



# HeatMaster®

## TOTAL CONDENSING

### STAINLESS STEEL GAS CONDENSING COMBINATION BOILER



Sedbuk 'A' Rated

Totally condensing in both Heating and Hot Water

Exceptional hot water outputs in excess of 40 litres per minute (HM 35 TC) and 85 litres per minute (HM 85 TC)

Heat exchanger DHW cylinder manufactured in Stainless Steel

Reduced maintenance due to self-cleaning heat exchanger

Suitable for connection to new and existing heating systems



*excellence in hot water*

# Why Total Condensing?



Always at the forefront of developing products to satisfy hot water and heating needs which have changed dramatically over the last 30 years, ACV introduced the first storage combination boiler in the 1970's – the Delta was ahead of its time and the first in its class. Due to ACV's unique stainless steel Tank-in-Tank technology, the boiler and storage cylinder could be combined together in a single shell - transfer losses between the two were eliminated and performance (flow rates and recovery times) improved as a result.

With the high levels of building insulation now in place in most properties, the requirements for heating output are reducing – and this trend is set to continue with some experts predicting a drop in the boiler load due to heating from around 75% to as low as 45%. At the same time, hot water usage is increasing year-by-year as demand rises for luxury bathing facilities such as high performance showers and spa baths. If hot water demand has risen to 55% of the boiler load, the natural next step is to gain as much efficiency in hot water mode as possible.

To meet these high hot water requirements, larger properties normally require a separate boiler and cylinder or a storage combination boiler. To achieve efficiency it is best to have the boiler and cylinder as close together as possible. Efficiency also usually means using a condensing boiler, but typically condensing combination boilers only actually condense whilst working in heating mode and efficiency in hot water in a variety of condensing combination boilers varies considerably from boiler to boiler.



## Annual Fuel Consumption Comparison

Based on 55% hot water usage and 45% heating - % savings shown in green.





## Introducing the total condensing storage combination boiler - the HeatMaster TC



The HeatMaster TC - the only storage combination boiler to actually fully condense during both the hot water and heating modes. This is thanks to the new patented stainless steel heat exchanger which advances proven Tank-in-Tank technology. In the Kyoto era, with us all striving to reduce carbon emissions, the HeatMaster TC is arguably the most ecological gas boiler in the world.

Not only does the HeatMaster TC feature exceptional efficiency, but it is designed to cope with hot water demands of larger properties and commercial applications: this means superb mains pressure hot water delivery which is unrivalled in a boiler of this output, giving high volumes, fast recovery times and quick response to demand.

Also because HeatMaster TC is not a low water content boiler, it performs admirably when connected to older existing heating systems, therefore making an excellent choice for upgrades.

In addition, the HeatMaster TC features a built-in full weather compensation facility, which allows the boiler to monitor outside temperatures and adjust the boiler settings automatically, thus reducing energy consumption even further. All of this is delivered by a single unit with a footprint of 60 cm by 65 cm (HM 35 TC) or of 69 cm by 73 cm (HM 85 TC).

ACV is once again leading the way and taking you close to the edge of condensing boiler technology.



