2019

HOT WATER FROM HAMWORTHY

WATER HEATERS | CALORIFIERS | STORAGE TANKS
SOLAR THERMAL | HEAT METERS | COMMISSIONING
SERVICE | SPARES | TRAINING | TECHNICAL SUPPORT

Hamworthy

Heating *at work.*

Water heaters & solar thermal

We have a large and varied range of commercial water heaters.

Whether you prefer to separate your commercial heating and hot water systems or couple a calorifier with a heating boiler, we have the solution.

With over 40 different models including direct fired water heaters, calorifiers and storage tanks you can choose a water heater that accurately matches your building's requirements.

Our solar thermal hot water range also gives you a flexible, well proven and cost effective way to integrate renewable energy solutions into your hot water projects.

Product selector

With more than **40** products you'll be spoilt for choice.

Use the chart below to select the hot water product that best matches your hot water demand.

		Direct fired water heater			Indirect calorifier		Storage tank	Solar thermal
Condensing / Non-condensing		Condensing	Condensing	Condensing	Twin coil	Coil	Storage	
Continuous output @44°C ΔT (l/h)	Min	600	820	228	501	390	501	
	Max	2400	1200	614	1635	1055	1635	
Storage capacity (l)	Min	227	388	162	157	298	301	
	Max	504	388	384	972	958	981	
Recovery time @44°C ΔT (min)	Min	13	11	17	17	36	N/A	
	Max	37	16	41	36	46	N/A	
No of models		7	2	9	7	10	4	
Output power kW (max)	Min	30.5	41.9	11.7	29.1	20	N/A	
	Max	119.4	59.3	31.3	96.8	54	N/A	
Unvented (UV) Open Vented (OV)		UV OV	UV OV	UV OV	UV OV	UV OV	UV OV	
Flue options	B23	•	•	•				
	C13	•	•	•				
	C33	•	•	•				
	C53	•	•	•				
Fuel	Nat gas	•	•	•				
	LPG	•	•	•				
	Solar	#	•	#				•
Vessel material		Glass lined	Glass lined	Glass lined	Glass lined	Stainless steel	Glass lined	

Dorchester DR-FC Evo

pg **8**

Dorchester DR-TC

pg **12**

Dorchester DR-CC

pg **14**

Powerstock calorifier

pg **16**

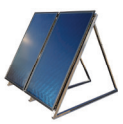
Halstock calorifier

pg **18**

Powerstock storage tank

pg **20**

Trigon



pg **22**

Fed by preheat using calorifier, refer to chart on page 7 to see solar system options.

Introducing our **hot water range**

We've got one of the largest range of natural gas, LPG, and solar powered products for the safe production of domestic hot water in commercial applications. These include direct fired water heaters, calorifiers and storage tanks, and solar hot water solutions.

This guide gives you an overview of Hamworthy products for DHW (Domestic Hot Water) generation, covering single units with maximum power ranging from 31.3kW to 119.4kW, and maximum continuous output ranging from 228 litres/hour to 2,400 litres/hour.

With such a wide choice of products available from Hamworthy, and with more than one potential solution to your DHW application, we always recommend that you discuss your requirements with our sales engineers or our dedicated hot water expert.

Years of experience in commercial DHW systems and in-depth knowledge of Hamworthy products, means they will be able to help you focus in on solutions that best fit your requirements.

Dorchester direct fired water heaters

All Dorchester ranges are built to last using high quality steel tanks and heat exchangers. For the safe production of potable hot water, a high quality vitreous enamel glaze is baked on to all tank interior and heat exchanger surfaces, creating a hygienic surface finish which gives excellent protection against corrosion.

Additional corrosion protection is provided by either electrical anode protection or sacrificial magnesium anode systems, depending on the range and options selected. All units are supplied fully insulated with CFC-free foam to minimise standing losses.

There are 18 models across 3 different ranges in the Dorchester product group, including condensing and solar options.

Powerstock calorifiers and storage tanks

The Hamworthy range of Powerstock calorifiers offers a flexible approach to indirect heating and storage of hot water, using a choice of energy sources. High efficiency gas fired boilers are commonly used with calorifiers as the primary energy source, but with the trend towards incorporating renewable energy into DHW systems, alternative technologies can also be used.

Powerstock calorifiers and storage tanks are all approved by the Water Regulations Advisory Service (WRAS). Cylinders are constructed from high grade steel with a high quality vitreous enamel lining. The five largest units in the Powerstock calorifier range incorporate a twin coil arrangement where two separate heat sources can be used.

There are 7 models in the Powerstock calorifier range and 4 models of storage tanks.

Halstock calorifiers

The Halstock range of calorifiers provide an alternative to the Powerstock where stainless steel is the preferred choice. Stainless steel cylinders are often chosen for their anode-free corrosion protection, particularly in areas of the country with soft water.

A highly durable, simple and easy to maintain product for efficient generation of domestic hot water. The Halstock range has 5 models available in open vented and unvented options. All models are approved by the Water Regulations Advisory Service (WRAS).

Dorchester DR-TC and Trigon solar thermal hot water

For those considering integrating solar energy into commercial hot water systems, we offer two solar thermal hot water systems, the Trigon solar system and Dorchester DR-TC solar system. The diagram on page 7 shows the two different types of schemes and their key components.

With correct design and installation plus the use of intelligent controls, solar thermal systems can use free solar energy by harnessing the power of the sun to reduce gas bills and help combat climate change.

Direct or indirect

Helping you choose the right hot water product for your application

What is a direct fired unit?

Direct fired units such as our Dorchester water heaters for hot water generation have an integral gas burner that directly heats the water in its storage cylinder. This is done by supplying hot gases through one or more of its heat exchanger fire tubes within the cylinder which then transfers heat to the surrounding water.

When using a direct fired unit, the **heating and hot water systems are separated.**

What is an indirect unit?

Indirect fired units such as calorifiers have no integral burner, but contain one or more heat exchanger coils that are filled with hot liquids (water or solar fluid) that have already been heated 'indirectly' by one or more external heat source, such as a boiler or solar collectors.

When using an indirect fired unit the **heating and hot water systems are often integrated.**

Separation or integration

Historically, indirect fired systems had a dedicated hot water boiler used solely for heating a calorifier. But with the high efficiencies of today's boilers the same boiler can now be used for both the heating circuit and the DHW system.

However, when space heating is not required, for example in the summer, the boiler has to operate to provide heat for the hot water system. This can result in wastage of energy if the boiler overfires. This is where the choice of boiler is crucial to be able match the heating load, hot water load and both combined.

Direct fired water heaters are solely dedicated to the job of hot water generation. They provide a faster heat up and response time compared with an indirect system. An indirect system is in fact 'heating water to heat water' and this increases the chance of heat losses in the boiler, and associated pipework between the boiler and calorifier.

Which product should I choose?

This is down to personal preference and how the application is being used. There are pros and cons to using each method and we would always recommend you tailor the system to your project. Some sites even choose a mix of the two methods.

The choice is yours, but we are happy to help and advise you which type of system would be most suited to your building. We also provide support in sizing the hot water to ensure you don't run out or oversize resulting in wasted energy.

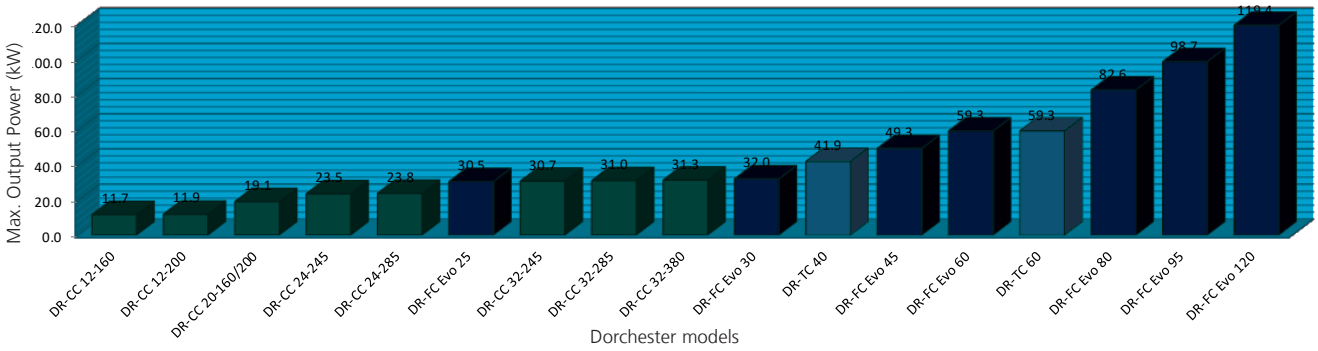
Contact your local sales manager for help with sizing your next hot water project. You'll find their details on the back cover of this guide.

Dorchester water heaters

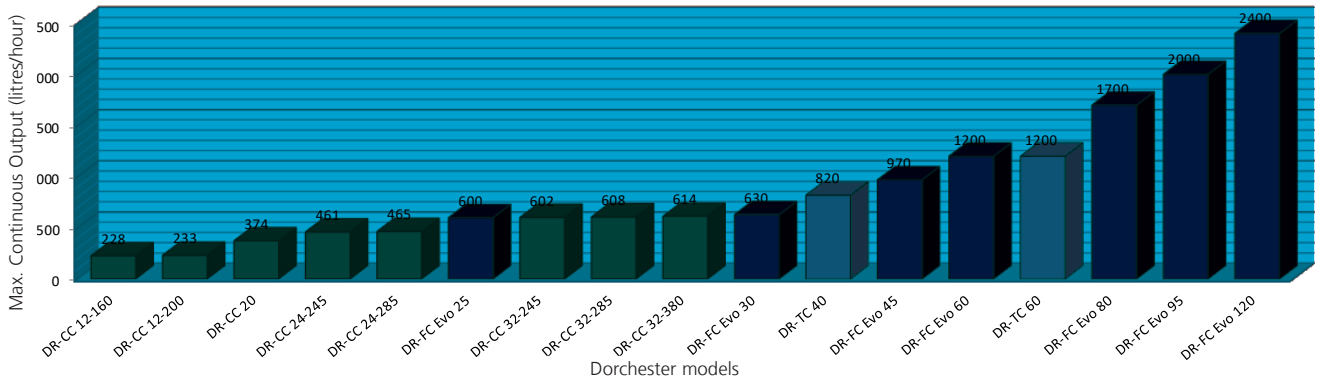
The following graphs provide a quick reference guide to compare Dorchester water heaters; maximum output power (kW), maximum continuous output (l/h), recovery time (mins) and maximum storage volume (l).

Key to graphs:
- Dorchester DR-TC
- Dorchester DR-FC Evo
- Dorchester DR-CC

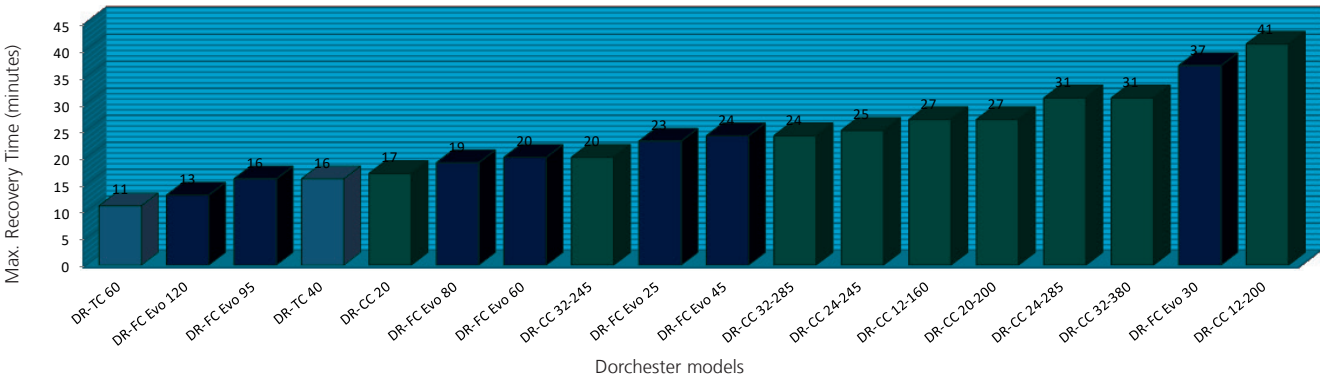
Graph 1. Dorchester water heaters in order of increasing maximum output power (kW)



