drop across the primaries, enables up to five times the quantity of heat to be fed from the boiler than a coil allows when using a given pipe and pump sizing.

The ability to control the volume of water heated, enables standing heat losses to be almost eradicated, with stored hot water being called into use just prior to known periods of high demand and only small quantities stored for normal use.

The rate of recovery can be set by the pump speed. Using the additional IHIU interface it becomes possible to increase heat input as the store empties, or to manage recovery periods to coincide with raised primary temperatures, allowing them to be turned off or weather compensated for the majority of the time.
Legionella and low temperature HIUs

As manufacturers we take responsibility for the safe function of our equipment, and this extends to the potential for the to introduce a risk of Legionella.

Historically, hot water cylinders, stored at 55-65°C, provide protection by sterilising the stored water, combination boilers go cold when not in use and then heat water to over 50°C typically, and heat interfaces have generally maintained themselves around hot water setpoint temperatures, so Legionella has never been difficult to address.

Today however, the need for more efficient HIUs, running at lower temperatures, has introduced a new set of conditions - a plate heat exchanger held deliberately at temperatures low enough to for Legionella to breed, rather than die. The lowest DHW setpoint we have been asked to ever set systems up to is 45°C. In our view this is a very sensible setpoint - too hot to shower in, but low enough to enable heat networks to run relatively cool and make use of low grade technologies such as heat pumps.

This is not hot enough to kill Legionella that may exist, but without stored water there should still be little if any chance of problematic levels of Legionella. Certainly never any reported cases we have heard from, or have any water authorities we have talked to including Thames Water and WRAS. Even still, it is nice to have the option to pull in Legionella protection to be sure.

If however we maintain the heat exchanger at such a temperature indefinitely through the use of a keep-warm mode, how does this effect Legionella risk, and if the keep warm is set below the DHW supply temperature, then this may result in water held at temperatures between within the optimal Legionella growth range - so is this a potential problem?

As standard we would typically deploy an anti-Legionella cycle that after the last use of the day holds the plate heat exchanger to 60°C for over an hour to kill of any existing Legionella. This is possible with electronic HIUs as they can incorporate timing functions - effectively raising keep warm temperatures for a period.

Mechanical HIUs however do not offer this timing functionality, and as such do not have the ability to sterilise periodically. Are we therefore at risk from basing HIU designs on mechanical controls with a reduced keep warm temperature? For advice we turned to the LinkedIn Legionella Group. One of the most concerning responses was as follows:

"HSG 274 discusses low volume/low risk systems. As soon as you put a shower into the system you obviously increase the potential risk due to aerosol. As for 38°C - you are asking for problems. If you can guarantee (which you can't) that the water will be flushed daily, then you could argue that the system throughput would help prevent proliferation. The trouble is that people go on holiday etc, therefore units may not be used for weeks, at 38°C you'd have a lovely biofilm! With regards to cases of LD - 50% are source unknown, a once-through systems that has stagnated over a holiday then been flushed clear whilst infecting someone is a perfect example of why the source would be unknown."

With the DATA HIU going through WRAS approval, we were particularly keen to tick all the boxes that may relate to Legionella that WRAS were concerned with in order when using lower keep warm temperatures, to ensure prompt certification. Our investigations have determined that there are no requirements or tests currently in the WRAS approval mechanism regarding Legionella - so we took the existing position that Legionella protection would be turned on as standard, and instructions would be clear that it must not be disabled if lower keep warm temperatures are used.

All our electronic HIUs offer the option of Legionella protection as standard. This includes the DATA, DICi, and SLIM HIUs. The anti-Legionella function on the DATA HIU was recognised by the industry last year when the system made it through as a finalist for the Combating Legionella Awards. The system is now fully WRAS approved and as well as been officially the most efficient HIU in the industry (as independently tested) it also offers the most advanced protection there is against Legionella.
The use of pre-fabricated plumbing rigs for new-build applications is nothing new, starting with framed cold water tanks with a hot water cylinder and optional gas boiler back in the 1970’s. Combination boilers and unvented cylinders made these mostly obsolete, however the range of building services to be provided in a modern dwelling calls for a fresh look at the advantages that can be gained from taking pre-fabrication to the extreme, and our CUPBOARD HIU is the result.