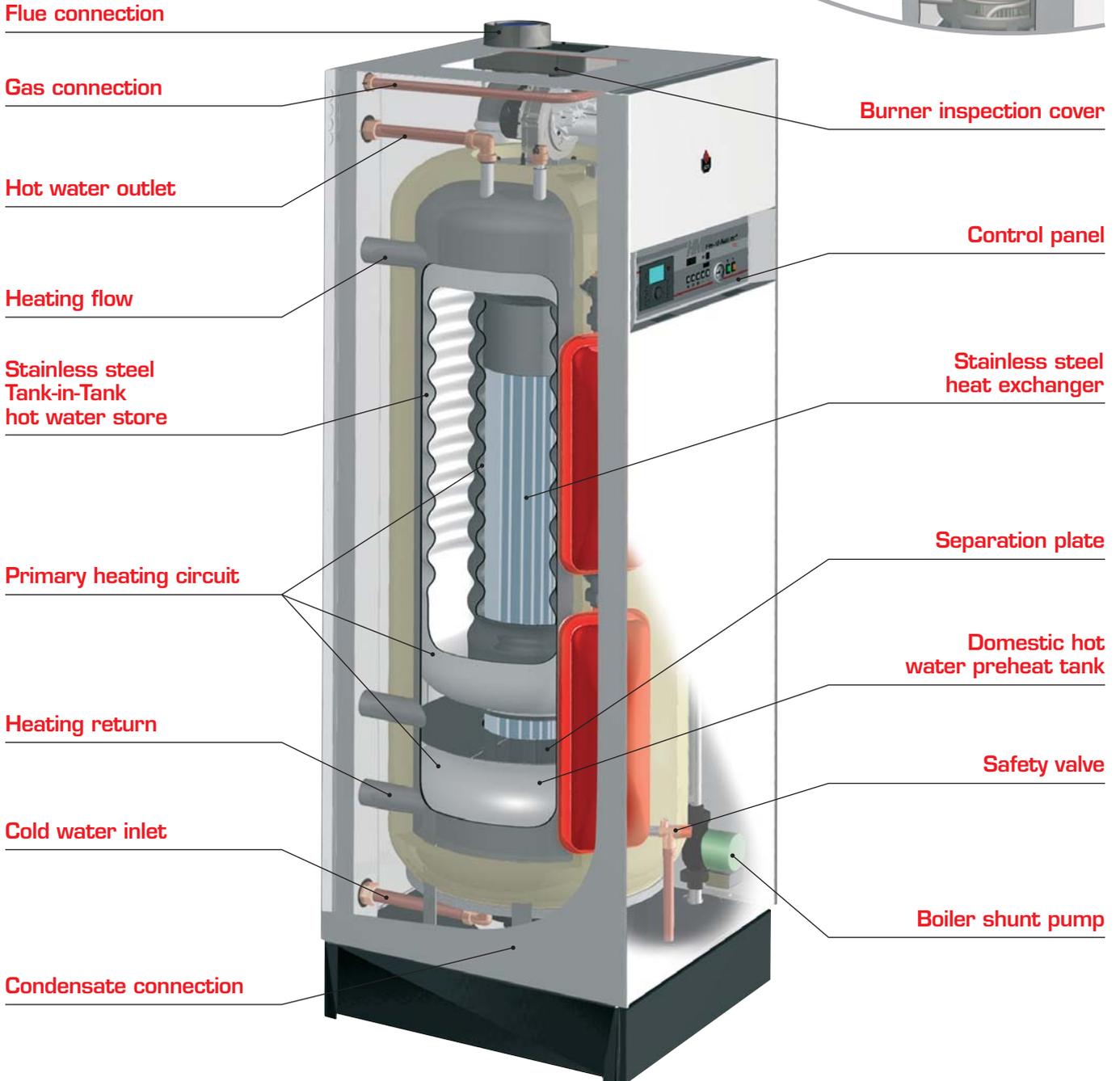
# How does it work?

## HM 35 TC

The HeatMaster 35TC incorporates a stainless steel coil around the lower Heat Exchanger section preheating the domestic hot water.



## HM 85 TC



### Flue system

ACV offers a complete range of flue accessories in polypropylene and stainless steel.



### High quality insulation

The HeatMaster is insulated with 50 mm of CFC/HFC/HCFC and ozone depletion free polyurethane insulation.



### Modulating premix gas burner

The HeatMaster TC benefits from having the advanced air/gas modulating pre-mix gas burner as standard.

- Very easy to install, adjust and maintain
- Low NOx emissions
- Safe and quiet.

The HeatMaster TC combines the unique ACV Tank-in-Tank concept with a dual primary circuit resulting in exceptional performance from a totally condensing combination boiler.

