Quantum Electric Cylinders

Installation and User Instructions

Please leave manual with end user

R02889-10

GDC Group is a licensed member of the Benchmark Scheme which aims to improve the standards of installation and commissioning of domestic heating and hot water systems in the UK and to encourage regular servicing to optimise safety, efficiency and performance.

Benchmark places responsibility on both manufacturers and installers. The purpose is to ensure that customers are provided with the correct equipment for their needs, that it is installed, commissioned and serviced in accordance with the manufacturer's instructions by competent persons and that it meets the requirements of the appropriate Building Regulations The Benchmark Checklist can be used to demonstrate compliance with Building Regulations and should be provided to the customer for future reference.

Installers are required to carry out installation, commissioning and servicing work in accordance with the Benchmark Code of Practice which is available from the Heating and Hot Water Industry Council who manage and promote the Scheme. Visit www.centralheating.co.uk for more information.

The HWA Charter requires that all members adhere to the following:

- *supply fit for purpose products clearly and honestly described*
- *supply products that meet, or exceed appropriate standards and building and water regulations*
- *provide pre and post sales technical support*
- *provide clear and concise warranty*

For further information on the HWA Charter Membership, please refer to the HWA website www.hotwater.org.uk

These products are tested in accordance with EN12897:2006

Contents

1 Manual Warnings

Electrical Warnings
Indicates any hazard of an electrical nature.

Information
Indicates tips and advice for the smooth operation of the system.

General Warnings
Indicates a general warning against actions which could result in damage to the system or personal injury to the installer and/or user.

2 Safety Information

This appliance can be used by children aged 8 years and above and persons with reduced physical, sensory or mental capabilities or lack of experience and knowledge if they have been given supervision or instruction concerning use of appliance in a safe way and understanding the hazards involved - some parts of this product can become hot and cause burns. Children shall not play with the appliance. Cleaning and user maintenance shall not be made by children without supervision.

No isolating device may be fitted between the inlet group and the cold water inlet on the cylinder, as by doing so important safety devices could be isolated!

The maintenance of this appliance must be carried out by suitable qualified person only. It is recommended to maintain the unit on an annual basis. Isolate all electrical supplies from the unit before commencing work.
Danger of electrical shock!

It is important to check the pre-charge pressure of the expansion vessel membrane before filling the cylinder. This has been factory set to 3 bar. The pre-charge should be greater than or equal to 3 bar.

It is important that the tundish is positioned away from any electrical components.

Means for electrical disconnection must be incorporated in the fixed wiring in accordance with the wiring rules.

Before removing the cover from the immersion heater isolate appliance using isolating switch!
Danger of electrical shock!
Only use suitable electrically insulated equipment when working inside immersion housing.

A high level cut-out is fitted to the product for each heat source. This should never activate under normal operation.

Please leave manual with end user.

If an electronic copy of this manual should be required, please contact the manufacturer at the address at the back of this manual.

3 Introduction

Thank you for choosing this product. The Quantum direct electric cylinders are specified with high quality, immersion heaters for fast reheat times. They boast 60mm of low GWP insulation foam, together with 100% recyclable stainless steel inner components and a sleek black, hard wearing outer shell manufactured from completely recycled materials.

Note: This product has been designed specifically for the purpose of delivering heated, domestic and sanitary hot water as part of a pressurised water heating system. The package is provided with fittings that comply with Section G3 of Building Regulations.

Dimplex cannot take responsibility for ensuring safe operation of the appliance outside of the scope of intended use.

4 Scope of Delivery

Scope of delivery								
Cylinder volume		**125l**	**135l**	**150l**	**180l**	**210l**	**250l**	**300l**
Cylinder with 3kW immersion *		2	2	2	2	2	2	2
T+P valve *		1/2”, 7bar/90°C			1/2”, 7bar/90°C		1/2”, 7bar/90°C	
Inlet control group consisting of:-		✓			✓		✓	
- in line strainer								
- 3 bar PRV								
- 6 bar ERV								
- non-return valve								
- balanced cold water supply port								
- connection for expansion vessel								
Expansion vessel with fixing kit and connection hose		12 l			18 l		24 l	
Tundish		15mm/22mm			15mm/22mm		15mm/22mm	
Installation & User Instructions x 1		✓			✓		✓	
Terms and conditions x 1		✓			✓		✓	

Table 1: Scope of Delivery for Edel Water Heater

* These items are supplied factory fitted

5 Pre-Installation

Please read the following section carefully before commencing installation. If in any doubt, please call the appropriate help desk. Disregarding the instructions given in this manual in its entirety and any relevant regulations, standards and codes of practice will void the guarantee of this product.

Handling – depending on the size of the unit and access to its installation location, consideration must be given to the handling of the unit. Please note that handling, installation and use of this product is subject to the Health and Safety at Work Act. If the unit is not installed immediately, it should remain in its protective packaging with all pipe protectors/end caps applied to prevent damage and dirt deposit inside the cylinder.

Pipe Work – the pipe runs should be executed as short as possible, unused pipe work should be removed and all remaining pipe work should be lagged in accordance with regulatory requirements to prevent heat loss and the formation of condensation.

Taps and Fittings – all taps and fittings incorporated in the unvented system should have a rated operating pressure of 0.6 MPa (6 bar) or above.

5.1 Risk Assessment

The compilation of a risk assessment is strongly recommended before installing the product. The following areas require particular consideration in addition to the information required by the Health and Safety at Work Act.

Scalding - where appropriate or required by law a thermostatic mixing valve is to be fitted to the hot water outlet of the cylinder (see also water borne organisms).

Explosion - the unit is fully equipped with all relevant safety equipment to comply with current regulations. The correct design and function has been verified by independent third party testing. The correct application thereof is the responsibility of the installer.

Water Borne Organisms (i.e. Legionella) - if applicable a risk assessment should be carried out following the recommendations outlined in the Approved Code of Practice L8.

The user preference must be considered when commissioning the system, in particular when adjusting the temperature and timer settings.

5.2 Siting Considerations

When choosing a suitable location for the cylinder the following aspects should be considered:

- structural integrity
- access for installation, operation, maintenance and replacement
- routing of discharge pipe work
- access to water mains supply, hot and cold water distribution pipes
- access to suitable electricity supply
- location in relation to remaining system components
- frost protection

The Quantum direct electric cylinders are designed to be floor standing, vertically mounted, indoors and in a frost free environment. The cylinder may be located on any flat and level surface, provided it is sufficiently robust to support the weight of the cylinder when full of water (please see technical data) and suitably accessible for replacement/maintenance without specialist tools or lifting equipment as this will void the warranty conditions.

The position and orientation of the cylinder should be such that easy access is provided for servicing the controls. A minimum distance of 400mm in front of the immersion is recommended, to allow the replacement of the immersion heater should the need arise. When installing the cylinder all labels should be clearly visible and ensure that no pipework hinders any work to be carried out on the various cylinder components.

Particular care must be taken when placing the cylinder in a garage or outbuilding. All exposed pipe work must be correctly insulated to avoid frost damage.

5.3 Cold Water Supply

For satisfactory and safe performance of the unvented cylinder the water supply must meet the following criteria:

Minimum dynamic pressure	150 kPa (1.5 bar)
Maximum inlet supply pressure	1200 kPa (12 bar)
Minimum flow rate	15 l/min
Max. chlorine content	250mg/L
Max. water hardness	200mg/L

The following instructions have to be followed when installing the cold water mains supply to the cylinder:

- The cold water supply to the cylinder must come directly from the cold water mains after the mains stop valve to the property.

- The cold water inlet pipe work should have at least an inside diameter of 19mm and should meet the requirements of the water regulations for the supply of wholesome water.

We recommend an annual maintenance inspection is carried out on the domestic hot water cylinder. In hard water areas this should include inspection of the immersion heater, [above 120ppm or 120mg/l]. A local water treatment company should be able to offer free water quality testing. The heating
elements may require periodic de-scaling. The installer should do this as part of a maintenance agreement.

If required, precautions can be taken to minimise effects of water hardness, i.e. installation of a water conditioner or water softener. These devices should be installed in hard water areas where high water storage temperatures are required, i.e. greater than 60°C storage temperatures, particularly when water hardness exceeds 200ppm. Should the water cylinder require de-scaling, this must be performed by a qualified technician.

5.4 Building Regulation G3 Discharge Requirements

As part of the requirements of Building Regulation G3 any discharge from an unvented system should be conveyed to where it is visible, but will not cause danger to persons in or about the building. The tundish and the discharge pipes should be fitted in accordance with the requirements of Building Regulation approved document G3, (England and Wales), Part P of Northern Ireland and Standard 4.9 of Scotland.

5.4.1 Discharge Pipe D2

According to the Building Regulations the discharge pipe (D2) from the Tundish should:

"have a vertical section of pipe at least 300mm long below the tundish before any elbows or bends in the pipework and be installed with a continuous fall of at least 1 in 200 thereafter."

The discharge pipe (D2) should be made of:

"metal; or other material that has been demonstrated to be capable of safely withstanding temperatures of the water discharged and is clearly and permanently marked to identify the product and performance standard".

We strongly recommends the use of metal pipe-work only and GDC Group Ltd does not take responsibility for any damage caused from discharges.

The discharge pipe D2 should be at least one pipe size larger than the nominal outlet size of the safety device unless its total equivalent hydraulic resistance exceeds that of a straight pipe 9m long, i.e. for discharge pipes between 9m and 18m the 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 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. See Figure 1, Table 2 and the worked example.

Note: An alternative approach for sizing discharge pipes would be to follow Annex D, section D.2 of BS 6700:2006 + A1:2009).

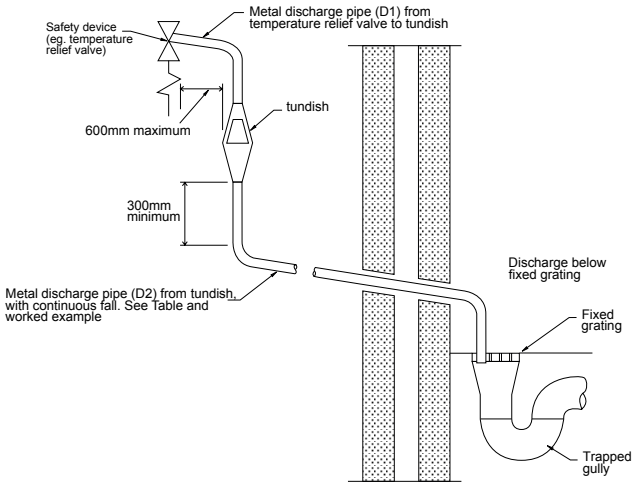


Figure 1: Typical Discharge Arrangement

Valve Outlet Size [-]	Minimum size of discharge pipe before tundish [mm]	Minimum size of discharge pipe after tundish [mm]	Maximum allowed length of pipe after tundish [mm]	Length to be substracted for each elbow or bend [m]
G1/2	15	22	9	0.8
		28	18	1.0
		35	27	1.4
G3/4	22	28	9	1.0
		35	18	1.4
		42	27	1.7
G1/2	28	35	9	1.4
		42	18	1.7
		54	27	2.3

Table 2: Sizing of copper discharge pipe "D2" for common temperature relief valve outlet sizes

5.4.2 Worked Example

This example is for a G½ temperature relief valve with a discharge pipe (D2) (as fitted on 125L to 300L cylinders) having 4 No. 22mm elbows and length of 7m from the tundish to the point of discharge.

From Table 2, the 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, which is less than the actual length of 7m, therefore calculate the next largest size.

Maximum resistance allowed for a straight length of 28mm copper discharge pipe (D2) from a G½ temperature relief valve equates to 18m.

Subtract the resistance for 4 No. 28m.m 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:

1.) Where a single common discharge pipe serves more than one system, it should be at least one pipe size larger than the largest individual discharge pipe (D2) to be connected.