The modules are standardised square blocks of 665mm square by 310mm deep, based on a standard size of EPP insulating enclosure.

The modules are installed into aluminium framework, typically three high, and arranged to form a square cupboard space that will accept a standard washing machine (that feeds into the waste trap module).

The framework is fitted with pipework for incoming services, along with isolation and a first fix kit where required. Any electrical interconnections between modules are made using standardised Molex connectors that can allow the frame to be installed with modules missing, to be plugged in later. Plumbing connections will typically have union connections allowing a similar approach, so the entire system can act as a first fix kit.

The advanced aluminium frame system we use future proofs for modification, while providing a strong lightweight structure that allows the entire system to be delivered completed for rapid connection. Modules can be swapped on site, allowing building services to be upgraded easily.

**Modules:**

1. Air Handling  
2. Distribution Board  
3. Networking and Home Control Centre  
4. Heat Interface Unit (HIU)  
5. Underfloor Heating Manifolds  
6. Waste Services  
7. Commercial HIFLOW Heat Exchanger  
8. Pump Station  
9. Water Storage  
10. Thermal Storage

Custom modules available.
The MECH HIU uses a gas filled mechanical control valve to accurately regulate DHW. Central heating is provided directly, with a Differential Pressure Control Valve fitted on the CH feed.

DHW temperature can be adjusted by the resident without removing the HIU casing or breaking any of the security seals.

The unit comes in an attractive EPP casing, with overall dimensions of only 585mm W x 485mm H x 265mm D, and remarkably low heat losses < 20W.

All connections are bottom entry and the unit is supplied with a Pre-plumbing jig as standard. The jig spaces the unit 50mm from the wall to allow pipes to be run up the back.
For outputs of up to and over 100kW, with multiple options including DHV, multi-zone central heating, return temperature limitation, pumps of various sizes, heat meters, by-passes, and more. Perfect for boiler replacement or cluster installations.

- Dual Zone CH, High Output Pump, Unvented Kit & Instant DHW
- Dual Zone CH & Instant DHW
- Single Zone CH, High Output Pump & Instant DHW
- Dual Zone CH, HW Zone, & High Output Pump
- Single Zone CH & HW Zone
- Unvalved CH Feed & Direct Primary Feed
- Electronic CH Control Valve
- Mechanical Return Temperature Limitation
- MASTER & MAJOR Casing
The IHIU controller represents the pinnacle of modern Linux control systems, providing a very powerful open-source software environment capable of connecting to virtually any device, while at the same time costing a fraction of the cost of a traditional proprietary electronic controller.

The miniature computer has built in Ethernet and WiFi, and runs the same software as most internet routers, making it a powerful hub for secure communications to almost any network connected device or server.

The controller has numerous inputs and outputs and its USB port, expandable by the use of a USB hub, allows connection to almost any peripheral designed for computers, from USB storage devices, through to GSM dongles, RS485 devices, or even cameras, making it more than just a controller for hot water systems. The IHIU has ModBus Master functionality, allowing it to connect to ModBus devices, read registers, and act as a bridge to other networked systems. You can connect wireless mesh networking dongles to establish site wide self healing networks, with secure communication from any controller on the network through to any other controller—including ones connected to the internet and acting as a bridge.

It runs at 5v as standard, making power supply straightforward, allowing the use of backup powerbanks, or super capacitors, and making it easier to power from lower voltage sources such as PV cells. A PoE (Power over Ethernet) option is available.

The IHIU system provides a cross platform auto-adapting browser based interface, allowing information to be displayed as desired, and user friendly interfaces to be easily designed and deployed.
Responsive Servicing

The instances of emergency call-out can be reduced with HIUs connected and reporting performance issues, as well as the number of wasted call-outs that require a follow up with the correct spares.

