Telford STAINLESS PRODUCTS

Tornado & Tempest Stainless™

Installation Guide
(including Solar & Horizontal)

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WATERHEATER MANUFACTURERS ASSOCIATION

benchmark COLLECTIVE MARK
THE MARK OF QUALITY FOR THE INSTALLATION, COMMISSIONING AND SERVICING OF DOMESTIC HEATING AND HOT WATER SYSTEMS

WRAS APPROVED PRODUCT

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Pbf.48994

March 2014

MAINS PRESSURE DOMESTIC HOT WATER APPLIANCE

Telford STAINLESS PRODUCTS

Tempest & Tornado Stainless

Mains pressure domestic hot water cylinder

STORAGE CAPACITY IN LITRES	WEIGHT WHEN FULL IN KGS
90	125
125	165
150	195
170	220
200	250
250	310
300	360
400	448
500	557

Water Supply Pressure	
Max 10 Bar	Min 1.5 Bar
Electric Immersion Heaters	
14"/3kW • 230V AC	
Operating Pressure	
3 BAR	
Expansion Vessel Charge Pressure	
See guide	
Expansion Relief Valve Setting	
6 BAR	
Pressure & Temperature Relief Valve Setting	
7 BAR / 90°C	
Maximum Primary Working Pressure	
2.5 BAR	
APPLIANCE SERIAL NO:	
Weight & Litres Capacity Litres	Kgs
Direct	Indirect

WARNING TO USER:

- This appliance **MUST** be serviced annually by a competent person.
- Failure to comply with the above will invalidate the manufacturer's warranty.
- Do not remove or adjust any component part of this unvented water heater: Contact the installer.
- If this unvented water heater developes a fault, such as a flow of hot water from the discharge pipe, switch the heater off and contact the installer.

WARNING TO INSTALLER:

- This installation is subject to building regulation approval, notify Local Authority of intention to install.
- Use only manufacturer's recommended replacement parts.

Installed by:

Name: .....

Address: .....

.....

Tel. No.: .....

Completion Date: .....

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Technical help 7961

Telford Copper Cylinders Limited Unit 22 Furrows Business Park Telford TF1 2FE

Telford STAINLESS PRODUCTS

	Date	Parts Replaced	Installers Reg. No.
Installed and Commissioned			
First Annual Service			
Second Annual Service			
Third Annual Service			
Fourth Annual Service			
Fifth Annual Service			
Sixth Annual Service			
Seventh Annual Service			
Eighth Annual Service			
Ninth Annual Service			
Tenth Annual Service			

NOTES

Tornado Stainless **Tempest Stainless**

1	Cold fill connection - $^{3}/_{4}$" F *
2	Boiler flow and return connections - $^{3}/_{4}$" F * (Indirect version only)
3	Hot Water Draw Off - $^{3}/_{4}$" F *
4	Immersion Heater - supplied loose (Two with direct versions)
5	Cylinder Thermostat pocket - 22mm (Indirect version only)
6	Pressure and temperature relief valve-fitted

* 400 litre cylinders and above are fitted using 1" BSP F.

Components supplied for fitting on site:
Inlet Control Group *(comprising of a pressure reducing valve set to 3.0 bar, single check valve, filter and expansion valve set to 6.0 bar). Cylinder thermostat (indirect models only)* Energy cut out valve *(indirect models only).* Tundish Expansion vessel (8 litre on 90 litre models, 1*2 litre on 125* & 150 litre models, 18 litre on 170 & 200 litre models, 24 litre on 250 & 300 litre models, and 50 litre on 400 and 500 litre models) and Immersion heater(s).

STEP 1

- Read this instruction book carefully before proceeding. Tornado and Tempest Stainless™ cylinders are mains pressure products and are unvented. Unvented hot water systems should only be fitted and serviced by competent persons, as defined by the current edition of the Building Regulations (England and Wales) Approved Document G or equivalent regulations.
- The Tornado Stainless™ expansion vessel fits inside the top of the case. Tempest Stainless™ expansion vessel is fitted outside the case. Please verify which model you have before proceeding with the installation.
- The unit must be stored in an upright and dry place before installation.
- Only use the components supplied with the Tornado and Tempest Stainless.™ Failure to do so is potentially dangerous and will invalidate the product guarantee.
- The Tornado and Tempest Stainless™ should be connected to a public mains water supply through the Inlet Control Group supplied. Indirect models must only be used with pumped primary system.
- The standard Tornado and Tempest Stainless™ cannot be used with solid fuel boilers where legislation applies.
- Tornado and Tempest Stainless™ mains pressure systems require an annual safety check by a competent person. **Failure to carry out this safety check will invalidate the warranty.**

STEP 2

Measure the area in which you plan to install the Tornado and Tempest Stainless™ and ensure that the floor can support the weight of the cylinder when full.

Capacity (litres)	Weight When Full (Kgs)	Tornado Stainless Overall Height (mm)	Tempest Stainless Overall Height (mm)	External Diameter (mm)	Heat Up Time 0 - 60°C (mins)	Re-Heat Time to 60°C after 70% Draw Off (mins)
90	125	1220	750	510	26	18
125	165	1420	935	510	36	25
150	195	1540	1060	510	37	26
170	220	1780	1200	510	36	25
200	250	1600	1120	554	33	24
250	310	1920	1330	554	35	25
300	360	2080	1650	554	40	29
400	480	-	1590	660	46	34
500	580	-	1835	660	52	39

Please note the above figures are for guideline purpose only.

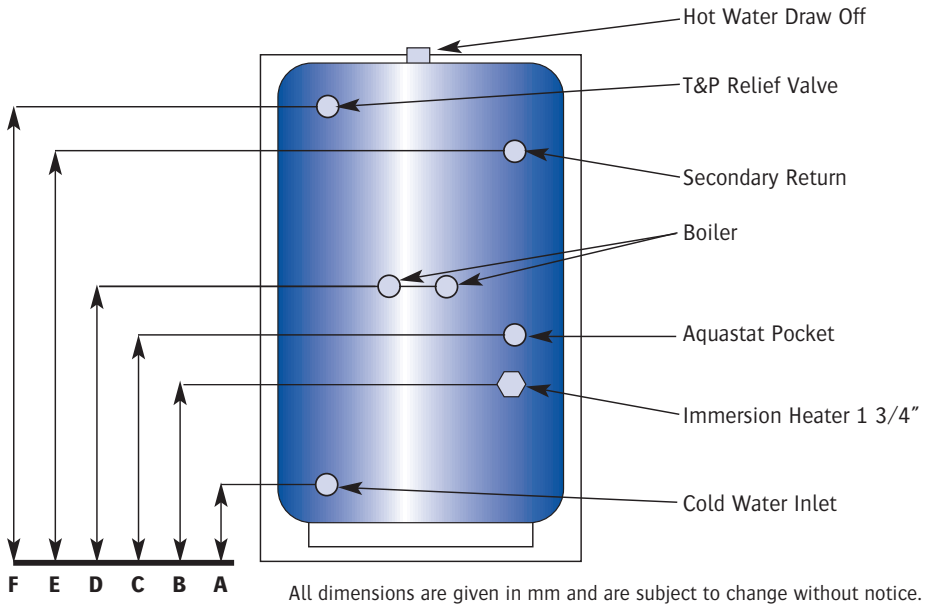
Heat-up and re-heat times are for indirect models. All dimensions and weights are nominal.

Tornado and Tempest Stainless™ are designed to work efficiently under most water flow and pressure conditions. However, the full potential of a mains pressure system is unlikely to be achieved if the flow falls below 20 L/Min and the dynamic pressure is less than 1.5 bar. A minimum of 300mm clear space should be left above the Tornado Stainless for maintenance.

