



2b

**Direct Fired
Water Heaters**



ECOTHERM is the leading brand for turnkey hot water, steam and solar systems for hotels, hospitals and industry in the Middle East.

ECOTHERM amazes its customers with "Individual Heat Transfer Solutions" for hot water, steam and solar generation. The following advantages mark these solutions:

Individuality

ECOTHERM realizes extensive turnkey systems as well as the production of separate components. Each single plant is specifically aligned to the customer's individual requirements. The basis is an own production in Austria and a wide product portfolio.

Premium quality

All products made of high-class duplex stainless steel guarantee a long-life cycle and perfect hygiene. ECOTHERM is certified to ISO 9001 : 2008 with all required European standards.

Innovation

We are always open to the new, we constantly investigate new technologies and we develop path-breaking and future-oriented products.

Premium service

Clients benefit from extensive service at consulting, planning, engineering, supervision and training. ECOTHERM regularly improves the know-how of its partners and clients via selective trainings.

Efficiency

The ECOTHERM Group managed by the owner has slim decision-making structures. ECOTHERM turnkey solutions from one single source and the economical handling of energy resources offer an optimal cost-benefit ratio.

Experience

With thousands of installations the past 30 years in Europe, the Middle East, Asia, North Africa and Central America, ECOTHERM has become one of the technology and innovation leaders for individual hot water, steam and solar solutions on the market.

Reliability

ECOTHERM systems are monitored around the clock and can be serviced at low cost, quickly and efficiently via an advance control panel. Our designed plants have low maintenance requirements and are totally dependable.

Sustainability

ECOTHERM products help our customers to save energy and money. We save valuable resources through the use of renewable energies. ECOTHERM high-performance plants have minimal space requirements and provide maximum energy savings. When planning new products ECOTHERM engineers take all the qualitative and economic principles into account in accordance with ecological principles.

Partnership

We live in a partnership with all our customers, suppliers and employees. This relationship is characterized by honesty, commitment, openness, trust and reliability. The object is a joint long-term success.

Internationality

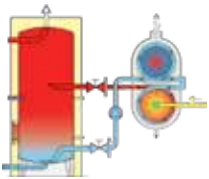
The international alignment of ECOTHERM with branches in Dubai, Kuwait, Mexico, Hungary, India and partners in more than 20 countries is the basis for our flexible and efficient project implementation that is always on schedule.

ECOTHERM Direct Fired Water Heaters



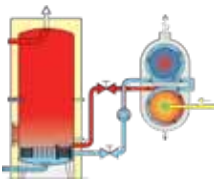
General Information, Benefits

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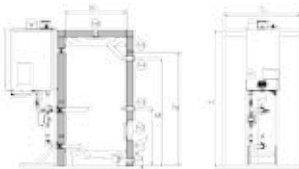
- **Direct Fired Water Heater, Model: EDFH**
recommended for water hardness
max. 205 ppm Ca CO₃ or 11,5 gr dH

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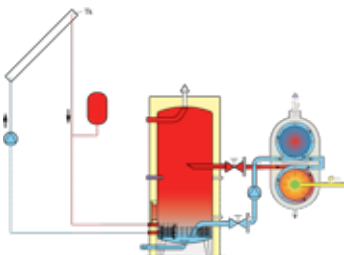
- **Indirect Fired Water Heater, Model: EIFH**
recommended for water hardness
above 205 ppm Ca CO₃ or 11,5 gr dH

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Technical Specifications

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Options:

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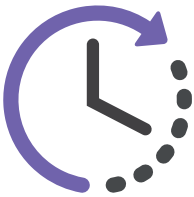
- **Modular Heating System**
- **Electric Backup Heating**
- **Direct Fired Water Heater w/Solar Pre-Heating**
- **Indirect Fired Water Heater w/Solar Pre-Heating**

Why Ecotherm's Direct Fired Water Heaters?



Accessible

Our plants are mainly used in hotels, hospitals and industry. We combine all available energy sources such as gas, oil, electricity and renewable energy sources. The result is perfectly hygienic water or steam at all times. We offer systems of highest quality and efficiency as a result of our unrivalled experience in over thousand installations in Europe, the Middle East, Asia, North Africa and in Central America. Each unit is specifically aligned to the customer's individual requirements.



Fast and quick

We create enthusiasm among our customers with our excellence in services extending from advice and consulting, to planning, engineering, supervision and specialized training. A new standard in customer support has been set with the ECOTHERM International Support Centre in Dubai launched in September 2011.



Skilled at your service

As a result of our more than thousand installations in the last decade in Europe, the Middle East, Asia, North Africa and in Central America, we have become leaders on the market for technology and innovation of hot water, steam and solar systems. Our team has long service records with us and continuously refreshes its know-how with the outstanding training and seminars the ECOTHERM Academy provides.