Systems that report an increased probability of component failure in the near future can be programmed into existing maintenance schedules.

The real benefits of such methods have yet to be demonstrated fully, and will come through having the ability to analyse data and further evolve the software that is used to identify problems until everything that can be predicted is done so accurately. Each unexpected component failure can be reflected on in light of the historical data before the failure, and where clues are found they can be checked out against other failure records and a function put in place to send an alarm to maintenance managers when other systems show symptoms.

The following 'emergencies' can all be avoided by automatic monitoring, checks, and alarms:

- Leaks in central heating systems, or under-pressurised systems
- Pump or control valve failure following general wear
- Keep warm modes not set hot enough for rapid delivery in mornings
- Central heating too hot or cold for times of year
- Blocked strainers (or primary pipework)
- Plant related issues that may result in multiple complaints, such as differential pressure across the network or primary temperatures too low to meet peak demand.

Such functionality can provide maintenance engineers with system summaries providing the full service history, advising the steps required next service, along with a list of parts, tools, and expected timescales for planned works.

Where a home display is provided by the billing system, it would be desirable to combine service alarms with messages to both engineers and occupants, so call-out times can be efficiently scheduled. Ideally the engineer only gets the nod once a problem has been identified, the system has picked a time when an engineer is in the area, and confirmed the time with the occupant via their home display.

The additional hardware costs are minimal, given a billing system already provides a communications backbone, and could be estimated at £150 per HIU to cover parts and labour. The services are generally driven by software alone, with little cost to deploy en masse given systems can be remotely updated.

With an emergency call-out costing in the region of £250, compared to £75 as part of a scheduled service, if an average of two call-outs per decade can be avoided, then this provides a saving of £175 every 10 years.
SVG based dashboards can be designed using the built in editor, and thereby customised in situ as required. Alternatively, any reputable vector editing software will be able to export SVG formats allowing you to use your favoured application instead.

The powerful analytical features provided by the IHIU platform includes ability to graph all sensor readings and system states historically, down to 10 second resolution. This level of detail allows an engineer to easily spot problems, or confirm correct operation of all aspects of the system.

The IHIU Control System can be deployed on a number of platforms, including the Raspberry Pi. This enables us to offer the 'Plumb Pi', providing the IHIU software tailored to run on the Raspberry Pi 3 along with the latest 7" touch screen and an enclosure.

This hardware platform provides the basis for our open-source user interface, bringing together the cream of open-source software available, pre-configured, along with programs to allow connection to different sensors, to our range of HIUs, and other equipment.

A low cost computer for plumbers, equally suited for permanent installation or as a field computer for commissioning or monitoring systems.
Data Monitor Application

To enable easy access to HIUs by the use of a mobile phone, we have developed the Data Monitor App for Android devices. The software works in conjunction with our Data Monitor v1 remote monitoring system, based on open-source Linux technology.

Together the complete Data Monitor system enables the full functionality of our modern electronic HIUs to be realised.

While usable in its own rights, the system is primarily for demonstrating the complete suite of functions available for integration of our HIUs into 3rd party systems. It is based on open source hardware and software platforms to allow connection of our HIUs to just about any other system with minimal effort.

Functionality

The following functions are available, and can be customised to clients requirements.

- Secure access provided to HIUs by use of online user registration combined with access tokens.
- All functions can be limited by user access levels, such as Manufacturer / User / Engineer / Estate Manager / Billing Provider.
- Live provision of Alarm codes and sensor data.
- Access to all commissioning settings:
  - DHW set temperature
  - Keep warm temperature
  - Keep warm timing
  - Central heating temperature
  - Return limit temperature
- Remote control over central heating
- Remote control over on-board pre-pay shutdown without the need for an additional security valve
- Makes use of voice recognition and speech synthesis on modern phones to enable one click access to all commands.
- Can be set to only send out data under alarm conditions, to protect users patterns of use from anyone.
- Can teach the system new answers to new questions.
- QR code integration to allow rapid identification of HIUs and to load commissioning settings.
The CAMPER HIU uses the latest electronic stepper motor controls to provide both DHW and central heating from a district heating circuit, using two plate heat exchangers.