PROBLEM Solving:

SYMPTOM	POSSIBLE CAUSES	ACTION
No flow	Mains service valve not open Blocked filter.	Open stop valve or replace. Clean filter in base of Pressure Reducing Valve.
Low Pressure	Service valve not fully open or partially blocked filter. Restricted delivery pipework Low mains pressure.	Ensure service valve is fully open or clean filter in PRV. Replace damaged or old pipework. Check incoming mains pressure or discuss with local water supplier
Discharge from P&T or P valve(s)	Expansion vessel. Inlet Pressure Reducing Valve. Defective expansion relief valve or debris or scale on seating of valve. Defective or incorrectly set cylinder thermostat (ie temperature set too high) allowing water to overheat. Crossflow from uncontrolled cold water mains supply to mixer tap or shower valves.	Replenish or replace in accordance with instructions in the maintenance section. Replace PRV Operate expansion relief valve mechanism to clear debris. If discharge does not stop replace expansion relief valve. Check setting and operation of cylinder thermostat (55-65°C). Replace if necessary. Check mixer taps and shower valve and fit check valves or area pressure controls if required. Alternatively supply cold water to mixer tap or shower valves from balanced supply position on inlet control set.
INDIRECT		
Water fails to heat	Boiler not working. Pump and/or control valve not operating. Cylinder thermostat upper limit stat has operated.	Check boiler controls. Check control functions and replace faulty parts. Reset the button on the dual cylinder thermostat after investigating cause of overheating.
Not enough hot water	Cylinder too small.	Check storage specification is adequate. Telford Service Department can help.
Water not hot enough	Boiler not providing enough heat. Cylinder thermostat settings incorrect.	Adjust thermostat to between 55°C and 65°C. Ensure boiler thermostat is set to above 75°C.
DIRECT		
Water fails to heat	Upper limit cut-out switch has operated in immersion heater.	Turn off electricity supply, open cap of I/H and reset cut-out (red button) or press external reset button if fitted.

DIMENSIONS - TEMPEST INDIRECT HI GAIN



All dimensions are given in mm and are subject to change without notice.

Cap (Ltr)	90	125	150	170	200	250	300	400	500
Height	750	935	1060	1200	1120	1330	1650	1590	1835
Diameter	510	510	510	510	554	554	554	660	660
A	170	170	170	170	195	195	195	240	240
B	200	200	200	200	225	225	225	270	270
C	400	400	400	450	475	555	555	640	640
D	495	495	495	600	625	845	845	870	890
E	-	-	-	-	815	975	1255	1240	1390
F	550	750	880	1030	930	1140	1435	1340	1590

Cap (L)	Time to re-heat from Cold	Time to re-heat from 75% draw-off with Boiler
90 Ltr	13 Min	9 Min
125 Ltr	19 Min	13 Min
150 Ltr	19 Min	13 Min
170 Ltr	19 Min	13 Min
200 Ltr	17 Min	12 Min
250 Ltr	18 Min	13 Min
300 Ltr	20 Min	15 Min
400 Ltr	23 Min	18 Min
500 Ltr	25 Min	20 Min

Foam Information
ODP Ozone Depletion potential = 0
GWP Global Warning Potential = 2.2
Foam Type = Polyurethane
British Standard 1566, D: 2002

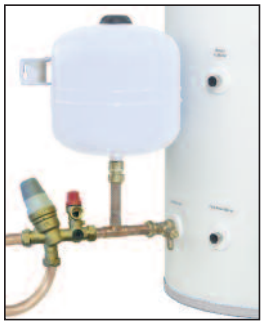
Parts Supplied
Dual High Limit Stat
3Kw Immersion Heater 240V single Phase
Expansion Vessel
Temperature & Pressure Relief
3Bar Inlet Control Group
2 Port Motorised Valve

Cap (L)	24 Hrs Standing Heat Loss	Immersion Heater
90 Ltr	1.21Kw/24Hrs	1 x 3Kw 240v single phase
125 Ltr	1.33Kw/24Hrs	1 x 3Kw 240v single phase
150 Ltr	1.50Kw/24Hrs	1 x 3Kw 240v single phase
170 Ltr	1.62Kw/24Hrs	1 x 3Kw 240v single phase
200 Ltr	1.75Kw/24Hrs	1 x 3Kw 240v single phase
250 Ltr	2.10Kw/24Hrs	1 x 3Kw 240v single phase
300 Ltr	2.30Kw/24Hrs	1 x 3Kw 240v single phase
400 Ltr	2.94Kw/24Hrs	1 x 3Kw 240v single phase
500 Ltr	3.15Kw/24Hrs	1 x 3Kw 240v single phase

To prevent damage to the coil, cylinder and cylinder connections, make any soldered joints before connecting pipework to the Tornado and Tempest Stainless.™

STEP 3 *(all cylinders)*

Position the unit vertically and make the incoming cold water connection to the fitting labelled "mains water inlet".
For commissioning and later maintenance purposes it is essential to fit a service valve immediately before the connection to the Inlet Control Group.



Inlet group with expansion vessel position (Tempest only) also shows drain off position and balanced supply.

Installing the Inlet Control Group
The mains cold water supply should first pass through the pressure reducing valve, which reduces the pressure to 3.0 bar - this is factory set and cannot be adjusted - and then through the 6.0 bar *expansion valve* . The Inlet Control Group includes a single check valve and filter.

*__NB__ Upon commissioning. The expansion vessel pressure, should be adjusted to 0.2 bar less than the incoming water pressure. The vessel needs to be installed in a secure fashion.

Ensure that the Inlet Control Group is fitted adjacent to the cylinder with the arrows on the side pointing in the direction of the flow. It must be no further away than 500mm from the cylinder and have no devices or connections/draw offs between it and the cylinder*. Balanced supplies for showers and mixer taps only should be taken from the appropriate connection on the Inlet Control Group(see illustration). Water regulations require that a single check valve should be fitted in the balanced draw off to prevent back flow. The inlet group supplied incorporates a single check within the body of the group.

*The expansion vessel for the Tempest Stainless™ must be fitted between the inlet control group and the unit (see illustration)

- A suitable means for draining the unit must be incorporated into the cold feed (see illustration) - Positioning the drain as suggested will allow a minimum of 80% of the cylinder to be drained off.

STEP 4 *(all cylinders)*

Connect the discharge pipework and tundish to the valve labelled "P&T" The tundish should be connected to the cylinder using 15mm metal pipe.

The tundish (supplied) must be fitted within 600mm of the outlet of the P&T valve and have at least 300mm of straight metal pipe below it, before any elbow or bend.

The pipework below the tundish should be fitted in accordance with the current edition of the Building Regulations *(see page 7).*

The discharge from the expansion valve on the Inlet Control Group must be connected into the discharge pipe work.

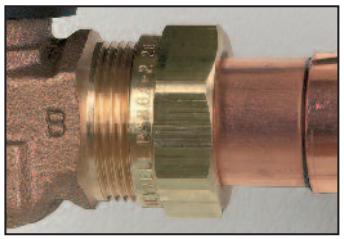
We recommend a double check valve should be fitted to the hot water draw off to prevent any back pressure.

STEP 5 *(indirect cylinders only)*

Connect the boiler flow and return to the labelled connections. Before making the connections ensure that the coil is free from obstructions by blowing through it.

The Energy Cut Out valve is an essential part of the safety requirements for indirect mains pressure cylinders and should be installed on the primary flow to the cylinder with port 'B' *(embossed on side of valve body)* to the cylinder. The valve will open and close on receiving a signal from the cylinder thermostat. No further control is required for the hot water in a two zone valve system. **This valve must also be used in a flow share (Y Plan) system, in conjunction with the mid-position valve, to act as a safety cut out valve.**

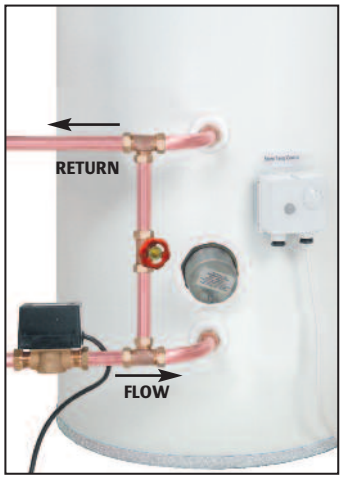
The cylinder thermostat controls the temperature of the hot water and also acts as an emergency cut out in the event that the boiler temperature controls fail. The cylinder thermostat is fitted into the pocket labelled "Store Temp Control" in the cylinder, and should be connected to operate the energy cut out valve in accordance with the wiring diagram for the scheme being installed *(see pages 11 and 12)*.



STEP 6 *(all cylinders)*

Connect hot water draw off to connection labelled "Hot Water Draw Off".

NB: If the secondary circulation system (where used) contains more than 15 litres of water a separate expansion vessel must be provided to compensate for the larger stored volume.



STEP 7 *(all cylinders)*

Make electrical connections to the immersion heaters - see wiring diagram inside cap of immersion heater. All electrical installations must be to IEEE standards.

