



Hamworthy Dorchester DR-LA & DR-LP

Fully Automatic & Permanent Pilot
Direct Gas Fired Storage Water Heaters
Continuous outputs 621 l/h to 2105 l/h



Heating *at work.*

Dorchester DR-LA & DR-LP

Direct Gas Fired Storage Water Heaters

Hamworthy Dorchester DR-L water heaters offer a practical and efficient means of producing domestic hot water. These multi-tube gas fired storage water heaters are available with a choice of permanent pilot ignition through the DR-LP range, or with fully automatic ignition in the DR-LA range. All DR-L models are fitted with an atmospheric burner and are suitable for firing Natural gas or LPG.

There are 7 models in the Dorchester DR-LA range with continuous outputs from 620 to 2103 litres/hour, based on a 44°C temperature rise. The DR-LP is available in 6 models, up to 1838 litres/hour. Storage capacities range from 264 to 374 litres.

Dorchester water heaters are constructed from high grade steel and fully fabricated before the application of a high quality vitreous enamel lining, ensuring the integrity of the lining. The cylinder is insulated with a layer of CFC-free foam to minimise standing losses.

All Dorchester water heaters are designed to meet HSC requirements for the control of Legionellosis. Two large inspection doors provide access for servicing and maintenance and connections are provided to facilitate top to bottom recirculation which ensures an even temperature is maintained throughout the vessel, preventing stratification.

Dorchester water heaters are suitable for open vented or unvented systems using an optional unvented supply kit.

Options

- Natural gas or LPG
- Choice of flue off-take position
- Unvented supply kit
- Electrical anode protection
- Close temperature control kit (DR-LA)
- Top to bottom pump recirculation kit
- Flexible replacement anodes

- Reduced installation costs
- Direct fired to maximise seasonal efficiency
- Exceeds Part L minimum requirements
- System design flexibility
- Anode protection to guard for long life
- Easy service and maintenance

BENEFITS

A choice of draught diverter on the DR-LA and DR-LP water heaters simplifies installation in replacement projects, to match existing flue systems.



Horizontal flue off-take for simplifying the flue system when replacing old water heaters.

Typical Layout

Dorchester DR-LA & DR-LP



Controlling 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.

Regular cleaning of the system will help to avoid the 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 promote the proliferation of legionella bacteria.

Designed for Safety

The Health and Safety Commission (HSC) approved code practice and guidance document L8, makes it clear that if the risk of Legionella is to be minimised, then the recommendations must be observed in so far as they relate to hot & cold water systems.

Dorchester water heaters conform to these requirements as follows:

- Access for cleaning.
- Generous flow and return connections.
- Adequately sized drain connection.
- Base designed to avoid sludge traps.
- Anodes to reduce metal corrosion.
- Designed to meet unvented supply requirements.
- Number of tappings correctly positioned to facilitate recirculation, destratification and to obviate stagnation areas.

Specification

Dorchester DR-LA & DR-LP

The Hamworthy Dorchester range of water heaters offers plenty of choice in meeting hot water demands for a wide variety of commercial applications.

With currently 7 ranges in the Dorchester family, comprising over 40 models, the DR-L water heaters provide traditional solutions for direct fired storage water heating.

Manufactured to the highest standards using the latest production technology to ensure a high quality long lasting finish in every product configuration, the Dorchester range of water heaters exceed the minimum efficiency requirements of the latest Building Regulations, Part L.

Compliance is assured with stringent controls in accordance with the European Standards for CE marking, and all models are Water Regulations Advisory Scheme (WRAS) approved.



Dorchester DR-LP, permanent pilot model.

Construction

The water heater cylinders are constructed from high grade steel and coated with a high quality vitreous enamel lining. The fabrication of the cylinder and welding is completed fully before the glass lining is applied, ensuring that the integrity of the lining is not affected during manufacture. On completion of the fabrication, the cylinder undergoes a precise glass coating process where the unit is rotated in every direction to ensure an even coating is applied throughout. Surplus material is drained before the unit is baked at 860°C to complete the adhesion of the lining to all internal surfaces of the cylinder, providing a high quality durable long lasting finish.

To ensure that standing losses are kept to a minimum the cylinder is covered with a layer of CFC free foam having a Global Warming Potential of less than 0.05.

The water heater is finished with a steel clad exterior to provide a robust and smart appearance.

Inspection and Clean Out Doors

Dorchester DR-LA and DR-LP models have two large inspection doors to provide easy access for the inspection and cleaning of the tank's interior, as required by the recommendations of the HSC for the control of Legionellosis, including legionnaires disease.

Burner System

The burner arrangement consists of multiple stainless steel burner bars, the number of which varies according to the output of each model. The atmospheric burner assembly is mounted below the cylinder, and by nature of the design, is very quiet in operation.

Heat Exchanger

Multiple vertical fire tubes are arranged through the cylinder, and each fire tube is fitted with a steel baffle in order to maximise the heat transfer.

The fire tubes exit the cylinder through a single terminal which is connected to the flue system via the draught diverter.

Draught Diverter (Choice of flue off-take position)

A draught diverter is supplied loose for fitting to the cylinder on site, and is specifically engineered to optimise the performance of each model. The draught diverter locates on a spigot on the heater flue connector and can be rotated to facilitate easier connection to the flue system.

There is a choice of draught diverter available to simplify the flue arrangements on replacement projects. The draught diverter can be supplied with either an angled flue off-take of a horizontal off-take. *See dimensional drawings on page 9 for more details.* The draught diverter type must be specified at the time of ordering.

Combustion Products Discharge Safety Device

If a water heater is to be installed in a habitable area then it is a requirement of EN 89 that it be fitted with a device that detects the spillage of combustion products and shuts down the appliance. A habitable area includes kitchens, shower blocks, workshops or any other area that is occupied.

A combustion products discharge safety device is fitted as standard on DR-LA and DR-LP water heaters, and comprises a thermostat that is fitted to the rim of the draught diverter. In the event of flue gas spillage occurring, due to down draught or lack of buoyancy in the flue system, the thermostat will shutdown the heater.