### Tank-in-Tank technology

ACV's advanced implementation of thermal storage technology is tried and tested and is remarkably simple, efficient and reliable. At the heart of the HeatMaster TC is a stainless steel tank through which the flue tubes pass. This is surrounded by a mild steel shell containing the primary water, which extends down to the combustion chamber and even around the flue tubes. The burner fires onto the primary water which indirectly heats the stainless steel tank containing the hot water. As with all Tank-in-Tanks, this is corrugated over its full height and is suspended in the HeatMaster TC by its hot and cold water connections.

The area of the heat transfer surface is therefore much greater than that of standard direct fired water heaters. A much larger heat transfer surface means that Tank-in-Tank units recover much faster than any other kind of hot water storage device - and keeps boiler cycling to a minimum. The high storage temperature within the inner tank also results in exceptional hot water outputs.

### Dual primary circuit technology

The HeatMaster TC primary circuit is split into two sections - a high temperature upper circuit and a low temperature lower circuit, divided by a separation plate. The hot water storage tank is located in the upper circuit which always operates at a temperature of between 60°C and 90°C. This is ideal for hot water production as it maintains the stored water at constantly high temperatures, eliminating bacterial formation such as Legionellae, as well as resulting in high volume hot water production.

The down-firing flue tubes pass through the upper circuit, through the separation plate and into the lower circuit. The primary water here operates at a temperature typically between 30°C and 60°C for heating (dependent on the heating return temperature), perfect for condensing when working in heating mode.

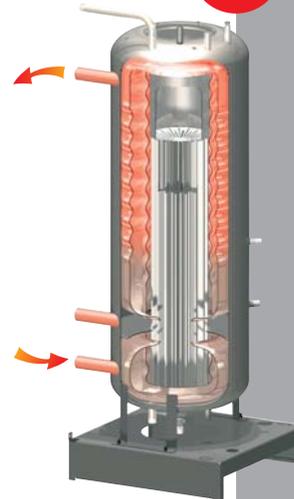
### Pre-heating tank technology <sup>[1]</sup>

During hot water mode, the lower circuit operates at a much reduced temperature, typically 5°C to 20°C depending on the cold water inlet temperature. The incoming cold water enters the lower primary circuit via a stainless steel tank which preheats the domestic water prior to it passing into the upper stainless steel tank.

As the pre-heating tank is wrapped around the lower flue tubes, it is able to absorb the remaining heat from the flue gases, resulting in a fully condensing HeatMaster TC during hot water mode either in full or part load conditions.

## Operating modes

1

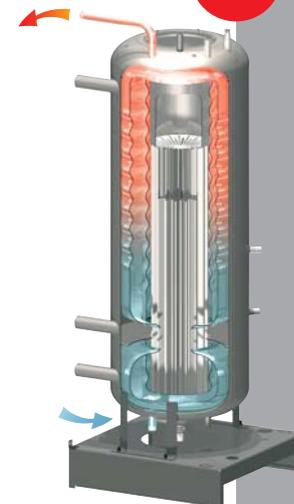


### Heating

The heating return enters the lower circuit of the boiler, which allows the boiler to operate in condensing mode.

The upper circuit of the HeatMaster TC is kept at a consistently high temperature due to the internal shunt pump which ensures that the primary water circulates around the heat exchanger flue tubes.

2

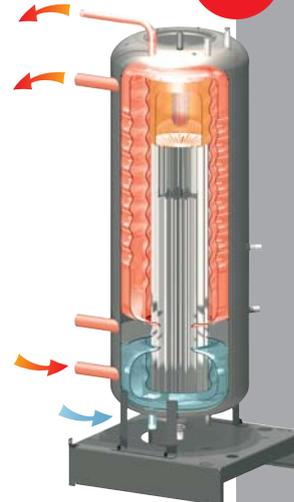


### Hot water

With the upper circuit maintained at high temperature, the HeatMaster TC is always ready to supply hot water on demand. The cold water enters the lower tank <sup>[1]</sup> and is pre-heated before entering the hot water tank above.