The benefits of our solutions

- Direct fired hot water system without plate exchanger, thus without efficiency loss
- The heat exchanger is burdened less and therefore has a longer lifetime
- The central heating system doesn't need to run all year to heat up the system
- Direct fired system without hydraulic and technical control problems
- Everything in stainless steel (boiler and tank)
- Constant storage tank temperature, so no temperature fluctuations
- Very fast response and short recovery time
- Relatively small storage tanks causing less standstill loss
- Easy to combine with external heat pump and solar system



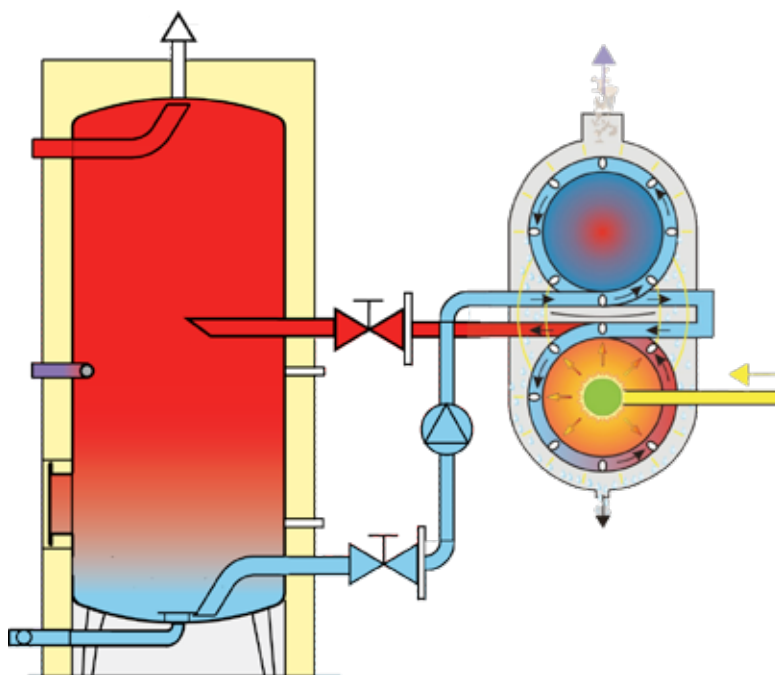
Our unique solutions: Are Ecotherm's Direct Fired Water Heaters really ECO?

Hot Water installations often need to provide a huge amount of water with a high temperature. Transporting this water through a long circulation network raises the needed capacity even more. Additionally, end users like to shower longer and more comfortable, both increasing the amount of needed hot water. Our systems excel in providing comfort, while doing this in a very energy efficient way due to some unique features. The direct fired systems are therefore labeled with an A-label.

Direct fired hot water without energy loss

Heating the water without the intervention of a boiler spiral group or plate exchanger is the most energy efficient way.

Ecotherm uses stainless steel heat exchangers only which allows direct heating of the tap water without energy loss.



The system for central heating doesn't have to run to heat up the tap water (for example during the summer period)

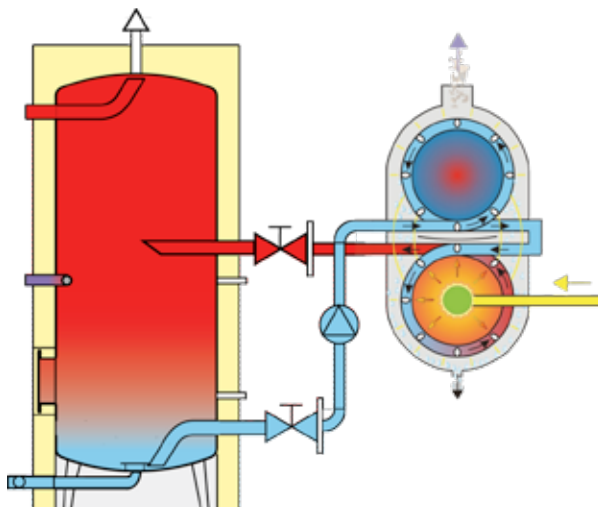


The Eco Injection System (EIS) ®

In addition to the full stainless steel system, we supply a storage tank with a simple, but ingenious injection system. With the Eco Injection System the cold water will be preheated and mixed inside the storage tank. The important advantage of this system is that the boiler can run at a much lower temperature and thus achieve an efficiency of up to 107%.