The immersion heaters supplied with the Tornado and Tempest Stainless™ cylinder are of a special construction and include both a control thermostat and overheat protection. When fitting, ensure the 'O' ring is positioned correctly on the head of the immersion heater and lubricate before fitting. Fit it by hand until almost home then tighten gently as the 'O' rings will seal easily. **Only use genuine replacement parts which can be obtained from a Telford Copper Cylinders approved merchant.**

Ensure that the immersion heater control setting is set between 55°C and 65°C for economical operation. **The upper limit thermostat is set to 80°C and must not be tampered with.**

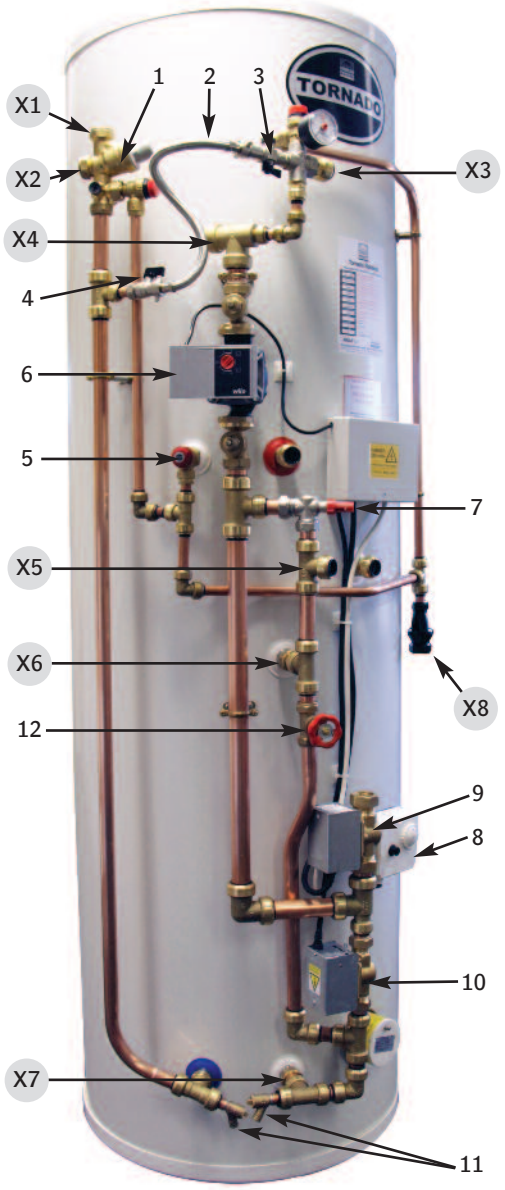


DIAGRAM KEY

X1 - Mains water feed

X2 - Balanced supply

X3 - Heating expansion vessel connection

X4 - Flow from boiler

X5 - Return to boiler

X6 - Return from coil

X7 - Flow to coil

X8 - Discharge to outside (D2)

1 - Inlet Group

2 - Filling loop

3 - Isolating valve to heating

4 - Isolating valve

5 - T&P Relief

6 - Pump

7 - By-pass

8 - Cylinder aquastat

9 - Heating 2 port valve

10 - Hot water 2 port valve

11 - Drain off point

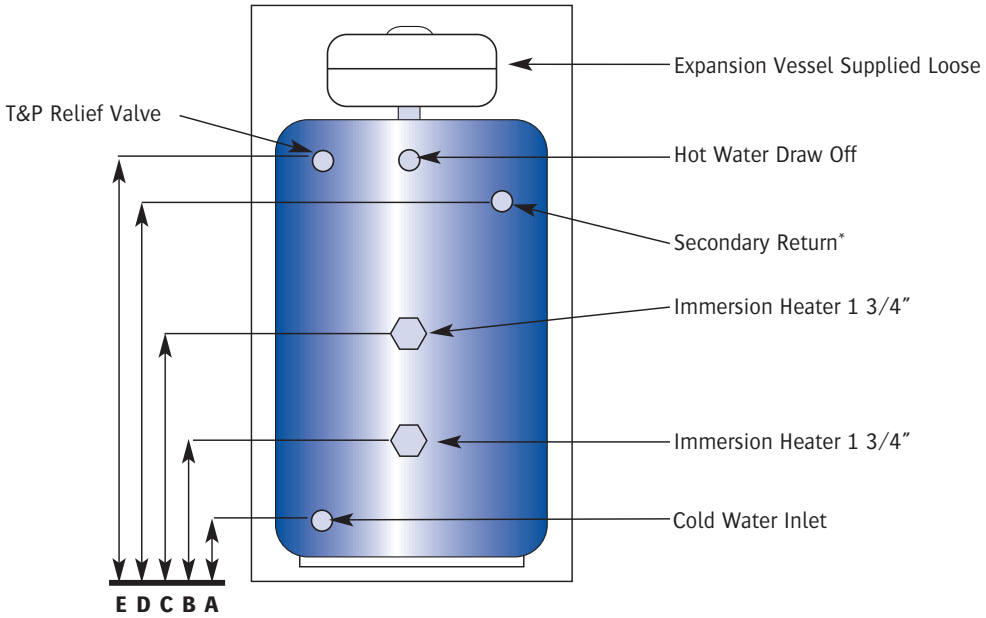
12 - Coil by-pass regulator valve

DO NOT use the pipework as a carrying aid when positioning this cylinder.

Separate power supplies must be made available for the pump, two port valves and the aquastat.

Installation must be carried out as described in this installation guide with reference to this section where appropriate. This will ensure compliance with Building Regulations, IEEE Regulations and Telford Copper Cylinders warranty provisions.

DIMENSIONS - TORNADO DIRECT



All dimensions are given in mm and are subject to change without notice

Cap (Ltr)	90	125	150	170	200	250	300
Height	1220	1420	1540	1780	1600	1920	2080
Dia	510	510	510	510	554	554	554
A	170	170	170	170	195	195	195
B	200	200	200	200	225	225	225
C	495	495	495	600	625	845	845
D	-	-	-	-	815	975	1255
E	550	750	880	1030	930	1140	1435

Parts Supplied	
3Kw Immersion Heater 240V single Phase	Temperature & Pressure Relief
Expansion Vessel	3Bar Inlet Control Group

Foam Information
ODP Ozone Depletion Potential = 0
GWP Global Warning Potential = 2.2
Foam Type = Polyurethane
British Standard 1566,D:2002

Cap (L)	24Hrs Standing Heat Loss	Immersion Heater
90Ltr	1.21Kw/24Hrs	1 x 3Kw 240v single phase
125Ltr	1.33Kw/24Hrs	1 x 3Kw 240v single phase
150Ltr	1.50Kw/24Hrs	1 x 3Kw 240v single phase
170Ltr	1.62Kw/24Hrs	1 x 3Kw 240v single phase
200Ltr	1.75Kw/24Hrs	1 x 3Kw 240v single phase
250Ltr	2.10Kw/24Hrs	1 x 3Kw 240v single phase
300Ltr	2.30Kw/24Hrs	1 x 3Kw 240v single phase

Cap (L)	Time to re-heat from cold	Time to Re-heat from 75% Draw-off with Boiler
90Ltr	52 Min	27 Min
125Ltr	72 Min	37 Min
150Ltr	86 Min	45 Min
170Ltr	98Min	51 Min
200Ltr	108 Min	63 Min
250Ltr	144 Min	75 Min
300Ltr	202 Min	136 Min

STEP 8 *Commissioning & Operating*

Ensure all connections are fully tightened.

Open all of the hot taps supplied by the cylinder and slowly fill the unit by opening the service valve. Continue to fill the unit until water runs continuously from all of the open taps. Open the service valve fully, and close all hot taps.

Check for leaks.

Heat the water to 60°C. When up to temperature, the cylinder should be isolated and drained to flush out any flux/solder introduced during the installation process. The filter in the inlet control set should be removed, cleaned and re-fitted - *see photograph.*

Reheat the cylinder to desired temperature and recheck for leaks.

For safety and energy saving reasons it is advisable to operate the Tempest Tornado Stainless™ at a temperature between 55°C and 60°C.

STEP 9

Place this instruction book in a convenient place for the end user. Complete the Benchmark Log Book and leave with the cylinder. Complete the guarantee card and post to Telford Copper Cylinders to validate the warranty.

We recommend the installation of a 22mm gate valve between the flow connection on the cylinder and the return connection on the cylinder as illustrated in image in step 6 page 5.

Discharge - Building Regulations:

Discharge pipes must be installed in accordance with the latest edition of the Building Regulations.

Discharge Pipes

The discharge pipe (D1) from the vessel up to and including the tundish is generally supplied by the manufacturer of the hot water storage system (see paragraph 3.5). Where otherwise, the installation should include the discharge pipe(s) (D1) from the safety device(s). In either case the tundish should be vertical, located in the same space as the unvented hot water storage system and be fitted as close as possible and within 600mm of the safety device e.g. the temperature relief valve.