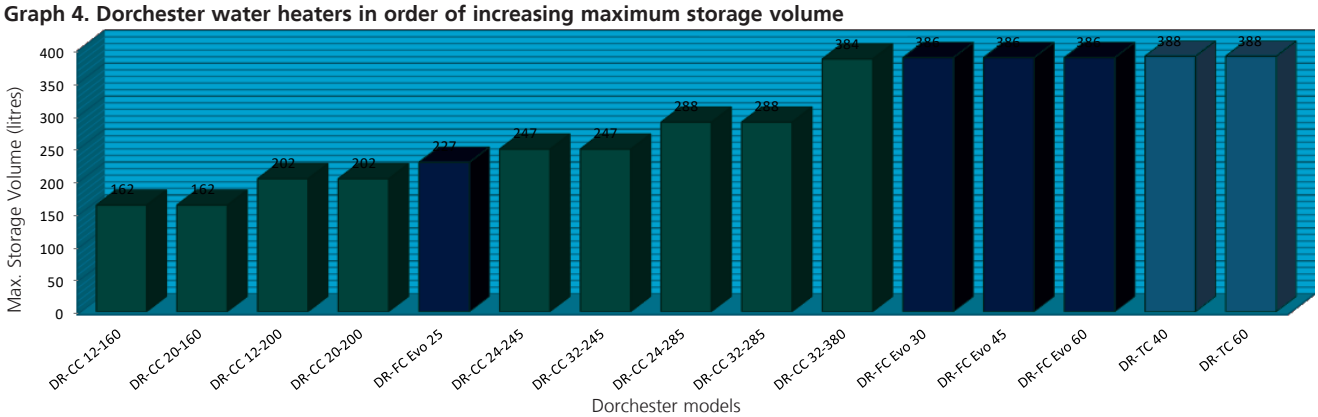
Graph 2. Dorchester water heaters in order of increasing maximum continuous outputs (litres/hour)



Graph 3. Dorchester water heaters in order of increasing recovery time (minutes)

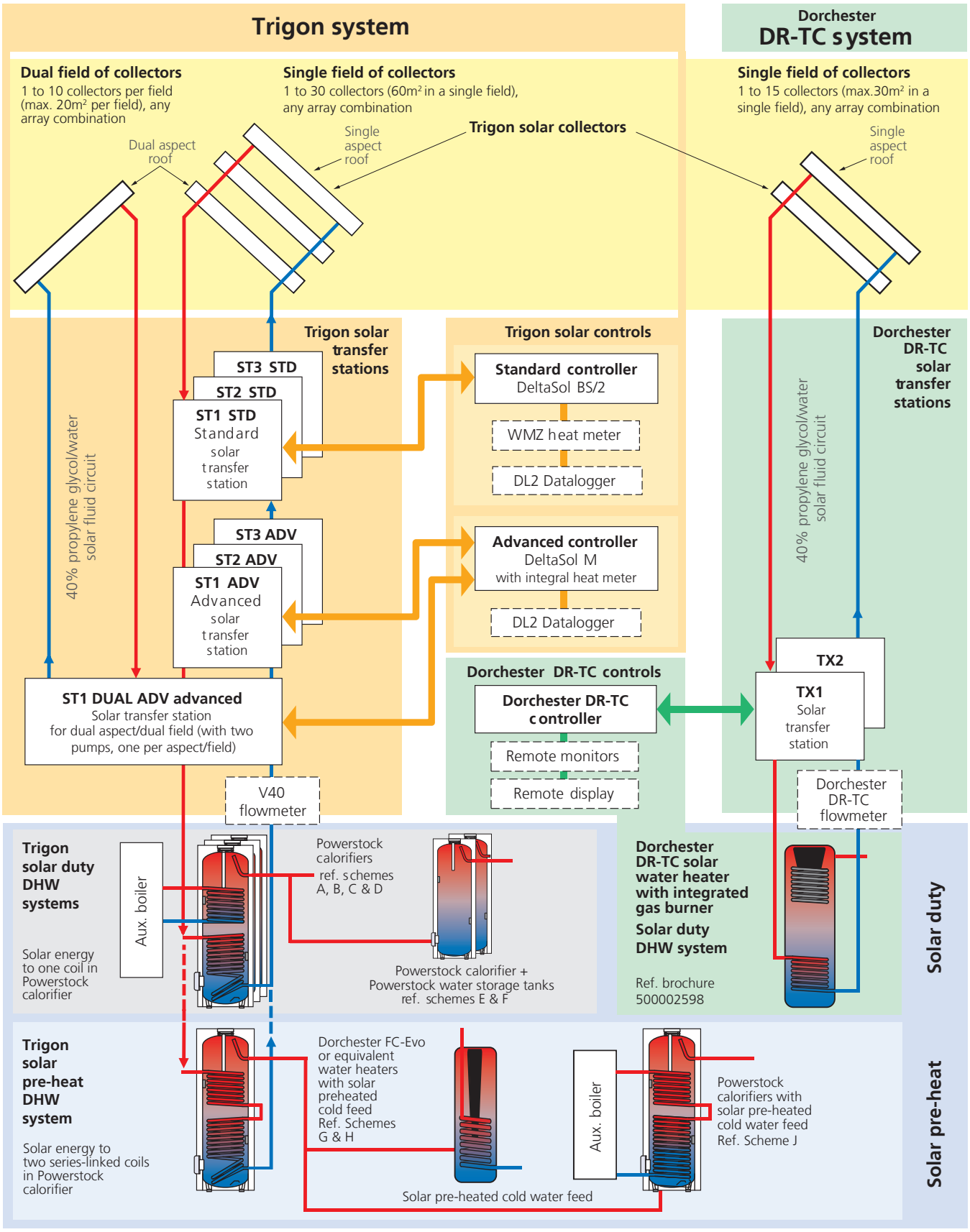


Graph 4. Dorchester water heaters in order of increasing maximum storage volume



Trigon Solar & Dorchester DR-TC

Solar systems block diagram



Refer to pages 22-24 for Trigon and pages 12-13 for Dorchester DR-TC.

CONTINUOUS OUTPUTS

7 MODELS

600-2400 LITRES/HOUR

Dorchester DR-FC Evo condensing water heater

up to 98% Gross Seasonal Efficiency | Nat Gas LPG | 2 Yr Warranty | ErP Part L Compliant | BIM Objects

Fully automatic, condensing direct fired water heater for domestic hot water.

Featuring modulating burners and condensing operation, the Dorchester DR-FC Evo provides a high efficiency domestic hot water solution which can be sized to suit many applications.

IMPROVED SCALE TOLERANCE

This condensing water heater has a down firing pre-mix modulating burner that reduces the risk of scale build up impacting on heat transfer.

Key benefits:

- Down firing burner
- Multiple temperature settings to enhance condensing performance
- Exceeds Part L minimum requirements
- Electrical anode for corrosion protection
- Whisper quiet <45 dB(A)
- Low NO_X (Class 5) emissions
- Up to 98% seasonal efficiency
- Inspection & cleanout door for easy maintenance
- 7 day programmable timeclock

ANODE PROTECTION

All models are fitted with electric anodic corrosion protection as standard. This ensures excellent protection for corrosion. It is also effective with water supplies with conductivity as low as 125 micro-siemens.

The non-sacrificial anodes, require no maintenance or replacement, but a permanent power supply must be maintained.

Options:

- Natural gas or LPG
- Unvented supply kit
- Horizontal or vertical flue terminal kit
- Top-to-bottom pump recirculation kit
- Remote monitoring unit

INTELLIGENT CONTROLS

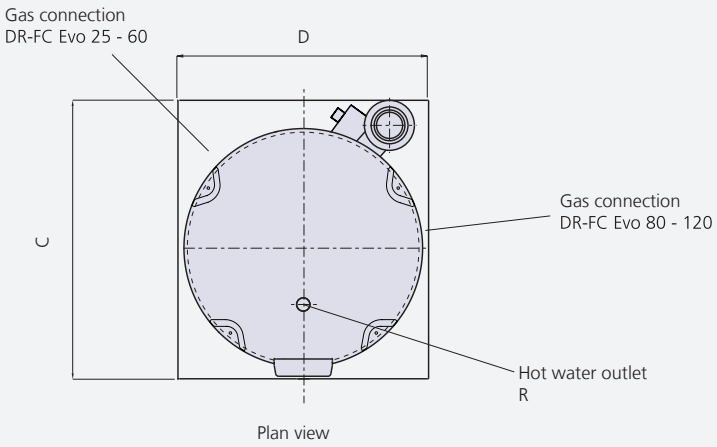
Controller features include:

- 7-day timer control mode
- Hysteresis control
- Extra period mode (override weekly program)
- Continuous ON or OFF modes
- Frost protection function
- Anti-legionella function
- Programmable external pump control
- Data logging

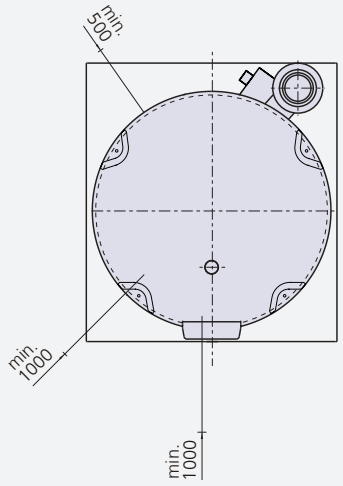
DIMENSIONS

Note: All dimensions in mm unless otherwise stated.

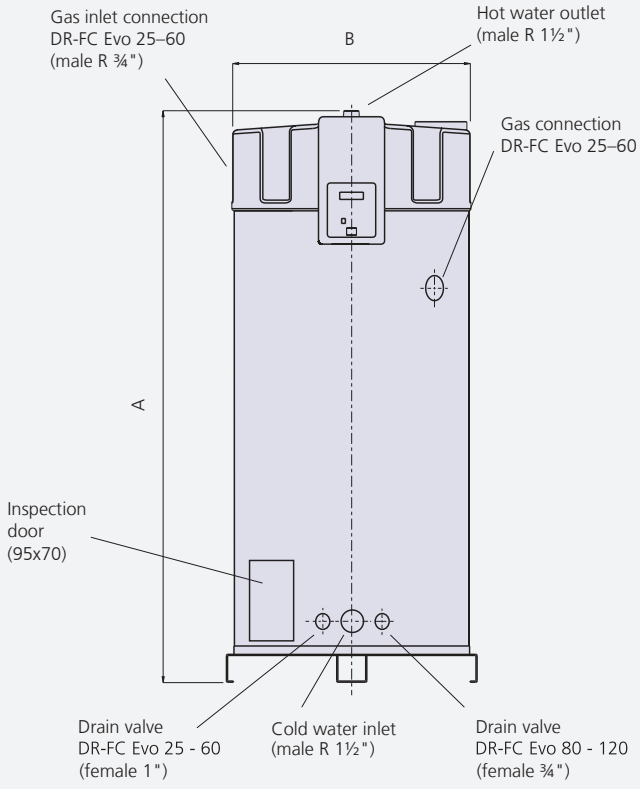
Dimension	Reference	DR-FC Evo 25	DR-FC Evo 30	DR-FC Evo 45	DR-FC Evo 60	DR-FC Evo 80	DR-FC Evo 95	DR-FC Evo 120
Height	A	1485	2015	2015	2015	2060	2060	2060
Diameter	B	705	705	705	705	850	850	850
Depth	C	925	925	925	925	1000	1000	1000
Width	D	850	850	850	850	900	900	900



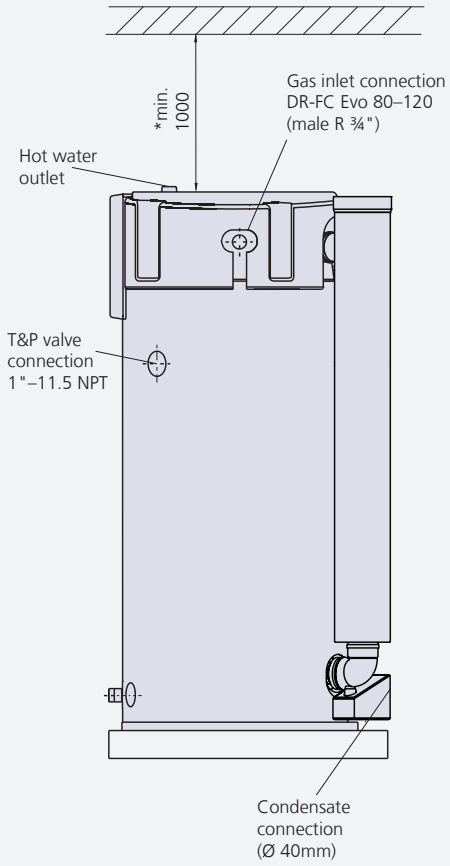
Plan view



Plan view of clearances



Front view



Side view

Note: *Recommended 1000mm top clearance is required for removal of anodes.