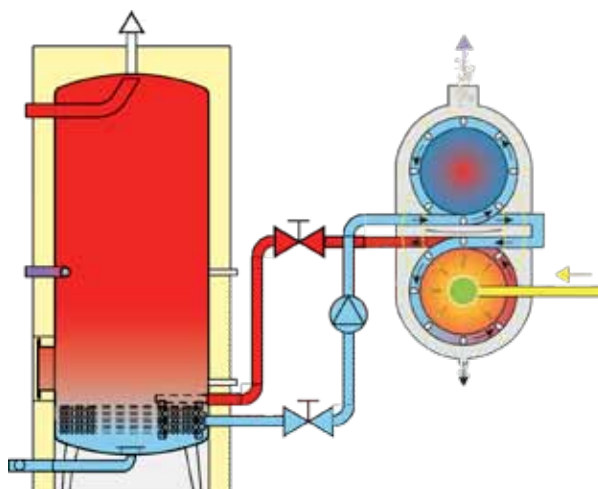
Model EDFH: Direct Fired Water Heater

recommended for water hardness max. 205 ppm Ca CO₃ or 11,5 gr dH



Model EIFH: Indirect Fired Water Heater

recommended for water hardness above 205 ppm Ca CO₃ or 11,5 gr dH



European state of the art PCB technology

- Clear display with graphic design
- Modbus connection standard
- Bacnet connection optional
- Easy to read fault history
- Internet and WIFI connection possible



Easy WiFi
control



Combining creatively for high comfort

The DFWH is a series of hot water boilers consisting of four types with increasing capacity. Those direct fired water heaters are very innovative due to their capacity and can be combined with several different storage tanks. The fully stainless steel equipped boiler has an A-label mark as flow-through water heater.



The benefits

- A-label water heater
- Large continuous tapping capacity
- Very fast response system
- Extreme low NOx output
- Modulation of 5:1
- Compact wall hung boiler technology
- Stainless steel heat exchanger
- Adjustable tapping water temperature of 35 to 75 °C
- Pump circuit with frost control
- Activatable legionella program
- Suitable for building management systems (BMS)
- Operates on both natural and propane gas
- No waiting time for boiler start
- The boiler condensates while tapping water up to 60 °C
- Efficiency up to 107%
- Cascade up to 16 boilers
- Easy installation and Maintenance



Many combination possibilities

By providing the option to combine the DFWH with our patented storage tank we offer unique solutions to meet the needs of every project for domestic hot water. For example you can choose for a high peak output and short recovery time at projects like sports facilities, while at other projects like health care facilities it is often better to choose a system that can provide a certain amount of hot water throughout the day.

Technical specifications: gas boiler

General DFWH		DFWH 80	DFWH 100	DFWH 120	DFWH150
Dimensions (h x w x d)	mm	845 x 440 x 530			
Weight (empty)	kg	77	77,5	78	85
Water in- and outlet connection	inch	1"	1"	1"	1 1/2"
Gas supply connection	inch	R 3/4	R 3/4	R 3/4	R1
Flue/air parallel	mm	80-80	100-100	100-100	150-150
Flue/air concentric	mm	80-125	100-150	100-150	100-150
Nominal input (net) (G20) (min. - max.)	kW	14,6 - 74,3	17,2 - 92,2	24,0 - 120	34,0 - 138
Nominal input (gross) G20 (min. - max.)	kW	16,2 - 82,5	19,1 - 102	26,6 - 133,2	37,8 - 153
Nominal output 80/60 °C (min. - max.)	kW	14,0 - 71,2	16,5 - 88,4	24,7 - 106	32,6 - 132
Nominal output 50/30 °C (min. - max.)	kW	15,2 - 77,5	18,0 - 96,2	27,2 - 116	35,5 - 144
Nominal output 37/30 °C (min. - max.)	kW	15,7 - 80,1	18,6 - 99,5	28,1 - 120	36,7 - 149
Efficiency 50/30 °C	%	107,9	107,9	108,2	107,9
Gas consumption G20 (Supply pressure: 20 mbar)	m³	1,54-7,86	1,82-9,76	2,1-10,5	3,60-14,6
Gas consumption G31 (Supply pressure: 30/37 bar)	m³	0,60 - 3,04	0,70 - 3,77	1,06 - 4,54	1,39 - 5,65
NOx-class (EN15502-1)	-	6			
Available pressure for the flue system	Pa	150			
Sound power level, indoors	dB(A)	67	65	62	66
Max. water temperature	°C	75			
Pressure hot water system (min. - max.)	bar	1,0 - 8,0			
Overflow pressure (max.)		10			
Power consumption	W	170	170	230	250
Power supply	V / Hz	230/50			
Protection class		IPX4D			

EDFH: key to model number

Model	kW	Vol	Press
1 2 3 4	5	6	7

Type

1st digit: **E** = ECOTHERM
 2nd digit: **D** = Direct
 3rd digit: **F** = Fired
 4th digit: **H** = Heater

kW

5th digit: heat exchanger nominal rating in kilowatt

Vol (Volume)

6th digit: tank capacity in litres

Press (Pressure)

7th digit: operating pressure

EIFH: key to model number

Model	kW	Vol	Press
1 2 3 4	5	6	7

Type

1st digit: **E** = ECOTHERM
 2nd digit: **I** = Indirect
 3rd digit: **F** = Fired
 4th digit: **H** = Heater

kW

5th digit: heat exchanger nominal rating in kilowatt

Vol (Volume)