The low temperature of the bottom circuit results in continuous condensation of the flue gases in hot water mode.

3



### Heating and hot water

Once up to temperature, the HeatMaster TC is capable of producing heating and hot water simultaneously.

[1] The HeatMaster 35 TC, incorporates a coil around the base of the Heat Exchanger to preheat the Domestic Hot Water.

# A heart of stainless steel

The heart of the new HeatMaster TC is ACV's specially designed new stainless steel heat exchanger, built on over 80 years experience in the manufacture of heating and hot water products.

The combustion gases pass downwards through the heat exchanger tubes and condense in the lower circuit of the HeatMaster TC, making maximum use of the energy available from the combustion process. The result is a highly efficient combination boiler which gives exceptional output for its size.

## Excellent resistance to corrosion

Most boilers use a water tube for the combustion process, however the stainless steel heat exchanger of the HeatMaster TC has flue tubes running through the sealed water jacket. Whilst this increases the volume of water in the system, the benefit is that it allows stable temperature control of the boiler and minimises the risk of overheating due to varying water flow rates.

## Low maintenance

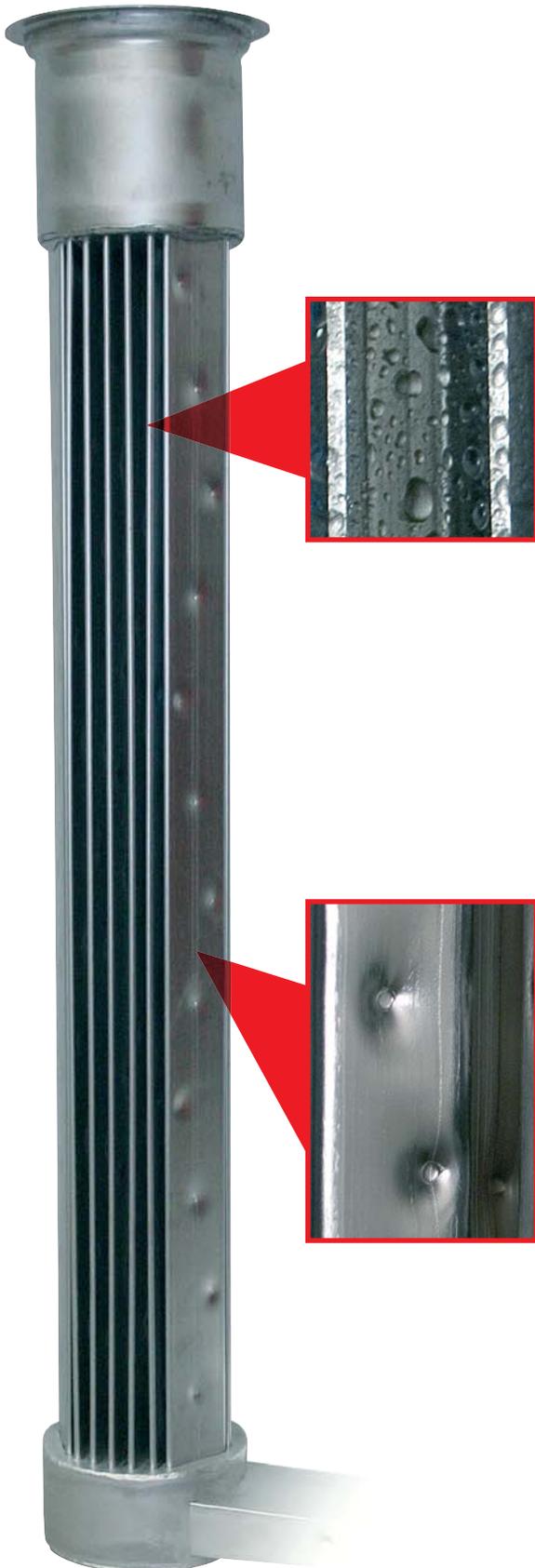
The stainless steel heat exchanger of the HeatMaster TC is self-cleaning - as the condensate runs down the exchanger tubes, it cleans any possible traces of combustion residue. This ensures that the boiler continues to function at maximum efficiency throughout its life, and therefore maintenance requirements for the heat exchanger are reduced.