The system is supplied in the form of a fibre glass floor standing unit, coloured to suit, for external installation. It is ideally suited for caravans and holiday parks where properties are semi-permanent.

Overall dimensions are only 800mm (W) x 1400mm (H) x 350mm (D) with exceptionally low standing heat losses resulting from the multiple layers of highly engineered EPP moulded insulation.

The heat meter display is visible through a glass window to allow heat readings to be easily taken at the start and end of occupancy periods, and can be checked by an occupant.

When connected together to a remote server, the CAMPER allows complete remote management of the system.

Connections are made in a lower compartement, along with a filling loop, and dirt an air seperator to protect the HIU from debris in the central heating, and rapidly purge air from the system.
Case Study: Balgair Castle, Stirlingshire

The holiday park at Balgair Castle was one of the first jobs we encountered requiring HIUs to be installed outdoors.

They specifically needed to be flood proof and run at reduced network temperatures.

In addition to these rather unique requirements, we also needed to ensure low return temperatures at all times, and be capable of running at reduced network flow temperatures. The site covers a large area and pipework heat losses are minimised this way.

We used a variant of our DIGI hiu combined with a very close approach double-pass heat exchanger for central heating to get the low return temperatures, and designed a new fibre-glass cabinet to house the DIGI—as well as others in the range.

The CAMPER HIU cabinet is split into two sections, with the lower compartment used for connecting pipework and isolation valves. It also lifts the HIU off the ground by over 600mm to protect from flooding.

The site has now been up and running perfectly for a year, with all hot water and central heating driven by biomass from the surrounding area.
To satisfy the demand for higher outputs, the HIFLOW Modular HIUs provide for outputs from 125kW to 1500kW, delivering a mix of hot water, high temperature heating and underfloor heating.

Each module provides for heat transfer between one circuit and another, be it from or to, primary water, stored water, or domestic water, and can be mixed and matched to deliver a specific set of heat transfer requirements from a single set.

The modular nature of the system provides a number of advantages, including high levels of redundancy in the case of a single unit failure, easier handling, and less expensive spare parts.

Each module runs using its own embedded electronics, connecting to each other via WiFi or Ethernet. The modules co-operate to achieve the desired loads, rotating their operation as they go.

At low loads the number of modules used reduces to range-rate automatically, ensuring efficient turbulent heat exchange across the full range of outputs.

Modules are optionally supplied on frame with manifolds for easy connection to services.

Another unique feature (patent pending) is the ability to draw from more than one heat source - a high temperature supply, and a lower temperature supply. This allows the efficient combination of heat pumps, CHP, and boilers to deliver loads at various temperatures while maintaining the efficient operation of each heat source.
Case Study: Putney Plaza

The requirement for the plant based provision of DHW, underfloor heating, radiators, a commercial zone, combining heat from gas boilers, CHP, and extract air heat pump proved perfect for the HIFLOW HIUs.

The Putney system uses a bank of six HIFLOW modules for 1.5MW of DHW. It has two modules for radiators, three for underfloor heating, and two for a commercial zone, along with 8000 litres of custom made buffer stores. The modules work together to match required loads and to provide excellent levels of redundancy. This modular approach has ensured the site has seen 100% delivery of all services since turn-on.

The Putney HIFLOWs draw heat from two sources - a high grade source (boilers, CHP) and a low grade (heat pump) blending these feeds for optimum efficiency of all plant.

The entire system is controlled using IHIU Control Systems, with all systems monitored remotely. This has allowed us to tweak setpoints, or introduce screed drying cycles when asked by installers, and demonstrate historic performance down to 10 second intervals.
The Amazon District range of cylinders are designed for the provision of domestic hot water on communal heating systems. The Indirect version also provides a plate heat exchanger interface for central heating.