6th digit: tank capacity in litres

Press (Pressure)

7th digit: operating pressure

Performance data model DFWH

Model	Nominal rating *)	Storage tank	Continuous hot water output (l/hour)		Peak hot water output 60°C		Peak hot water output 45°C		Nominal rating DIN4708	
Model	kW	litres	at 60°C	at 45°C	litres/10min	litres/h	litres/10min	litres/h	NL 1	NL 2
EDFH / EIFH	80	300	1433	2084	524	1718	762	2499	29	21
EDFH / EIFH	80	500	1433	2084	714	1908	1038	2775	36	25
EDFH / EIFH	80	750	1433	2084	951	2146	1384	3121	41	28
EDFH / EIFH	80	1000	1433	2084	1189	2383	1729	3466	46	31
EDFH / EIFH	80	2000	1433	2084	2139	3333	3111	4848	65	43
EDFH / EIFH	80	3000	1433	2084	3089	4283	4493	6230	83	53
EDFH / EIFH	80	4000	1433	2084	4039	5233	5875	7612	100	63
EDFH / EIFH	80	5000	1433	2084	4989	6183	7257	8994	120	74
EDFH / EIFH	100	300	1791	2606	584	2076	849	3020	35	25
EDFH / EIFH	100	500	1791	2606	774	2266	1125	3297	46	31
EDFH / EIFH	100	750	1791	2606	1011	2504	1471	3642	52	35
EDFH / EIFH	100	1000	1791	2606	1249	2741	1816	3987	57	38
EDFH / EIFH	100	2000	1791	2606	2199	3691	3198	5369	76	49
EDFH / EIFH	100	3000	1791	2606	3149	4641	4580	6751	95	60
EDFH / EIFH	100	4000	1791	2606	4099	5591	5962	8133	110	69
EDFH / EIFH	100	5000	1791	2606	5049	6541	7343	9515	130	80
EDFH / EIFH	120	300	2150	3127	643	2435	936	3541	41	28
EDFH / EIFH	120	500	2150	3127	833	2625	1212	3818	54	38
EDFH / EIFH	120	750	2150	3127	1071	2862	1557	4163	63	42
EDFH / EIFH	120	1000	2150	3127	1308	3100	1903	4509	68	45
EDFH / EIFH	120	2000	2150	3127	2258	4050	3285	5890	87	56
EDFH / EIFH	120	3000	2150	3127	3208	5000	4667	7272	105	66
EDFH / EIFH	120	4000	2150	3127	4158	5950	6048	8654	120	74
EDFH / EIFH	120	5000	2150	3127	5108	6900	7430	10036	140	85
EDFH / EIFH	150	300	2687	3908	733	2972	1066	4323	51	34
EDFH / EIFH	150	500	2687	3908	923	3162	1342	4599	66	43
EDFH / EIFH	150	750	2687	3908	1160	3400	1688	4945	79	51
EDFH / EIFH	150	1000	2687	3908	1398	3637	2033	5290	84	54
EDFH / EIFH	150	2000	2687	3908	2348	4587	3415	6672	100	63
EDFH / EIFH	150	3000	2687	3908	3298	5537	4797	8054	120	74
EDFH / EIFH	150	4000	2687	3908	4248	6487	6179	9436	140	85
EDFH / EIFH	150	5000	2687	3908	5198	7437	7560	10817	155	94

To eliminate a potentially hazardous infestation of legionella bacteria due to a storage tank temperature of 45°C, ECOTHERM strongly recommends a safe storage tank temperature of 60°C. To ensure a user friendly hot water temperature of 45°C, a thermostatically controlled cold water mixing unit must be added to the storage tank outlet. This will ensure hygienic, fresh and safe hot water suitable for modern day domestic usage.

If hot water is required at a temperature of 45°C, ECOTHERM recommends that the water is heated up to 60°C in the storage tank and then reduced to 45°C

using a mixing unit and cold water. The high temperature of 60°C prevents the development of Legionella and guarantees hygienic hot water.

*) **Nominal Output** according to DIN 4708, T1 and T3. For further information see „Guide to hot water demand according to European standard and DIN 4708“ on page 14

Conversion factor for Imp. gallon:

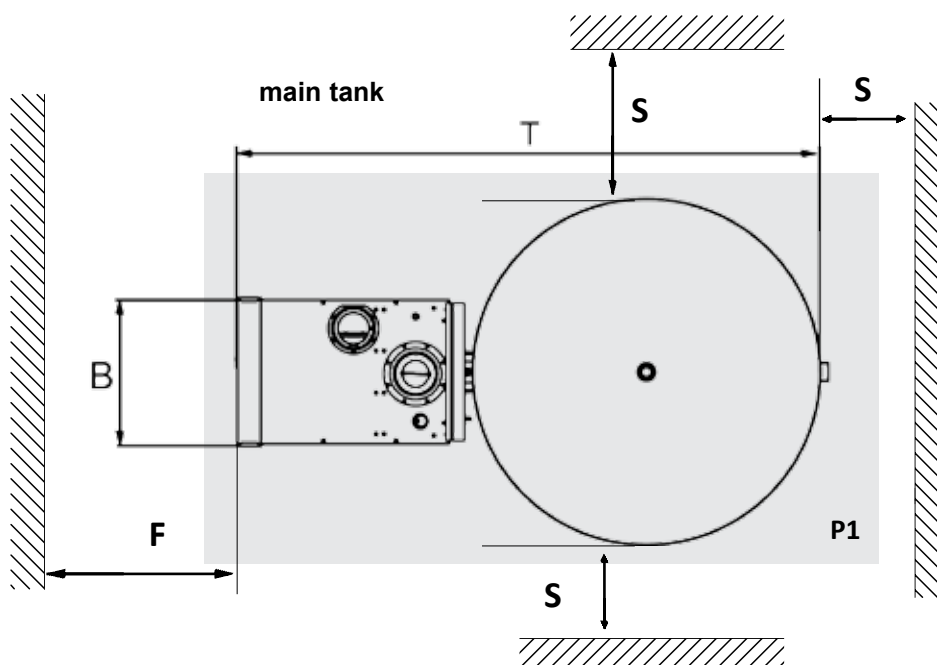
1 litre	=	0.22	gallons
1 gallon	=	4.546	litres

Floor space requirements for DFWH

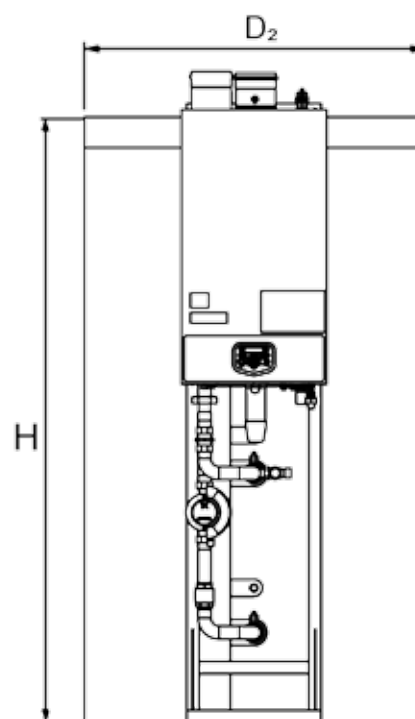
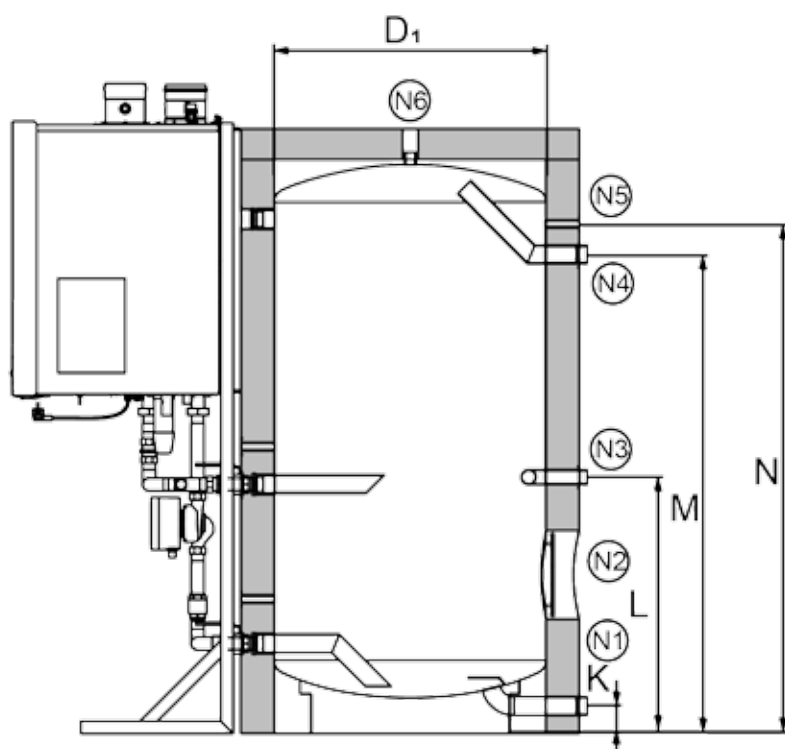
The required floor space of mechanical and electrical equipment plays an important role when it comes to determining the overall building costs. Conventional storage type water heaters require a large amount of space. ECOTHERM direct fired high capacity water heaters require up to 95 % less floor space. These savings can lead to a significant reduction of the total costs of the establishment of a new building.