The discharge pipe (D2) from the tundish should terminate in a safe place where there is no risk to persons in the vicinity of the discharge, be of metal and:

a. be at least one pipe size larger than the normal outlet size of the safety device unless its total equivalent hydraulic resistance exceeds that of a straight pipe 9m long i.e. discharge pipes between 9m and 18m equivalent resistance length should be at least two sizes larger than the nominal outlet size of the safety device, between 18 and 27m at least 3 sizes larger, and so on. Bends must be taken into account in calculating the flow resistance. Refer to Diagram 1, Table 1 and the worked example. An alternative approach for sizing discharge pipes would be to follow BS 6700: 1987 *Specification for design installation, testing and maintenance of services supplying water for domestic use within buildings and their curtilages,* Appendix E, section E2 and table 21.

b. have a vertical section of pipe at least 300mm long, below the tundish before any elbows or bends in the pipework.

c. be installed with a continuous fall.

d. have discharges visible at both the tundish and the final point of discharge but where this is not possible or is practically difficult there should be clear visibility at one or other of these locations. Examples of acceptable discharge arrangements are:

i. ideally below a fixed grating and above the water seal in a trapped gully.

ii. downward discharges at low level; i.e. up to 100mm above external surfaces such as car parks, hard standings, grassed areas etc. are acceptable providing that where children may play or otherwise come into contact with discharges a wire cage or similar guard is positioned to prevent contact, whilst maintaining visibility.

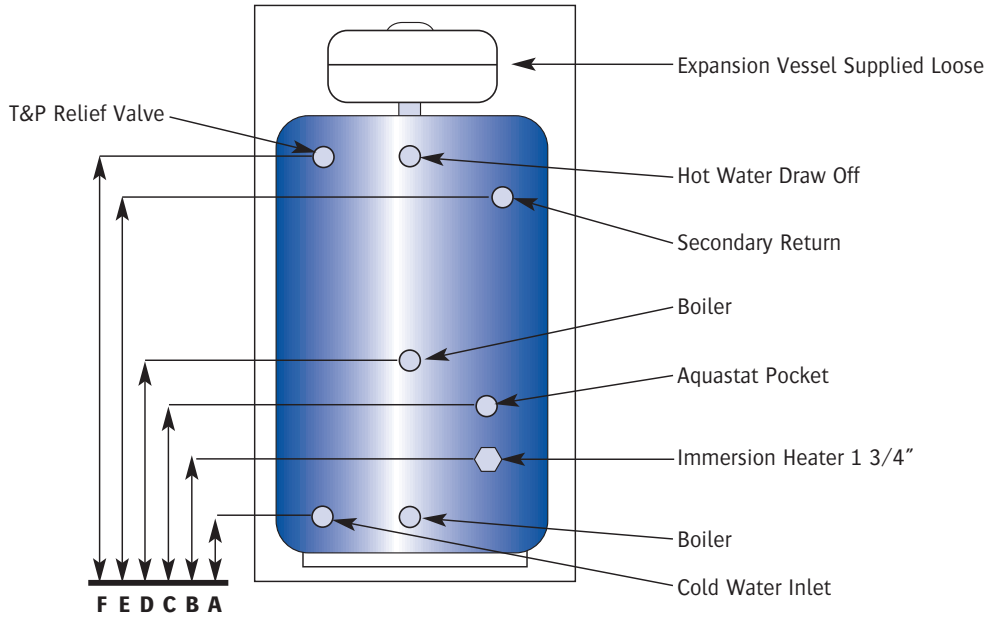
iii. discharges at high level; e.g. into a metal hopper and metal down pipe with the end of the discharge pipe clearly visible (tundish visible or not) or onto a roof capable of withstanding high temperature discharges of water and 3 m from any plastics guttering system that would collect such discharges (tundish visible).

iv. where a single pipe serves a number of discharges, such as in blocks of flats, the number served should be limited to not more than 6 systems so that any installation discharging can be traced reasonably easily. The single common discharge pipe should be at least one pipe size larger than the largest individual discharge pipe (D2) to be connected. If unvented hot water storage systems are installed where discharges from safety devices may not beapparent i.e. in dwellings occupied by blind, infirm or disabled people, consideration should be given to the installation of an electronically operated device to warn when discharge takes place.

Note:

The discharge will consist of scalding water and steam. Asphalt, roofing felt and non-metallic rainwater goods may be damaged by such discharges.

DIMENSIONS - TORNADO INDIRECT



All dimensions are given in mm and are subject to change without notice

Cap (Ltr)	90	125	150	170	200	250	300
Height	1220	1420	1540	1780	1600	1920	2080
Dia	510	510	510	510	554	554	554
A	170	170	170	170	195	195	195
B	200	200	200	200	225	225	225
C	400	400	400	450	475	555	555
D	495	495	495	600	625	845	845
E	-	-	-	-	815	975	1255
F	550	750	880	1030	930	1140	1435

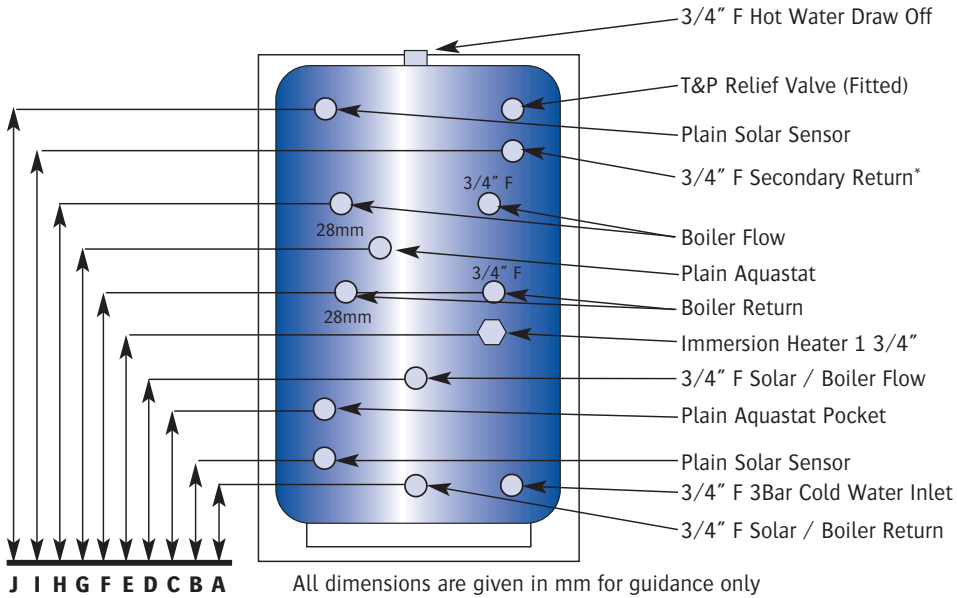
Parts Supplied	
Dual High Limit Stat	Temperature & Pressure Relief
3Kw Immersion Heater 240V single Phase	3Bar Inlet Control Group
Expansion Vessel	2 Port Motorised Valve

Foam Information
ODP Ozone Depletion Potential = 0
GWP Global Warning Potential = 2.2
Foam Type = Polyurethane
British Standard 1566,D:2002

Cap (L)	24Hrs Standing Heat Loss	Immersion Heater
90 Ltr	1.21Kw/24Hrs	1 x 3Kw 240v single phase
125 Ltr	1.33Kw/24Hrs	1 x 3Kw 240v single phase
150 Ltr	1.50Kw/24Hrs	1 x 3Kw 240v single phase
170 Ltr	1.62Kw/24Hrs	1 x 3Kw 240v single phase
200 Ltr	1.75Kw/24Hrs	1 x 3Kw 240v single phase
250 Ltr	2.10Kw/24Hrs	1 x 3Kw 240v single phase
300 Ltr	2.30Kw/24Hrs	1 x 3Kw 240v single phase

Cap (L)	Time to re-heat from cold	Time to Re-heat from 75% Draw-off with Boiler
90 Ltr	26 Min	18 Min
125 Ltr	36 Min	25 Min
150 Ltr	37 Min	26 Min
170 Ltr	36 Min	25 Min
200 Ltr	33 Min	24 Min
250 Ltr	35 Min	25 Min
300 Ltr	40 Min	29 Min

DIMENSIONS - TEMPEST TRIPLE COIL



All dimensions are given in mm for guidance only

* Cylinders 400 Ltrs and above are fitted with 1" BSPF Tappings

Cap (Ltr)	200	250	300	400	500
Height	1120	1330	1650	1590	1835
Dia	554	554	554	660	660
A	190	190	190	235	235
B	245	245	245	285	285
C	390	390	390	435	435
D	500	500	500	620	620
E	545	575	570	715	715
F	585	640	640	820	820
G	780	890	885	1120	1120
H	890	1025	1250	1240	1260
I	890	1025	1020	1240	1390
J	930	1140	1430	1340	1590