2.) The discharge pipe should not be connected to a soil discharge stack unless the soil discharge stack is capable of safely withstanding temperatures of the water discharged, in which case, it should:
- **contain a mechanical seal, which allows water into the branch pipe without allowing foul air from the drain to be ventilated through the tundish.**
- **there should be a separate branch pipe with no sanitary appliances connected to it.**
- **if plastic pipes are used as branch pipes carrying discharge from a safety device, they should be either polybutalene (PB) or cross-linked polyethylene (PE-X) complying with national standards.**
- **be continuously marked with a warning that no sanitary appliances should be connected to the pipe.**

5.4.3 Termination of Discharge Pipe

The Building Regulations state that "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."

Examples of acceptable discharge arrangements are:

- "to a trapped gully with the end of the pipe below a fixed grating and above the water seal;
- 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 a wire cage or similar guard is positioned to prevent contact, whilst maintaining visibility; and,
- discharges at high level: e.g. into a metal hopper and metal downpipe with the end of the discharge pipe clearly visible or onto a roof capable of withstanding high temperature discharges of water and 3m from any plastic guttering system that would collect such discharges."

Note: As the discharge would consist of high temperature water and steam, asphalt, roofing felt and non-metallic rainwater goods may be damaged by such discharges.

5.5 Limitations

Due to the operating temperatures of direct electric cylinders the water hardness can considerably influence the longevity of the immersion heater element. Please consult local water board for advice on maintenance intervals.

5.6 Product Disposal

This product has been manufactured from mostly recyclable materials. At the end of the product's life, it should be disposed of at a Local Authority Recycling Centre.

Materials:

- Inner Cylinder - Duplex Stainless Steel
- Outer Cladding - Black HIPS/ABS
- Inlet/Outlet Pipe - Stainless Steel
- Coils - Corrugated Stainless Steel
- Insulation - 60mm PU Foam (GWP =1, ODP =0)
- T&P Valve - Brass & LDPE
- Immersion Heater - Incoloy and brass
- Tundish - LDPE

6 Installation

6.1 Cold Water Inlet with Inlet Group

6.1.1 Correctly Site the Cylinder

Install the cylinder in an appropriate location, ensuring all of the recommendations have been considered (see chapter 5.2).

6.1.2 Install the Inlet Group

The inlet group regulates the pressure of the incoming mains water supply to the cylinder and removes any debris that might be water borne.

Between the inlet group and the cold water inlet on the cylinder NO isolating device may be fitted, as by doing so important safety devices could be isolated!

6.1.3 Expansion Vessel

The expansion vessel is mandatory on all Quantum cylinders and can be connected directly to the cold water inlet group, utilising the flexible hose supplied with the vessel. The expansion vessel should always be fitted in accordance with the manufacturer's instructions. No isolating device must be fitted between the water cylinder and the cold water inlet group. Furthermore, it is recommended to mount the vessel higher than the cylinder to avoid having to drain the cylinder when maintaining and replacing the expansion vessel.

Figure 2: Connection of the expansion vessel to the inlet group

It is important to check the pre-charge pressure of the expansion vessel membrane before filling the cylinder. This has been factory set to 3 bar. The pre-charge should be greater than or equal to 3bar.

Note: The expansion vessel must be installed to the side of the expansion relief valve on the inlet group. To do this, the blanking plug must be removed and the expansion vessel connected, as shown in Figure 3.

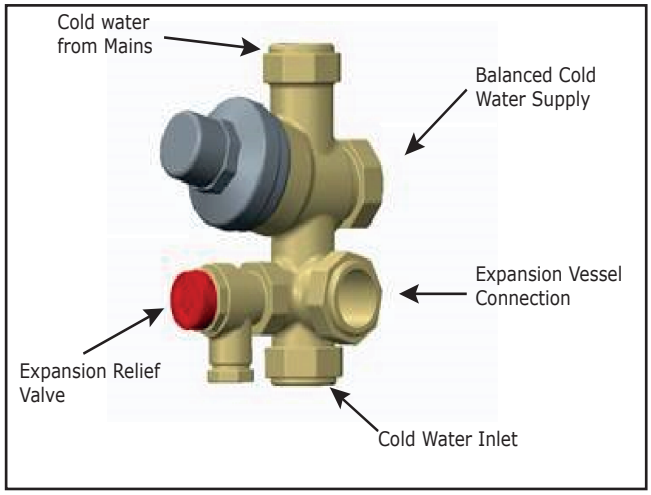


Figure 3: Detail Showing the Connection of the Expansion Vessel to the Inlet Group

6.1.4 Balanced Cold Water Supply

If a balanced cold water supply is required a connection can be taken from the bottom of the inlet group.

6.1.5 Drain Valve

It is also recommended to install a drain valve (not supplied) in the lowest point of the cold water feed to the cylinder. This allows the cylinder to be drained in a controlled manner should this become necessary.

6.2 Hot Water Outlet

The hot water pipe work is to be directly connected to the hot water outlet connection on the cylinder.

6.2.1 Thermostatic Mixing Valve

A thermostatic mixing valve may be required to limit the outlet temperature. In this case, the valve should be installed following the manufacturer's instructions, ensuring none of the safety equipment has been isolated, (i.e. make sure the connection to the thermostatic mixing valve is taken after the safety equipment of the inlet group).

6.2.2 Pipe Insulation

It is recommended to insulate the hot water pipe work from the cylinder to the outlets, to reduce the energy requirements for providing hot water. It is also recommended to insulate all other exposed pipework, such as the T&P to the tundish, the coil flow and return and the cold water inlet pipes.

6.3 Discharge Pipes from Safety Devices

6.3.1 Discharge Pipe D1

The temperature and pressure relief valve must be discharged directly or by way of a manifold via a short length of metal pipe (D1) into a tundish; and the discharge pipe must be installed in a continuously downward direction and in a frost free environment. Water may drip from the discharge pipe of the pressure relief device and this pipe must be left open to the atmosphere.

The diameter of discharge pipe (D1) should not be less than the nominal outlet size of the safety device, e.g. temperature relief valve.
Where a manifold is used it should be sized to accept and discharge the total discharge from all the D1 discharge pipes connected to it.

The discharge pipe work from the expansion relief valve must be installed constantly falling to an open point of discharge. It is recommended to combine it with the discharge of the temperature and pressure relief valve.

Note: The T&P valve is pre-sealed and if moved the seal will be broken, should this occur, it will need to be resealed with an appropriate sealant (see Figure 13)

6.3.2 Discharge Pipe D2

For a detailed description of the discharge pipe-work D2 see chapter 6.3.1.

6.3.3 Tundish

The tundish should be vertical, located in the same space as the unvented hot water storage system and be fitted as close as possible to, and lower than, the safety device, with no more than 600mm of pipe between the valve outlet and the tundish.

Discharge should be visible at the tundish, where discharges may not be apparent, e.g. in dwellings occupied by people with impaired vision or mobility, consideration should be given to the installation of a suitable safety device to warn when discharge takes place, e.g. electronically operated.

Note: To comply with the Water Supply (Water Fittings) Regulations, the tundish should incorporate a suitable air gap.

It is important that the tundish is positioned away from any electrical components.

6.4 Immersion Heaters

The main immersion heater and boost immersion heater supplied with this cylinder come pre-wired. A supply cable shall be connected to the unit through the entry in the electrical enclosure, at the bottom of the cylinder. Details are given on how to do this in section 6.5 of this manual. The electrical wiring diagram for the product is shown in Figure 8.

The immersion heater incorporates an independent non self-resetting over temperature cut-out. Should the over temperature cut-out operate, the reset pin will be pushed upwards, and become level or slightly proud of the cover at the position marked "Safety", and the water in the cylinder will fail to heat. This denotes a fault somewhere in the system and an appropriate investigation shall be carried out before the cut-out is reset. Use a suitable sized implement to reset the pin by pushing it hard into its original position.

Should it be necessary to remove the thermostat from the immersion element, ensure that the contacts are re-fitted correctly into the positions on the element. Failure to do so carries the risk of overheating the contacts and thus damaging the appliance.

The immersion heater thermostat must not be opened under any circumstances.

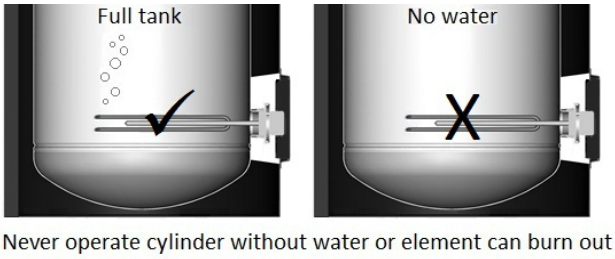


Figure 4: Correct Operation of Immersion Heater

The cylinder must be filled with water before switching on the immersion heater. Failure to do so will damage the element and void any guarantee on the product.

6.5 Electrical Connection

The water cylinder has to be connected in accordance with IEE Wiring Regulations and the installer carrying out the work has to be suitably qualified. Before connecting the cylinder, verify that all the wiring connections on each of the elements and thermostats have been installed correctly, that they are secure and that none of the wires are damaged.

The electrical installation of this cylinder can be set-up for permanent supply or switched supply (peak and off-peak). For information on how to correctly wire either set-up please see Figures 7 or 8 in Section 6.5.2.

6.5.1 Access Connections

To access the electrical connection panel, remove the enclosure hood by removing the retaining screws on the sides, as shown in Figure 5. Please take care when removing the hood, as it is connected to the cylinder via an earth cable and a cable to the UI. The water cylinder requires two supply cables. Where an off-peak supply circuit is available this can be used and connected to the 'switched' supply connections marked on the terminal block. Where only one wiring circuit is available two supplies from this circuit are required. Both supplies must be connected through a separate double pole isolating switch which must have a contact separation of at least 3mm in all poles. The cables shall be connected to the unit through the entry in the electrical enclosure, at the bottom of the cylinder and should be connected to the cylinder as shown in Figure 6.

The cables should be cable-tied securely to the strain relief provided and if required cable-tied to the existing cabling on the right-hand side.
The protective tape should be removed from the contact area between the hood and the cylinder cladding before commissioning as per Figure 6.