7 MODELS

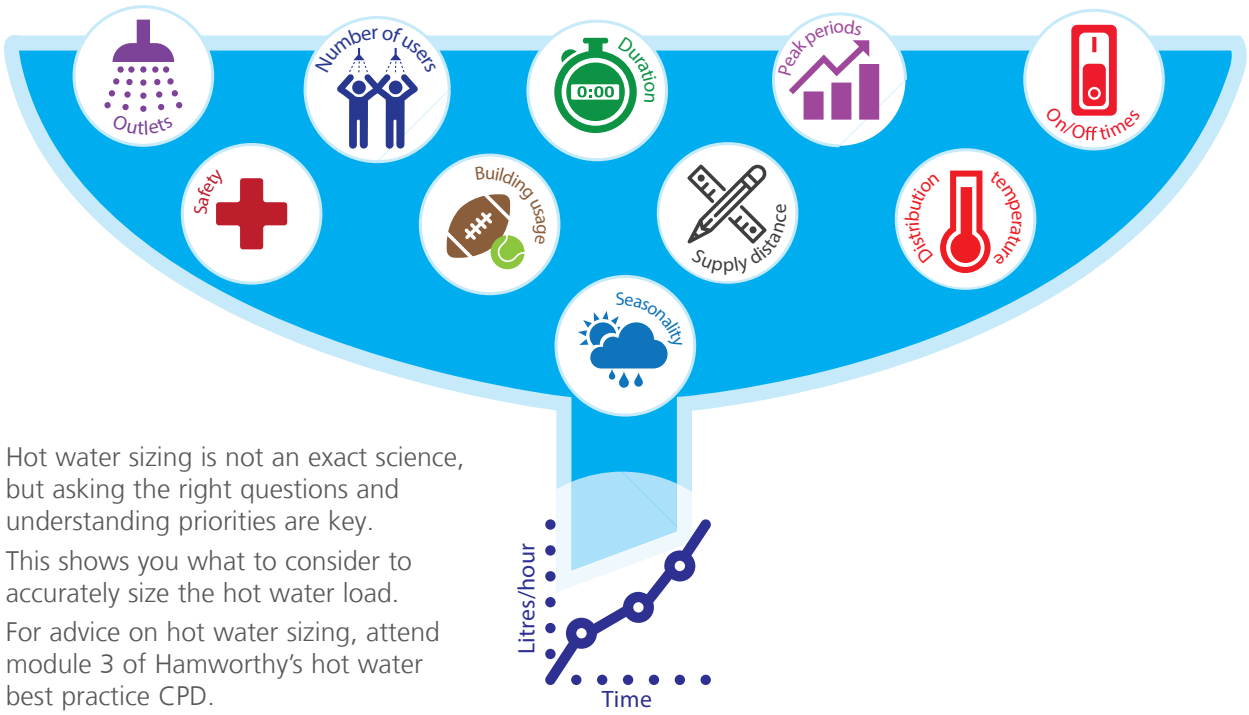
CONTINUOUS OUTPUTS
600-2400 LITRES/HOUR

Dorchester DR-FC Evo condensing water heater

Technical data

	Model	Unit	DR-FC Evo 25	DR-FC Evo 30	DR-FC Evo 45	DR-FC Evo 60	DR-FC Evo 80	DR-FC Evo 95	DR-FC Evo 120
Energy	Building regulations thermal efficiency gross	%	96	98	96	95	97	95	95
	ErP efficiency rating		A	A	A	A	N/A	N/A	N/A
	Input, gross maximum (output - maximum)	kW	31.6 (30.5)	32.6 (32.0)	51.2 (49.3)	61.2 (59.3)	85.0 (82.6)	103.4 (98.7)	126.3 (119.4)
	Heating-up time, ΔT = 44°C	min.	23	37	24	20	19	16	13
	Heating-up time, ΔT = 50°C	min.	26	42	27	23	21	18	15
	Heating-up time, ΔT = 55°C	min.	29	46	30	25	23	20	16
Water	Continuous output with 44°C ΔT (1st hour output)	l/h (l)	600 (730)	630 (870)	970 (1300)	1200 (1500)	1700 (1900)	2000 (2200)	2400 (2600)
	Continuous output with 50°C ΔT (1st hour output)	l/h (l)	530 (630)	560 (730)	850 (1100)	1100 (1300)	1500 (1700)	1700 (1900)	2100 (2300)
	Continuous output with 55°C ΔT (1st hour output)	l/h (l)	480 (560)	510 (640)	780 (930)	930 (1100)	1300 (1500)	1600 (1700)	1900 (2000)
	Storage capacity	litres	227	386	386	386	504	504	504
	Maximum operating water pressure - open vented (unvented)	bar	8 (5.3)	8 (5.3)	8 (5.3)	8 (5.3)	8 (5.3)	8 (5.3)	8 (5.3)
	Expansion relief valve setting - unvented kit	bar	6	6	6	6	6	6	6
Gas	Gas inlet pressure - minimum/nominal/maximum	mbar	17.5 min. / 20.0 nom. / 25.0 max.						
	Gas flow rate - maximum@ 1013.25 mbar and 15°C	m^3/h	3.1	3.2	5.0	6.0	8.3	10.1	12.3
Flue	Approx. flue gas volume @ 15°C, 9.8% CO_2, N.T.P	m^3/h	37.3	38.5	60.2	72.3	103.1	125.5	152.8
	Flue gas temperature - maximum	°C	45	50	60	65	50	55	60
	NO_x emission (0% excess oxygen, dry air free) European Class 5	mg/kWh	24	32	36	37	34	36	36
	Pressure at flue outlet (B23) with no pressure at air inlet	Pa	52	62	133	173	88	126	180
Misc.	Nominal supply voltage		230V 1Ph 50Hz						
	Weight - empty (filled with water)	kg	196 (423)	239 (625)	239 (625)	239 (625)	405 (909)	405 (909)	405 (909)
	Approx. shipping weight	kg	215	260	260	260	426	426	426
	Noise emissions @2m from flue terminal	Max. dB (A)	<45	<45	<45	<45	<45	<45	<45

Hot water sizing considerations



Hot water sizing is not an exact science, but asking the right questions and understanding priorities are key.

This shows you what to consider to accurately size the hot water load.

For advice on hot water sizing, attend module 3 of Hamworthy's hot water best practice CPD.
hamworthy-heating.com/cpd

Case study

Abbey Hill Academy, Stockton-on-Tees

Abbey Hill Academy

Products

- Dorchester DR-FC Evo water heaters
- Purewell VariHeat boilers

Sector

- Education

Building

- Special needs school refurbishment

Application

- Space heating
- Direct fired domestic hot water

Abbey Hill Academy is a school for children with learning difficulties based in Stockton-on-Tees. The facility consists of three buildings providing a comfortable learning atmosphere for around 300 students aged 11 to 19 years.

Two old cast iron sectional non-condensing boilers were supplying heating and hot water to the main Stephenson Building consisting of 18 classrooms for around 160 students. Old atmospheric water heaters installed in the same building delivered hot water to showers, sinks, basins and the main kitchen. The Academy was looking for a cost-effective upgrade that was energy efficient, would reduce costs, could be fitted to the existing system and came with a complete package of supply to commission.

Two Dorchester DR-FC Evo direct fired condensing water heaters were chosen to replace the old water tanks, delivering a total output of 1,192 litres per hour, whilst two Purewell VariHeat cast iron condensing boiler were chosen for the heating system.

Philip McHale, Premises & Facilities Manager at Abbey Hill Academy as part of the Horizons Specialist Academy Trust said: *"I checked a lot of boiler manufacturers and found Hamworthy's website to be useful with the offer of a free site survey. We were pleased that we got to meet both Steve Johnson, area sales manager and Stuart Turner, the national sales manager. Both had a genuine interest in our project.*

We updated the old tank fed system that delivered poor hot water pressure to mains fed. There has been a vast improvement in hot water pressure and it has also improved our Legionella management."

The water heaters have an anti-legionella safety function, which means water will be heated for a period at a high temperature (e.g. 65°C for one hour) to prevent the risk of legionella bacteria forming in the vessel. Additionally, the recirculation pump can be set to run to ensure the whole system is purged. Built in controls allow this task to be performed on a regular basis, ensuring water stays legionella-free and safe.

Abbey Hill Academy won a bid for the Condition Improvement Fund (CIF) which is offered by the Education Funding Agency (EFA) to fund projects to keep buildings safe and in good working order. Previous CIF rounds have been heavily oversubscribed which is why applicants need to meet the bid criteria and demonstrate the urgency of projects to secure the fund.

Two DR-FC Evo water heaters installed at Abbey Hill Academy.

Dorchester DR-TC solar water heater

2 MODELS

820-1200 CONTINUOUS OUTPUTS LITRES/HOUR

up to 98% Gross Seasonal Efficiency

Nat Gas Solar LPG

2 Yr Warranty

ErP Part L Compliant

Hybrid solar water heater with integrated direct fired condensing gas burner for domestic hot water.

The hybrid solution, with integrated intelligent controls, results in tangible saving in fuel usage, reduced running costs, lower emissions, as well as offering space saving advantages.

Key benefits:

- Space-saving commercial DHW solution
- Solar-prioritised to save fuel
- Integrated intelligent controls
- Solar pump modulation maximises solar contribution
- Down firing burner
- Low NO_X (Class 5) emissions
- Whisper quiet
- Inspection & clean out door for easy maintenance
- Electrical anode for corrosion protection

PRIORITISES SOLAR ENERGY OVER GAS

Connecting the Dorchester DR-TC to a solar system can provide up to 30kW of solar input, providing significant energy saving opportunities, reduced gas bills and a lower carbon footprint.

Options:

- Two solar transfer stations
- Remote monitor unit
- Remote display unit
- Top-to-bottom recirculation kit
- Unvented supply kit
- Room sealed or open vented flues
- Heat metering equipment
- Dummy sensor kit

TRIGON SOLAR THERMAL SYSTEM

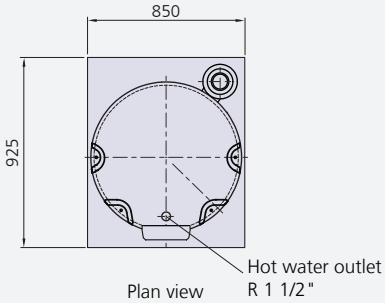
The Hamworthy Trigon collector field connect via the solar transfer station to the solar coil in the Dorchester DR-TC, forming a sealed solar circuit and uses Tyfocor L solar fluid as the recommended heat transfer medium. See page 26 for more on the Hamworthy Trigon system.

Technical data

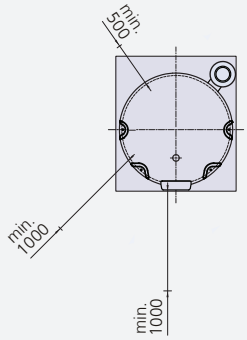
	Model	Unit	DR-TC 40	DR-TC 60
Energy	Building regulations thermal efficiency gross	%	96	96
	ErP efficiency rating		A	A
	Input, gross maximum (output - maximum)	kW	43.5 (41.9)	62.1 (59.3)
	Heating-up time, ΔT = 44°C	min.	16	11
	Heating-up time, ΔT = 50°C	min.	18	13
	Heating-up time, ΔT = 55°C	min.	20	14
Water	Continuous output with 44°C ΔT (1st hour output)	l/h (l)	820 (880)	1200 (1200)
	Continuous output with 50°C ΔT (1st hour output)	l/h (l)	730 (750)	1100 (1100)
	Continuous output with 55°C ΔT (1st hour output)	l/h (l)	660 (670)	930 (920)
	Storage capacity	litres	388	388
	Maximum operating water pressure - unvented	bar	7	7
	Expansion relief valve setting - unvented kit	bar	6	6
Gas	Gas inlet pressure - minimum/nominal/maximum	mbar	17.5 min. / 20.0 nom. / 25.0 max.	
	Gas flow rate - maximum@ 1013.25 mbar and 15°C	m^3/h	4.2	6.0
Flue	Approx. flue gas volume @ 15°C, 9.8% CO_2, N.T.P	m^3/h	57.1	81.4
	Flue gas temperature - maximum	°C	50	60
	NO_x emission (0% excess oxygen, dry air free) European Class 5	mg/kWh	52	52
	Pressure at flue outlet (minimum)	Pa	94	181
Solar	Recommended solar fluid		Propylene glycol e.g. Tyfocor L (diluted 40% Tyfocor / 60% water)	
	Maximum pressure of solar fluid circuit	bar	6	6
Misc.	Nominal supply voltage		230V 1Ph 50Hz	
	Weight - empty (filled with water)	kg	245 (633)	245 (633)
	Approx. shipping weight	kg	245	245
	Noise emissions @2m from flue terminal	Max. dB (A)	<45	<45

DIMENSIONS

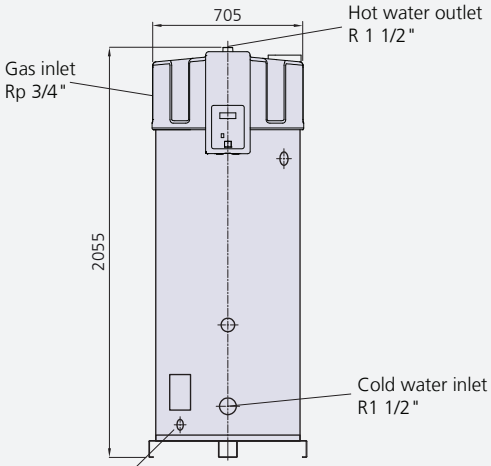
Note: All dimensions in mm unless otherwise stated.