## Stable boiler temperature control

Most boilers use a water tube for the combustion process, however the stainless steel heat exchanger of the HeatMaster TC has flue tubes running through the sealed water jacket. Whilst this increases the volume of water in the system, the benefit is that it allows stable temperature control of the boiler and minimises the risk of overheating due to varying water flow rates.

## High efficiency

The stainless steel heat exchanger flue tubes are designed to reach an optimal heat exchange over their entire length. The HeatMaster TC reaches an exceptional continuous output throughout the lifespan of the boiler, since no oxidation occurs in the heat exchanger. Furthermore the fuel consumption of the boiler is improved thanks to the reduced pressure loss in the flue tubes.





The HeatMaster 35 TC can be installed with the optional easy-fit manifold kit incorporating 22mm compression fittings, which allows all the hot, cold and heating pipework to be connected easily and conveniently at the top of the HeatMaster TC. The easy-fit kit enables the HeatMaster 35 TC to be installed into a confined space whilst still giving access to the pipework connections.

# Residential applications



Mutiple unit installations for commercial and industrial applications requiring high volume hot water output

# Commercial and industrial applications

## Technical characteristics

		HM 35 TC		HM 85 TC	
Fuel		Natural Gas	LPG	Natural Gas	LPG
Input max./min.	kW	34.9/10.0	30.6/10.0	85.0 (92.0)/17.2	85.0 (92.0)/17.2
Output max./min.	kW	34.1/9.8	29.9/9.8	82.5/16.7	82.5/16.7
Effi ciency hot water mode	%	105.9	105.9	105.0	105.0
Effi ciency heating mode (max. input) 80/60°C	%	97.9	97.9	97.0	97.0
Effi ciency heating mode (30% load acc. EN677)	%	108.5	108.5	107.0	107.0
Annual effi ciency [1]	%	106.3	106.3	105.5	105.5
Sedbuk rating		A	A	A	A
Max. operating pressure	bar	3	3	3	3
Max. operating temperature	°C	90	90	90	90
Total capacity	L	189	189	315	315
Primary capacity	L	108.5	108.5	125.0	125.0
Flue connection	mm	80/125	80/125	100/150	100/150
Max. length concentric fl ue Ø 80/125 mm	m	20	20	8	8
NOx class according to EN483		class 5	class 5	class 5	class 5
Dimensions A	mm	1720	1720	2145	2145
B	mm	600	600	690	690
C	mm	670	670	725	725
D	mm	500	500	580	580
E	mm	125	125	150	150
F	mm	80	80	100	100
G	mm	140	140	160	160
Weight empty	kg	174	174	284	284



### Hot Water Performances (Primary flow temperature 85°C - cold water inlet 10°C)

Peak flow 40°C	L/10'	419	419	850	850
Peak flow 40°C	L/60'	1312	1312	3177	3177
Continuous fl ow 40°C	L/h	1057	1057	2793	2793
Peak flow 60°C	L/10'	224	224	459	459
Peak flow 60°C	L/60'	692	692	1778	1778
Continuous flow 60°C	L/h	578	578	1583	1583

[1] Average effi ciency over the year based on the seasonal variations in heat-demands for heating as well for Hot Water.

# Intelligent technology

The HeatMaster TC benefits from having the ACV advanced MCBA electronic control fitted as standard. This control manages all the gas burner and boiler functions, including its safety parameters and flame modulation, as well as monitoring and controlling the various temperatures across the boiler and therefore heating demand. This allows the MCBA control to vary the boiler power accordingly, hence reducing the stop/start cycle significantly and thus saving fuel and wear and tear on components.