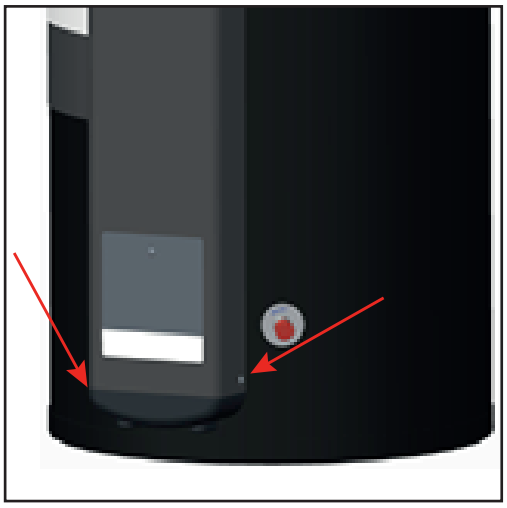


Figure 5: Retaining Screw Positions

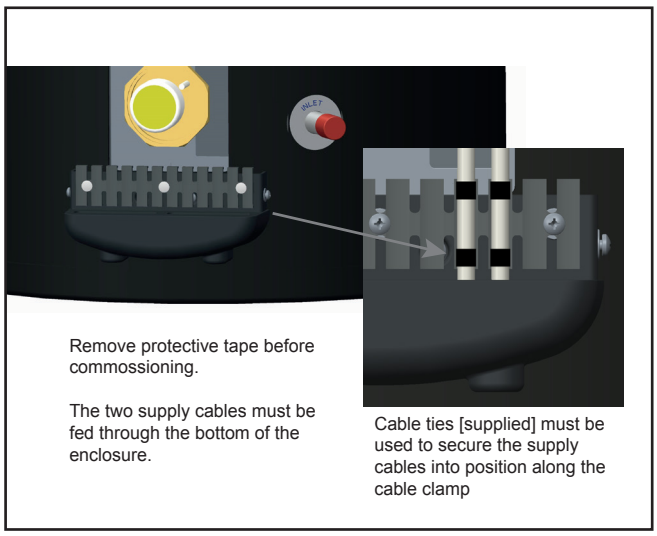


Figure 6: Supply Cable Anchorage

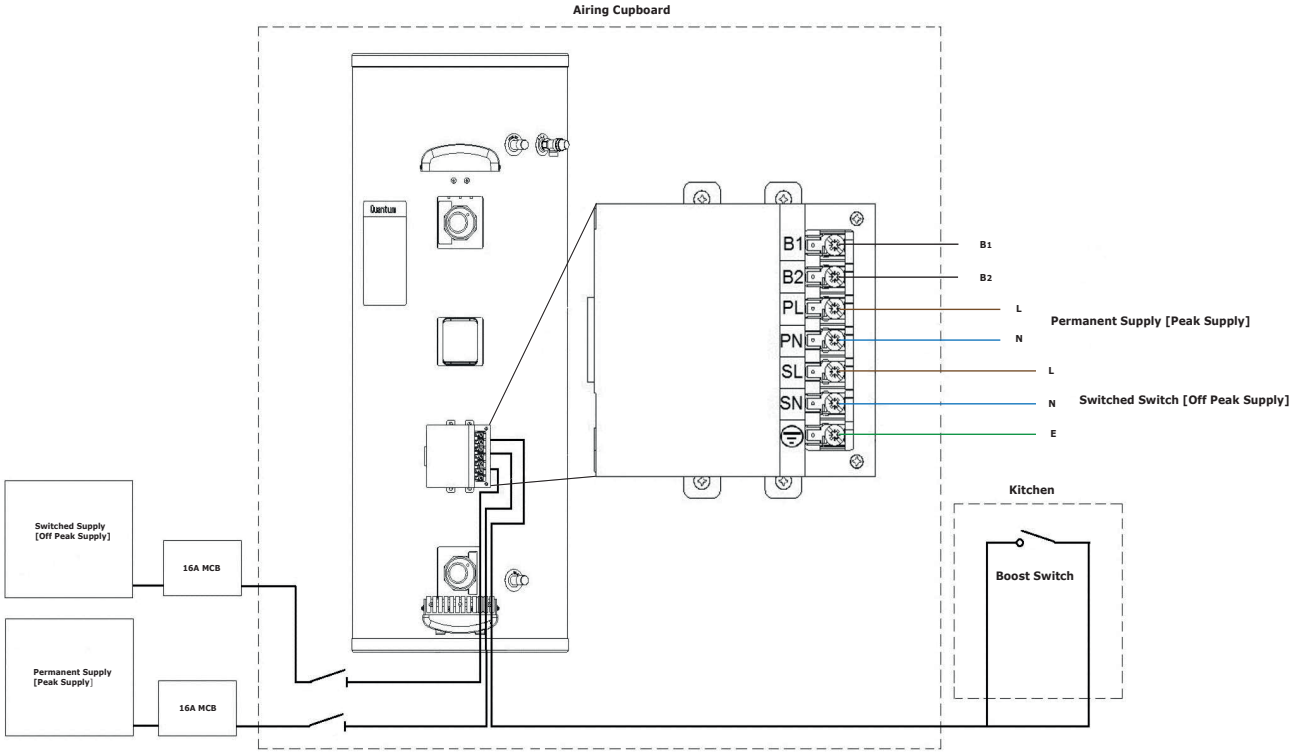


Figure 7: Off Peak Wiring Configuration

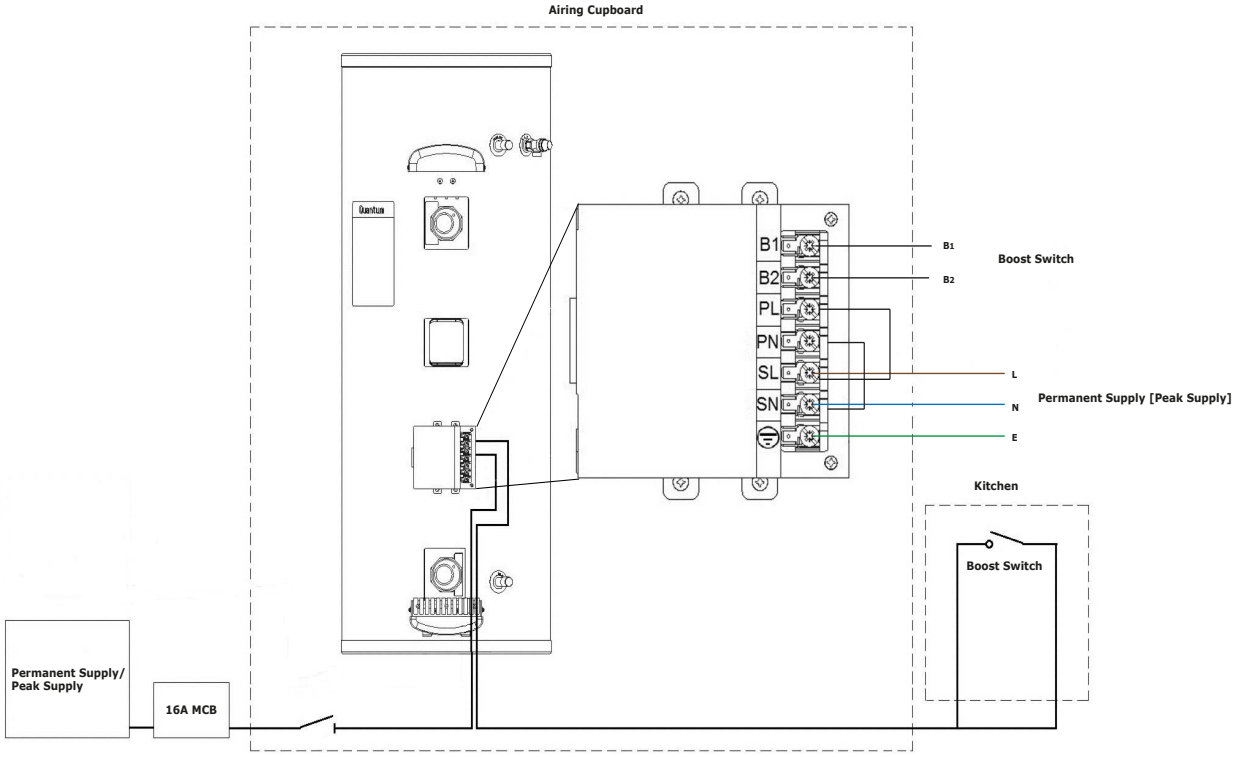


Figure 8: Energised or Always On Wiring Configuration

Note:

The Boost connections must be connected in series with a toggle switch which allows the external boost function to be utilised.

The external boost connection on the Quantum cylinder is a contact wire which must not be connected to the mains power supply.

If an electronic timer switch from a previous installation is in place it must be replaced with a single pole toggle switch which is wired from the B1 and B2 connections as shown in Figure 7.

The water temperature required from the boost function can then be set from the UI and the boost element will automatically turn off once this temperature is achieved in 55 litres of the water stored.

When connected to a permanent supply, the charge period must be programmed on the cylinder user interface, see Section 7.

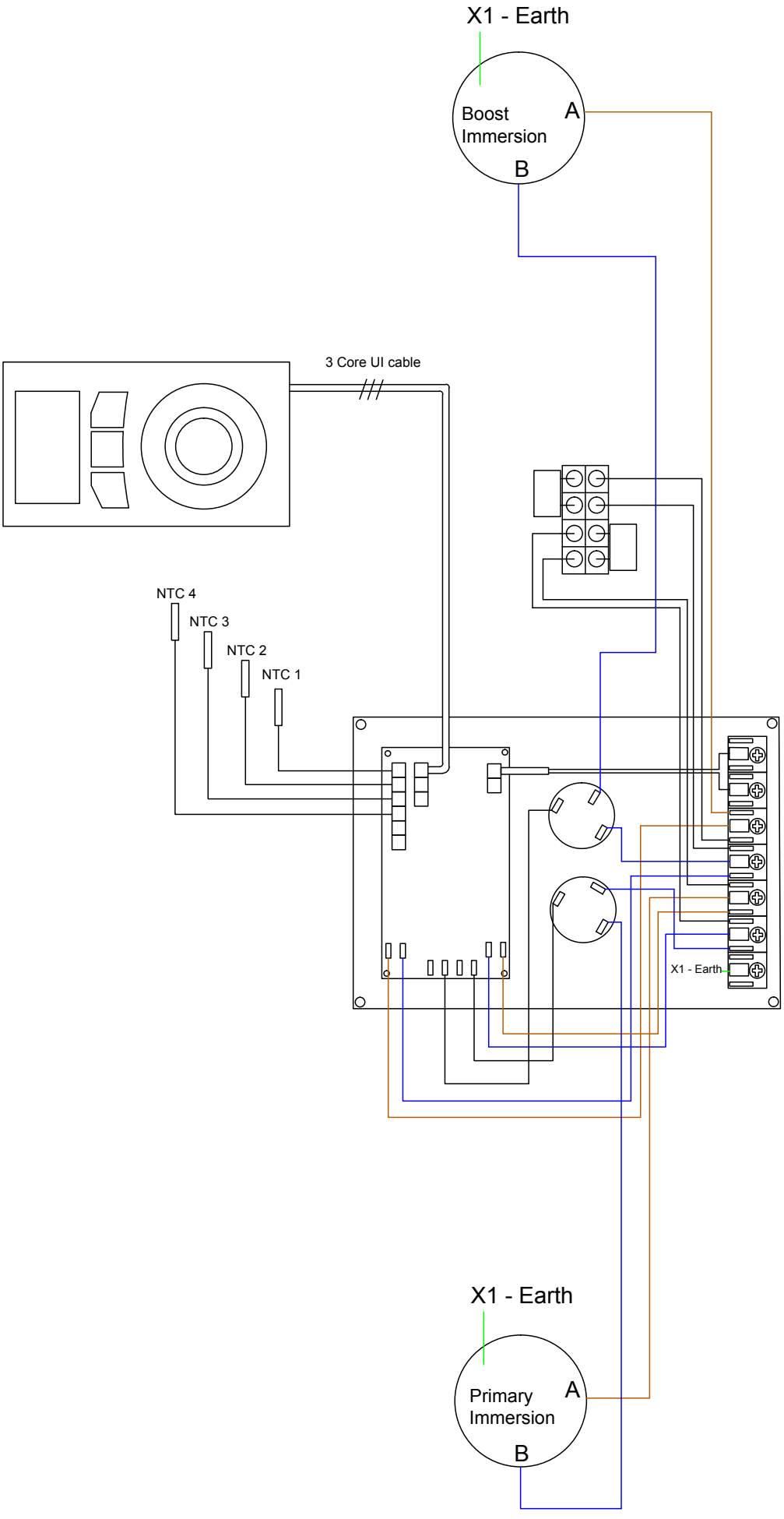


Figure 9: Wiring Schematic

6.6 Connection of Secondary Return

For cylinders that do not have a dedicated secondary return connection, it is possible to install a secondary return by connecting a swept - T to the cold water inlet of the cylinder (see Figure 10).

The secondary return pipe should incorporate a check valve and a WRAS approved circulation pump; timer and thermostat to be provided separately. Where secondary return circuits are used, then an additional expansion vessel may be required.

The secondary return loop must avoid:

- stagnant water in long pipe runs
- long waiting times at draw off point for hot water
- undue water wastage

To minimise the energy consumption of the secondary return circuit and to ensure reliable operation it is important to consider:

- the control of the circulation pump to be time and temperature controlled
- the secondary return circuit pipe work to be insulated
- the secondary return pump to be of suitable material and specification

Figure 10: Secondary Return Loop

7 Commissioning

At the time of commissioning, complete all relevant sections of the Benchmark Checklist located on the inside back pages of this document.

The following commissioning procedures only detail the required steps to be taken for the potable water loop:

1) Before making any mains connections to the inlet control group, flush the mains pipework out to ensure all debris has been removed so as not to damage the strainer within the combination valve.

2) Make final mains connection on combination valve and check all connections and joints to ensure they have been tightened and secured correctly.

3) Before turning on the mains supply to the cylinder a hot water tap should be opened, preferably on the same floor or the floor below where the cylinder is located.

4) Check the pre-charge in the expansion vessel and ensure it is at least 3 bar. Note actual pressure on label on expansion vessel.