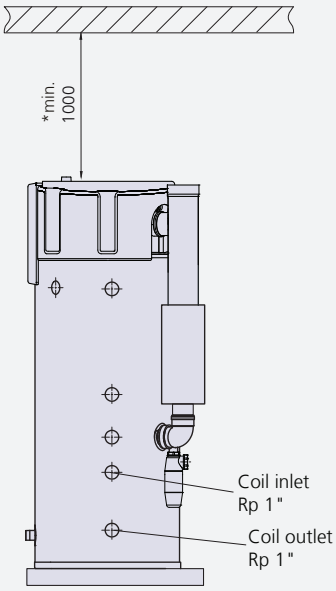
Plan view



Plan view of clearances



Front view



Side view

Note: *Recommended 1000mm top clearance is required for removal of anodes.

Dorchester DR-CC condensing water heater

CONTINUOUS OUTPUTS

9 MODELS

228-614 LITRES/HOUR

up to 98% Gross Seasonal Efficiency | Nat Gas LPG | 2 Yr Warranty | ErP Part L Compliant | BIM Objects

Compact condensing direct fired water heater for domestic hot water.

A compact, condensing unit with integrated simple to use controls. Its size and flexible flue options make it suited to small to medium sized commercial applications.

EVEN HEAT DISTRIBUTION

A 'cold zone' heat exchanger design with the coil located in the middle of the unit, gives a greater surface area for more transfer of heat as well as even heat distribution inside the tank, and reduces the likelihood of stratification.

Key benefits:

- Fits through a standard doorway
- Heat exchanger design and burner location distributes heat evenly
- Electrical anode for corrosion protection
- Easy access for service and maintenance
- Low NOx
- Minimal clearances
- Flexible flue options

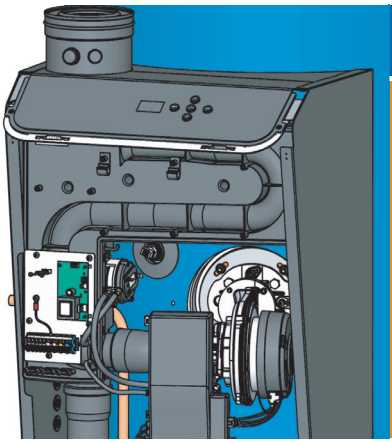
Options:

- Natural gas or LPG
- Unvented supply kit
- Horizontal or vertical flue terminal kit

ANODE PROTECTION

All models are fitted with electric anodic corrosion protection as standard. This ensures excellent protection for corrosion. It is also effective with water supplies with conductivity as low as 125 micro-siemens.

The non-sacrificial anodes, require no maintenance or replacement, but a permanent power supply must be maintained.



EASY ACCESS FOR SERVICE & MAINTENANCE

An easily accessible clean out door as well as all serviceable parts being located at the front of the unit make the DR-CC easy to service and maintain. This allows for minimal side and no rear clearances so the unit can be easily installed in tight plantrooms.

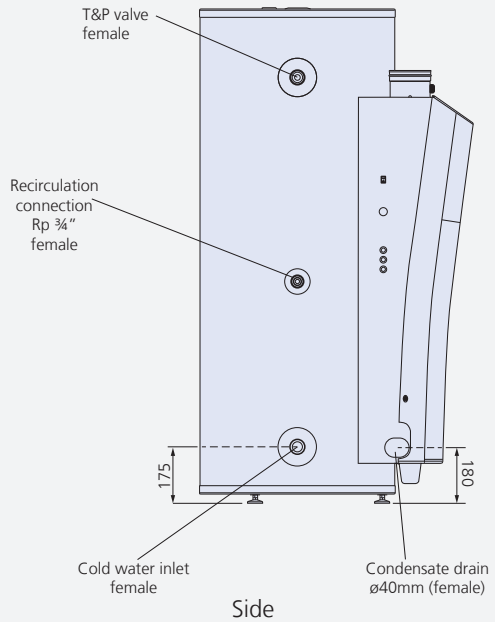
Technical data

	Dorchester DR-CC model	Units	DR-CC 12-160	DR-CC 12-200	DR-CC 20-160	DR-CC 20-200	DR-CC 24-245	DR-CC 24-285	DR-CC 32-245	DR-CC 32-285	DR-CC 32-380
Energy	Building regulations thermal efficiency gross	%	96	98	95	95	96	97	95	96	97
	ErP efficiency rating	-	A	A	A	A	A	A	A	A	A
	Input, gross – maximum	kW	12.1	12.1	20	20	24.4	24.4	32.2	32.2	32.2
	Heating-up time, ΔT = 44°C	min.	27	41	17	27	25	31	20	24	31
	Heating-up time, ΔT = 50°C	min.	31	47	19	30	29	35	22	27	36
	Heating-up time, ΔT = 56°C	min.	34	52	22	34	32	40	25	31	40
Water	Continuous output with 44°C ΔT	l/h	228	233	374	374	461	465	602	608	614
	Continuous output with 50°C ΔT	l/h	201	205	329	329	406	410	530	535	540
	Continuous output with 56°C ΔT	l/h	180	183	294	294	362	366	473	478	482
	Storage capacity	litres	162	202	162	202	247	288	247	288	384
	Maximum working pressure	bar	8	8	8	8	8	8	8	8	8
Gas	Input, net - maximum	kW	10.9	10.9	18	18	22	22	29	29	29
	Output – maximum	kW	11.7	11.9	19.1	19.1	23.5	23.8	30.7	31	31.3
	Gas inlet pressure – nominal	mbar	20	20	20	20	20	20	20	20	20
	Gas flow rate – maximum @1013.25 mbar and 15°C	m^3/h	1.2	1.2	1.9	1.9	2.3	2.3	3.1	3.1	3.1
Flue	Approximate flue gas volume @15°C, 9.8% CO_2, N.T.P. (Nat. Gas - G20)	m^3/h	14.72	14.72	24.34	24.34	29.76	29.76	39.3	39.3	39.3
	Flue gas temperature – maximum	°C	42	61	42	61	57	65	57	65	65
	NOx emission, dry air free, European Class 6. Maximum (at part load)	mg/kWh	22	22	30	30	33	33	37	37	37
	Pressure at the flue outlet only (B23) with zero pressure at air inlet	Pa	33	33	59	59	108	108	192	192	192
Misc.	Noise level	dB(A)	41	41	52	52	53	53	58	58	58
	Weight when empty	kg	95	106	95	106	120	136	120	136	155
	Approximate shipping weight	kg	114	122	114	122	136	153	136	153	172
	Maximum floor load/ weight filled with water	kg	255	306	255	306	365	429	365	429	551

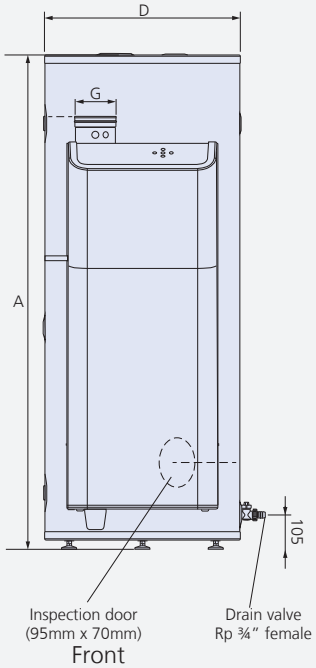
DIMENSIONS

Ref.	Dimension	DR-CC 12-160	DR-CC 12-200	DR-CC 20-160	DR-CC 20-200	DR-CC 24-245	DR-CC 24-285	DR-CC 32-245	DR-CC 32-285	DR-CC 32-380
A	Total height	1270	1545	1270	1545	1545	1745	1545	1745	1745
D	Width	560	560	560	560	610	610	610	610	675
E	Depth	805	805	805	805	855	855	855	855	920

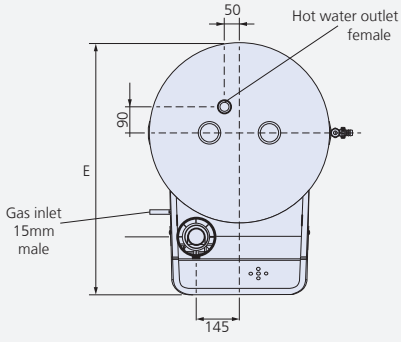
Note: All dimensions in mm unless otherwise stated.



Side



Front



Plan

Clearances

- 1000mm at front
- 500mm at sides
- 1000mm at top
- No rear clearances

CONTINUOUS OUTPUTS

7 MODELS

501-1635 LITRES/HOUR*

Powerstock calorifier

2 Yr Warranty | ErP Part L Compliant | BIM Objects

Glass lined calorifier for indirect fired hot water storage.

Offering a flexible approach to indirect heating and storage, Powerstock calorifiers can be easily coupled to any heating boiler or renewable energy source to provide highly efficient domestic hot water.

Key benefits:

- Twin coils connect to two energy sources
- Safe storage of hot water
- Integration with renewable energy products such as solar
- Magnesium anode corrosion protection for longer life
- Adaptable to match load demand
- Inspection and clean out door for easy maintenance
- WRAS approved

TWIN COILS

All but the two smallest models have twin coil arrangements which can be connected to two heat sources such as a heating boiler and a solar thermal system.

Alternatively the coils can be connected in series to create an extended surface area single coil.

Options:

- Unvented supply kit
- Top-to-bottom pump recirculation kit
- Electrical anode protection
- Electric immersion heater kits with ratings of 4kW or 9kW

FAIRSTEAD COMMUNITY SCHOOL

With over 320 pupils and a heating and hot water system due for an upgrade, Fairstead Community school in Norfolk called on Hamworthy Heating to provide the solution. The school was keen to move to a greener solution and selected 2 Powerstock calorifers attached to 6 Trigon solar collectors, along with an RHI heat meter to provide the domestic hot water for the school. A biomass boiler was chosen to supply the school's heating load.

The consultant leading the project commented: *"the installation was successful and as well as benefiting from lower fuel bills, Norfolk County Council are currently working on the application to receive the Renewable Heat Incentive payment".*