LPG Fuels

All Dorchester water heaters are suitable for Natural Gas or LPG fuel. The fuel type must be specified at the time of ordering.

It is strongly recommended that on LPG installations, gas detection equipment is fitted and that this equipment is positioned near the heater and at low level. It is also imperative that the plant room is ventilated at high and low level.

Permanent Pilot Ignition (DR-LP)

On Dorchester DR-LP models there is a permanent pilot ignition system with automatic gas valve and safety pilot which is monitored by means of a thermocouple device. A piezo spark device is fitted to provide ignition for the pilot flame.

Fully Automatic Ignition (DR-LA)

Dorchester DR-LA models are equipped with a fully automatic ignition system. A fully electronic soft start gas valve and hot surface ignition ensures reliable burner operation.

Anode Protection

DR-LA and DR-LP models are all fitted with removable magnesium sacrificial anodes as standard, ensuring excellent protection against corrosion. Clearance is required above the unit for maintenance and replacement of the magnesium sacrificial anodes.

Flexible Magnesium Sacrificial Anodes (Optional)

Flexible replacement magnesium anodes can be ordered as an option where clearance above the unit is restricted. The fixed anodes can be used from installation, and when in need of replacement, then the flexible anodes can be used.

Electrical Anode Protection (Optional)

In areas of the country with particularly soft water supplies having electrical conductivity less than 200 micro-siemens, such as Scotland, Devon and Cornwall, magnesium sacrificial anodes may not be fully effective in providing protection against internal corrosion.

The optional electrical protection replaces the magnesium sacrificial anodes and is effective in providing internal corrosion protection with water supplies having electrical conductivity levels as low as 125 micro-siemens. A further benefit of this system is that it can remove the need for the full clearance required for maintenance above the heater.

It is essential for correct operation that an uninterrupted 24-hour power supply is maintained at all times to ensure proper protection of the unit.

Electrical anode protection will be factory fitted where specified at the time of ordering.

Open Ventted or Sealed Systems

The water heaters are suitable for open ventted or unvented systems using an optional unvented supply kit.

Unvented Supply Kit (Optional)

All Dorchester water heaters are suitable for installation in direct unvented systems. The expansion vessel is sized for the water heater and local pipe work only, and should be re-sized if used on larger systems.



Unvented supply kit for local use.

The unvented supply kit allows the water heater to be fed directly from the mains water supply or from a booster pump set without the need for header tanks. The kit contains all the essential components to comply with the Water Supply (water fittings) Regulations 1999, including a suitably sized pressure and temperature relief valve, which locates directly into the water heater. *Refer to page 10 for more details.*

Temperature Control

The outlet temperature of the heater is regulated by the control thermostat which is housed in the control panel. The operating temperature set point is adjustable from 40°C to 73°C with two-stage limit protection. An intermediate limit temperature setting of 84°C will prevent the burner firing until temperature conditions return to normal, when the unit will reset automatically via the control panel. The high temperature limit setting is 93°C, at which point the unit will shut down and require manual reset.

Specification

Dorchester DR-LA & DR-LP

Top to Bottom Pump Recirculation Kit (Optional)

In order to prevent stratification within the heater, thus creating a zone of lower temperature water that can possibly lead to the proliferation of Legionella bacteria, a top to bottom re-circulation kit should be specified. The top to bottom circulator should be controlled to run during the anti-legionella purge cycle. Alternatively, by constantly returning water from the flow connection back into the base of the heater, a uniform temperature is maintained.

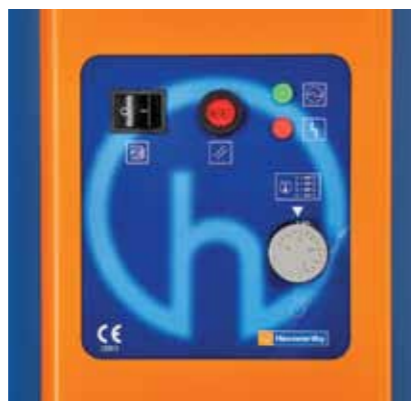
The kit includes a pump, isolation valves, non-return valve and pipe work for fitting on site.



Top to Bottom Recirculation Kit.

Close Temperature Control Kit (Optional DR-LA)

For applications requiring above average temperature control, an optional electronic thermostat kit can be fitted. This will provide close control of the flow temperature within $\pm 2.5^{\circ}\text{C}$, dependent on the operating conditions.



Control Panel.

Control Panel - DR-LA

DR-LA, fully automatic models, have a pre-wired control panel which includes on/off switch, control thermostat, power indicator, lockout indicator and reset button. Volt free contacts and a frost protection thermostat are fitted as standard. A fully electronic soft start gas valve and hot surface ignition ensures reliable burner operation.

Volt Free Contacts - DR-LA

DR-LA models are equipped with volt free contacts to facilitate remote signalling, for integration with a controls system or for remote monitoring.

The volt free contacts indicate lockout and normal run conditions.

Frost Protection - DR-LA

Dorchester DR-LA water heaters are supplied as standard with a frost protection thermostat. When the on/off switch on the control panel is in the off position, the frost protection system will initiate firing of the burner when the stored water temperature falls below the set point, to provide protection against freezing in the cylinder.



Close Temperature Controller.

Delivery

Dorchester water heaters are delivered factory assembled and mounted within protective frames, shrink wrapped and on a timber pallet base.

Draught diverters are supplied separately in a cardboard carton for fitting on site.

All Hamworthy products are delivered to site on a tail-lift vehicle, and deliveries are closely co-ordinated with the customer, to suit the on-site construction programme. Standard delivery is to ground level from the tail-lift vehicle. *To enquire about special delivery services, please contact our customer services team. Tel: 0845 450 2865.*

Commissioning

Hamworthy Heating strongly recommend that all water heaters are commissioned by their service department who will issue an appliance log book that details the initial operating settings, and which can be used to record all future maintenance work.