Cap (L)	24Hrs Standing Heat Loss	Immersion Heater	Boiler & Solar Cap (L)
170 Ltr	1.62Kw/24Hrs	3Kw 240v Single Phase	50% Solar 50% Boiler
200 Ltr	1.75Kw/24Hrs	3Kw 240v Single Phase	50% Solar 50% Boiler
250 Ltr	2.10Kw/24Hrs	3Kw 240v Single Phase	50% Solar 50% Boiler
300 Ltr	2.30Kw/24Hrs	3Kw 240v Single Phase	50% Solar 50% Boiler
400 Ltr	2.94Kw/24Hrs	3Kw 240v Single Phase	50% Solar 50% Boiler
500 Ltr	3.15Kw/24Hrs	3Kw 240v Single Phase	50% Solar 50% Boiler

Parts Supplied	
2 x Dual High Limit Stat	Temperature & Pressure Relief
3Kw Immersion Heater 240V single Phase	3Bar Inlet Control Group
Expansion Vessel	2 Port Motorised Valve

Cap (L)	Time to Re-heat from 75% Draw-off with Solar	Time to Re-heat from 75% Draw-off with Boiler
170 Ltr	Dependent on UV	85Ltr = 18Min
200 Ltr	Dependent on UV	100Ltr = 20Min
250 Ltr	Dependent on UV	125Ltr = 25Min
300 Ltr	Dependent on UV	150Ltr = 26Min
400 Ltr	Dependent on UV	200Ltr = 24Min
500 Ltr	Dependent on UV	250Ltr = 25Min

Foam Information
ODP Ozone Depletion Potential = 0
GWP Global Warning Potential = 2.2
Foam Type = Polyurethane
British Standard 1566,D:2002

DIAGRAM 1 - Typical discharge pipe arrangement

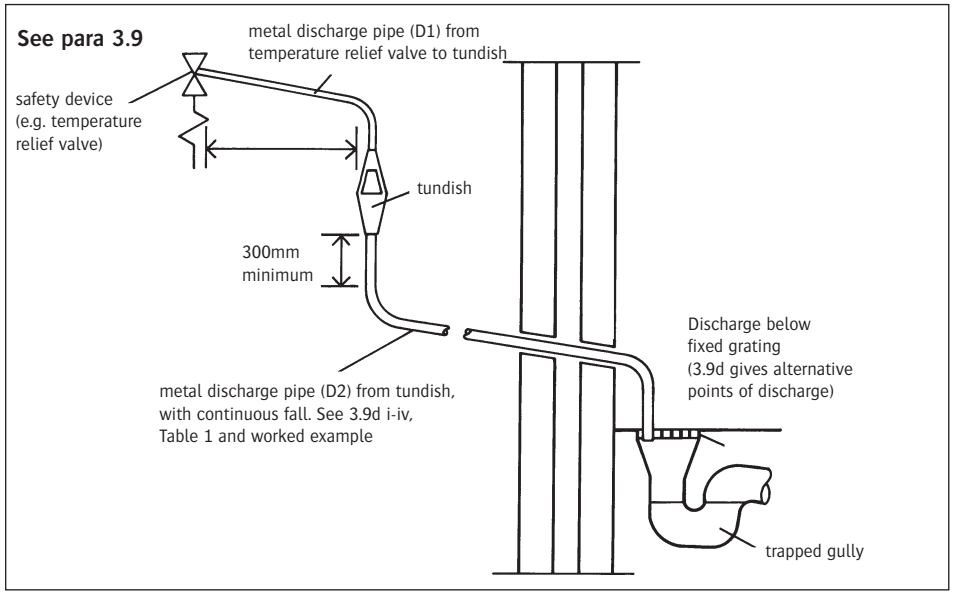


Table 1 - Sizing of copper discharge pipe 'D2' for common temperature relief valve outlet sizes

Valve Outlet Size	Minimum Size of Discharge pipe D1*	Minimum Size of Discharge Pipe D2* from tundish	Maximum resistance allowed, expressed as a length of straight pipe (i.e. no elbows or bends)	Resistance created by each elbow or bend
G½	15mm	22mm	up to 9m	0.8m
		28mm	up to 18m	1.0m
		35mm	up to 27m	1.4m
G¾	22mm	28mm	up to 9m	1.0m
		35mm	up to 18m	1.4m
		42mm	up to 27m	1.7m
G1	28mm	35mm	up to 9m	1.4m
		42mm	up to 18m	1.7m
		54mm	up to 27m	2.3m

*see 3.5, 3.9, 3.9(a) and Diagram 1

Worked Example:-

The example below is for a G½ temperature relief valve with a discharge pipe (D2) having 4 no. elbows and length of 7m from the tundish to the point of discharge.

From Table 1:

Maximum resistance allowed for a straight length of 22mm copper discharge pipe (D2) from a G½ temperature relief valve is: 9.0m. Subtract the resistance for 4 No. 22mm elbows at 0.8m each = 3.2m

Therefore the maximum permitted length equates to: 5.8m.

5.8m is less than the actual length of 7m therefore calculate the next largest size.

Maximum resistance allowed for a straight length of 28mm pipe (D2) from G1/2 temperature relief valve equates to: 18m.

Subtract the resistance for 4 No. 28mm elbows at 1.0m each = 4m.

Therefore the maximum permitted length equates to 14m.

As the actual length is 7m, a 28mm (D2) copper pipe will be satisfactory.

NOTES ON WATER QUALITY AND SCALING:

Water hardness can vary considerably around the country. If furring of kettles normally occurs in the area, then the unit should be fed with conditioned water only. This can be provided by a water softener with a high capacity flow rate, or a suitable water conditioner (not supplied). It is recommended that the temperature controls are set below 65^{0}C to prevent lime scale build up.

The performance of all water storage appliances and their associated components may deteriorate if you do not protect adequately against hard water scaling. If more than 150ppm salts are present in local water samples, an effective conditioner should always be used.

MAINTENANCE:

The following checks should be conducted annually:

Check the operation of the T & P valve and Expansion valve by rotating the heads of the valves in turn until water is discharged. The discharge should stop immediately when the valve head is released. Should this not be the case the valve should be replaced. Check that the discharged water flows freely to waste and that there is no blockage.

Remove and clean the filter in the Pressure Reducing Valve.

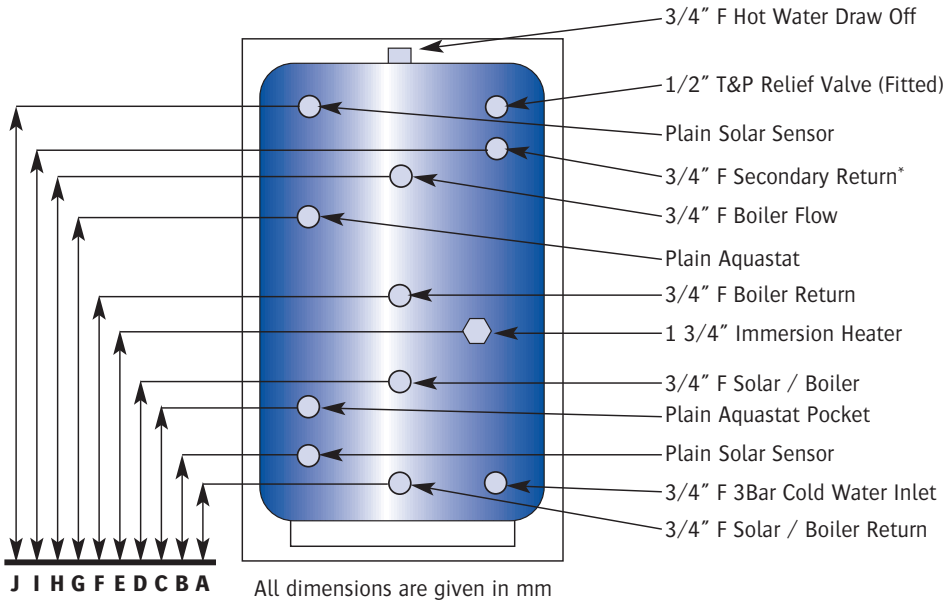
Check that the expansion vessel charge pressure is set at 0.2 bar below the incoming pressure. If water is being discharged from the expansion valve it may be indicative of pressure loss within the expansion vessel itself. To check the pressure, isolate the unit from the cold supply and release any pressure by opening a hot tap until water stops flowing. Then use a tyre pressure gauge to verify the charge pressure. If the unit is more than 5 years old when this problem is experienced it may be advisable to replace the pressure vessel. If however, the pressure in the expansion vessel is 0.2 bar below incoming pressure the discharge may be being caused by back pressure or cross-over between the cold and hot water supplies - see below.