WRAS APPROVED PRODUCT

Technical data

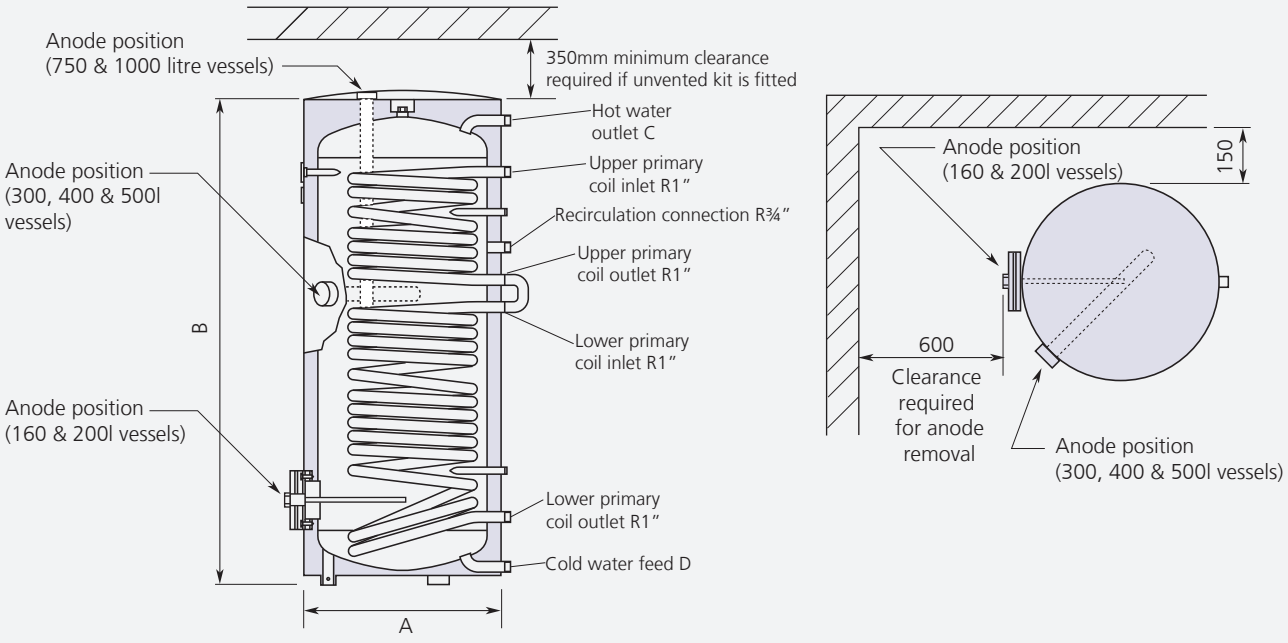
		Units	PS160	PS200	P300	PS400	PS500	PS750	PS1000
General data	Storage capacity	l	157	196	299	382	474	750	972
	ErP efficiency rating		B	C	C	C	C	C	C
	Top coil surface area (volume)	m^2 (l)	N/A	N/A	0/8 (6.6)	1.05 (7.0)	1.3 (8.9)	1.17 (8.2)	1.12 (7.9)
	Bottom coil surface area (volume)	m^2 (l)	0.75 (4.9)	0.95 (6.2)	1.55 (10.4)	1.8 (12.2)	1.9 (12.2)	1.93 (13.5)	2.45 (17.1)
	Maximum operating pressure - primary coil (secondary storage)	bar	10 (10)	10 (10)	10 (10)	10 (10)	10 (10)	10 (10)	10 (10)
	Maximum operating temperature - primary coil (secondary storage)	°C	110 (70)	110 (70)	110 (70)	110 (70)	110 (70)	110 (70)	110 (70)
	Standby losses	kW/24hr	1.44	1.92	2.4	2.9	3.12	3.6	4.8
Bottom coil only in operation	Continuous output - ΔT = 50°C	l/h	501	600	816	976	1109	1062	1281
	Heat input	kW	29.2	35.6	48.4	57.9	65.7	63.0	76.0
	10 min peak output - ΔT = 50°C	l	250	362	448	615	771	1100	1197
	Recovery time	min.	20	20	22	24	26	42	46
Top & bottom coil connected in series	Continuous output - ΔT = 50°C	l/h	N/A	N/A	1032	1285	1549	1432	1635
	Heat input	kW	N/A	N/A	61.2	76.2	91.8	85.0	97.0
	10 min peak output -ΔT = 50°C	l	N/A	N/A	567	889	1077	1319	1483
	Recovery time	min.	N/A	N/A	17	18	18	31	36
	Weight - empty (filled with water)	kg	70 (230)	80 (280)	130 (422)	185 (565)	215 (685)	253 (1003)	312 (1307)

* Continuous outputs in header are @ 44°C ΔT

Note: All dimensions in mm unless otherwise stated.

DIMENSIONS

Dimension	Reference	PS160	PS200	PS300	PS400	PS500	PS750	PS1000
Diameter	A	540	540	600	700	700	950	1050
Height	B	1184	1445	1794	1591	1921	2030	2030
Hot water outlet	C	R¾"	R¾"	R1"	R1"	R1"	R1¼"	R1¼"
Cold water feed	D	R¾"	R¾"	R1"	R1"	R1"	R1¼"	R1¼"



Note: It may be necessary for the pipe feeding the coil to be larger than 1".

CONTINUOUS OUTPUTS

10 MODELS

390-1055 LITRES/HOUR

Halstock calorifier

5 Yr Cylinder Warranty

ErP Part L Compliant

Stainless steel calorifiers for indirect hot water.

Simple and easy to maintain, the highly durable stainless steel Halstock comes with a 5-year cylinder guarantee.

Key benefits:

- 5-year cylinder guarantee
- Corrosion-resistant stainless steel
- High quality finish
- Low heat loss for maximum economy
- No sacrificial anode – low maintenance
- Can be installed wherever convenient
- Fire retardant CFC/HCFC-free insulation
- WRAS approved

NO ANODES REQUIRED

Halstock calorifiers are constructed using high quality duplex stainless steel meaning there is no requirement for additional corrosion protection anodes.

This results in easier maintenance and lower life costs.

Options:

- Open vented or unvented variants
- Immersion heaters

LOW STANDBY LOSSES

Very low standing losses are achieved by a generous layer of CFC polyurethane tank insulation under a protective plastisol cladding.

WRAS APPROVED PRODUCT

Choosing the right hot water product

Read our guide on choosing between direct or indirect hot water products and find out the benefits of each system.

Refer to page 5 or visit www.hamworthy-heating.com/compare-direct-indirect-fired-hot-water

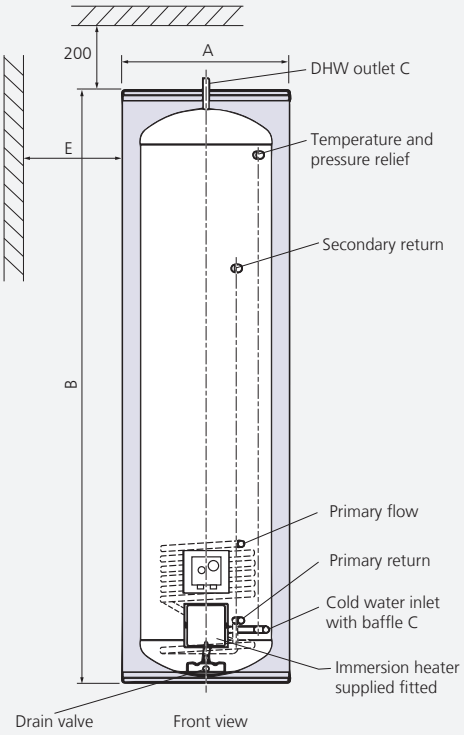
Technical data

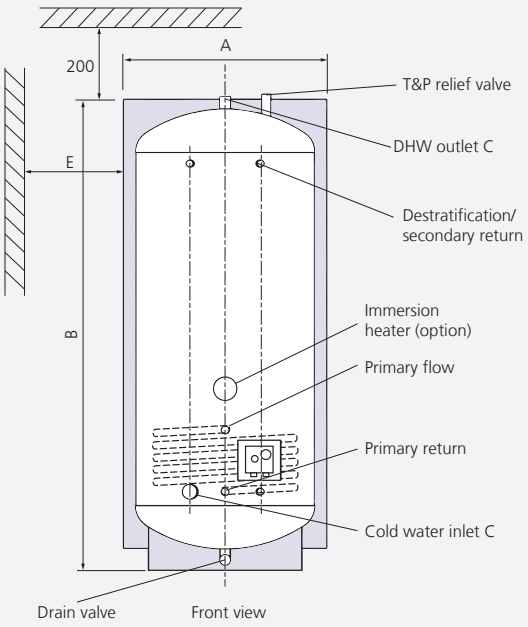
	Model	Unit	HS305UV	HS400/ HS400UV	HS500/ HS500UV	HS810/ HS810UV	HS965/ HS965UV
Energy	Coil output	kW	20	27	27	54	54
	Immersion heater power (phase)	kW (ph)	3 (1ph)	6 (3ph/1ph)	6 (3ph/1ph)	9 (3ph)	12 (3ph)
	ErP efficiency rating		C	D	D	D	D
	Coil max. operating temperature (max. pressure)	°C (bar)	100 (3)	100 (3)	100 (3)	100 (3)	100 (3)
	Heating up time, ΔT = 50°C - coil only	min.	54	52	66	54	60
	Recovery time - coil only	min.	38	36	46	37	44
	Heat up time - immersion only	hour	5.8	3.9	4.9	5.3	4.7
	Recovery time - immersion only	hour	4.1	2.7	3.4	3.7	3.3
	Standby losses @65°C	kW/24hr	2.5	2.9	3.3	4.0	4.3
Water	Capacity - nominal (capacity with coil)	litres	305 (298)	400 (396)	500 (496)	810 (803)	965 (958)
	Continuous output @44°C ΔT	l/h	390	527	527	1055	1055
	Continuous output @50°C ΔT	l/h	344	464	464	929	929
	10 minute peak output, ΔT = 50°C	litres	361	481	582	974	1131
	Tank maximum working pressure	bar	6	6	6	6	6
	Hydraulic pressure test	bar	9	9	9	9	9
Misc.	Expansion vessel size	litres	24	35	35	50	80
	Weight - empty (filled with water)	kg	60 (354)	95 (495)	105 (605)	155 (965)	170 (1135)

DIMENSIONS

Note: All dimensions in mm unless otherwise stated.

Dimensions	Reference	HS305UV	HS400/ HS400UV	HS500/ HS500UV	HS810/ HS810UV	HS965/ HS965UV
Tank diameter	A	570	750	750	1080	1080
Tank height	B	2028	1435	1720	1600	1850
DHW outlet / cold inlet	C	22mm	1" F	1" F	1½" F	1½" F
Coil connections	D	Ø22mm stub	Ø28mm stub	Ø28mm stub	Ø28mm stub	Ø28mm stub
Front clearance	not shown	500	500	500	500	500
Side clearance	E	100	100	100	100	100





STORAGE CAPACITIES

4 MODELS

300-981 LITRES

Powerstock storage tank

2 Yr Warranty | ErP Part L Compliant | BIM Objects

Hot water storage tank.

Easily coupled to any direct or indirect water heater system to supplement storage volumes to suit large demand applications.

INCREASE SYSTEM SECURITY

Locations with substantial and continuous hot water demands can use Powerstock storage tanks to increase the security of their DHW system.

Key benefits:

- Safe storage of hot water
- Can be easily coupled to any direct or indirect fired hot water systems
- Supplements hot water storage volumes to suit large demand applications
- Increases system security
- Magnesium anode corrosion protection for long life
- Inspection & clean out door for easy maintenance
- WRAS approved

Options:

- Unvented supply kit
- Top-to-bottom pump recirculation kit
- Electrical anode protection
- Electric immersion heater kits with ratings of 4kW or 9kW

IMMERSION HEATERS

Optional electrical immersion heaters can be fitted to all Powerstock models to provide an auxiliary heat source.

Available with either single or three phase power supplies, immersion heaters are available with power outputs of either 4 or 9kW.

WRAS APPROVED PRODUCT

Technical data

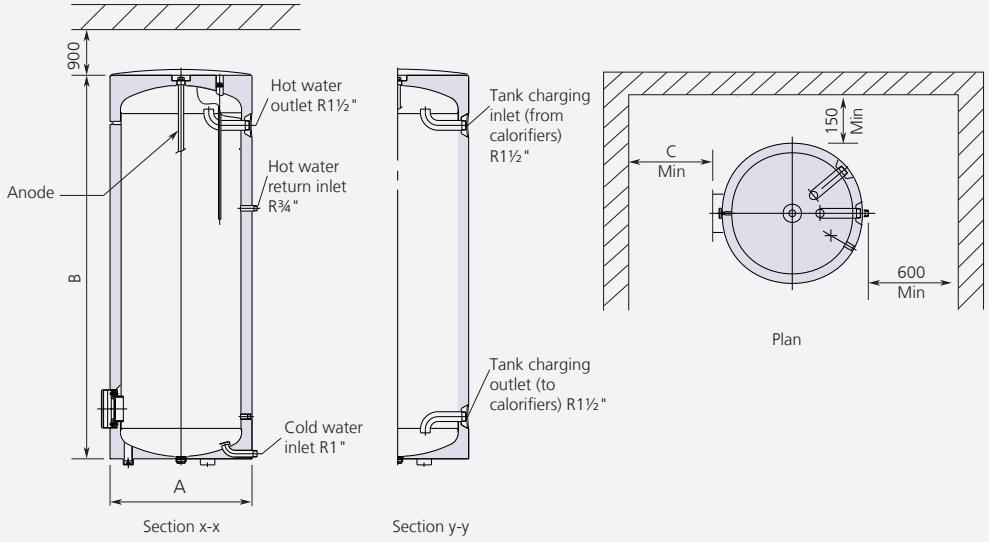
		Units	ST300	ST500	ST750	ST1000
General data	ErP class		C	C	C	C
	Storage capacity	l	300	478	750	981
	Maximum operating pressure	bar	10	10	10	10
	Maximum operating temperature	°C	95	95	95	95
	Weight - empty (filled with water)	kg	87 (387)	111 (613)	217 (967)	283 (1264)
	Standby losses	kW/24hr	2.4	3.12	3.6	4.8

DIMENSIONS

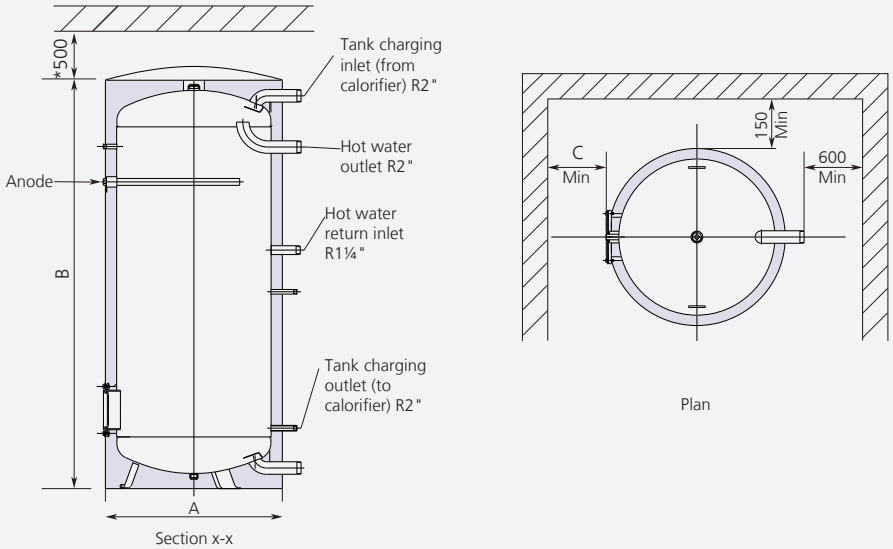
Note: All dimensions in mm unless otherwise stated.