5) Turn on the supply to the cylinder and fill until water runs from the open hot water tap. Continue to flush the system until all debris has been removed.

6) Close the hot water tap.

7) Check all joints for leaks, even those not having been altered especially when replacing a vented cylinder.

8) Open temperature and pressure relief valve to ensure proper discharge and check after closing that valve is not dripping.

9) Open expansion relief valve to ensure proper discharge and check after closing that valve is not dripping.

10) Check all shower outlets, toilet cisterns and other draw off points for leaks or dripping (especially when replacing a vented unit). Open all water outlets to purge air from pipe work and ensure proper operation.

11) Instruct user in the operation of the unit and hand over this manual advising the owner of annual service requirements.

12) Complete the technical data label on the cylinder with legible and permanent writing.

7.1 Verify Electronic Operation

After the plumbing of the cylinder has been fully commissioned and the appliance connected to a suitable electrical supply, the electrical supply to the unit can be turned on.

The user interface should power up and a battery symbol and temperature should be visible on the display screen.

The user interface consists of the following components as shown:

Figure 11: User Interface

1. Display Screen
2. "Menu" Button
3. "Back" Button
4. "Advance" Button
5. "Selector Dial"

7.2 Initialise System Settings and Communications

The system settings of the cylinder can now be verified, and or changed. To access the service menu of the appliance the back button, menu button and selector dial, should be pressed for 10 seconds.

7.2.1 Set Tariff

- Enter the service menu.
- Rotate the dial to select tariff and press the dial to select.
- The tariff can be set to either Off-peak or Timed.
- Off Peak tariff heats the cylinder using the bottom immersion heater to the primary set-point whenever an off peak power supply is available. Section Figure 7 for wiring configuration.
- Timed tariff requires that time period is set during which the cylinder will be heated to the primary temperature set-point. This heat up or charge period on the cylinder to be aligned with any low cost energy tariff available. See Figure 8 for wiring configuration.

7.2.2 Set Hygiene Mode

- Enter the service menu.
- Rotate the dial to select hygiene and press the dial to select
- Hygiene mode can be set to either Daily, Weekly, Monthly or Off temperature for hygiene mode operation can then be set between a range of 60-68°C (see Figure 12 for how to access the hygiene function).

7.2.3 Set Communication Mode

The water can be controlled by the utility via the RF module installed. Where this communication mode is not available the unit can be operated in standalone mode (i.e. when communications with the utility are cut off, the cylinder operates in standalone mode). In this mode the heater tries to achieve 60°C at T1 and tries to maintain this throughout the day. The communications of the appliance can be changed as shown in Figure 12.

7.2.4 Set Cylinder Size

The water can be controlled by the utility via the RF module installed. Where this communication mode is not available the unit can be operated in standalone mode (i.e. when communications with the utility are cut off, the cylinder operates in standalone mode). In this mode the heater tries to achieve 60°C at T1 and tries to maintain this throughout the day. The communications of the appliance can be changed as shown in Figure 12.

7.2.5 RTC Calibration

Calibration of the Real Time Clock is performed on initial commissioning and should not be required by the user unless changes are required to the electronic components on the cylinder.

7.2.6 Reset

- Enter the service menu.
- Ensure that reset is highlighted, and press the selector dial.
- Select using the selector dial if you want to reset the temperature log, the energy log or the full system to the factory defaults. Once the required option is highlighted press and hold the selector dial for 5 seconds (see Figure 12 for how to access the reset function).

7.3 Confirmation of Operation

Operation of the cylinder shall be confirmed with a cold tank, use a current tester or verify that the outlet pipe feels warm within 1hr of start-up.

Note: This should only be attempted if the insulation may be disturbed slightly without damage.

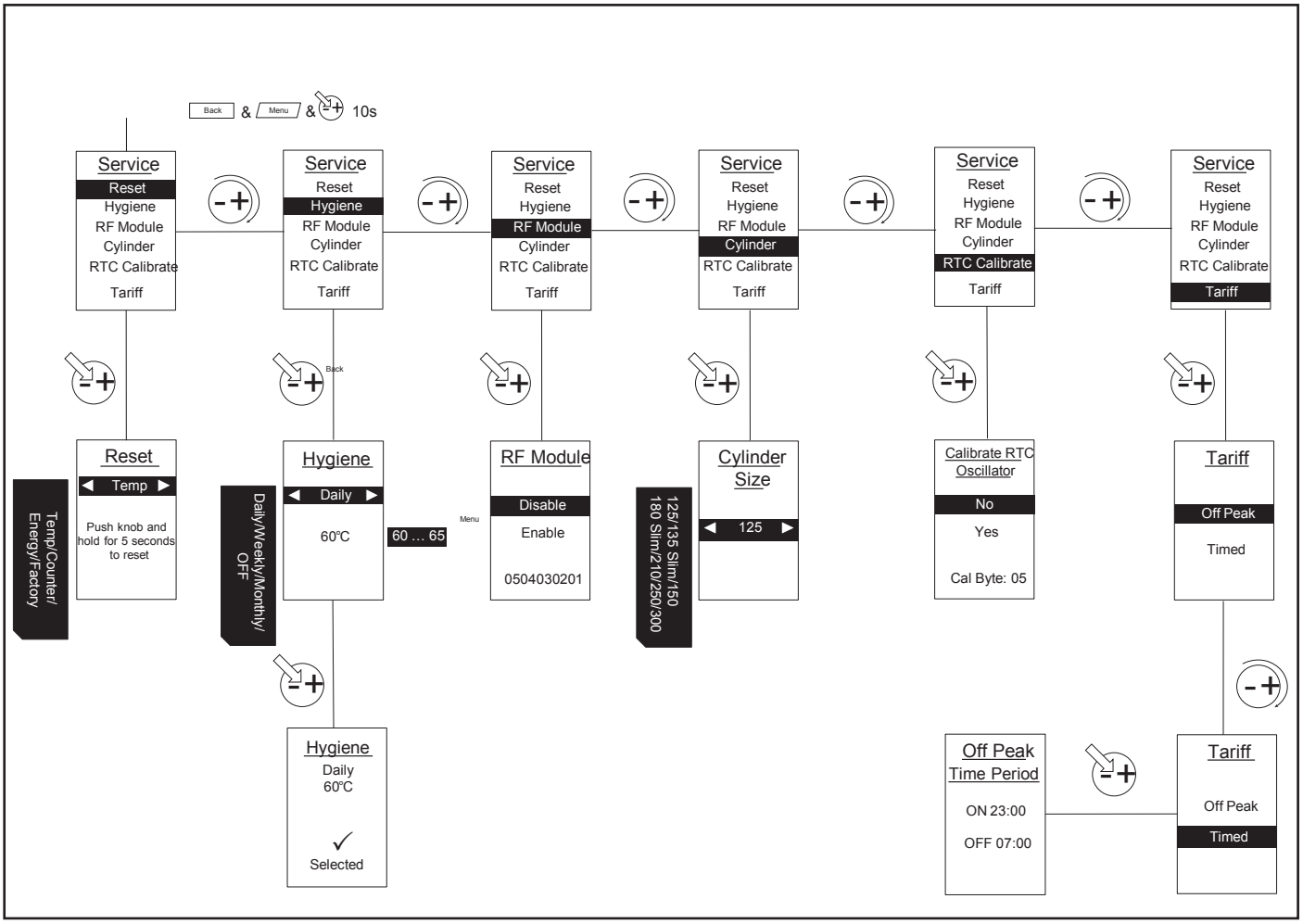


Figure 12: Service Menu for Factory Reset and Communications Set Up

8 Maintenance

After servicing, complete the relevant Service Record section of the Benchmark Checklist located on the inside back pages of this document. To meet with warranty requirements the cylinder must be serviced annually.

The maintenance of this appliance must be carried out by a suitably qualified person only. It is recommended to maintain the unit on an annual basis. Isolate all
electrical supplies from the unit before commencing work.

1) Draw some water from cold water tap and retain in container.

2) Isolate cold water mains supply from cylinder.

3) Briefly open temperature and pressure relief valve, assure safe discharge and check that valve is not dripping when closed.

4) Briefly open expansion relief valve, assure safe discharge and check that valve is not dripping when closed. The expansion relief valve should be operated regularly to remove lime deposits and to verify that it is not blocked.

5) Open hot water tap and release remaining pressure from unit.

6) If the system is drained completely for an internal inspection, ensure the hot water tap remains open, connect a hose to the drain valve and ensure a safe discharge.

7) Note the set pressure of the pressure reducing valve. Remove cartridge and clean strainer in water provided in container. Re-assemble pressure reducing valve ensuring the correct pressure is set.

8) Periodically the immersion heaters should be removed cleaned and the unit flushed out. Check the O-ring seal for damage and replace if necessary.

9) Check electrical wiring connections and the condition of the cable of the immersion heater and the thermostat.

10) The immersion heater boss can also be used for access to view the internal components of the cylinder.

11) Re-commission unit (see chapter 7).

Note: If the cylinder has not been used in excess of 1 month then it must be drained down by a competent person and recommissioned before use. The immersion must be switched off at the mains before draining the cylinder.

If replacement parts are required, please see Figure 13 for part description and part numbers.

Waste electrical products should not be disposed of with household waste. Please recycle where facilities exist. Check with your Local Authority or retailer for recycling advice.

9 Spare Parts

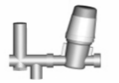
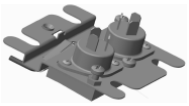
Description		Part No
22mm x 3bar Inlet control group		R00041-1
Inlet control group PRV cartridge		R00009-1
12 litre expansion vessel		R00044-2
18 litre expansion vessel		R00045-2
24 litre expansion vessel		R00046-2
Expansion vessel fixing kit		R00094-2
DN16 3/4" BSP x 1000 flex pipe		R00095-1
1/2" BSP T&P valve		R00020-1
15 x 22 straight PE tundish		R00047-1
1 3/4" BSP 3kW Incoloy Imm &HLStat		R02888-2
Quantum ECU Asm		R02702-3
Quantum Sensor Triac Asm		R02728-2
Quantum Cyl UI		R02710-2
QWCd125 Hood		R02936-3
QWCd150 Hood		R02937-3
QWCd210 Hood		R02938-3
QWCd250 Hood		R02939-3
QWCd300 Hood		R02940-3
Enclosure Top Asm		R03728-1
Enclosure Bottom Asm		R03731-1
Thread sealant		R00836-1
Quantum direct electric cylinder installation & User Instructions manual		R02889-10