To replace the pressure vessel, unscrew from threaded connection. The new pressure vessel should be adjusted to 0.2 bar below incoming pressure and then fitted to the cylinder, ensuring that the threads are sealed appropriately.

Back pressure
Back pressure from a faulty or uncontrolled mixer valve or appliance will cause the cylinder to over pressurise and may result in water being discharged from the expansion valves. To protect the cylinder we recommend the fitting of a check valve on the hot water draw off to prevent back flow into the cylinder.

Use only genuine Telford replacement parts on all repairs.

TEMPEST TWIN COIL / SOLAR INFORMATION DATA



All dimensions are given in mm

Cap (Ltr)	170	200	250	300	400	500
Height	1200	1120	1330	1650	1590	1835
Dia	510	554	554	554	660	660
A	175	190	190	190	235	235
B	175	245	245	245	285	285
C	395	390	390	390	435	435
D	500	500	500	500	620	620
E	535	545	575	570	715	715
F	585	585	640	640	820	820
G	865	780	890	885	1120	1120
H	N/A	890	1025	1250	1240	1390
I	1015	890	1025	1020	1240	1260
J	1040	930	1140	1430	1340	1590

* Cylinders 400 Ltrs and above are fitted with 1" BSPF Tappings

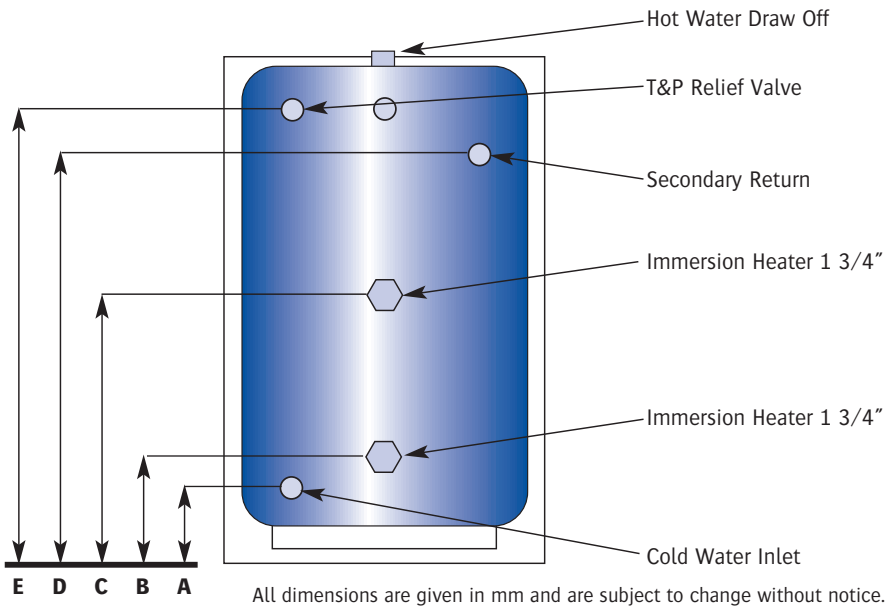
Cap (L)	24Hrs Standing Heat Loss	Immersion Heater	Boiler & Solar Cap (L)
170Ltr	1.62Kw/24Hrs	3Kw 240v Single Phase	50% Solar 50% Boiler
200Ltr	1.75Kw/24Hrs	3Kw 240v Single Phase	50% Solar 50% Boiler
250Ltr	2.10Kw/24Hrs	3Kw 240v Single Phase	50% Solar 50% Boiler
300Ltr	2.30Kw/24Hrs	3Kw 240v Single Phase	50% Solar 50% Boiler
400Ltr	2.94Kw/24Hrs	3Kw 240v Single Phase	50% Solar 50% Boiler
500Ltr	3.15Kw/24Hrs	3Kw 240v Single Phase	50% Solar 50% Boiler

Parts Supplied	
Dual High Limit Stat	Temperature & Pressure Relief
3Kw Immersion Heater 240V single Phase	3Bar Inlet Control Group
Expansion Vessel	2 Port Motorised Valve

Cap (L)	Time to Re-heat from 75% Draw-off with Solar	Time to Re-heat from 75% Draw-Off with Boiler
170Ltr	Dependent on UV	85 Ltr = 18 Min
200Ltr	Dependent on UV	100 Ltr = 20 Min
250Ltr	Dependent on UV	125 Ltr = 25 Min
300Ltr	Dependent on UV	150 Ltr = 26 Min
400Ltr	Dependent on UV	200 Ltr = 24 Min
500Ltr	Dependent on UV	250 Ltr = 25 Min

Foam Information
ODP Ozone Depletion Potential = 0
GWP Global Warning Potential = 2.2
Foam Type = Polyurethane
British Standard 1566,D:2002

DIMENSIONS - TEMPEST DIRECT



All dimensions are given in mm and are subject to change without notice.

Cap (Ltr)	90	125	150	170	200	250	300	400	500
Height	750	935	1060	1200	1120	1330	1650	1590	1835
Diameter	510	510	510	510	554	554	554	660	660
A	170	170	170	170	195	195	195	240	240
B	200	200	200	200	225	225	225	270	270
C	410	410	620	620	645	645	645	690	690
D	-	-	-	-	815	975	1255	1240	1390
E	550	750	880	1030	930	1140	1435	1340	1590

Cap (L)	Time to re-heat from Cold	Time to re-heat from 75% draw-off with Boiler
90 Ltr	52 Min	27 Min
125 Ltr	72 Min	37 Min
150 Ltr	86 Min	45 Min
170 Ltr	98 Min	51 Min
200 Ltr	108 Min	63 Min
250 Ltr	144 Min	75 Min
300 Ltr	202 Min	136 Min
400 Ltr	242 Min	198 Min
500 Ltr	289 Min	236 Min

Foam Information
ODP Ozone Depletion potential = 0
GWP Global Warning Potential = 2.2
Foam Type = Polyurethane
British Standard 1566, D: 2002

Parts Supplied
2 x 3Kw Immersion Heater 240V single Phase
Expansion Vessel
Temperature & Pressure Relief
3Bar Inlet Control Group

Cap (L)	24 Hrs Standing Heat Loss	Immersion Heater
90 Ltr	1.21Kw/24Hrs	2 x 3Kw 240v single phase
125 Ltr	1.33Kw/24Hrs	2 x 3Kw 240v single phase
150 Ltr	1.50Kw/24Hrs	2 x 3Kw 240v single phase
170 Ltr	1.62Kw/24Hrs	2 x 3Kw 240v single phase
200 Ltr	1.75Kw/24Hrs	2 x 3Kw 240v single phase
250 Ltr	2.10Kw/24Hrs	2 x 3Kw 240v single phase
300 Ltr	2.30Kw/24Hrs	2 x 3Kw 240v single phase
400 Ltr	2.94Kw/24Hrs	2 x 3Kw 240v single phase
500 Ltr	3.15Kw/24Hrs	2 x 3Kw 240v single phase

Lifetime Guarantee:

The Stainless steel vessel carries a lifetime guarantee against faulty manufacture or materials, provided that:

- The product is used solely for the storage of water from a mains public supply.
- The product has not been modified or tampered with.
- The product has been installed and maintained in accordance with the installation instructions.
- The product has not been subjected to damage caused by frost, or other external influence. The Guarantee Card, supplied with the product, has been completed and returned to Telford Water Heaters within 28 days of installation.

The immersion heater, water control valves, cylinder thermostat, expansion vessel and energy cut out valves are guaranteed for two years from the date of manufacture on a new build. For new install/replacement one year.

This guarantee is only available in the United Kingdom of Great Britain and Northern Ireland.

Claims made against our Lifetime Guarantee must be supported with evidence of purchase and the product serial number, along with a copy of the completed Benchmark Log Book.
Your Statutory rights are not affected by this guarantee.

All cylinders are WRAS Approved.

Exclusions to the guarantee
Any labour charges associated with replacement of the unit or any of its components.