space requirement for main tank

storage capacity	B*	D1	D2	F min.	S min.	T (80 - 120 kW)	T (150 - 180 kW)	P ₁ min.	tank weight (empty)
liters	mm	mm	mm	mm	mm	mm	mm	mm	kg
300	440	500	660	1000	600	1146	1337	1740 x 1060	50
500	440	650	810	1000	600	1296	1487	1890 x 1210	65
750	440	750	910	1000	600	1396	1587	1990 x 1310	85
1000	440	890	1050	1200	600	1536	1727	2130 x 1450	115
2000	440	1250	1450	1400	600	1936	2127	2530 x 1850	235
3000	440	1350	1550	1400	600	2036	2227	2630 x 1950	335
4000	440	1500	1700	1600	600	2186	2377	2780 x 2100	460
5000	440	1650	1850	1600	600	2336	2527	2930 x 2250	500



Connection Dimensions and Heights



pipng connection sizes

connection	size	function description
N1	2" ext	cold water outlet / drain
N2	DN 200	cleaning flange
N3	1 1/2 " ext	circulation
N4	2 " ext	hot water outlet
N5	1/2 " int	temperature sensors
N6	1" int	air vent

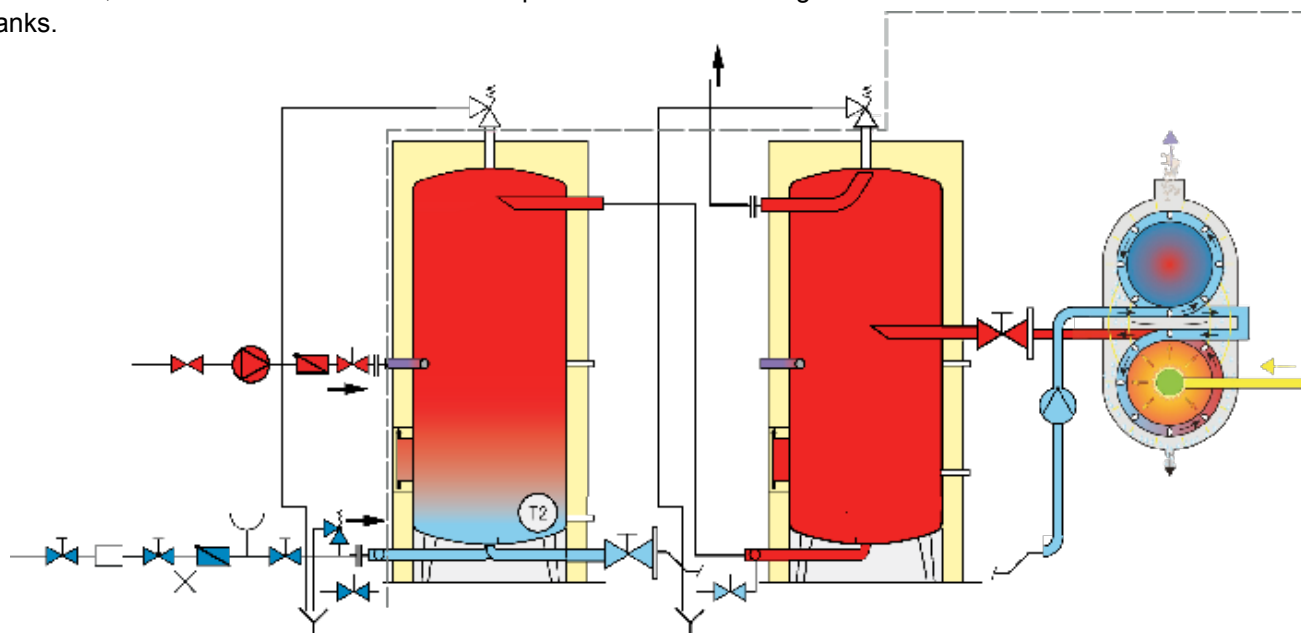
dimensions

storage capacity	K	L	H	M	N
liters	mm	mm	mm	mm	mm
300	90	840	1850	1570	1670
500	90	840	1900	1570	1670
750	90	840	1900	1570	1670
1000	90	840	1900	1570	1670
2000	90	860	2000	1590	1670
3000	90	1060	2550	2090	2190
4000	90	1160	2750	2190	2290
5000	90	1160	2750	2190	2290