Figure 13: Replacement Part Numbers for Quantum Electric Range of Cylinders

10 Technical Data and Product Fiche

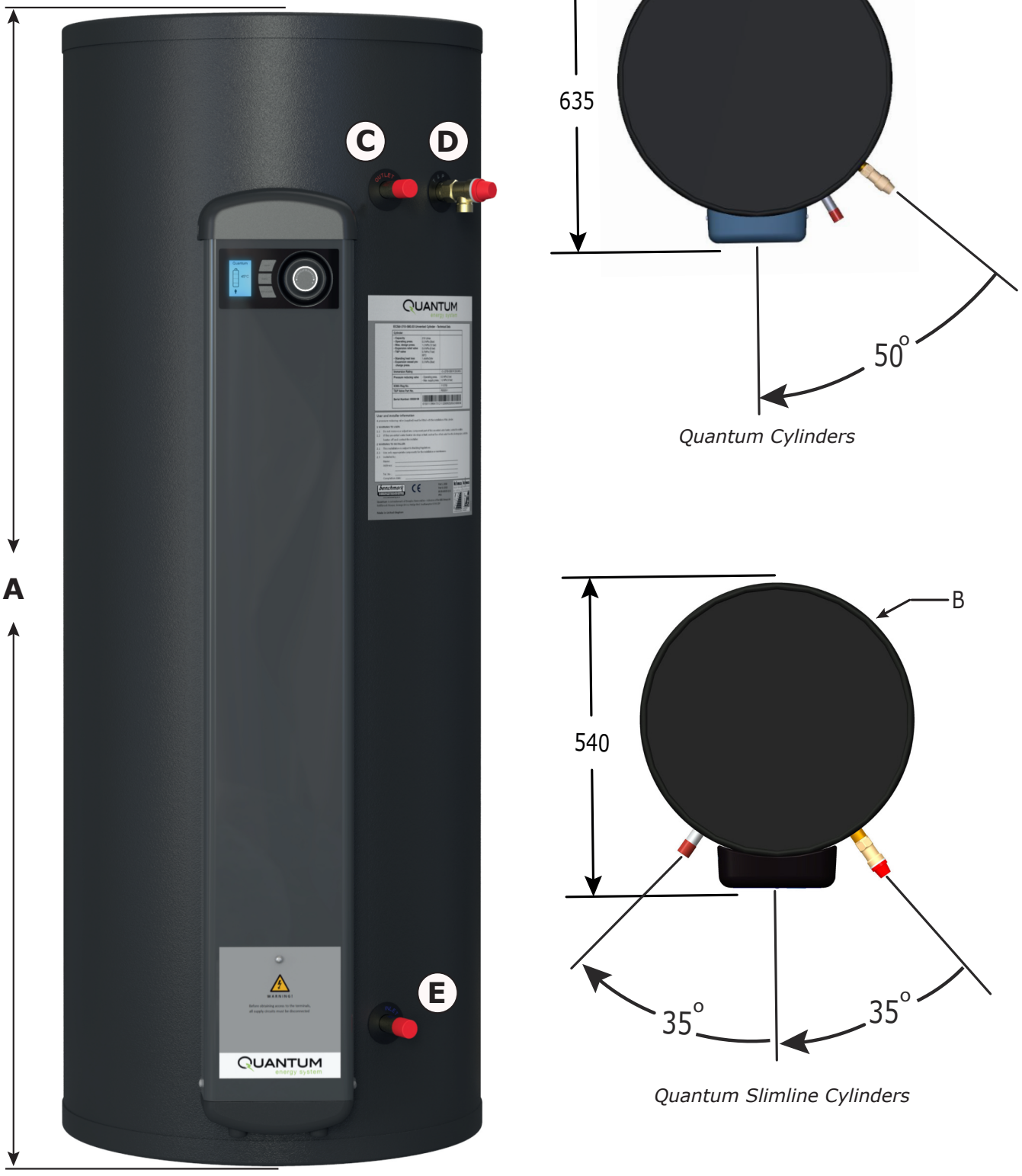


Figure 14: Quantum Direct Electric Cylinder and Top-Views (For Reference Only)

Quantum Direct Electric Cylinder Range - Dimensions								
Reference		**QWCd125-580**	**QWCd135-480**	**QWCd150-580**	**QWCd180-480**	**QWCd210-580**	**QWCd250-580**	**QWCd300-580**
Weight [kg]		24	22	27	30	34	42	48
Reheat Time [mins]*		122	132	150	175	218	284	313
Heat Loss [kWh/24h]		0.95	1.35	1.10	1.68	1.41	1.51	1.96
Height [mm]	**A**	945	1387	1115	1761	1490	1765	2065
Outer Diameter [mm]	**B**	580	480	580	480	580	580	580
HW Outlet [mm]	**C**	720	1180	890	1555	1265	1540	1840
T&P Valve [mm]	**D**	720	1180	890	1555	1265	1540	1840
CW Inlet [mm]	**E**	180	170	180	170	180	180	180

Table 3: Quantum Electric Cylinder Dimensions

Note: All measurements are taken from the base of the cylinder to the mid-point on the item.
* Determined in accordance with EN160335-2-21.

GDC Group Ltd	**Quantum Direct Electric Cylinder Range - Product Fiche**						
Reference	**QWCd125-580**	**QWCd135-480**	**QWCd150-580**	**QWCd180-480**	**QWCd210-580**	**QWCd250-580**	**QWCd300-580**
Load Profile - Primary	M	M	M	M	M	L	L
Energy Rating	C	D	C	D	C	C	C
Energy Efficiency	36%	35.1%	37%	35.1%	36%	37%	37%
Annual Energy Consumption [kWh]	1411	1411	1389	1460	1435	2739	2774
Load Profile - Secondary	-	-	-	-	-	M	M
Set Temper-ature	60°C	60°C	60°C	60°C	60°C	60°C	60°C
Sound Level [dB]	15dB	15dB	15dB	15dB	15dB	15dB	15dB
Operating Mode	Off Peak	Off Peak	Off Peak	Off Peak	Off Peak	Off Peak	Off Peak
V-40 [litres]	204	214	242	303	355	415	490

Table 4: Quantum Electric Cylinder Product Fiche

Quantum Direct Electric Cylinder Range - Product Features	
Materials	
Inner cylinder	Duplex stainless steel LDX2101
Outer cylinder	HIPS
Inlet/outlet	Stainless steel
Insulation	60mm PU foam (GWP=1, ODP=0)
Maximum Operating Conditions	
Potable water temperature	70°C
Operating pressure	3 bar
Maximum design pressure	6 bar
Cold Water Supply	
Minimum dynamic pressure	1.5 bar
Maximum pressure	12 bar
Minimum flow rate	15 l/min
Connections	
Cold water inlet	22mm stainless steel
Hot water outlet	22mm stainless steel
Immersion Heater	
1 3/4 F BSP 3kW	
Thermostatic Control	
Direct Input	Integral immersion heater thermostat and cut out
Safety Components	
Pressure reducing valve and strainer	3 bar
Expansion relief valve	6 bar
Temperature and pressure relief valve	7 bar/90°C
Factory pressure test	12 bar
Other Features	
Over 60% in volume from recycled material, not including insulation	
Surface mounted sensor devices for compatibility and ease of maintenance	
Approvals	
KIWA approval number - 1112719	
Guarantee	
Inner cylinder	25 years
Immersion heaters	2 years - excluding the effects of lime scale or other water borne contaminants
Other components	2 years - excluding expansion vessel membrane pressure

Table 5: Quantum Direct Electric Product Fiche and Features

11 User Instructions

11.1 General

Please read the following statements carefully as it affects your warranty.

Please ensure that the installer has fully completed the Benchmark Checklist on the inside back pages of this document and that you have signed it to say that you have received a full and clear explanation of its operation. The installer is legally required to complete a commissioning checklist as a means of complying with the appropriate Building Regulations Part G3 (England and Wales), Part P of Northern Ireland and Section 6 of Scotland.

All installations must be notified to Local Area Building Control either directly or through a Competent Persons Scheme. A Building Regulations Compliance Certificate will then be issued to the customer who should, on receipt, write the Notification Number on the Benchmark Checklist.

This product should be serviced annually to optimise its safety, efficiency and performance. The service engineer should complete the relevant Service Record on the Benchmark Checklist after each service.

The Benchmark Checklist will be required in the event of any warranty work.

The permanent supply to the cylinder must be maintained at all times. The cylinder will ensure that heating only occurs during off-peak periods. If hot water is not required for a number of days Holiday mode should be activated. Failure to maintain the permanent supply can lead to cylinder malfunction.

11.2 Operation

The hot water temperature can be set to various requirements. It is recommended to set the hot water temperature to between 45°C and 55°C. Higher temperatures can introduce more heat loss from the unit and increase the risk of scalding significantly. A thermostatic mixing valve should be considered.

When turning on a hot tap for the first time after a heat up period there might be a short surge of water. This is normal in unvented systems and does not constitute a fault. Sometimes the water may appear milky – this is due to very fine air bubbles in the water which will clear quickly.

11.2.1 User Interface

The user interface consists of the following components as shown in Figure 15.

1. Display Screen
2. "Menu" Button
3. "Back" Button
4. "Advance" Button
5. "Selector Dial"

Figure 15: User Interface

Access to the main menu is by pressing the menu button on the User interface (labelled 2 in Figure 15).

The following parameters can then be set and changed by the user:

- setting of date and time, primary and boost immersion heater set temperature (see Figure 17)
- setting of functions (see Figure 20)
- display settings (see Figure 18)

11.2.2 Home Screen

The Home screen displays live information on the current status of the hot water cylinder.

1. Current outlet water temperature
2. Charge status of the cylinder section. E.g. shaded when the temperature is greater than or equal to 40°C.
3. Software version on the Charge Controller and User Interface.

The colour of the display will turn red once 48 °C is exceeded.

Above this temperature is generally considered to be unsafe and could cause a serious scald. The user should always run the cold tap first when filling a bath and test the water before getting into a bath or shower. The recommended temperature for bathing is 37°C.

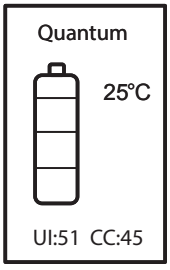


Figure 16:Home Screen

11.2.3 Setting the Date and Time

To adjust the time or date, follow the steps below:
- Press the Menu Button
- Select Time/Temp by pressing the control dial
- Rotate the dial to select Set and press the dial to select
- Press the dial to select Set Date/Time
- Rotate the dial to select the correct day and press the dial to select
- Rotate the dial to select the correct month and year and press to select
- Rotate the dial to select the correct time and press to select

11.2.4 Setting the Primary and Boost Immersion Heater Temperature

Setting the temperature is under the same menu as the date and time:
- Press the Menu Button
- Select Date/Time/Temp by pressing the control dial
- Rotate the dial to select Set and press the dial to select
- Rotate the dial to select Set Temp and press the dial to select
- Press the dial to select Primary Temp to set the primary immersion temperature or rotate the dial to Boost Temp and press the dial to select the Boost temperature set point

11.2.5 Activate and De-Activate the Boost Immersion

This is accessed from the Home screen and will be active until the boost temperature is achieved:
- press the advance button to activate
- press the advance button again to de-activate (see Figure 19)

11.2.6 Accessing Energy and Temperature Information

The Quantum cylinder also provides information about the hot water stored. Information is provided on the current status of the cylinder as well as some historical data. This information is accessed by pressing the selector dial for 3 seconds to display the user information menu; three choices are available:

1. Temperature – Displays the current, minimum and maximum temperatures recorded by the four temperature sensors

2. Energy
    i. Current – Displays current energy consumption by the immersion heater, storage capacity is the remaining storage capacity in the cylinder at that moment of time and the available hot water volume relating to the set temperature (stored now). Should the temperature be higher than the set temperature, then the mixed water volume to the set temperature is stated.
    ii. History – gives the energy consumption in kWh available for day -1, week-1, month-1, and the total energy that the unit has consumed since it has been installed.

The colour of the display will turn red once 48 °C is exceeded.

Above this temperature is generally considered to be unsafe and could cause a serious scald. The user should always run the cold tap first when filling a bath and test the water before getting into a bath or shower. The recommended temperature for bathing is 37°C.

3. Counter - Displays the total number of hours logged utilising the boost function.

11.2.7 Accessing and Setting Functions

To access and select Holiday Mode or No Control, follow the steps below:
- Press the menu button
- Rotate the dial to select Timer Mode and press the dial to select
- Rotate the dial to select one of Holiday or No Control and press the dial to select
- Set the desired timer conditions and press the dial to confirm

Holiday mode disables all heating during the selected holiday period. The holiday period consists of the remainder of the current day plus the number of holidays selected in the timer mode menu.

When in No Control the cylinder heats up to the primary setpoint temperature when the supply is active (off peak) or during the selected off peak tariff window (timed) as selected in the tariff menu, see section 7.2.1.

12 Maintenance

The maintenance of this appliance must be carried out by suitable qualified person only. It is recommended to maintain the unit on an annual basis. Isolate all electrical supplies from the unit before commencing work. Danger of electrical shock! See Section 7.

The Immersion Heater thermostat should not be removed from the immersion heater body.

Clean outer cladding of cylinder with a soft cloth dampened with warm water only. Do not use abrasive or aggressive cleaning materials, such as alcohol or petroleum based solvents, as this may damage the surface of the product.