Dimension	Reference	ST300	ST500	ST750	ST1000
Diameter	A	600	700	950	1050
Height	B	1794	1921	2030	2030
Clearance	C	600	600	600	700

ST300 & ST500 dimensions



ST750 & ST1000 dimensions



Trigon solar thermal

2 MODELS

1-30 SOLAR COLLECTORS

Solar

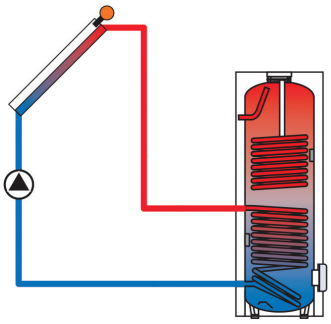
2 Yr Warranty

Solar thermal hot water solutions including solar collectors, solar transfer stations and controllers.

Trigon solar water heating equipment integrates highly efficient solar thermal energy into traditional heating and hot water systems for commercial applications.

Key benefits:

- Designed for commercial solar applications
- Optimised use of solar energy
- Full integration with hot water system
- Pre-programmed schemes for easy set up
- Intelligent power saving controllers
- Proven low-carbon solution
- Suitable for RHI funding - Solar KEYMARK certified



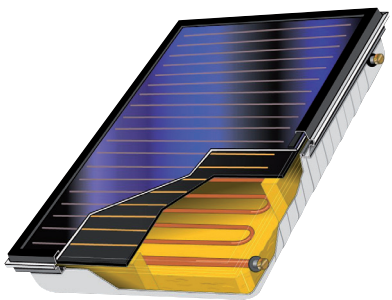
NEED HELP WITH SIZING

We have extensive knowledge and years of experience to assist in the sizing and specification of solar thermal systems.

We use an industry recognised solar sizing programme based on energy simulation to give projections of solar efficiency, carbon reduction & energy saving.

Options:

- Horizontal or vertical collectors
- Single or dual aspect fields
- Modular array mounting kits
- Solar transfer stations with standard or advanced controllers
- Heat metering
- Data loggers
- Powerstock calorifiers or storage tanks
- Dorchester direct fired water heaters



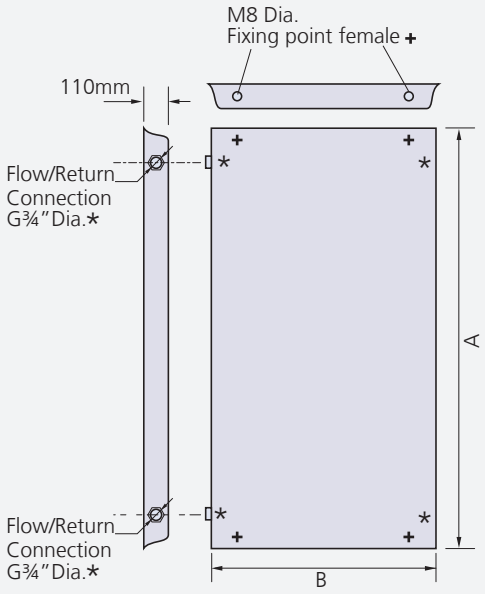
TRIGON SOLAR COLLECTORS

- 5 year guarantee
- Absorber with 'meander' pipe layout for even heat distribution
- Flexible connectors
- Tough, yet lightweight - 3.2mm safely glass
- Rapid assembly of collector arrays
- 60mm Rockwool insulation

Note: All dimensions in mm.

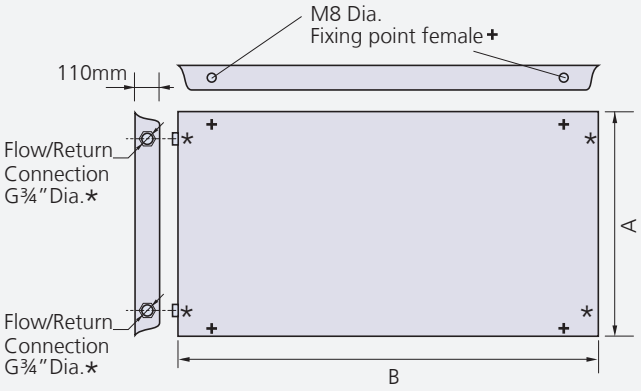
Solar collectors dimensions

Dimension	Reference	Trigon 2.3V	Trigon 2.3H
Height	A	2099	1099
Width	B	1099	2099



Trigon 2.3V Collector

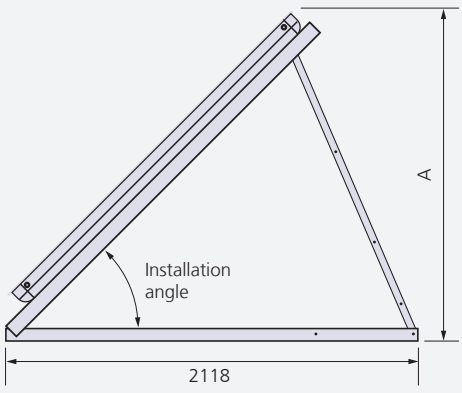
Note: + Indicates fixing point locations.
* Indicates flow/return connection locations.



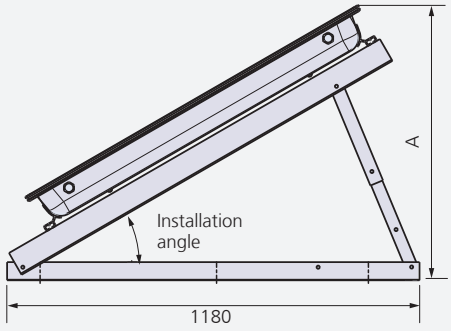
Trigon 2.3H Collector

Installation heights

		Vertical collector angle						Horizontal collector angle		
	Reference	Shallow			Steep			Shallow		
Dimension		20°	30°	45°	50°	60°	65°	20°	30°	45°
Height	A	951	1286	1716	1835	2032	2108	608	785	1008



Vertical A Frame



Horizontal A Frame

Trigon solar thermal

Technical data - Trigon solar collectors

	Trigon	Units	Collector model	
			Trigon 2.3V	Trigon 2.3H
Energy	Collector output @ irradiance 1000W/m² and 20l/hr/m² solar fluid flow rate	kW	1.57	1.57
	Collector yield per annum per m² absorber area @ irradiance 1000W/m² and 20l/hr/m² collector flow	kWh/m²	785	785
	Optical efficiency	%	80.4	79.4
	Heat loss coefficient a_1 * (Thermal transmittance, linear K_1)	W/(m²K)	3.235	3.494
	Heat loss coefficient a_2 * (Thermal transmittance, quadratic (K_1) W/m/°C)	W/(m²K)	0.0117	0.015
	Maximum idle temperature	°C	194	198
	Irradiation angle correction factor IAM-50	%	94.0	95.4
	Specific thermal capacity C*	kJ/(m²K)	5.85	6.3 (8.073)
	Effective thermal capacity	kJ/K	11.75	12.6
	Maximum operating pressure	bar	10	10
Solar	Recommended Max. flow rate per collector	litres/hr	20	20
	Recommended solar fluid		Propylene glycol e.g. Tyfocor L (diluted 40% Tyfocor 60% water)	
	Maximum solar fluid pressure	bar	10	10
	Maximum stagnation temperature at 1000W/m² and 30°C	°C	194	198
	Solar fluid content	litres	1.7	1.9
Collector	Surface area of collector, gross	m²	2.3	2.3
	Aperture surface area	m²	2.0	2.0
	Effective absorber surface area	m²	2.0	2.0
	Tempered solar safety glass, resistant to hail (EN12150, EN12975) thickness	mm	3.2	3.2
	Mechanical strength of the glass cover to climatic loads (wind lift and snow loading)	Pa	3200	3200
	Depth of Rockwool Insulation in base of housing	mm	55	60
	Angle of insulation	degrees	From 15° to 90° depending on fixings	

* Values to EN 12975

Technical data - Solar transfer station

		Units	ST1 (STD or ADV)	ST2 (STD or ADV)	ST3 (STD or ADV)	ST1 DUAL Extension
General data	Maximum pressure	bar	10	6	6	10
	Maximum continuous operating temperature	°C	120	120	120	120
	Maximum short term temperature <15 minutes	°C	160	160	160	160
	Percentage propylene glycol	%	45	45	45	45
	Pressure relief valve	bar	6	6	6	6
	Pressure gauge range	bar	0-6	0-6, with stop valve	0-6, with stop valve	0-6
	Sightglass flowmeter range	l/min.	1 -20	5-40	Not fitted	1 -20
	Non-return valve, opening pressure in head of hot water	mm	200	200	200	200
	Dial thermometer temperature range	°C	0-160	0-160	0-160	0-160
	Circulation pump make/model		Wilo Star-ST 15/7 ECO-3	Wilo Star-ST 25/7 3C	Wilo Start Top-S 30/10	Wilo Star-ST 15/7 ECO-3
	Insulation material/Lambda	W/(m.K)	EPP/λ = 0.041	EPP/λ = 0.041	EPP/λ = 0.041	EPP/λ = 0.041
	Electrical power (3 settings per pump)	W	40/48/54	59/81/110	335/385/390	2 x 40/48/54
	Electrical supply		230V 1Ph 50Hz			

1

MODEL

RHI heat meter

Solar

2 Yr Warranty

Renewable Heat Incentive (RHI) compliant solar-thermal heat meter, essential for non-domestic RHI claims.

Calibrated for Tyfocor L Solar Fluid @ 40% concentration so it is ready for use with Trigon solar and Dorchester DR-TC solutions.

Key benefits:

- Renewable Heat Incentive (RHI) compliant solar-thermal heat meter
- Essential for non-domestic RHI claims
- Calibrated for Tyfocor L Solar Fluid @ 40% concentration
- Ready to use with our Trigon solar solutions and Dorchester DR-TC solar water heater

Technical data - RHI heat meter

Parameter	Units	Value
Flow-nominal Qp	m^3/h	1.5
Pipe pressure minimum	bar	0.8
Operating temperature - permanent maximum	°C	90
Integrator ambient operating temperature (min./max.)	°C	5-55
Material		brass
Maximum flow Qs	m3/h	3
Minimum flow Qi	l/h	15
Low flow threshold	l/h	10
Pressure loss at Qp	bar	0.2
Cable length, flowmeter to calculator	mm	800
Temperature sampling rate - mains	Samples/min.	20
Temperature sampling rate - battery	Samples/min.	2
Display resolution t/ Δt	K	0.1/0.01
Temperature range-admissible	°C	2-200
Nominal supply voltage		230V 1Ph 50Hz
Weight	kg	1.4

Hot water safety

Ensuring the health and safety of end users is critical when designing a hot water system.

Controlling Legionella

All Dorchester models are designed to meet the Health & Safety Commission (HSC) requirement for the safe production of hot water, and in particular the control of Legionellosis.

What is Legionella?

Legionella bacteria are common in natural water sources and therefore low concentrations may be present in many water systems. It is important that hot water services are designed and operated in such a way that these organisms are prevented from multiplying. Water temperature is a significant factor in controlling the risk, with optimum conditions for bacterial growth occurring between 20°C and 45°C.