For more information on commissioning, contact Hamworthy Heating Service department. Telephone 0845 450 2866, or email service@hamworthy-heating.com

Maintenance

Installed water heaters will experience a wide variation in operating conditions that can occur due to the variable chemical nature of distributed water supplies. It is therefore strongly recommended that water heaters 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 should be serviced annually.

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, with the local water provider.

Appropriate water treatment, where advised, to reduce scale build up, should be referred to water treatment specialists.

Technical Data

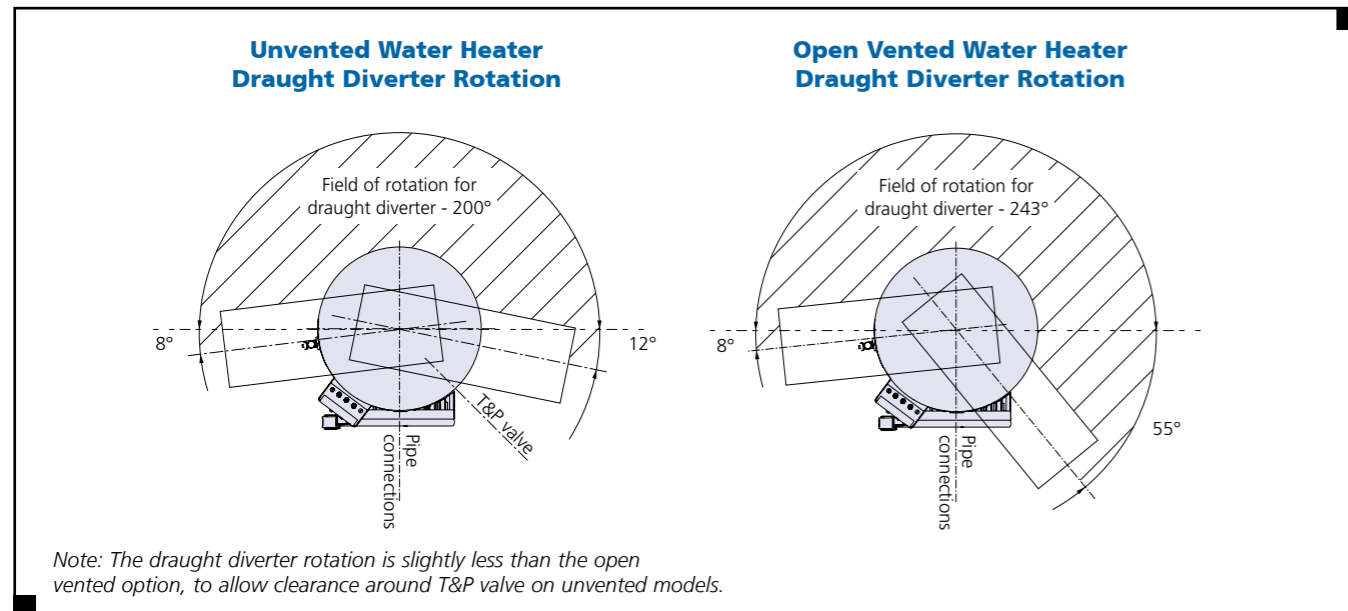
Dorchester DR-LA & DR-LP

Performance and General Data Information

Models		DR-LA/LP 30	DR-LA/LP 40	DR-LA/LP 45	DR-LA/LP 60	DR-LA/LP 75	DR-LA/LP 95	DR-LA 110	
Continuous output with 44°C Δt	l/h	620	819	964	1197	1425	1836	2103	
	UK gal/h	136	180	212	263	313	404	463	
Continuous output with 50°C Δt	l/h	545	721	848	1053	1254	1614	1851	
	UK gal/h	120	159	187	232	276	355	407	
Storage capacity	litres	324	374	312	351	291	265	264	
	UK gal	71	82	69	77	64	58	58	
Time to recover storage 44°C Δt	mins	31	27	19	17	12	8	7	
Time to recover storage 50°C Δt	mins	35	31	22	20	14	10	8	
Output maximum	kW	31.7	41.9	49.3	61.2	72.9	93.9	107.6	
	btu/h (x1000)	108	143	168	209	249	320	367	
Input (gross) maximum	kW	41.4	55.4	65.2	81.0	96.4	124.2	140.6	
	btu/h (x1000)	141	189	222	276	329	424	480	
Input (nett) maximum	kW	37.3	49.9	58.7	72.9	86.8	111.8	126.6	
	btu/h (x1000)	127	170	200	249	296	381	432	
Maximum water pressure	bar	8							
Gas flow rate natural gas (G20) – Maximum	m ³ /h	4.0	5.4	6.3	8.2	9.4	12.1	14.0	
Gas flow rate propane (G31) - Maximum	m ³ /h	1.4	2.0	2.4	3.0	3.4	4.3	4.9	
Nominal gas inlet pressure natural gas (G20)	mbar	20							
Maximum gas inlet pressure natural gas (G20)	mbar	25							
Maximum flue gas temperature	°C	180	200	200	180	180	200	185	
Water flow and inlet connection	in	1½" Rp							
Gas connection	in	¾" Rp						1" Rp	
Drain connection	in	1½" Rp							
T & P Valve connection	in	1" NPT				1½" Rp			
Draught diverter spigot ID horizontal connection	mm	150		180		225			
	mm	150		180		225			
Draught diverter spigot ID angled connection	mm	150		180		225			
	mm	150		180		225			
Nominal supply voltage		230V, 1Ph, 50Hz							
Approx. shipping weight	kg	214	242	230	259	265	291	350	