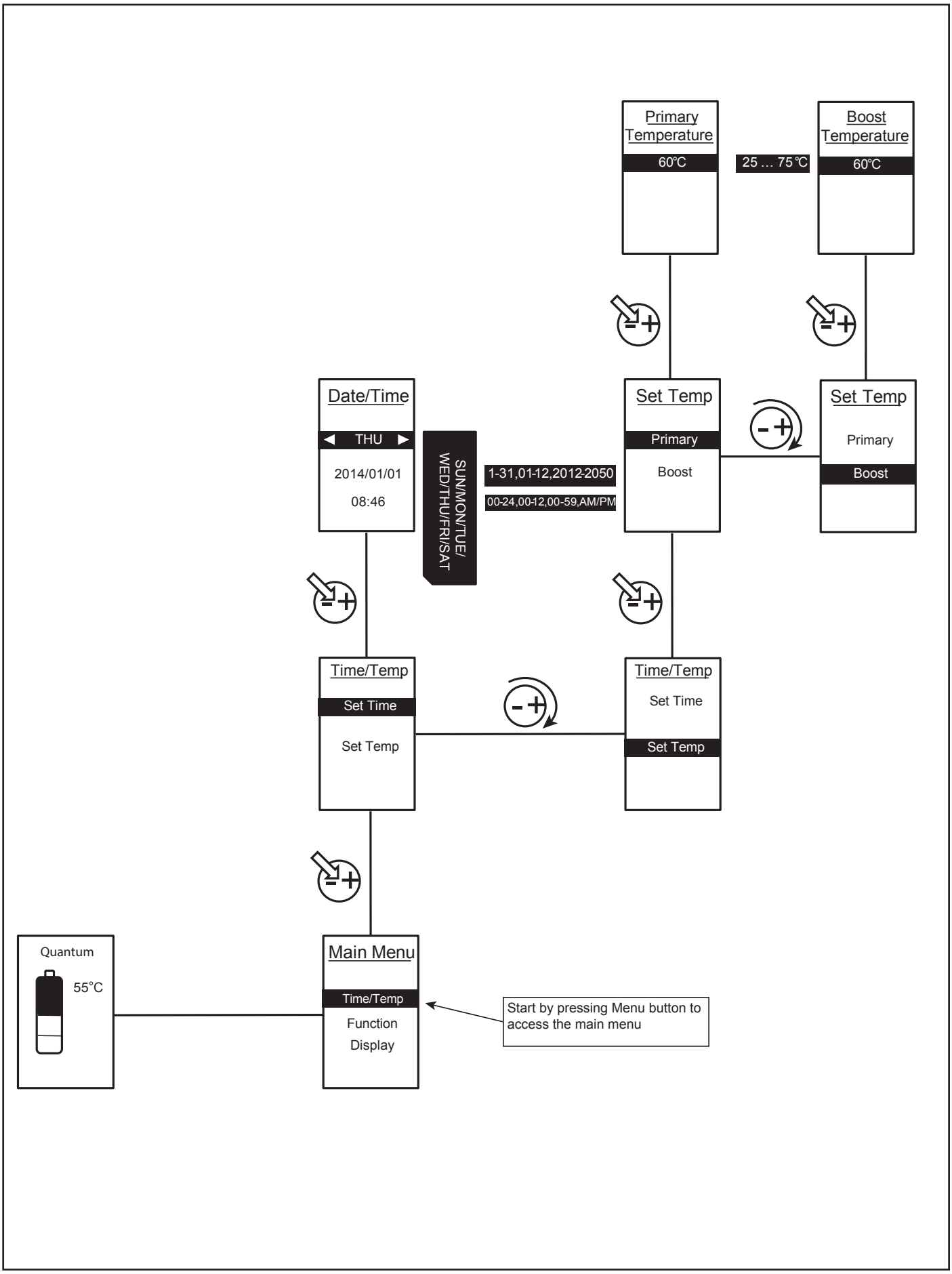


Figure 17: How to Set the Current Date, Time, Primary and Boost Temperature Set Point