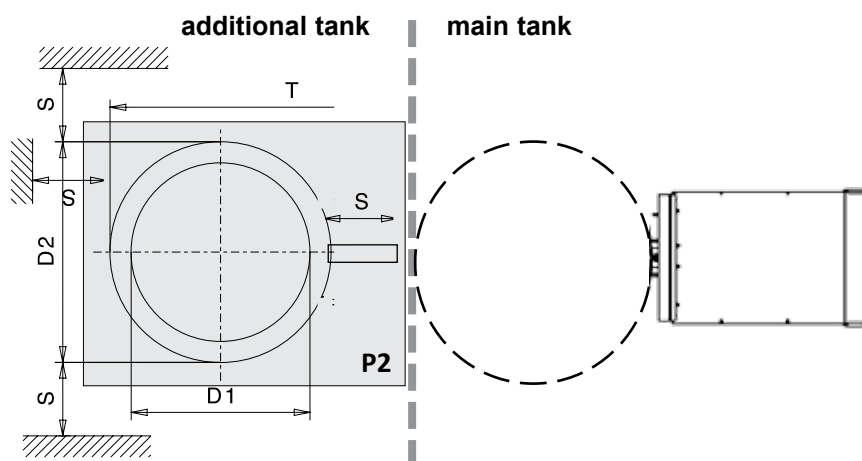


Operation with two ECOTHERM[®] stainless steel storage tanks

If more storage capacity is required and/or the height of the boiler room is too low, the water heaters can also be operated with two storage tanks.



Storage Capacity	D1	D2	S minimum	Additional plinth P ₂ minimum
Liter	mm	mm	mm	mm
300	500	660	600	1460 x 1060
500	650	810	600	1610 x 1210
750	750	910	600	1710 x 1310
1000	890	1110	600	1910 x 1510
2000	1250	1470	600	2270 x 1870
3000	1350	1570	600	2370 x 1970
4000	1500	1720	600	2520 x 2120
5000	1700	1920	600	2720 x 2320



P₂ = additional plinth or platform
(optional, scope of building)

More Options

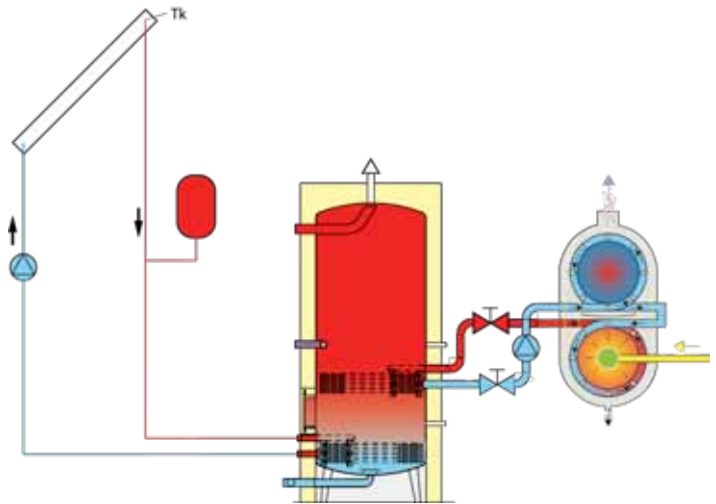
Modular Heating System for every heating demand (80 - 2160 kW)

Cascade up to 16 boilers



Direct Fired Water Heater with Solar Pre-Heating

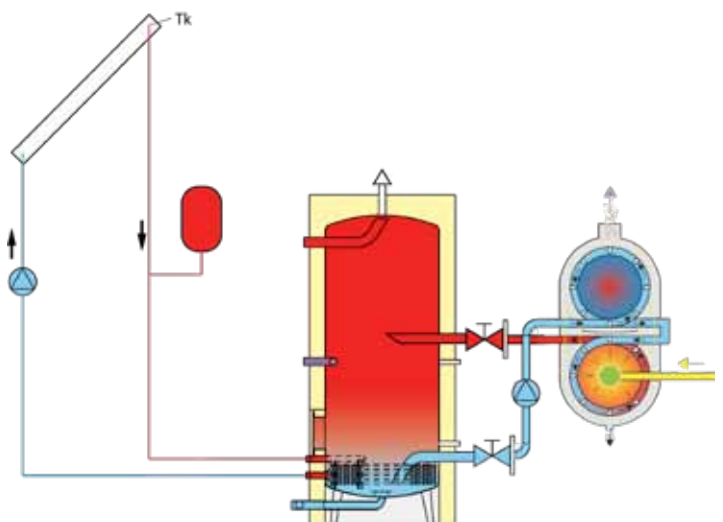
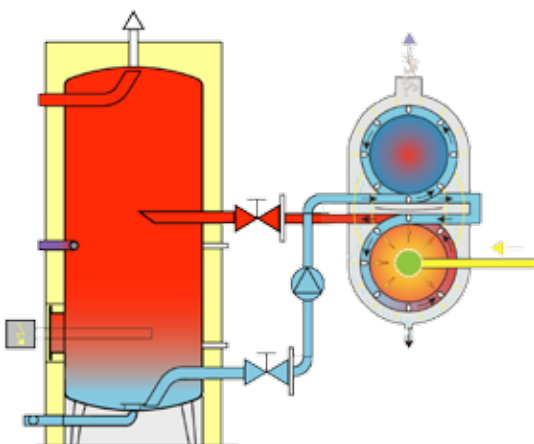
recommended for water hardness
max. 205 ppm Ca CO₃ or 11,5 gr dH



Electric Backup Heating

Indirect Fired Water Heater with Solar Pre-Heating

recommended for water hardness
above 205 ppm Ca CO₃ or 11,5 gr dH



Guide to hot water demand according to European standards and DIN 4708

Using these guidelines as a rough check for your hot water requirement. The actual requirement can vary depending on usage patterns. Refer to your planning consultant for further information.