Dimensional Details

Dorchester DR-LA & DR-LP

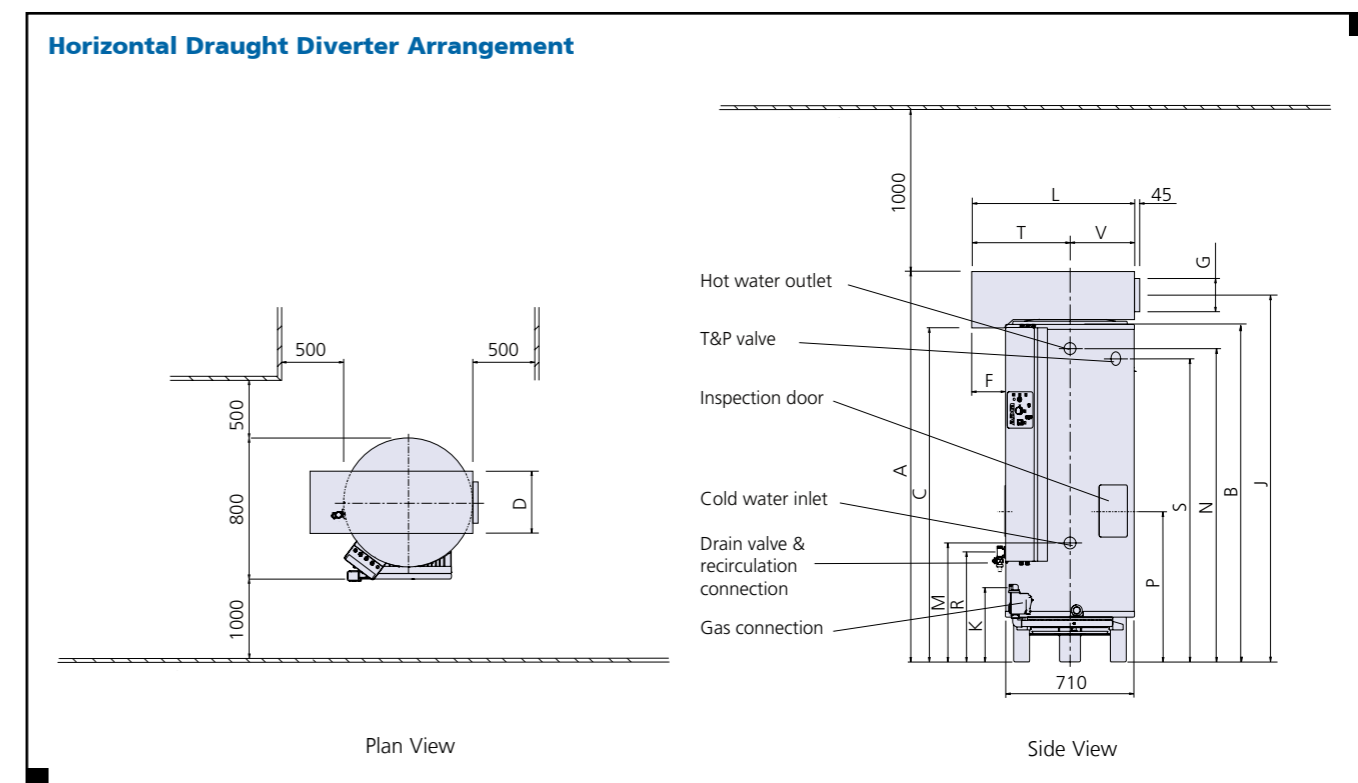
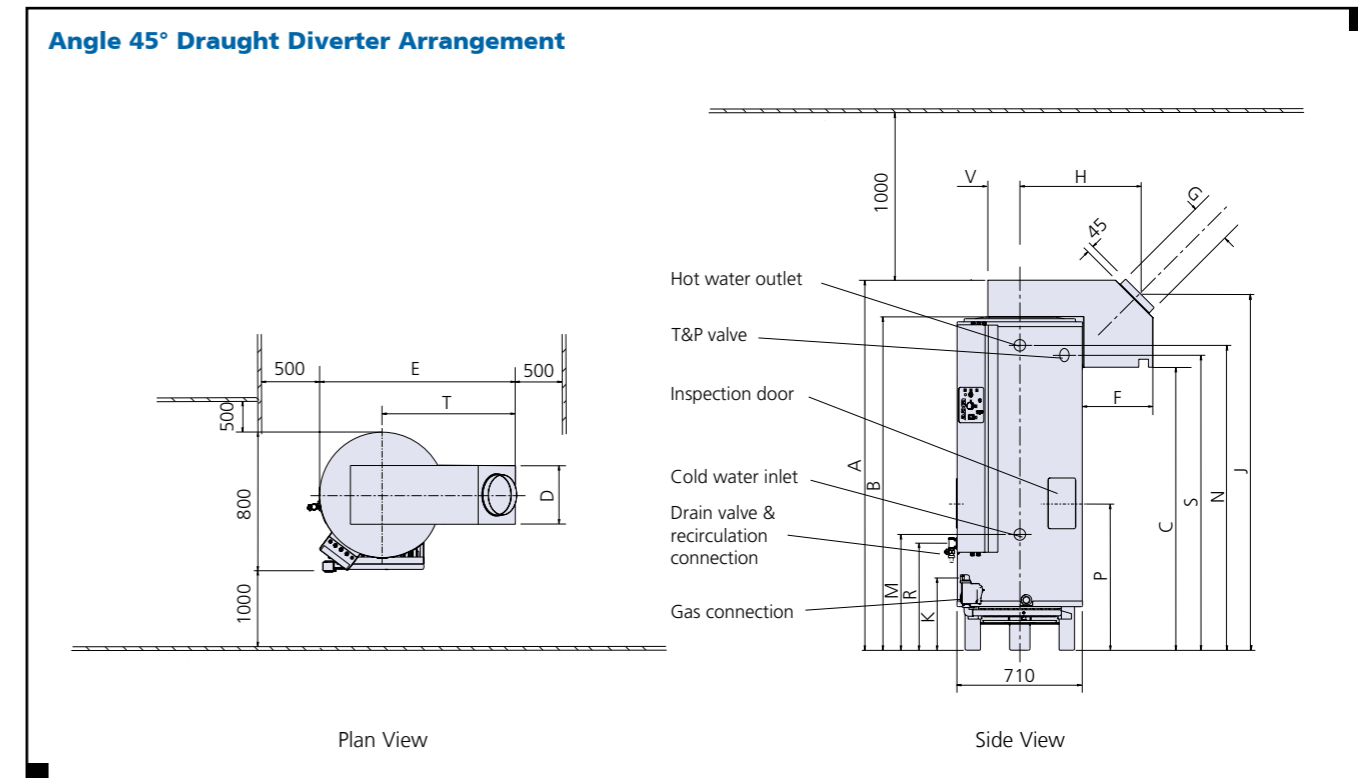