HeatMaster TC fascia shows the optional integrated control panel

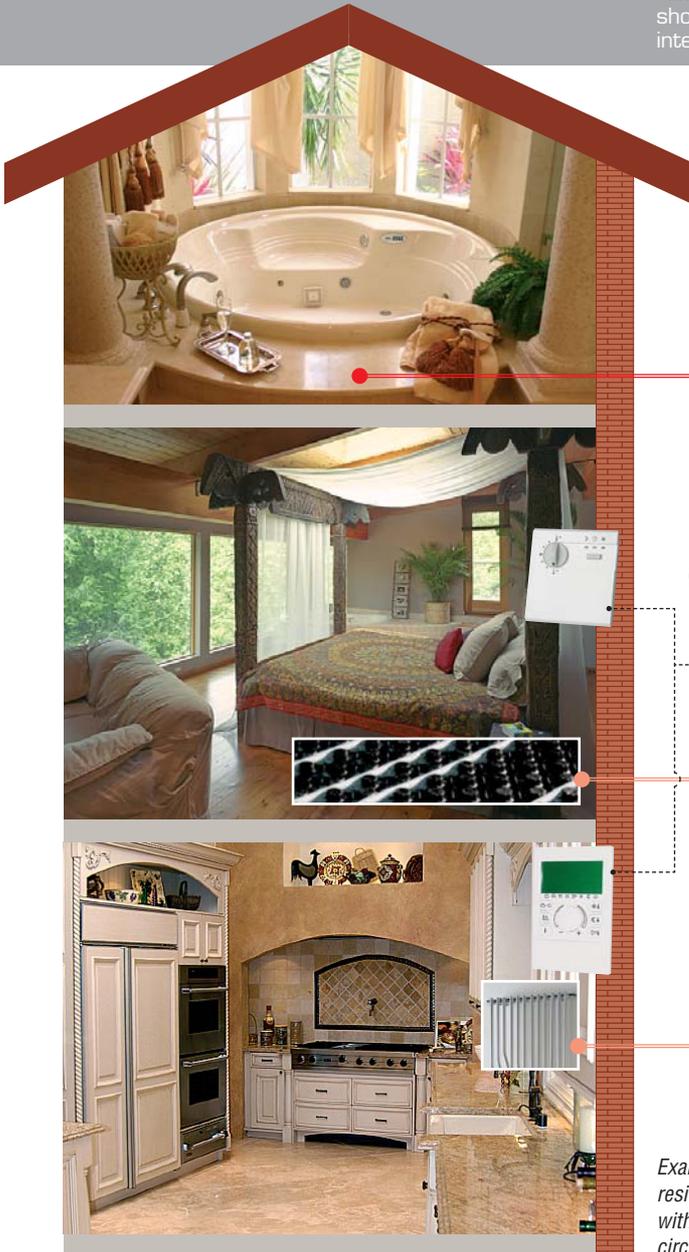
## Weather compensation control

The demand for heating can vary considerably during the day and is dependant on many factors such as changing outside temperatures and other heat sources inside the building, for example; computers, people and machinery. It also can vary at different times throughout the year, which means that sometimes the required heat input may only be a few kW to maintain the desired room temperatures.

The MCBA control is able to offer a solution to these variations of heat demand. With the simple and cost effective addition of an outside sensor it is able to monitor the varying temperatures and control the boiler far in advance of normal boiler temperature measurement.

Further enhancements may be made by using internal room sensors or thermostats which would control a single heating circuit or be extended to encompass multiple circuits, all via individual pumps or modulating motorised valves. All these options can be programmed by using either an optional integrated control panel on the HeatMaster TC, and/or externally mounted units. The choice is up to you, and ACV would be happy to advise on the right system for your application.

This weather-dependent control is more commonly known as compensation control and will further enhance the fuel savings already made by the HeatMaster TC, as well as provide a more controllable and comfortable temperature inside the building.



Example of a residential application with two heating circuits (HM 35 TC)

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