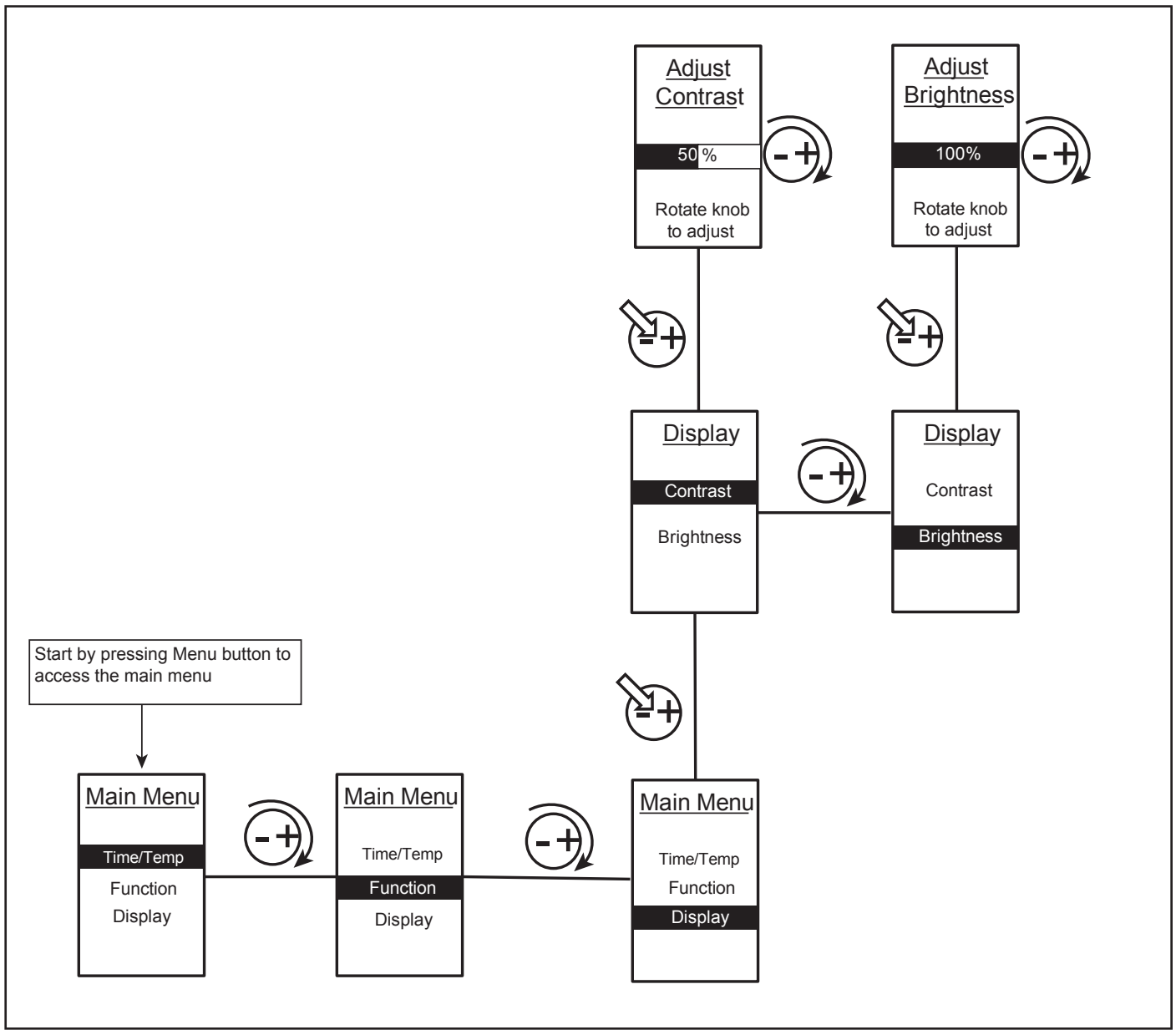


Figure 18: How to Adjust the Display Settings of the User Interface

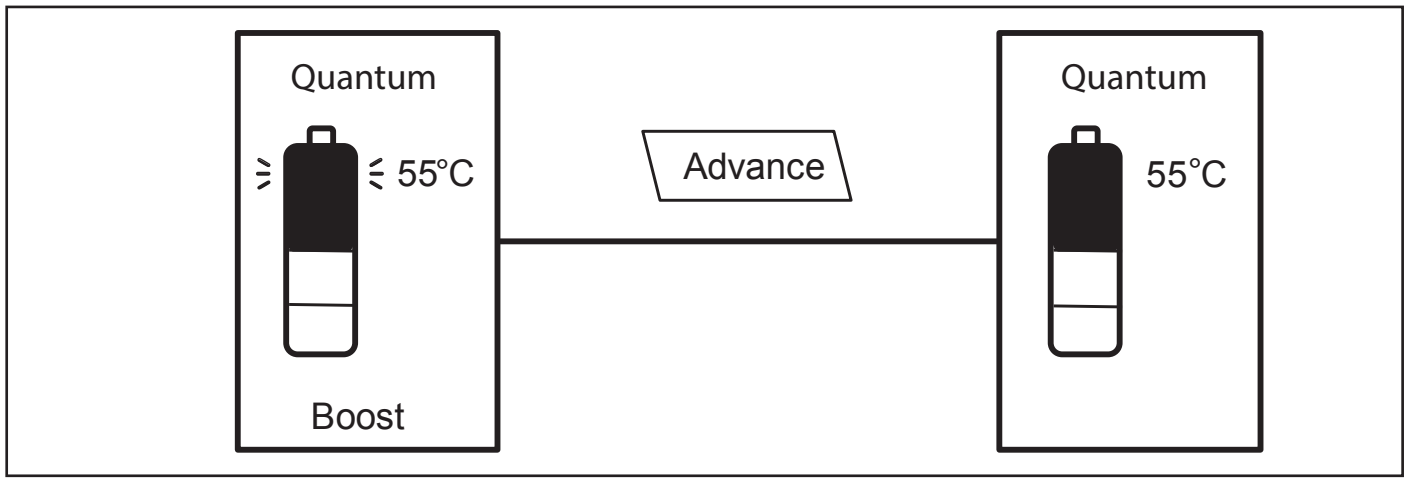


Figure 19: How to Activate and De-Activate the Boost Immersion Heater

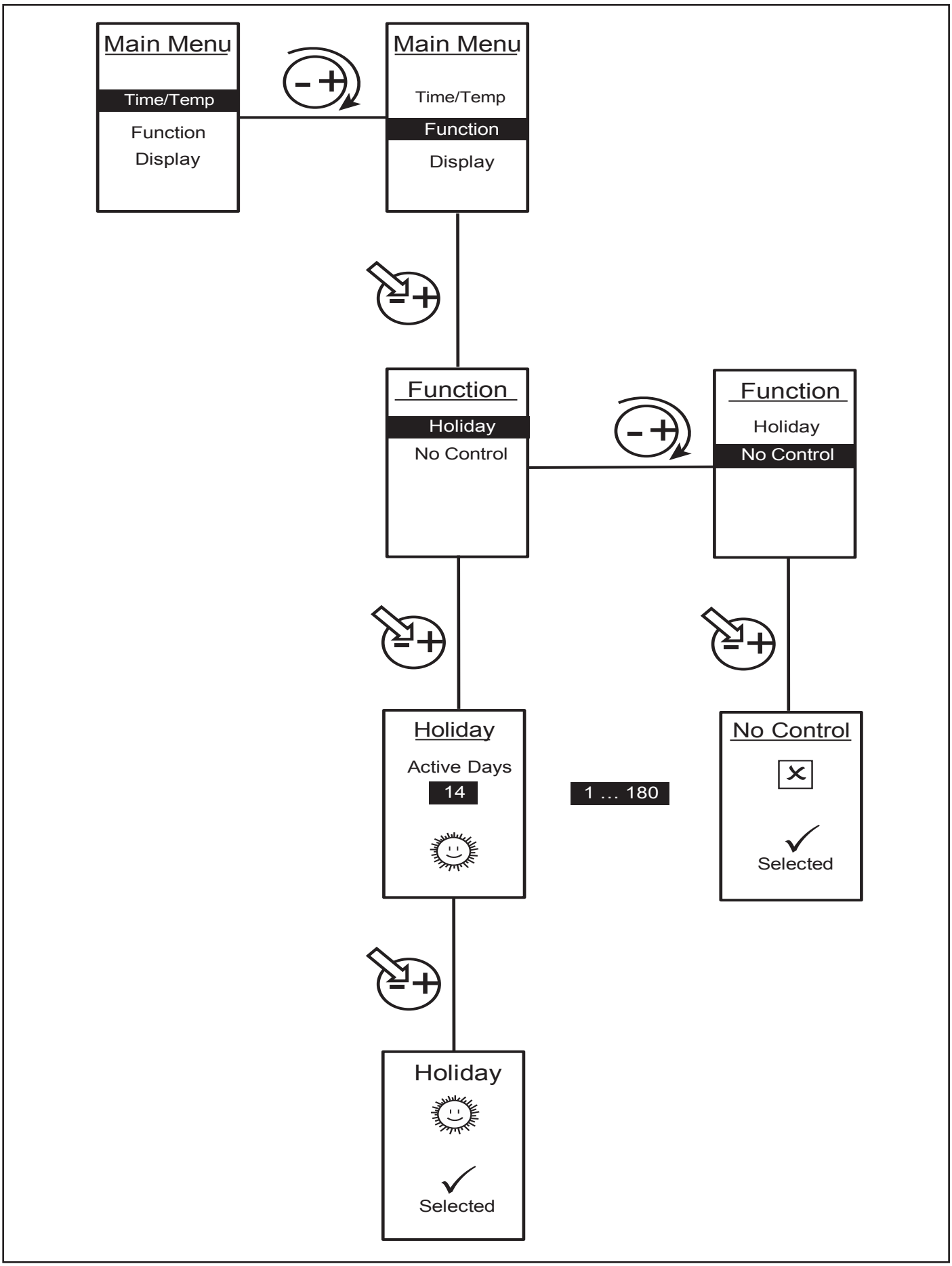


Figure 20: How to Set Functions

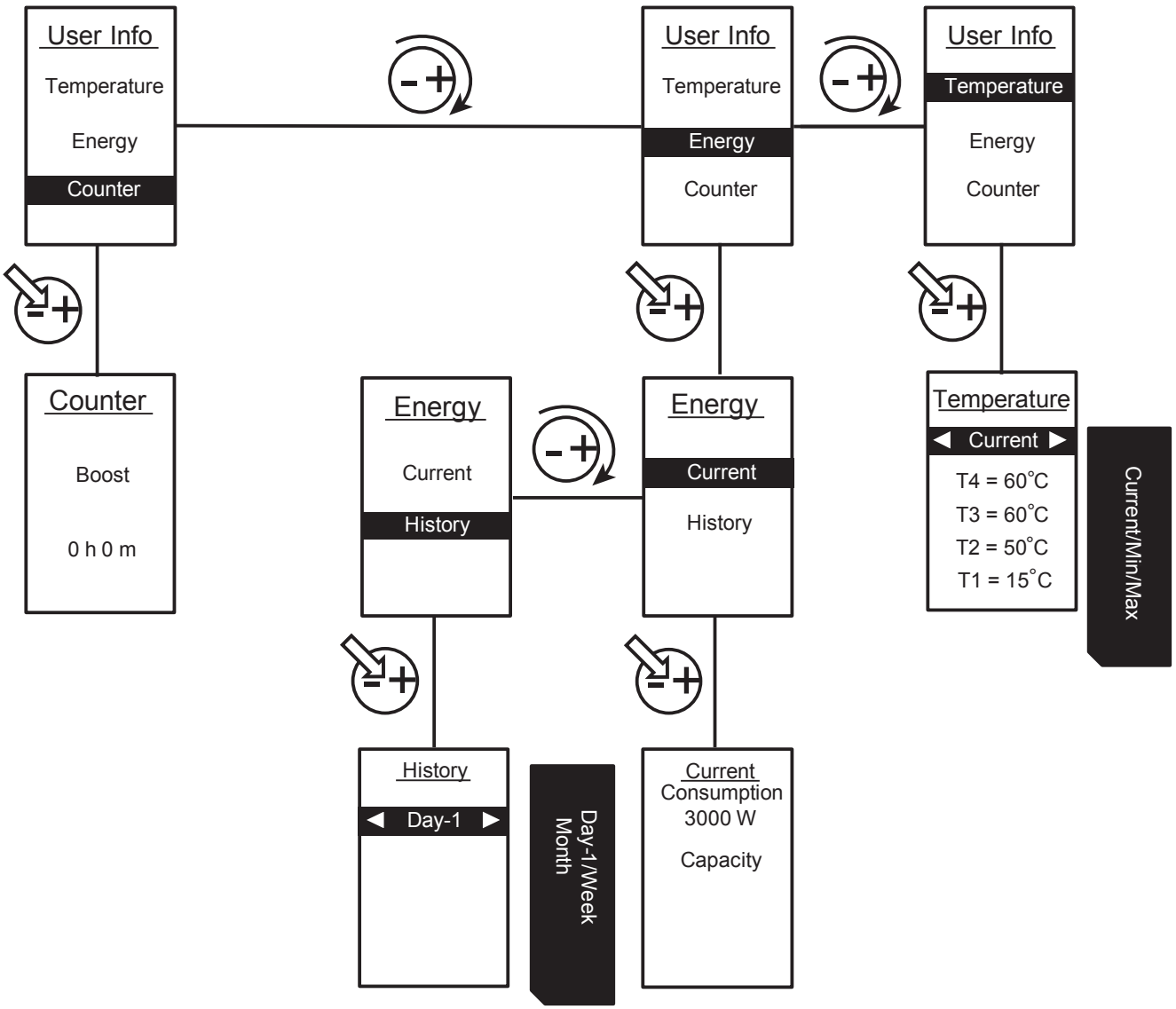


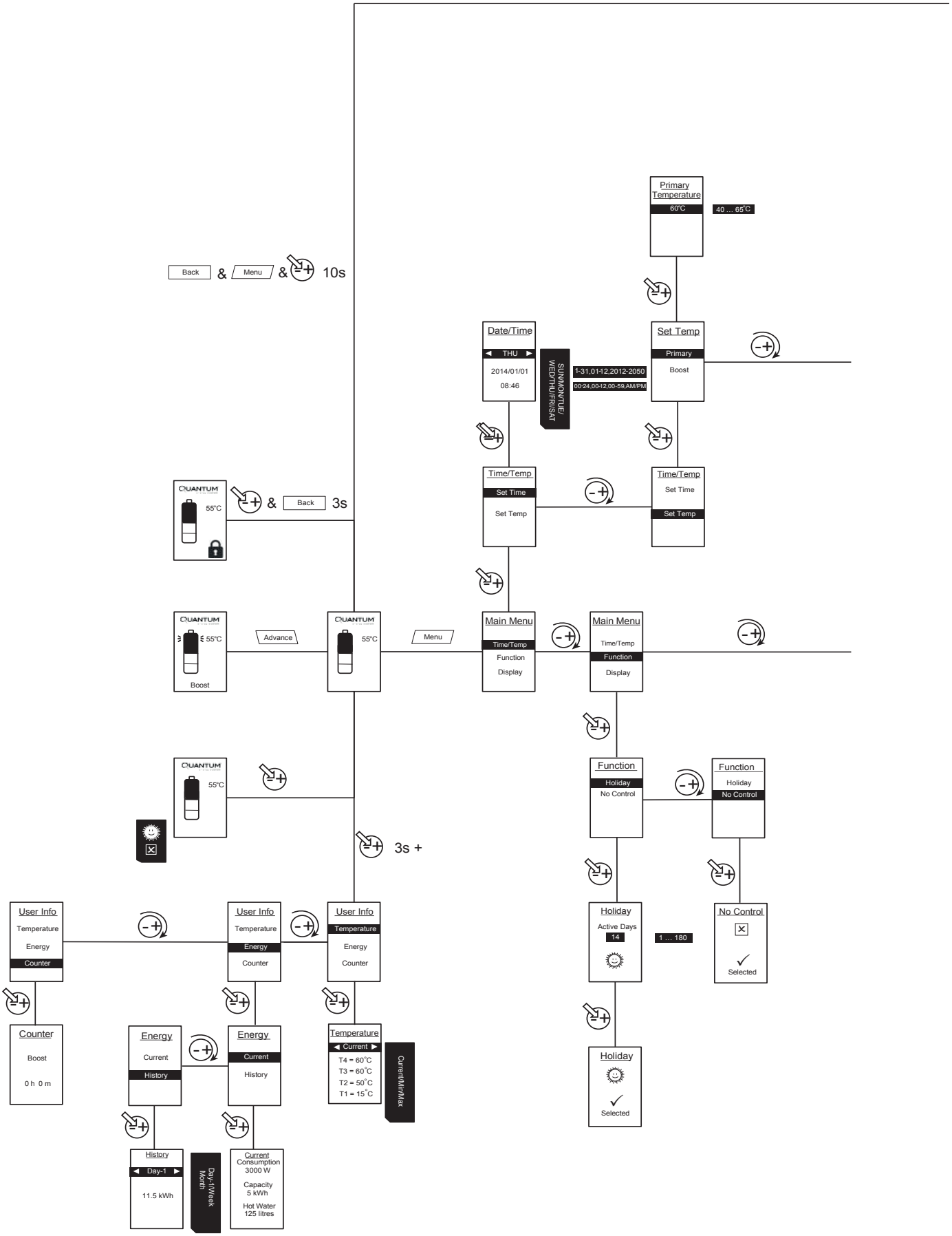
Figure 21: How to Access the System Information on the User Interface