Models		DR-LA/LP 30	DR-LA/LP 40	DR-LA/LP 45	DR-LA/LP 60	DR-LA/LP 75	DR-LA/LP 95	DR-LA 110
Overall height	A	1900	2100	1900	2040	2000	2025	2085
Cylinder height	B	1760	1960	1760	1900	1795	1810	1870
Horizontal DD	C	1640	1840	1640	1695	1565	1580	1640
Angle 45° DD	C	1480	1680	1480	1620	1510	1535	1595
Horizontal DD	D	285			325			
Angle 45° DD	D	290			330			
Width inc. DD	E	1100			1105			
Horizontal DD	F	255		340	395			
Angle 45° DD	F	355		390				
Flue spigot dia.	G	150		180	225			
Flue centre line	H	640			675			
Flue centre line	J	1840	2040	1840	1980	1935	1950	2010
Gas Connection Auto	K	400			340	400	340	205
Gas Connection Pilot	K	205			NA			
Horizontal DD	L	970		1055	1110			
Cold water inlet	M	565		505	575	590	650	
Hot water outlet	N	1605	1810	1605	1750	1640	1655	1715
Inspection door	P	730		670	740	765	855	
Drain	R	500	515	500	455	525	540	595
T&P valve	S	1550	1760	1550	1700	1595	1600	1660
Horizontal DD	T	610		695	750			
Angle 45° DD	T	745		750				
Horizontal DD	V	360			180			
Angle 45° DD	V	155		180				

DD= Draught Diverter Auto=DR-LA models Pilot=DR-LP models

Dimensional Details

Dorchester DR-LA & DR-LP



Note: Draught diverter must be specified at time of ordering - Horizontal or 45 degree angled off-take.

System Schematics

Dorchester DR-LA & DR-LP

Unvented Systems

Following the publication of Part G3 of the Building Regulations, provisions were issued for the essential safety requirements necessary on unvented hot water storage systems. These requirements are now covered in law by The Water Supply (Water Fittings) Regulations 1999.

The safety system comprises of a number of essential controls pre-set to specific and very important pressure and temperature levels. To ensure that the controls are correctly sized for application, set to appropriate levels and assembled in the correct order, Hamworthy Heating offer the unvented kit as a single WRAS approved "water train" with a separate temperature/pressure relief valve sized to suit the energy input of the heater. This considerably simplifies site installation, leaving the installer to connect from the water main to the water train and from the train to the heater.

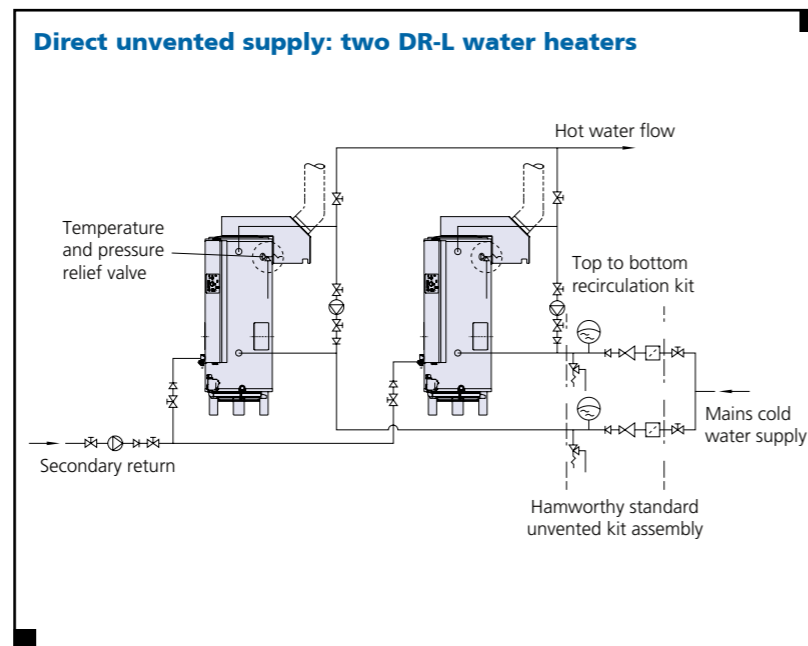
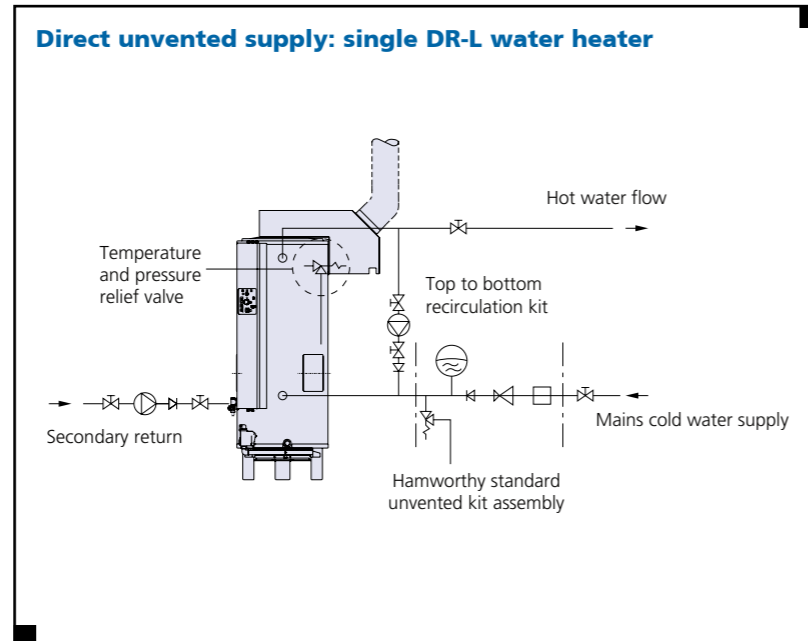
A connection is provided on all DR-L water heaters for the fitting of the temperature and pressure (T&P) relief valve, the discharge of which should be via an air break to a tundish. For comprehensive recommendations on the design, installation and testing of services supplying water within buildings, attention is drawn to the appropriate sections of BS 6700.