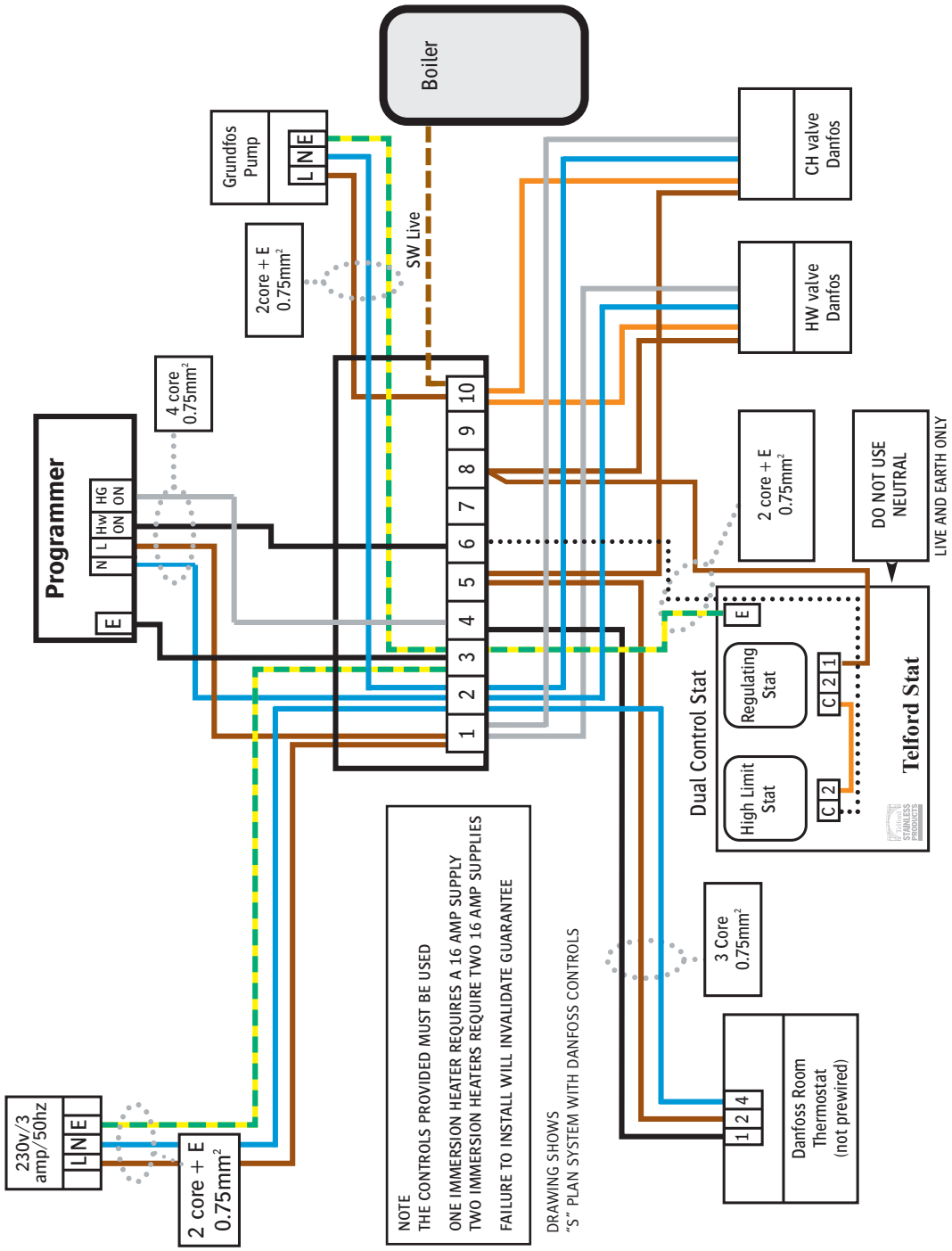
Any consequential losses caused by malfunction or failure of the unit.

The effects of scale build up.

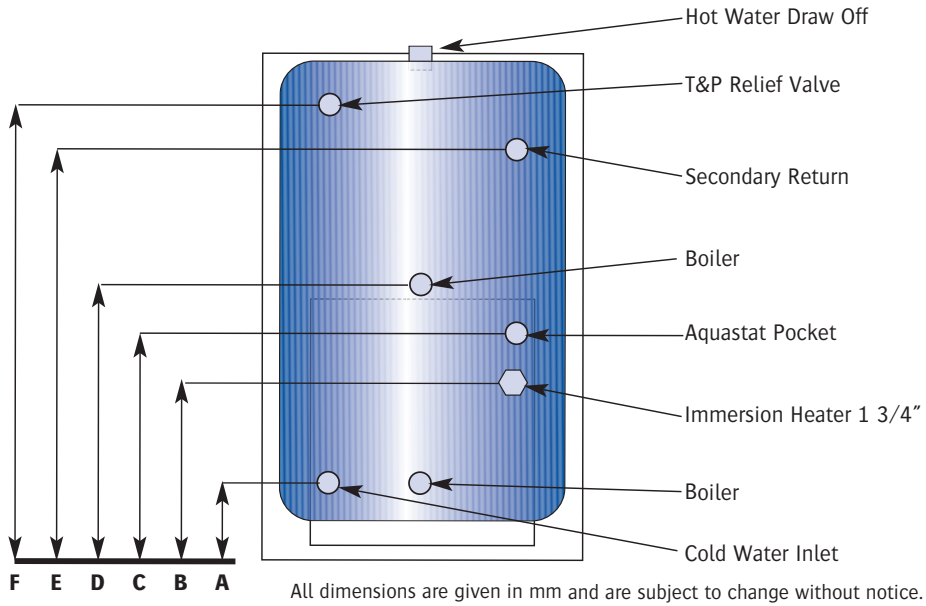
Failure to carry out the annual safety check on this product will invalidate the guarantee.

Failure to service the expansion vessel may cause a **serious escape of water.**

S-PLAN WIRING LAYOUT AND SYSTEMS SCHEMATIC



DIMENSIONS - TEMPEST INDIRECT



All dimensions are given in mm and are subject to change without notice.

Cap (Ltr)	90	125	150	170	200	250	300	400	500
Height	750	935	1060	1200	1120	1330	1650	1590	1835
Diameter	510	510	510	510	554	554	554	660	660
A	170	170	170	170	195	195	195	240	240
B	200	200	200	200	225	225	225	270	270
C	400	400	400	450	475	555	555	640	640
D	495	495	495	600	625	845	845	870	890
E	-	-	-	-	815	975	1255	1240	1390
F	550	750	880	1030	930	1140	1435	1340	1590

Cap (L)	Time to re-heat from Cold	Time to re-heat from 75% draw-off with Boiler
90 Ltr	26 Min	18 Min
125 Ltr	36 Min	25 Min
150 Ltr	37 Min	26 Min
170 Ltr	36 Min	25 Min
200 Ltr	33 Min	24 Min
250 Ltr	35 Min	25 Min
300 Ltr	40 Min	29 Min
400 Ltr	45 Min	35 Min
500 Ltr	50 Min	40 Min

Foam Information
ODP Ozone Depletion potential = 0
GWP Global Warning Potential = 2.2
Foam Type = Polyurethane
British Standard 1566, D: 2002

Parts Supplied
Dual High Limit Stat
3Kw Immersion Heater 240V single Phase
Expansion Vessel
Temperature & Pressure Relief
3Bar Inlet Control Group
2 Port Motorised Valve

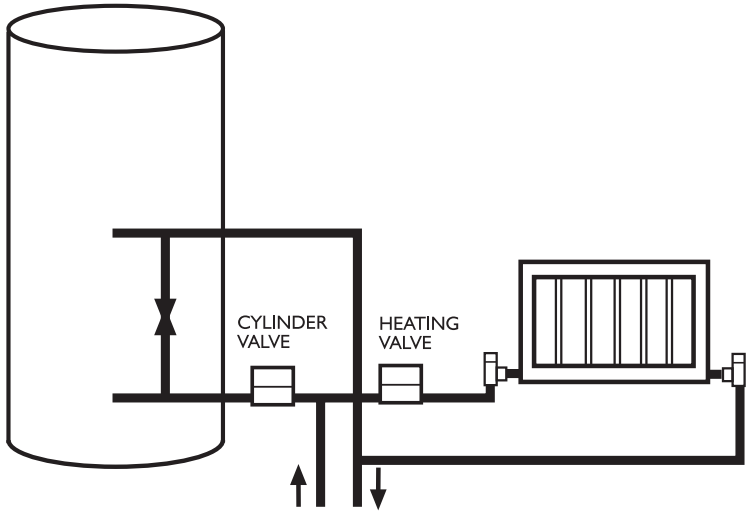
Cap (L)	24 Hrs Standing Heat Loss	Immersion Heater
90 Ltr	1.21Kw/24Hrs	1 x 3Kw 240v single phase
125 Ltr	1.33Kw/24Hrs	1 x 3Kw 240v single phase
150 Ltr	1.50Kw/24Hrs	1 x 3Kw 240v single phase
170 Ltr	1.62Kw/24Hrs	1 x 3Kw 240v single phase
200 Ltr	1.75Kw/24Hrs	1 x 3Kw 240v single phase
250 Ltr	2.10Kw/24Hrs	1 x 3Kw 240v single phase
300 Ltr	2.30Kw/24Hrs	1 x 3Kw 240v single phase
400 Ltr	2.94Kw/24Hrs	1 x 3Kw 240v single phase
500 Ltr	3.15Kw/24Hrs	1 x 3Kw 240v single phase