The Amazon Unvented Cylinder is completely pre-fabricated with all the required controls, including both plumbing and wiring, and is supplied with an insulated casing and support frame that allows the system to be installed over a washing machine.

The system is aimed at installations that require excellent hot water performance whilst only drawing very low loads from the heat network.

The performance is such that high flow rates of DHW up to 50 litres/minute at 65°C can be achieved, making the Amazon District suitable for driving both individual and small groups of properties.

The use of storage allows primary supply temperatures to ramp down for significant periods of the day, or off completely in Summer. When compared to a system that runs on instantaneous DHW generation (using HIUs) that requires primary temperatures to be over 60°C day and night, 365 days a year, the efficiency gains that can be achieved by running the network at weather compensated heating temperatures is significant. In such instances, stores can be set to respond automatically to rising primary temperatures to initiate recovery, allowing the timing of DHW loads to be managed centrally and matched to times when high grade heat is cheaper, or central heating loads are at their lowest.

Electric backup of DHW is provided as standard making the system capable of satisfying DHW demand while the heat network is shut down for maintenance.

As with most of our systems, the range of options is almost limitless, and includes a choice of sizes, heating loads, methods of recovery, types of frame and cladding, heat metering, billing options, multiple heating zones, underfloor heating controls, and more.
HEATBANK® PANDORA Thermal Store

The HEATBANK® PANDORA Thermal Store is a patented thermal store with a unique benefit - it has no need for a discharge pipe for either hot water or heating. This makes the system perfect for high rise developments where the routing of discharges is an issue, leading to its use in the thousands across London by most house builders, as well as local authorities.

The PANDORA is as close to a fit and forget mains pressure hot water system as it gets, without any discharge pipes, no G3 unvented regulations to worry abouts, an no servicing requirements to maintain safe operation.

There are various configurations available with the simplest using electric immersion elements to drive hot water, through to systems that combine multiple heat sources and loads and come complete with all the controls fitted and wired for rapid installation.

100kW Hot Water

Maintenance Free

No Discharge Pipe

No Limescale build up in Store

No G3 Unvented Regulations

Options to suit all heat sources

As used in the thousands by most major housebuilders and many local authorities
There are always circumstances where stored heat is required in a property, be it to reduce load on the primary supplies, deliver exceptional hot water loading, or provide electric backup of hot water using an immersion heater.

The HEATBANK® PANDORA Thermal Store is a patented thermal store that has been used over many years in thousands of properties.

Twin plate heat exchangers are used for connection to the primary source, and for delivery of mains pressure DHW.

Its unique feature is the lack of a discharge pipe from the system, for either hot water or heating, making the system perfect for high rise developments where the routing of discharges becomes challenging.

Electric backup can be used to drive both hot water and central heating.

A big advantage of using stored heat and electric backup together, is it allows district networks to go cold for extended periods of time, significantly reducing network loads. It becomes possible to weather compensate district supplies, and to better manage the demand of high grade heat to improve boiler plant efficiencies.

As with all the HEATBANK® Thermal Store range, numerous options are available to match specific contract requirements, including the use of multiple heat exchangers to deliver high outputs or independent loads, heat metering, intelligent control, and storage sizes from 60 litres up to 500 litres.
Case Study: Queensland Road, Islington

The Queensland Road development, alongside the Emirates Stadium, required 350 thermal stores to run from a centralised boiler plant. The HEATBANK PANDORA was the obvious solution.

Hot water storage was a requirement from the outset. Simply to ensure that systems have electric backup and occupants can never be left without hot water. Furthermore, systems were required with no discharge pipes and low return temperatures to the central boiler plant - neither were achievable with normal storage technologies.

The HEATBANK PANDORA DISTRICT uses a plate heat exchanger input to obtain low return temperatures and a patented feed and venting system to overcome the need for any discharges. The entire system was WRAS approved for this contract and the development has been running for almost four years.

Case Study: Oxford Brookes University

Oxford Brookes University made use of our HEATBANK PANDORA to provide distributed storage from a central CHP plant, with each store delivering domestic hot water to eight accommodation units.