Unvented Supply Kit (Optional)

Each unvented supply kit is designed to be used with an individual water heater. Multiple water heater installations should be specified with one unvented supply kit per water heater. Each unvented supply kit comprises 1" nominal components as follows:

- Strainer
- Adjustable pressure reducing valve with tapping points for inlet and outlet pressure measurement
- Non return valve
- 3/4" Expansion relief valve, 6 bar
- Temperature and pressure relief valve, 7 bar, 95°C
- 24 Litre expansion vessel, 3.5 bar cushion pressure

For large hot water systems or systems with additional storage tanks, alternative expansion vessel capacity may be required. Consult with Technical team for full range of Hamworthy expansion vessels. Tel: 01202 662500.



System Schematics

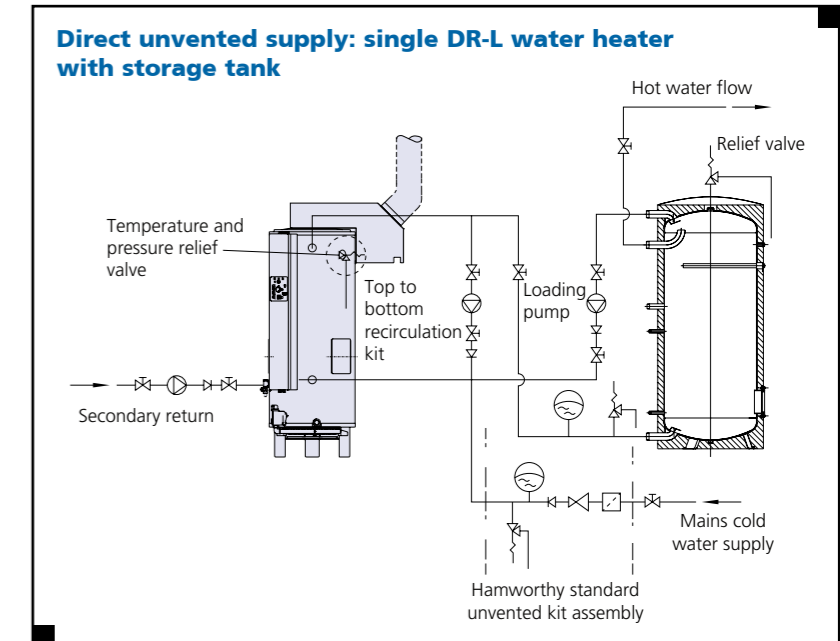
Dorchester DR-LA & DR-LP

Unvented Systems

For systems requiring peak load high volumes of hot water, Dorchester DR-L water heaters can be installed with additional storage tanks. Using a loading pump, water is transferred between the water heater and the storage tank creating a large volume hot water store. The loading pump can be thermostatically controlled to turn off once the storage tank reaches set point temperature, saving electrical energy.

Cooler secondary return water is re-circulated to the water heater for re-heating.

With unvented systems, additional expansion vessel capacity is required to cater for the storage tank volume.

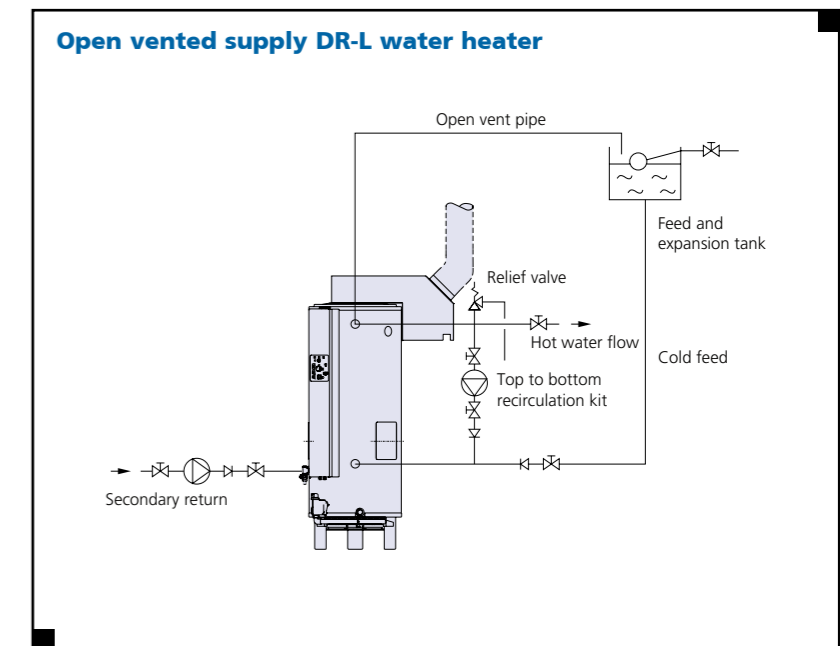


Open Vented Systems

With open vented systems the feed and expansion tank must be sized to provide sufficient cold water storage and accommodate expanded system water without the risk of overflowing.

System operating pressure is a direct result of the height of the feed and expansion tank. The feed and expansion tank must therefore be carefully located to ensure sufficient head pressure and flow is maintained at all outlets likely to be operating concurrently.