FITTING NOTES - HORIZONTAL

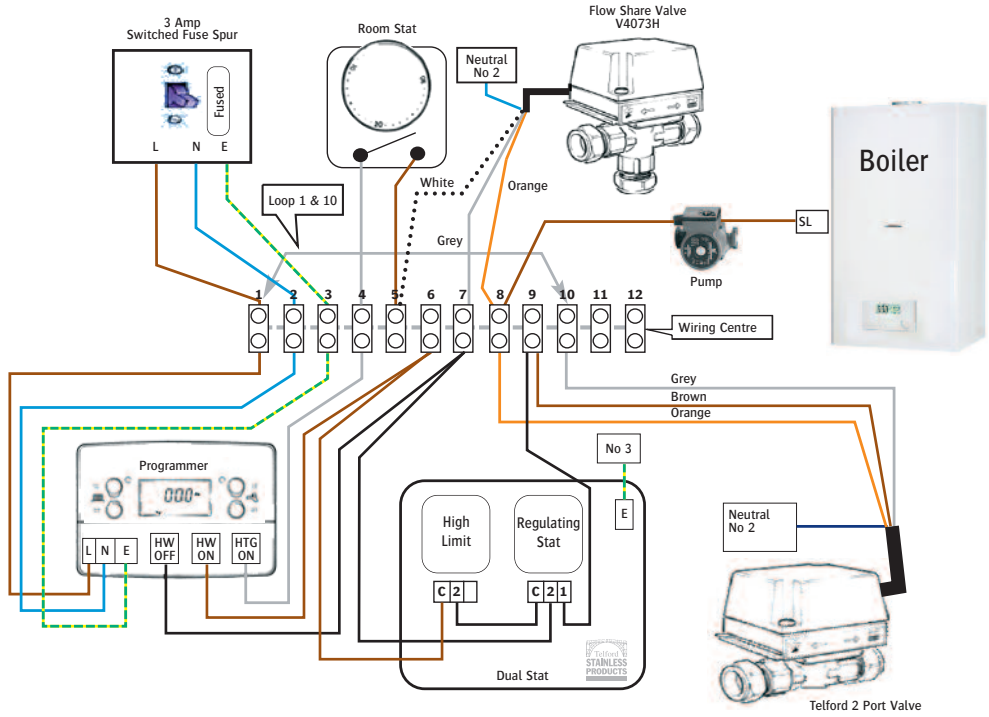
Installation must be carried out as described in this installation guide with reference to this section where appropriate. This will ensure compliance with Building Regulations, IEEE Regulations and Telford Copper Cylinders warranty provisions.

The cylinder should be mounted on the cradles (or other suitable support) so that the tappings A, B, C are along the top edge. The cylinder MUST NOT be rotated around the long axis.

PIPE WORK LOGIC LAYOUTS
S - PLAN SYSTEM



Y PLAN
TORNADO & TEMPEST STAINLESS
(WIRING FOR FLOWSHARE ONLY V4073H



Telford Copper Cylinders hold no responsibility for the wiring diagram above. The wiring diagram is for Guide line only

TELFORD SOLAR UNVENTED TWIN COIL CYLINDER STANDARD TAPPING DIAGRAM

* Cylinders 400 Ltr and above are fitted with 1″ BSPF Tappings

A	Solar Sensor Pockets
B	Hot Water Draw Off- $^3/_4$″ F
C	Pressure & Temperature relief valve - fitted
D	Boiler flow & return connections - $^3/_4$″ F
E	Cylinder thermostat pocket - 22mm
F	Immersion heater
G	Solar coil flow connection - $^3/_4$″ F
H	Solar coil return connection - $^3/_4$″ F
I	Auxiliary cylinder thermostat pocket - 22mm
J	Cold fill connection - $^3/_4$″ F

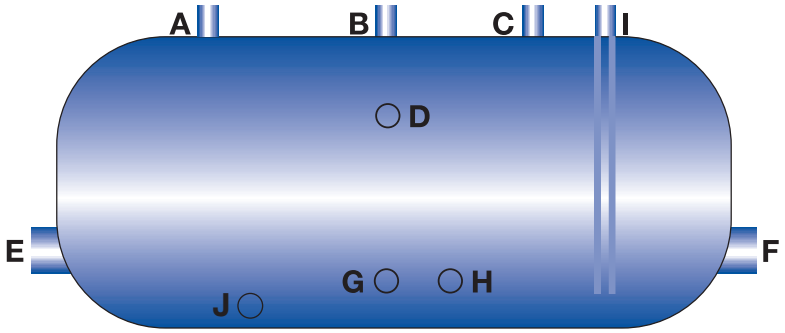
Position of tappings may differ slightly according to cylinder capacity.

The following components are supplied with the cylinder:-

T&P Relief Valve (fitted), Immersion Heater, Aquastat, Safety Cut Out Valve, High Pressure Inlet Group and Expansion Vessel (sized to suit).

Installation must be carried out as described in this installation guide with reference to this section where appropriate. This will ensure compliance with Building Regulations, IEEE Regulations and Telford Copper Cylinders warranty provisions.

HORIZONTAL INSTALLATION



All dimensions are given in mm and are subject to change without notice.

Cap (Ltr)	90*	125	150	170	200	250	300	400	500
Length	750	935	1060	1200	1120	1330	1650	1590	1835
Diameter	510	510	510	510	550	550	550	660	660
Height	610	610	610	610	650	650	650	760	760

Key	Description	Ind	Dir
A	Hot Water Draw Off $^3/_4$″F	Y	Y
B	T&P Relief Valve (Fitted)	Y	Y
C	Boiler Flow $^3/_4$″F Indirect only	Y	N
D	Secondary Return $^3/_4$″F (200, 250, 300 only)	Y	Y
E	Immersion Heater 1 $^3/_4$″ Indirect and Direct	Y	Y

Key	Description	Ind	Dir
F	Immersion Heater 1 $^3/_4$″ Direct Only	N	Y
G	Aquastat Pocket Indirect only	Y	N
H	Boiler Return ″ $^3/_4$″F Indirect only	Y	N
I	Cold Feed $^3/_4$″F (With Dip Pipe)	Y	Y
J	$^1/_2$″ BSP Tapping for drain point	Y	Y

* 90 litre available as direct only. Un-Vented Components Supplied Expansion vessel (supplied loose)

• Installation must be carried out as described in this guide with reference to this section where appropriate. This will ensure compliance with Building Regulations, IEEE Regulations and Telford Copper Cylinders warranty provisions. • The cylinder should be mounted on the cradles (or other suitable support) so that the connections A, B, I, (C) are along the top edge. The cylinder MUST not be rotated around the long axis.

Cap (L)	Time to re-heat from Cold	Time to re-heat from 75% draw-off with Boiler
90 Ltr	26 Min	18 Min
125 Ltr	36 Min	25 Min
150 Ltr	37 Min	26 Min
170 Ltr	36 Min	25 Min
200 Ltr	33 Min	24 Min
250 Ltr	35 Min	25 Min
300 Ltr	40 Min	29 Min
400 Ltr	45 Min	35 Min
500 Ltr	50 Min	40 Min

Foam Information
ODP Ozone Depletion potential = 0
GWP Global Warning Potential = 2.2
Foam Type = Polyurethane
British Standard 1566, D: 2002

Parts Supplied
Dual High Limit Stat
3Kw Immersion Heater 240V single Phase
Expansion Vessel
Temperature & Pressure Relief
3Bar Inlet Control Group
2 Port Motorised Valve

Cap (L)	24 Hrs Standing Heat Loss	Immersion Heater
90 Ltr	1.21Kw/24Hrs	1 x 3Kw 240v single phase
125 Ltr	1.33Kw/24Hrs	1 x 3Kw 240v single phase
150 Ltr	1.50Kw/24Hrs	1 x 3Kw 240v single phase
170 Ltr	1.62Kw/24Hrs	1 x 3Kw 240v single phase
200 Ltr	1.75Kw/24Hrs	1 x 3Kw 240v single phase
250 Ltr	2.10Kw/24Hrs	1 x 3Kw 240v single phase
300 Ltr	2.30Kw/24Hrs	1 x 3Kw 240v single phase
400 Ltr	2.94Kw/24Hrs	1 x 3Kw 240v single phase
500 Ltr	3.15Kw/24Hrs	1 x 3Kw 240v single phase