The Pandora was selected as it provided a perfect solution with no discharge pipes and instantaneous mains hot water to overcome Legionella issues.

The CHP plant required return temperatures of 60C or below, while the client required DHW secondary return circuits fed from each store to remain at 60C. The design uses very close approach heat exchangers so that the return to the boiler can be kept at or below 60C. The DHW temperatures stay above 55C at all times, rising to 60C every few minutes.
Combining just about every type of heat source available to drive central heating and hot water for domestic properties, the HEATBANK Xcel thermal store standardises the whole approach of utilising these heat sources efficiently, providing design features that allow any possible combination using a standardised product.

In its most basic form the store can act as a buffer system, used purely for central heating. Large 1½" bosses allow all sizes of domestic wood burners to be connected using gravity circulation, with numerous other bosses for pumped circuits. Even larger 2¼" bosses allow for immersion heaters as well as retro-fit coils (mainly used for overheat protection).

A 1m² coil is provided as standard for connection of solar panels (or any other pressurised heat source). A PHE (plate heat exchanger) option can be added to generate mains pressure hot water to run multiple bathrooms using high pressure mains water, without the need for unvented certification or annual maintenance. Further options provide fitted controls for the use of sealed and vented boilers as well as heat pumps.

Control options include pump assemblies, thermostats, programmers and timers, and control valves. Both radiators and underfloor heating can be run simultaneously, and the store is configured in such a way that low temperature loads (e.g. underfloor heating) can run off low temperature heat sources (e.g. heat pump) while high temperature loads (e.g. radiators) run using higher temperature heat sources (e.g. wood burners or boilers).

The exceptional performance of the HEATBANK Xcel is why it is the only thermal store that has been approved by nearly every wood burner manufacturer there is.
Case Study: National Trust, Morden Hall Park

The Stable Yard at Morden Hall Park in Surrey comprises of solar thermal, an air source heat pump and wood burner, tied together using HEATBANK XCEL technology.

Under a plan intending to reduce energy consumption by 20%, the Trust’s main green sources will be biomass, heat pumps, hydro and solar. An example of the progress being made by the National Trust is the heating system installed at Morden Hall Park. The scheme, which incorporates possibly the UK’s most energy efficient historic building, the Stable Yard, uses both modern and more established renewable energy methods.

The property is supplied by the multifuel Xcel HEATBANK® thermal heating system, a wood-fired boiler and three different types of solar panels. An Archimedes Screw, a more historic generator of energy, supplies the visitor centre by calmly churning the water of the River Wandle.

A fitting conclusion to the project is that the stable yard received an ‘Excellent’ rating from BREEAM, the world’s foremost environmental rating system. This is a big achievement as only the top 10% of new non-domestic buildings get an ‘Excellent’ so it’s very rare for a refurbished or historic building to score so highly. Going through a BREEAM assessment is a big job - it uses a huge range of measures, including aspects related to energy and water use, health and well-being, pollution, transport, materials, waste, ecology and management processes.
The HEATBANK XCEL provides an extensive number of optional assemblies for various inputs, outputs, and control. Our Online System Designer software allows one to custom design a system, or sometimes it is easier to refer to one of the standardised data sheets, some of which are listed below.

**DS-1**
Buffer Y-Plan

**DS-2**
Buffer DHW Coil

**DS-3**
Buffer DHW PHE

**DS-4**
Multifuel Pellet Wood Solar

**DS-5**
Multifuel Pellet Solar

**DS-6**
Multifuel Oil Wood Solar

**DS-7**
Multifuel Wood

**DS-8**
Multifuel Wood Solar

**DS-9**
Multifuel Pellet Wood

**DS-10**
Multifuel Oil Solar

**DS-11**
Multifuel Oil Wood

**DS-12**
DHW Coil Solar
Some catalogues are more than just a collection of products.

Some catalogues are historic documents, a snapshot of today's technology, a summary of a life's work, expressions of love, of art, and of dedication to a discipline.

This one's about plumbing.

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