The minimum recommended height for the bottom of the feed and expansion tank above the hot water heater is 2 metres



Wiring Diagrams

Dorchester DR-LA & DR-LP

Power Supply

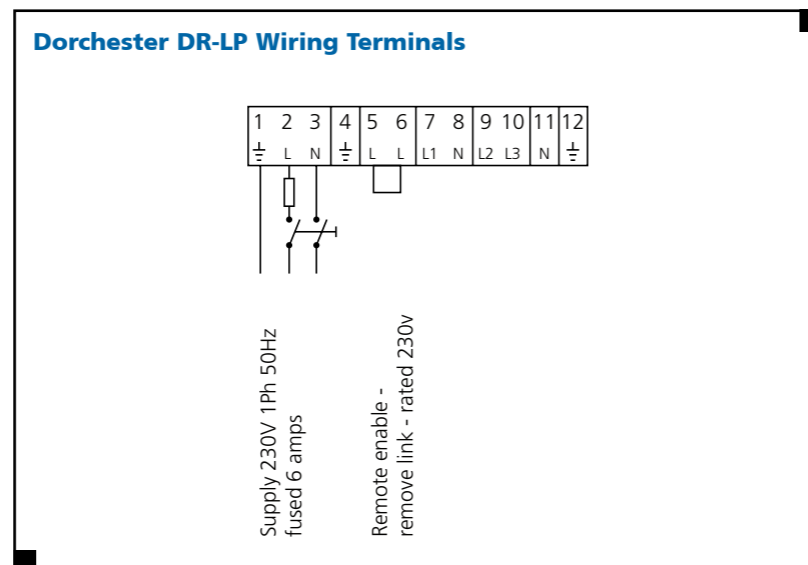
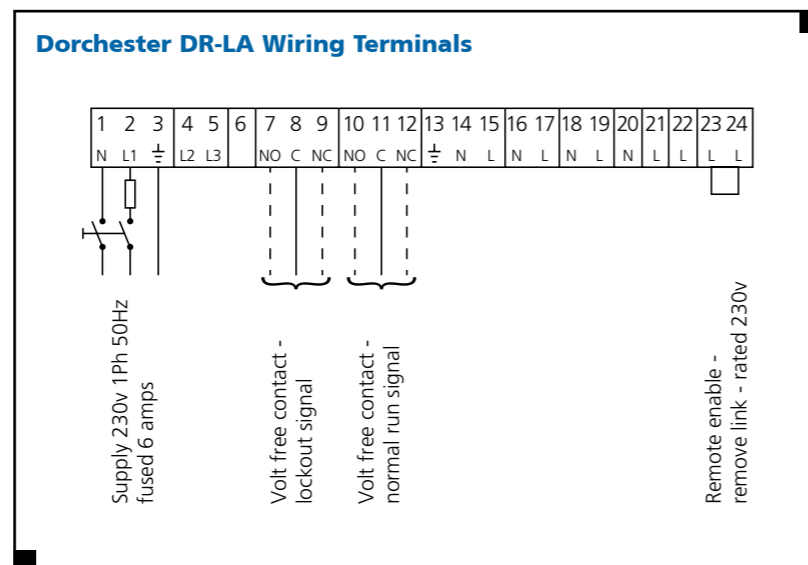
An independent isolator and fused electrical supply is recommended for each water heater. Supply 230 Volt, 50Hz, single phase. Wiring external to the water heater must be installed in accordance with IEE Regulations and any local regulations which apply. Wiring must be completed in heat resistant 3 core cable, size 1.00 mm². External fuses should be 6 Amp.

Remote Enable

Each water heater has the facility for receiving a remote enable signal for connecting external controls such as remote time clocks or BMS. The hard wired link in the water heater control panel must first be removed and the appropriate terminals hard wired to external control. The remote enable control circuit operates at 230V and any external control must be equipped with a volt free contact switching circuit.

Remote Signalling

Dorchester DR-LA fully automatic water heaters are supplied with volt free contacts as standard to indicate lockout and normal run. Each set of contacts is BMS compatible and rated up to 230V. Normally open as well as normally closed contacts are provided with each set of contacts.



Sizing Guidance Notes

Dorchester DR-LA & DR-LP Water Heaters

The following notes are given for guide-line purposes and the assumptions made are general. The diversification of hot water requirements are great and each particular application must be examined in detail.

General Guide-lines

There are applications where sizing a water heater is a straightforward exercise. An obvious example is an industrial hot water load for a 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 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. Other types of installations which can be easily sized are sports pavilions and leisure centres, especially those catering for team games, when a known number of players 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 one shower running continuously for 1 hour can dump 328 l (72 gal). Multiplied by 10 or 20 this can represent a large load which is obviously 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.

The third category comprises almost all other commercial and industrial applications where hot water demand is random. To size the hot water requirement it is necessary to determine when the demand is greatest. Obviously if the water heater can cope with the peak demand, the remainder will be adequately catered for. However, the heater cannot be sized on the assumption that all outlet appliances will run continuously for 1 hour since this will result in gross over-sizing of heaters. Since there are no common usage of diversity factors in general use, simple guide-lines and common sense must be used to estimate "how many times a bath will be used per hour or how long is an average shower, or how many people will bath rather than shower?" Listed below are a series of guide-lines which may prove helpful in sizing Hamworthy water heaters.

Restaurants, Kitchens, etc Serving Main Meals

Each meal will use:

9 litres (2.0 gal) at 60°C (140°F)

Made up from:

3 litres (0.75 gal) preparation, 6 litres (1.25 gal) washing up

The peak period would be spread over 1, 2 or 3 hours etc, depending on the establishment.

Bar sinks - allow 114 litres (25 gal) per hour.

School kitchens in general use 30% less than restaurants but allowance should be made for the number of sittings.

Hotels and Motels

Assume average occupancy as 1½ people per room unless specified as single rooms.

Generally the peak will occur over a two hour period in the morning (7.0am-9am). In specialised hotels catering for specific functions (i.e. conferences) the peak could be reduced to one hour. For medium sized hotels 100-200 people allow 25-35 litres (6-8 gal) hot water per person over two hour peak period. For smaller hotels allow more per person - for larger hotels allow 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 times per hour.