System cleaning

Regular cleaning of the system will help avoid build-up of sediments, which may harbour or provide nutrients for the bacteria. Water stagnation may encourage the growth of biofilm, which can provide local conditions that may encourage growth of Legionella bacteria.

How to control Legionella?

Legionella can be safely and easily controlled with good design which takes into account the impact of low flow rates, dead legs and stratification, together with a regular planned cycle of pasteurisation. By raising the temperature of the entire hot water system once per day, to 60°C for 1 hour will effectively control Legionella.

The installation of top-to-bottom recirculation kits on water heaters and tanks is also recommended and these should be set to run during programmed anti-Legionella cycles to prevent stratification and ensure the entire tanks contents is heated to the right temperature. Similarly, system recirculation pumps should be operated at the same time to ensure the whole hot water system is made safe.

In addition, outlets such as taps and shower heads should be regularly operated and cleaned, and records of such maintenance and anti-Legionella schemes in use kept by a person designated with that responsibility for the building.

Legionella protection vs scalding & limescale risk

The design of safe hot water presents conflicting need, and a compromise is required to strike a balance between the risk of scalding and the risk of a hot water system running at a temperature that encourages growth of Legionella bacteria. Both risks could be potentially balanced by setting the water heaters thermostat to 54.4°C as Legionella cannot survive for long periods at this temperature.

However, European guidelines* recommend hot water should be stored at 60°C and distributed at a minimum of 50°C, with 55°C achieved within one minute at outlets.

UK guidelines# recommend that the hot water circulating loop should be designed to give a return temperature of 50°C or above.

Limescale

An effect of storing water at 60°C or above is that limescale deposits form more regularly, which can provide an environment in which bacteria could thrive. This implies that the higher the storage temperature, the more frequent the inspection and removal of limescale deposits will need to be, and in any case must be carried out as an essential part of the routine maintenance of a water heater as part of its Legionella prevention regime.

Scale should also be regularly removed for other reasons; 1mm of scale build-up can cause up to 7% drop in efficiency in water heaters, and hot spots may form on heat exchanger surfaces which could cause the heat exchanger to fail.

Thermostatic mixing valves

Another effect of storing water at 60°C or above is that such strategies require use of thermostatic mixing valves (TMVs) to guard against any risk of scalding by users.

For commercial and healthcare applications these should be TMV2 or TMV3 WRAS approved valve depending on the application. These are fitted prior to hot water outlets to blend cold water automatically with the hot water to reduce the temperatures to safe levels at the point of use.

Temperatures

The specific hot water outlet temperatures vary depending on the purpose of the hot water and the category of user, with lower temperatures for those considered in 'at risk' groups. Building Regulations (Part G) recommend the maximum temperature cannot exceed 48°C (for baths only), whereas in NHS institutions the maximum temperature should not exceed 41°C for hand washing and showers, 44°C for baths and 46°C for supervised baths.

Local authorities may also refer to the Guideline for Environmental Design in schools which recommends a maximum hot water temperature for school wash basins of 43°C.

Powerstock

Powerstock calorifiers and storage tanks are provided with a control thermostat that may be used to control the primary heat source to achieve the stored water temperature set point. For systems which utilise solar energy, there may be occasions when the desired stored water temperature will be exceeded. It is particularly important for such systems that suitably applied thermostatic mixing valves are fitted to all hot water outlets to reduce the risk of scalding.

* European Guidelines for the Control and Prevention of Travel Associated Legionnaires' Disease.

UK Health & Safety Commission's L8 document - 'Legionnaire's disease. The control of Legionella bacteria in water systems.'

Hot water systems

There are many elements that need to be considered when designing systems, find some of the key ones below.

Maintenance

Installed water heaters and calorifiers will experience a wide variation in operating conditions that occur due to differing patterns of usage and the variable chemical nature of distributed water supplies. It is therefore strongly recommended that water heaters and calorifiers be drained and inspected within 3 months of the initial commissioning.
Once the level of calcium deposition and rate of anode decay are established a suitable maintenance schedule can be implemented. However, as a minimum all water heaters and calorifiers should be serviced annually.
Solar circuits must be inspected annually for correct operation of venting points, safety equipment and to check the quality and pressure of solar fluid. The calibration of optional solar metering systems may need to be checked in line with regulations for claiming renewable heating incentives.

Water treatment

Due to the variable chemical composition of distributed water supplies, it is necessary to identify the properties of the cold water feed to the water heater. In common with all types of water heating equipment, scale will develop with normal use and it is therefore essential that the appropriate steps are taken to ensure reliable and continuous operation.
Contact should be made with the local water provider to determine the quality of the feed water and reference should be made to water treatment specialists for appropriate advice.

Dead legs

Dead legs to water draw off points should be as short as possible and not exceed the lengths laid down in the Water Supply (Water Fitting) Regulations 1999. These regulations state that the maximum length of uninsulated pipes supplying a hot water draw off tap measured along the axis of the pipe from the heater cylinder or tank or from a secondary circuit should be:

Pipe outside diameter/mm	Max. dead leg length/mm
≤12	20
12-22	12
22-28	8
>28	3

Open-vented primary systems - secondary hot water temperature control

Low pressure open vented primary systems are specified as being those where the primary circuit pressures are less than 5 metres head at the top of the boiler and/or less than 2.5 metres head at the mid-point of the calorifier primary coils.
Low pressure open vented systems are classified by their design as those that prevent the primary temperature exceeding 100°C in the event of primary circuit temperature control failure.
In these systems the calorifier temperature controls can be connected to divert the primary flow or stop the primary pump to prevent excessive heating of the calorifier content. In non-low pressure open vented primary systems where the primary circuit pressures are greater than 5 metres head at the top of the boiler and/or 2.5 metres head at the midpoint of the calorifer coil, the primary temperature is deemed as capable of exceeding 100°C due to operating under pressure. In these systems additional temperature control measures are required to prevent the calorifier content exceeding 100°C in the event of primary circuit temperature control failure.

Stratification

Stratification is essentially the layering of hot and cold water within a water heater, with the hottest water naturally rising to the top of the cylinder and coolest water collecting at the bottom of the cylinder. This effect can be both desirable and undesirable, depending on the circumstances and operational requirements on the cylinder at any given time.
From the anti-Legionella perspective, and during an anti-Legionella purge cycle, a top to bottom recirculation system (shown right) is run to take hot water from the top of the cylinder and return it to the cooler base of the water heater, continually mixing the water so that a uniform temperature is maintained throughout. This will prevent a cooler layer of water forming at the bottom of the cylinder that might otherwise not reach the required pasteurisation temperature for the required length of time during an anti-Legionella cycle and so risk a region in which Legionella bacteria could thrive.
Stratification is however a useful effect in that it ensure the hottest water is always available at the draw-off point at the top of the tank. Stratification may be useful in solar circuits, where it may be beneficial to have a cooler lower part of the cylinder where the solar coil is located. This is because the solar circuit only operates when the calculated temperature differential (the measured collector temperature minus the store temperature measured at the solar coil) is at, or greater than, the programmed temperature differential (typically 3 to 5°C). Therefore, the lower the store temperature in the vicinity of the solar coil, the lower the collector temperature can be for the solar circuit still to operate and input solar energy into the store. Which means that even on cold days with little sunlight, the solar system can make an effective contribution to water heating, helping to drive up efficiencies and make savings on fossil fuel usage possible all year round.

Hot water sizing

Hot water sizing is not an exact science, but asking the right questions and understanding the priorities are key.

Hot water sizing

Sizing a hot water system requires an understanding of the peak and continuous hot water flow requirements of the application, which is easier to determine in some applications than in others.

A simple example

A relatively simple example is for an industrial process requiring a specific amount of hot water, in a specified time at a specified temperature. All that is required is the lowest cold water supply temperature and then the heater(s) output can be directly related to the amount of hot water required. If the load is continuous, the heater or heaters must be sized to cope with the full amount. If the load is intermittent, consideration can be given to a smaller heater installed in conjunction with a suitably sized storage tank.

Complex but predictable

A more complex but still predictable application might be a sport and leisure facility where a known number of people will use showers, baths etc. at a known time. This is, in effect, the peak load when a large quantity of hot water may be dumped quickly since all showers may be running continuously. For sizing it is necessary to determine the duration of continuous use, which will depend on the maximum number of players using the showers. Showers can save water, but a shower running continuously for 1 hour can dump 328 litres. Multiplied by 10 or 20 this can represent a large load which is best catered for by storage with a long recovery time. However, due consideration should be given to additional heaters and lower storage on the grounds of standby and cost.

Random demand

With many other commercial and industrial applications the hot water demand can be difficult to predict. A balance may need to be struck between what is the maximum expected demand that the system must satisfy, and for how long it must be sustained at a given temperature. It is clear that if the water heater can cope with the peak demand, the remaining demand will be adequately catered for. However, the heater would not normally be sized on all outlet appliances all running at the same time and at their maximum continuous flow rates for a time longer than their peak period duration, as this would result in gross over-sizing of heaters.

Having established the number of appliances, the usage, and the quantity of hot water required, the output of the heaters must be related to the hot water storage temperature. Any decrease in the cold water supply or increase in hot water storage temperatures will result in decreased output from the heater.

Various factors need to be taken into account to determine appropriate storage capacity requirements for the applications, and how much if any, additional storage may be required. These include general consumption throughout the day, recovery times, over how many hours the peak load is spread, and whether a larger storage buffer than the water heater's own storage is required to guard against the possibility of high flow rates at peak times. Any additional storage will require a bronze loading pump to transfer hot water from the water heater into the storage tank.

To help with sizing, the page opposite lists typical flow rates estimates for various outlet appliances and for different applications.

Solar circuit sizing

In addition to sizing a hot water system with solar contribution for conditions of no available solar energy, Dorchester DR-TC and Trigon solar systems must be appropriately sized to make best use of the solar energy, when it is available. It is not the case of maximising the number of collectors to fit the available installation area as there are more disadvantages than advantages of an oversized collector field.

Apart from the additional material cost and increased payback, an oversized collector field can result in a system that cannot dissipate heat to the store faster than it can absorb heat, and when the required storage temperature has been met, the solar pumps will switch off meaning that the collector temperatures could quickly rise above the stagnation temperature, having a detrimental effect on the usable lifetime of the solar fluid, as well as putting the equipment under thermal stresses.

An undersized solar system may make savings on the capital costs of the equipment and installation, and a reduced risk of stagnation will extend the life of the solar fluid. However, overall operating costs will increase as gas usage will be greater than on a correctly sized system.

An optimum sized solar system allows for the maximum operating time of a solar circuit, which will achieve the best efficiency and return on investment. The solar circuit operation may be set to deliver water at a higher temperature than the gas circuit, and so extend the capacity of the hot water store due to higher resulting mixing requirements at the points of use.

Hamworthy sizing support

Whether it is for a water heater, calorifier, or solar system, or a DHW system with a combination of heat sources, Hamworthy can assist with sizing and selection of hot water products to suit the application.

Our extensive knowledge and years of experience in commercial hot water systems means we help you choose the appropriate sized solution to meet the buildings needs. We can also assist in the selection and specification of the solar circuit equipment for a specific application based on energy simulation using an industry recognised solar sizing program, which will give results that include projections of solar efficiency, carbon reduction and energy saving.

Hot water sizing guidelines

The guidelines below will help for sizing water heaters based on their intended application.

Restaurants, kitchens serving main meals

Each meal will use:
6 litres at 60°C
Made up from:
3 litres preparation, 6 litres washing up
The peak period would be spread over 1, 2 or 3 hours etc. depending on the establishment.
Bar sinks - allow 114 litres per hour.
School kitchens in general use 30% less than restaurants but allowances should be made for number of sittings.

Dormitories

Allow 15 litres per man, 20 litres per woman over a peak 1 hour period.

Flats and apartment blocks

Assume average occupancy of 2½ people per flat.
Allow 38 litres per person over peak 3 hour period.

Commercial laundry

Allow 12 litres per kg of wash at 71°C.

Industrial shower rooms

Assume shower period to be 20 minutes at end of each shift and that all showers and wash tabs are running continuously for this period at full flow i.e. dump load. If using individual shower times, allow 5 minutes per shower.
Ideal for heater plus storage application.

School changing rooms

Assume all showers and wash basins are used at full flow for 10 minutes after each gym period.

Hairdressers and beauty salons

Allow 280 litres per hour of water at 60°C per wash basin per peak demand.

Hotels and Motels

Assume average occupancy of 1½ people per rooms unless specified as single rooms.
Generally the peak will occur over a two hour period in the morning (7am-9am). In specialised hotels catering for specific function (i.e. conferences) the peak could be reduced to one hour.