Maximum demand rates (liters of hot water per hour at 60°C)

building	demand factor	bath tub	shower	bidet	private washbasin	public washbasin	kitchen sink	bar sink	slop sink
hotel & hostel	0,5	50	50	10	10	15	80	100	50
hospital	0,7	60	70	10	10	15	80	-	50
restaurant	1,0	-	-	-	5	25	140	100	100
sport center	1,0	-	220	-	5	15	80	100	40
day school	0,8	-	180	-	5	20	80	-	40
university	0,8	-	220	-	5	25	80	-	40
offices	1,0	-	-	-	5	10	40	-	40
factory	1,0	-	120	-	5	20	80	-	50

Calculation example

Hotel with 300 rooms Liters / Hour at 60 °C

300	bath tub / shower	=	15.000
300	private washbasin	=	3.000
300	bidets	=	3.000
60	public washbasin	=	900
25	kitchen sink	=	2.000
15	bar sink	=	1.500
15	slop sink	=	750

total = 26.150 x demand factor 0,5 (hotel)
demand = 13.075 liters / hour continuous at 60 °C

Demand capacity for apartments (with shared water heating)

ECOTHERM Stainless Steel Water Heaters are often used apartments and other building with shared water heating. The maximum number of standard apartments (according to DIN 4708) that each ECOTHERM Water Heater will serve is indicated in the performance tables pages 28, 29, 30 and 32.

Hot water demand

for standard apartments (DIN 4708*)

number of apartments	cont. requirement (liters per hour)	
	60 °C	45 °C
50	3000	4300
100	5200	7500
150	7200	10400
200	9100	13200
250	10700	15500
300	12000	17400

Standard Apartment (DIN4708*)

A standard apartment is defined as having 4 rooms, 3-4 persons, 150 liters bath (filling time 10 min.), 1 washbasin and 1 kitchen sink.

*) DIN4708

specifies that the performance of the heat exchanger and the hot water storage capacity are both significant factors in determining the number of apartments a water heater can serve.

Guide to hot water demand according to ASHRAE

Use this guide for a rough check of your hot water demand. The actual requirement can vary depending on usage patterns. Refer to your planning consultant for further information.

Maximum demand rates (liters of hot water per hour at 60°C)

building	demand factor	bath tub	shower	bidet	private wash-basin	public wash-basin	kitchen sink	pantry sink	service sink	storage capacity
hotel	0,25	75,7	283,9	7,6	7,6	30,3	113,6	37,9	113,6	0,8
hospital	0,25	75,7	283,9	7,6	7,6	22,7	75,7	37,9	75,7	0,6
restaurant	-	-	-	-	-	-	-	-	-	-
sports center	-	-	-	-	-	-	-	-	-	-
school	0,4	-	851,6	7,6	7,6	20	75,7	37,9	75,7	1,0
gymnasium	0,4	113,6	851,6	7,6	7,6	30,3	-	-	-	1,0
offices	0,3	-	113,6	7,6	7,6	22,7	75,7	37,9	75,7	2,0
factory	0,4	-	851,6	7,6	7,6	45,4	75,7	-	75,7	1,0

Source: ASHRAE HVAC 1991 Applications Handbook

Calculation example

hotel with 30 rooms liters / hour at 60 °C

60	lavatories x 7,6	=	456
30	bath tubs x 75,7	=	2.271
30	showers x 283,9	=	8.517
60	kitchen sinks x 113,6	=	6.816
15	laundry tubs x 75,7	=	1.135

total = 9.525,6 x demand factor 0,25 (hotel)
demand = 2.381,4 liters / hour continuous at 60 °C

Nominal Power Rating NL1

The nominal dwelling unit is a 4 room apartments with 3,5 (3 to 4) persons and a sanitary equipment with a bath tub, a washstand and a kitchen rinse. The hot water requirement for each dwelling with $W_b=5820$ Wh includes that of a bath tub (small bath tub with typical capacity of 140 liters) and a minimum temperature increase of 35K from cold water. Occupation

or equipment deviations from nominal parameters are to be compensated by adjusting the number of nominal dwellings according to DIN 4708 part 2. The nominal power rating according to DIN 4708 part 3 must correspond to the nominal demand using DIN 4708 part 2.

ECOTHERM SUPPORT CENTER

**Contact us for
more information!**



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