Always check restaurant load to ensure that peak morning capacity will cover it. Overall, allow 115-135 litres (25-30 gal) per guest per day.

Dormitories

Allow 15 litres (3.2 gal) per man, 20 litres (4.2 gal) per woman over a peak 1 hour period.

Flats and Apartment Blocks

Assume average occupancy of 2½ people per flat. Allow 38 litres (8.4 gal) per person over a peak 3 hour period.

Rest and Convalescent Homes - with Kitchen and Laundry

Allow 38 litres (8.4 gal) per person over a peak 3 hour period.

Industrial Shower Rooms

Assume shower period to be 20 minutes at the end of each shift and that all showers and wash taps are running continuously for this period at full flow i.e. dump load 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.

Offices

Allow 1.5 litres (0.33 gal) per person per hour for 1 hour peak load.

Commercial Laundry

Allow 6 litres (1.25 gal) per lb of wash at 71°C (160°F).

Launderettes

Determine the cycle time of the machines (add 10 minutes for unloading and reloading). Calculate the number of cycles that occur in one hour and multiply 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.

Hairdressers and Beauty Salons

Allow 280 litres (63 gal) per hour of water at 60°C (140°F) per wash basin per peak demand.

Hospitals etc.

Demand will depend on the type of hospital, nursing home, etc. Overall consumption per person per day of hot water can range between 70 litres (15.4 gal) - 230 litres (52 gal).

Sizing Guidance Notes

Dorchester DR-LA & DR-LP Water Heaters

In all applications it is desirable to cross check general assumptions with actual flow rates and capacities and 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 following tables gives 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 bath per hour, 2 showers each of 10 minutes, sinks filled one per hour, etc.

Approximate Flow Rates From Standard Fittings

Fitting	Flow rate	
	l/s	UK gal/min
Wash basin tap	0.15	2.0
Wash basin spray tap	0.05	0.7
Bath tap	0.30	4.0
Sink tap 15mm	0.20	2.6
Sink tap 20mm	0.30	4.0
Shower spray head	0.15	2.0
Shower 100mm rose	0.40	5.3

Approximate Mixed, Hot and Cold Capacities of Appliances in Normal Use

Cold water 10°C (50°F), hot water 60°C (140°F), mixed water 40°C (104°F)

Appliance	Capacity In Normal Use		Amount of Hot Water		Amount of Cold Water		Temperature in Use	
	l	UK gal	l	UK gal	l	UK gal	°C	°F
Wash basin	5	1.1	3.0	0.66	2.0	0.44	40	104
Bath	80	17.6	48.0	10.60	32.0	7.00	40	104
Small sink	12	2.6	7.2	1.60	4.8	1.00	40	104
Large sink	18	4.0	10.8	2.40	7.2	1.60	40	104
1 min shower spray	9	2.0	5.4	1.20	3.6	0.80	40	104
5 min shower spray	45	9.9	27	5.90	18.0	4.0	40	104
1 min shower (100mm rose)	24	5.3	14.4	3.20	9.6	2.10	40	104
5 min shower (100mm rose)	120	26.4	72.0	15.80	48.0	10.60	40	104

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:

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

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 (140°F) for various cold water supply temperatures and various mixed water temperatures.

Factors at Various Cold Water and Mixed Water Temperature for Determining Hot Water Quantity at 60°C (140°F)

Cold Water Supply Temperature	Mixed Water Temperature						
	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

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

The output figures given are based on a rise in the temperature of 44°C i.e. with a storage temperature of 60°C the cold water supply must be at 16°C. The following table indicates the continuous output of the heater with various temperature rises across the heaters.

The normal maximum storage temperature is 60°C and hence 55°C is the maximum rise expected across the heater with a cold water supply

temperature of 5°C. It is possible however that for certain applications a higher storage temperature will be required when, if the cold water supply temperature remains at 5°C the calorifier outputs will be further reduced.

The question of additional storage if required and how much should be looked at in light of general consumption throughout the day, recovery times, whether the peak period is spread over 1 hour or 3 hours and whether a larger storage buffer than the calorifiers own storage is required to guard against the possibility of high flow rates at peak time.

Where the installation requires the use of large volumes of hot water over short periods and a storage tank

is specified, a loading pump will be required to transfer hot water from the calorifier into the storage tank. This should be a bronze pump and sized to suit the continuous output of the water heater under design temperature conditions.

It is important that cold water supply capacities and pressures as well as pipe work layouts are suitable for high volume draw off at peak times to ensure satisfactory hot water delivery to draw off points.

One or more storage tanks may be used in conjunction with Powerstock Calorifiers to satisfy hot water demand.

Model	Temperature Rise Across Calorifier (Hot Water Temperature - Cold Water Supply Temperature)			
	40°C (72°F)	44°C (80°F)	50°C (90°F)	55°C (100°F)
DR-LA/LP 30	683	621	546	497
DR-LA/LP 40	904	822	723	658
DR-LA/LP 45	1062	965	849	772
DR-LA/LP 60	1319	1199	1055	959
DR-LA/LP 75	1570	1427	1256	1142
DR-LA/LP 95	2022	1838	1617	1470
DR-LA 110	2316	2105	1852	1684

Powerstock Storage Tanks

Hot Water Storage

Powerstock hot water storage tanks are the perfect partner for Dorchester water heaters where large volumes of hot water are required with intermittent use.

Available in 300, 500, 750 and 1000 litre capacities, these high quality glass lined storage tanks can be installed in single or multiple configurations to match the hot water demand.

Powerstock storage tanks are WRAS approved and suitable for both unvented and open vented applications

Options

- Unvented supply kit
- Top to bottom pump recirculation kit
- Electrical anode protection
- Electric immersion heater kit

For further details of Powerstock Storage Tanks, refer to brochure 500002488.





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Hamworthy reserves the right to make changes and improvements which may necessitate alteration to the specification without prior notice.

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