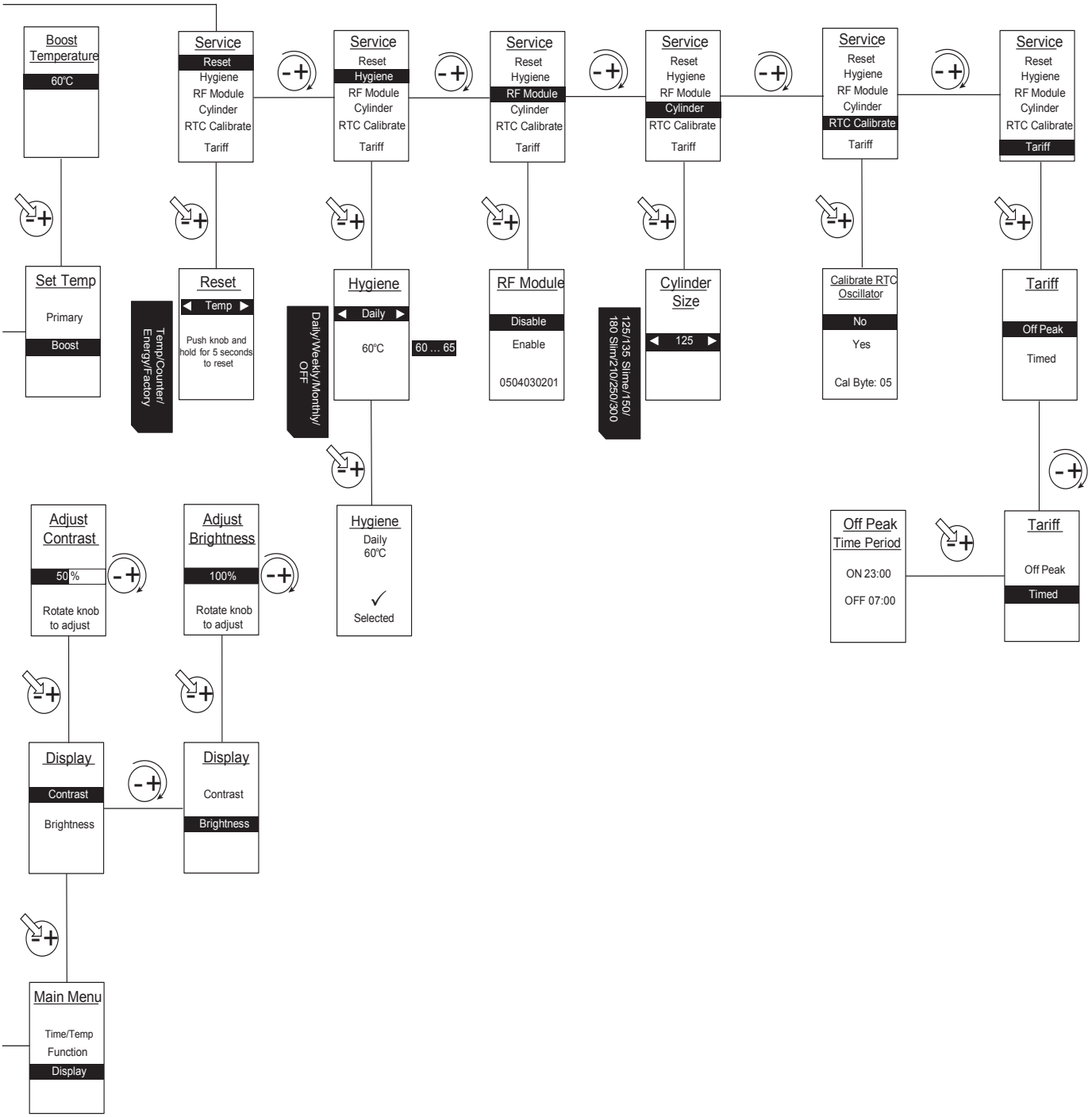
13 Troubleshooting

Fault	Cause	Solution
A No water from hot water taps	A.1 Stop valve closed A.2 Strainer blocked A.3 Pressure reducing valve fitted against flow	A.1 Open stop valve A.2 Turn water supply off, clean strainer and re-commission A.3 Re-fit with arrow showing in direction of flow
B Intermittent water discharge through tundish on warm-up	B.1 Expansion vessel lost charge	B.1 Check expansion vessel (see commissioning/maintenance), top-up or replace
C Continuous discharge	C.1 Pressure reducing valve not working C.2 Pressure relief or T&P valve not seating correctly C.3 Malfunction of high limit thermostat or appliance	C.1 Check pressure after valve and replace if faulty C.2 Manually lift valve once or twice to clear debris, otherwise replace C.3 Check function of thermostats and appliances
D Leakage from casing	D.1 Compression/threaded joints not formed correctly	D.1 Re-seal joints with care
E Hot water from cold tap	E.1 Hot pipe work being routed adjacent to cold pipe work. E.2 Leaking seal in mixer tap	E.1 Insulate hot pipe work or re-route E.2 Replace seals in mixer tap
F Metallic noise from system	F.1 Pipe work not sufficiently supported	F.1 Add extra pipe work fixings
G Humming noise from system during re-heat	G.1 Air in system G.2 Flow rate well in excess of specification	G.1 Bleed system thoroughly and re-pressurise G.2 Reduce pump speed
H Cylinder not charging	H.1 Power supply turned off H.2 Tariff not set correctly H.3 Temperature set-point not set correctly H.4 Direct heating malfunction H.5 Direct heating high limit thermostat has tripped	H.1 Ensure both power supplies are turned on H.2 Set tariff correctly (Section 7.2.6) H.3 Set Primary Set-point (Section 11.2.5) H.4 Call for qualified person to check immersion heater H.5 Reset limit thermostat(s) and inform installer
I The water in the cylinder is too hot	1.1 Primary/Boost temperature set point is too high I.2 Hygiene mode overriding primary set-point I.3 Temperature sensors faulty or not installed correctly	1.1 Check/Adjust the primary and boost temperature set-points (Section 11.2.5) I.2 Check/Adjust the Hygiene Set point (Section 7.2.2) I.3 Check temperature displayed for accuracy (Section 11.2.7), if clearly incorrect contact seller
J Hot water runs out during the day	J.1 Cylinder not storing enough energy to meet daily requirements J.2 Increased usage resulted in hot water ran out earlier than usual	J. 1 Raising the Primary set-point in order to store additional energy during the off peak period (Section 11.2.5) J.2 Boost function heats a small volume of water (Section 11.2.6)

14 Frequently Asked Questions

Issue	Cause	Solution
A Cylinder not charging	A.1 Power supply turned off A.2 Tariff not set correctly A.3 Temperature setpoint not set correctly	A.1 Ensure both power supplies are turned on A.2 Set tariff correctly (Section 7.2.6) A.3 Set Primary setpoint (Section 11.2.4)
B The water in the cylinder is too hot	B.1 Primary/Boost temperature setpoint is too high B.2 Hygiene mode overriding primary setpoint B.3 Temperature sensors faulty or not installed correctly	B.1 Check/adjust the primary and boost temperature setpoints (Section 11.2.4) B.2 Check/adjust the Hygiene setpoint (Section 11.2.5) B.3 Check temperature displayed for accuracy (Section11.2.7), if clearly incorrect contact supplier
C Hot water runs out during the day	C.1 Cylinder not storing enough energy to meet daily requirements C.2 Increased usage resulted in hot water running out earlier than usual	C.1 Raising the Primary setpoint in order to store additional energy during the off peak period (Section 11.2.4)
D How can I minimise energy consumption	D.1 Compression/threaded joints not formed correctly D.2 Frequent use of Boost function D.3 Energy lost through pipework	D.1 Store water at lower temperatures. This means that less energy will be consumed to heat the water and also minimise heat loss from the cylinder during the day (Section 11.2.3) D.2 Minimise boost usage during peak rate electricity periods. Ensure that adequate energy is stored in the cylinder overnight to meet the user's daily requirements. D.3 Ensure all pipework from the outlet of the cylinder is well insualted to minimise heat loss through the pipework


Back & Menu & 10s
Primary Temperature
60°C
40 ... 65°C
Date/Time
THU
2014/01/01
08:46
SUN/MON/TUE/WED/THU/FRI/SAT
1-31,01-12,2012-2050
00-24,00-12,00-59,AM/PM
Set Temp
Primary
Boost
Time/Temp
Set Time
Set Temp
Time/Temp
Set Time
Set Temp
QUANTUM
55°C
& Back 3s
Advance
Menu
Boost
Main Menu
Time/Temp
Function
Display
Main Menu
Time/Temp
Function
Display
3s +
Function
Holiday
No Control
Function
Holiday
No Control
User Info
Temperature
Energy
Counter
User Info
Temperature
Energy
Counter
User Info
Temperature
Energy
Counter
Holiday
Active Days
14
1 ... 180
No Control
Selected
Counter
Boost
0 h 0 m
Energy
Current
History
Energy
Current
History
Temperature
Current
T4 = 60°C
T3 = 60°C
T2 = 50°C
T1 = 15°C
Current/Min/Max
Holiday
Selected
History
Day-1
11.5 kWh
Day-1/Week/Month
Current Consumption
3000 W
Capacity
5 kWh
Hot Water
125 litres


Boost Temperature
60°C
Set Temp
Primary
Boost
Service
Reset
Hygiene
RF Module
Cylinder
RTC Calibrate
Tariff
Reset
Temp
Push knob and hold for 5 seconds to reset
Temp/Counter/ Energy/Factory
Hygiene
Daily
60°C
60 ... 65
Daily/Weekly/Monthly/ OFF
RF Module
Disable
Enable
0504030201
Cylinder Size
125
125/135 Slime/150/ 180 Slim/210/250/300
Calibrate RTC Oscillator
No
Yes
Cal Byte: 05
Tariff
Off Peak
Timed
Adjust Contrast
50 %
Rotate knob to adjust
Adjust Brightness
100%
Rotate knob to adjust
Hygiene
Daily
60°C
✓
Selected
Off Peak Time Period
ON 23:00
OFF 07:00
Display
Contrast
Brightness
Main Menu
Time/Temp
Function
Display

Notes

Notes

Notes

MAINS PRESSURE HOT WATER STORAGE SYSTEM COMMISSIONING CHECKLIST

This Commissioning Checklist is to be completed in full by the competent person who commissioned the storage system as a means of demonstrating compliance with the appropriate Building Regulations and then handed to the customer to keep for future reference.

Failure to install and commission this equipment to the manufacturer's instructions may invalidate the warranty but does not affect statutory rights.

Customer Name _____ Telephone Number _____

Address _____

Cylinder Make and Model _____

Cylinder Serial Number

Commissioned by *(print name)* _____ Registered Operative ID Number _____

Company Name _____ Telephone Number _____

Company Address _____

_____ Commissioning Date _____

To be completed by the customer on receipt of a Building Regulations Compliance Certificate*:

Building Regulations Notification Number *(if applicable)* _____

ALL SYSTEMS PRIMARY SETTINGS (indirect heating only)

Is the primary circuit a sealed or open vented system?	Sealed ☐	Open ☐	
What is the maximum primary flow temperature?			°C

ALL SYSTEMS

What is the incoming static cold water pressure at the inlet to the system?				bar
Has a strainer been cleaned of installation debris (if fitted)?	Yes ☐	No ☐		
Is the installation in a hard water area (above 200ppm)?	Yes ☐	No ☐		
If yes, has a water scale reducer been fitted?	Yes ☐	No ☐		
What type of scale reducer has been fitted?				
What is the hot water thermostat set temperature?				°C
What is the maximum hot water flow rate at set thermostat temperature (measured at high flow outlet)?				l/min
Time and temperature controls have been fitted in compliance with Part L of the Building Regulations?			Yes ☐	
Type of control system (if applicable)	Y Plan ☐	S Plan ☐	Other ☐	
Is the cylinder solar (or other renewable) compatible?	Yes ☐	No ☐		
What is the hot water temperature at the nearest outlet?				°C
All appropriate pipes have been insulated up to 1 metre or the point where they become concealed			Yes ☐	

UNVENTED SYSTEMS ONLY

Where is the pressure reducing valve situated (if fitted)?				
What is the pressure reducing valve setting?				bar
Has a combined temperature and pressure relief valve and expansion valve been fitted and discharge tested?	Yes ☐	No ☐		
The tundish and discharge pipework have been connected and terminated to Part G of the Building Regulations			Yes ☐	
Are all energy sources fitted with a cut out device?	Yes ☐	No ☐		
Has the expansion vessel or internal air space been checked?	Yes ☐	No ☐		

THERMAL STORES ONLY

What store temperature is achievable?		°C
What is the maximum hot water temperature?		°C

ALL INSTALLATIONS

The hot water system complies with the appropriate Building Regulations	Yes ☐
The system has been installed and commissioned in accordance with the manufacturer's instructions	Yes ☐
The system controls have been demonstrated to and understood by the customer	Yes ☐
The manufacturer's literature, including Benchmark Checklist and Service Record, has been explained and left with the customer	Yes ☐

Commissioning Engineer's Signature _____

Customer's Signature _____

(To confirm satisfactory demonstration and receipt of manufacturer's literature)

*All installations in England and Wales must be notified to Local Authority Building Control (LABC) either directly or through a Competent Persons Scheme. A Building Regulations Compliance Certificate will then be issued to the customer.

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

www.centralheating.co.uk

SERVICE RECORD

It is recommended that your hot water system is serviced regularly and that the appropriate Service Record is completed.

Service Provider

Before completing the appropriate Service Record below, please ensure you have carried out the service as described in the manufacturer's instructions.

SERVICE 1 Date

Engineer Name

Company Name

Telephone Number

Comments

Signature

SERVICE 2 Date

Engineer Name

Company Name

Telephone Number

Comments

Signature

SERVICE 3 Date

Engineer Name

Company Name

Telephone Number

Comments

Signature

SERVICE 4 Date

Engineer Name

Company Name

Telephone Number

Comments

Signature

SERVICE 5 Date

Engineer Name

Company Name

Telephone Number

Comments

Signature

SERVICE 6 Date

Engineer Name

Company Name

Telephone Number

Comments

Signature

SERVICE 7 Date

Engineer Name

Company Name

Telephone Number

Comments

Signature

SERVICE 8 Date

Engineer Name

Company Name

Telephone Number

Comments

Signature

SERVICE 9 Date

Engineer Name

Company Name

Telephone Number

Comments

Signature

SERVICE 10 Date

Engineer Name

Company Name

Telephone Number

Comments

Signature

Disregarding the instructions given in this manual in its entirety and any relevant regulations, standards and codes of practice will void the guarantee of this product. GDC Group Ltd reserve the right to revise products, literature and guarantee terms without prior notice due to a policy of continuous improvement.

To speak to customer please contact:

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