For medium sized hotels (100-200 people) allow 25-35 litres hot water per person over two hour peak period. For smaller hotels allow more per person, for large hotels slightly less. These figures assume that mainly showers are used, one per room.

For older hotels without showers and public bathrooms assume that baths are filled 3 or 4 timer per hour.
Always check restaurant load to ensure that peak morning capacity will cover it. Overall, allow 115-135 litres per guest per day.

Launderettes

Determine the cycle time of the machines and add 10 minutes for unloading and reloading. Calculate the number of cycles that occur in one hour and multiply by the number of machines and then multiply by the amount of hot water used by one machine in one cycle to arrive at the maximum demand.

Offices

Allow 1.5 litres per person per hour for 1 hour peak load.

Rest and convalescent homes - with kitchen and laundry

Allow 38 litres per person over a peak 3 hour period.

Hospitals, nursing homes

Demand will depend on type of hospital, nursing home etc. Overall consumption per person per day of hot water can range between 70 and 230 litres.

Download technical product brochures

For detailed technical information on products, including maximum continuous outputs at different levels of temperature rises, refer to individual product brochures.

Download individual product brochures from www.hamworthy-heating.com/technical-library

Hot water sizing guidelines

Approximate flow rates for fittings and appliances to assist in the sizing of hot water systems.

In all applications it is desirable to cross check general assumptions with actual flow rates and capacities.
In applications where no general guidelines exist it may be necessary to calculate hot water demand by listing the number and type of appliance in use.

The tables on this page give the approximate flow rates for standard hot or mixed water fittings and the approximate capacity in normal use. By appraising what function appliances perform it is possible to determine peak usage i.e. 3 baths per hour, 2 showers each of 10 minutes, sinks filled one per hour.

Approximate flow rates from standard fittings

Fitting	Flow rate (l/s)
Wash basin tap	0.15
Wash basin spray tap	0.05
Bath tap	0.30
Sink tap 15mm	0.20
Sink tap 20mm	0.30
Shower spray head	0.15
Shower 100mm rose	0.40

Approximate mixed hot and cold capacities of appliances in normal use

Cold water 10°C, hot water 60°C, mixed water 40°C

Appliance	Capacity in normal use (litres)	Amount of hot water (litres)	Amount of cold water (litres)	Temperature in use (°C)
Wash basin	5	3.0	2.0	40
Bath	80	48.0	32.0	40
Small sink	12	7.2	4.8	40
Large sink	18	10.8	7.2	40
1 min. shower spray	9	5.4	3.6	40
5 min. shower spray	45	27	18.0	40
1 min. shower (100mm rose)	24	14.4	9.6	40
5 min. shower (100mm rose)	120	72.0	48.0	40

The quantities of hot water shown above are only correct to those particular temperatures. For other combinations use the following formula to determine the proportion of hot water:

$$\text{Quantity of hot water} = \text{capacity of appliance} \times \frac{\text{Mixed water temperature - Cold water temperature}}{\text{Hot water temperature - Cold water temperature}}$$

Factors at various cold water and mixes water temperature for determining hot water quantity at 60°C

As a further example the table opposite gives the factors by which the capacity of an appliance is multiplied to obtain the quantity of hot water required when stored at 60°C for various cold water supply temperatures and various mixed water temperatures.

Cold water supply temperature	Mixed water temperatures						
	60°C	55°C	50°C	45°C	40°C	35°C	30°C
5°C	1.0	0.91	0.82	0.73	0.64	0.55	0.45
10°C	1.0	0.90	0.80	0.70	0.60	0.50	0.40
15°C	1.0	0.89	0.78	0.67	0.55	0.44	0.33
20°C	1.0	0.88	0.75	0.63	0.50	0.38	0.25

Case studies

St Paul's Cathedral, London

Project

- Grade 1 listed building refurbishment

Products

- Wessex ModuMax mk3 boilers
- Powerstock calorifiers

The challenge:

St Paul's Cathedral is a listed building which is subject to strict regulations, prohibiting alterations without special permissions. Leaking steel shell boilers from the 1960s needed replacement. The cathedral was looking for an energy-efficient, space-saving boiler to comply with current legislation and overcome access issues.

The solution:

Hamworthy provided a flexible and efficient modular boiler and hot water solution to fit the building. Two Wessex ModuMax mk3 WM254/508V modular condensing boilers with a combined output of 1,016kW were chosen. Backed up by a 10-year warranty and fitting through a standard doorway, they provided the installation flexibility needed for St Paul's Cathedral. **The cathedral has since reduced its gas consumption by close to 40%.** To meet the hot water requirements, especially during the summer months' peak demand when tourist groups arrive, two Powerstock PS500 glass-lined calorifiers with a capacity of 500 litres each and quick recovery time of 18 minutes were chosen.

Robin Bunton, who chose and installed boilers and water heaters, commented: *"We have used the Wessex boilers since they were introduced and know they are a very reliable product. They are space saving, great in refurbishment projects and buildings where you can't change the building fabric, such as St Paul's. The speed of heat up has greatly improved. Previously it would take a week to heat the cathedral up from cold, but now it only takes one day."*

Tom Fletcher, Works Manager at St Paul's Cathedral, added: *"Since the installation, we have found that we have managed to reduce gas consumption by close to 40%. This means that we have not only reduced our carbon footprint but have also benefited from significant savings on our gas bill, well above our initial project target of 10%."*

Riverside Children's Centre, Canterbury

Project

- Nursery heating and hot water refurbishment

Products

- Stratton mk2 wall hung boiler
- Halstock calorifier

The challenge:

The challenge was to combine a low-temperature underfloor heating circuit and a high-temperature hot water circuit. The old boiler installed in the building was a Hamworthy Ferndown combination boiler (heat and hot water), rated at 70kW. Philip was looking for a suitable replacement that fulfilled the criteria of reliability, high efficiency and to satisfy the hot water demand for meal preparation in the kitchen and other points of use throughout the building.

A continuous heating and hot water supply while the boiler was being replaced was crucial, as the nursery would be open throughout.

Riverside Children's Centre.

The solution:

Hamworthy's Stratton mk2 stainless steel wall hung condensing boiler with output of 43kW was chosen as an ideal replacement.

To cover the hot water demand, the centre required an adequate but not oversized water heater. The choice fell on a Hamworthy Halstock HS305UV stainless steel calorifier with a continuous output of 390 litres per hour.

Both stainless steel products were chosen due to their corrosion resistance to counteract the effect of softened, more aggressive water.

Philip Kiss, building services engineer at Canterbury City Council: ***The new boiler has only been running for just over half a year and we've already saved 16.7% on expenditure for gas*** *which means we're looking at savings of 22,438kWh and £1,593. It's great to already be benefiting from cost savings.*

Your notes

Services and warranty

Commissioning

We strongly recommend that all water heaters are commissioned by our service department. As well as ensuring your product is set up correctly for maximum efficiencies, you will receive extra benefits on warranty (see below). On completion, you will get a report with details of the initial operating settings.

Service

To maintain your water heaters, we have a range of servicing options that can be tailored to your requirements. For more information on commissioning and service please contact Hamworthy Heating service department.

Warranty

2 Yr Warranty

Most hot water products come with a 2 year warranty (except for consumables in line with our Terms and Conditions). Where the product is commissioned by Hamworthy service engineers within 6 months of delivery date, then the two-year warranty covers parts and labour from date of commissioning. We offer tailored packages to suit individual customer requirements, many of which include extended warranty benefits. Full details of warranty terms and conditions are available on request.

Spares

Essential to any maintenance and service regime is the availability of quality spare parts.

By coming to us, you can be assured of genuine spare parts and may also benefit from technological improvements. We have a long-term commitment to spare parts for our products.

Delivery

Standard delivery for all Hamworthy products is free of charge.

Deliveries are closely co-ordinated with the customer, to suit the site construction programme. Products are delivered to ground level and it is the responsibility of the customer to arrange movement of products from here to the required location on site.

To enquire about special delivery services including FORS and time critical deliveries (additional charges apply), please contact our customer services team.

Service

Tel: **01202 662555**

Email: **service@hamworthy-heating.com**

Spares

Tel: **01202 662525** Fax: **01202 662551**

Email: **spares@hamworthy-heating.com**

About Hamworthy

Hamworthy Heating is a leading British commercial boiler manufacturer. Our energy efficient heating, hot water and renewable solutions are used in buildings across the UK.

The Hamworthy difference

British engineering excellence

Here in the UK, we design, test, manufacture and source market-leading products. We know our products inside out, back to front and from start to finish. You can trust that we know what we're talking about.

Lifetime support

From design and specification, through to commissioning, training and maintenance, as well as commitment to spares availability. We provide long term support for businesses with their commercial heating and hot water needs.

People first

It's not just our products that set us apart, it's our people. Truly excellent customer service, great technical knowledge and being easy to deal with.

That's the Hamworthy difference.

Everyone's got history, we've got heritage

Our roots date back to 1914 when two brothers in Poole set up Hamworthy Engineering. Decades of experience go in to every nut, screw and bolt. Every phone call, text and email. Since 2008, we've been part of Groupe Atlantic, a company with a similar ethos to us. Groupe Atlantic was founded in 1968 by two engineers and is now one of the market leaders in the European heating and hot water industry. We're now part of their growing UK, ROI and North America Divisions.

Our associations

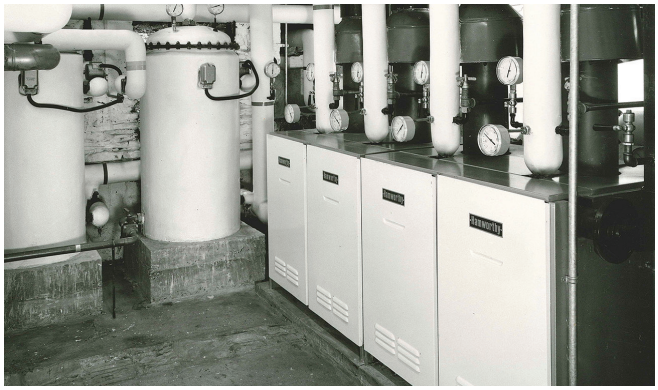
We are an active member of trade associations and professional bodies supporting the industries we work in.

Our accreditations

International Organisation for Standardisation (ISO) is the world's largest developer of voluntary International Standards. We are proud to have been awarded the following ISO accreditations:

- ISO 9001 Quality Management System
- ISO 14001 Environmental Management System
- OHSAS 18001 Health and Safety Management System

When you deal with Hamworthy, have confidence that we're working within a defined set of standards that are internationally recognised.



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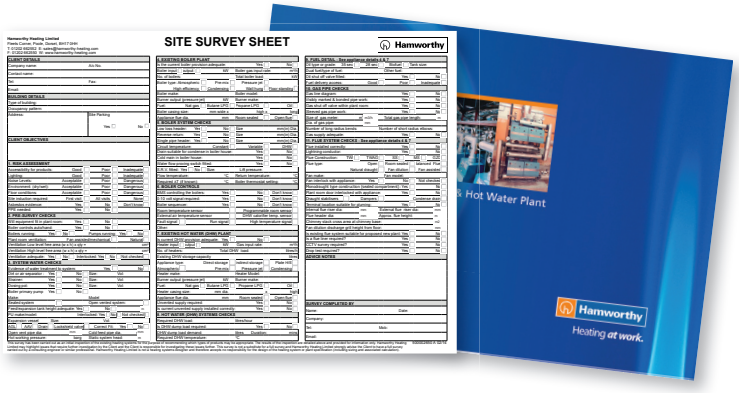

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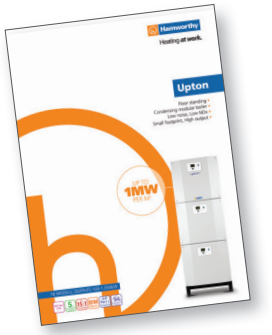

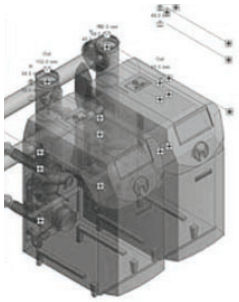

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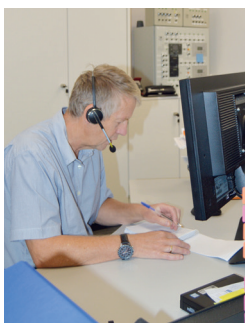
Get information for discontinued products

www.hamworthy-heating.com/discontinued-products



Contact our in-house technical support team on 01202 662505

Your local contact is:

British engineering excellence from Hamworthy Heating; the commercial heating and hot water specialists.

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