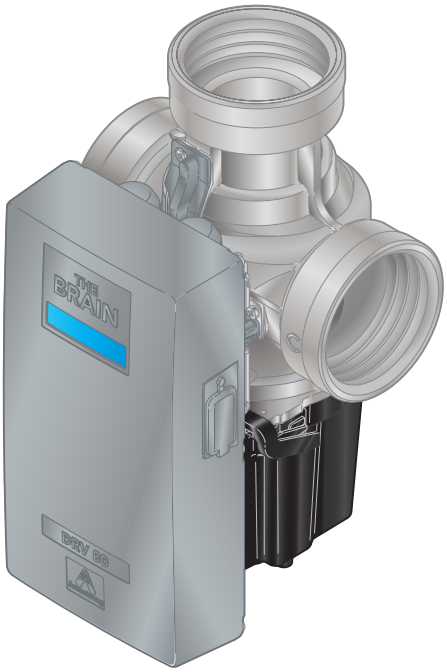
The Brain®
DRV80
Digital Recirculation Valve



The installation and service must be performed by a qualified installer.
For further information, please call our technical department Toll Free at 1-888-468-4673.

c UL us LISTED
Recirculating Valve
E357437

ASSE 1017

Armstrong International
221 Armstrong Blvd., Three Rivers, Michigan, 49093 - USA
Ph. (269) 279-3602 Toll Free (888) 468-4673 Fax (269) 279-3130

Keep this manual with installation for future reference.

DRV80 Digital Recirculation Mixing Valve

Contents

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Introduction

The Brain® DRV80 is a registered trademark of Armstrong Hot Water Group, a division of Armstrong International.

DRV80 features Rada Technology, Rada is a registered trademark of Kohler Mira Limited of Cheltenham, England.

The DRV80 is a digital recirculating type 1 controller valve for use as part of a warm water recirculation system within a commercial installation.

A dedicated accompanying mobile app can monitor and control temperature limits, disinfection cycle and view error logs. This product can be linked to external control and monitoring devices such as a Building Management System. Data connections can be made via the dedicated BMS port.

DRV80 Control Software and USB Drivers are available to download and update at ***www.armstronginternational.com/products/the-brain-digital-recirculation-valve/***

Download the "SAGE® by Armstrong" mobile app from either the Apple App Store or Google Play or scan the QR code.

Download on the App Store

GET IT ON Google Play

Safety

Icon Legend

If instructions are not followed:

- Injury or death and property damage are ***imminent***
- *Blessures ou décès et dégâts matériels* ***imminents***

- Injury or death and property damage are ***possible***
- *Blessures ou décès et dégâts matériels* ***possibles***

- Potential property damage, expensive repairs, and / or voiding the warranty may result
- Des dégâts matériels potentiels, des réparations onéreuses, et / ou une annulation de la garantie peuvent survenir

- Applicable codes must be followed and supersede any other instructions. Generally applicable codes in the US include:
  - IPC (International Plumbing Code)
- Read this manual
- Improper installation or operation may cause a flood resulting in property damage, personal injury, or death. Armstrong strongly recommends that a qualified installer be used.
- Service must be performed by a qualified person.
- Improper installation, start-up, operation, maintenance, or service may void the warranty.

Hot water or metal may cause scald burns. Skin exposure to 140°F water or metal for only five seconds may cause a second degree burn.

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General Advisory

The use of the word ‘failsafe’ to describe the function of any mixing valve is both incorrect and misleading. This DRV *(Digital Recirculation Valve)* incorporates additional shut-off devices to improve the level of safety however, in keeping with every other mechanism it cannot be considered as being functionally infallible.

Where chloramine / chlorine disinfection is practiced, ***DO NOT*** exceed a chloramine / chlorine concentration of **50** mg / l (ppm) in water, per one hour dwell time. Such procedures must be conducted strictly in accordance with the information supplied with the disinfectant and with all relevant Guidelines / Approved Codes of Practice.

Water must have levels of chloramine / chlorine lower than or equal to 4mg / l (ppm) for continual usage.

Data Storage

Armstrong International shall not accept liability in contract, tort (including negligence or otherwise) for any loss of profits, business or anticipated savings, or loss or corruption of data, or any indirect or consequential loss arising out of the customer's use of DRV80. The customer shall be solely responsible for the independent backup of all data / information stored on DRV80. Notwithstanding the foregoing, none of the exclusions and limitations stated above are intended to limit any rights the customer may have under local law or other statutory rights which may not be excluded.

Patents

GB - 2 421 297 2 437 891
US - 7669776 8043556
PCT - PCT/GB2006 / 000159
European - 06702758.1
India - 1231/MUMNP / 2007
Australia - 2006207367
Canada - 2595064
China - ZL200680005853.8
Japan - 4933451

Recycling and Disposal

This product and batteries should not be disposed of with your general household waste. When this product or batteries have reached the end of their serviceable life, take the product or batteries to a recognized WEEE (Waste Electrical and Electronic Equipment) collection facility such as your local civic amenity site for recycling. Your local authority or retailer can direct you to the nearest recycling facility.

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Standards and Codes

The Brain® DRV80 conforms to ASSE 1017 and CSA B125.3-11.

Hereby, Kohler Mira Ltd. declares that the radio equipment type DRV80 is in compliance with Directive 2014/53/EU.

The full text of the EU declaration of conformity is available at the following internet address:

www.radacontrols.com

The DRV80 operates in the Frequency band 2402MHz-2480MHz with a maximum power of 0dBm.

FCC Compliance Notice

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

- This device may not cause harmful interference.
- This device must accept any interference received, including interference that may cause undesired operation.

Note! This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help

Any modifications made to this device that are not approved by Armstrong may void the authority granted to the user by the FCC to operate this equipment.

Industry Canada

CAN ICES-3 (B) / NMB-3(B)

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La marque et les logos Bluetooth® sont des marques déposées de Bluetooth SIG, Inc. et Kohler Mira Ltd les utilise sous licence. Les autres marques déposées et noms commerciaux appartiennent à leurs propriétaires respectifs.

DRV80 UKCA/CE Marking Requirement

The Brain® DRV80 conforms to the UKCA/CE marking requirements.

EU Directives/Regulations

2014/53/EU - Radio Equipment Directive

2014/30/EU - Electromagnetic Compatibility Directive (EMC)

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2014/35/EU - Low Voltage Directive (LVD)

2011/65/EU - Restriction of Hazardous Substances Directive (RoHS)

1907/2006/EC - Registration, Evaluation, Authorization and Restriction of Chemicals (REACH) Regulation (Plus, subsequent amendments)

2012/19/EU - Waste Electrical & Electronic Equipment Directive

UK Regulations

S.I. 2017/1206 - Radio Equipment Regulations

S.I. 2016/1091 - Electromagnetic Compatibility Regulations

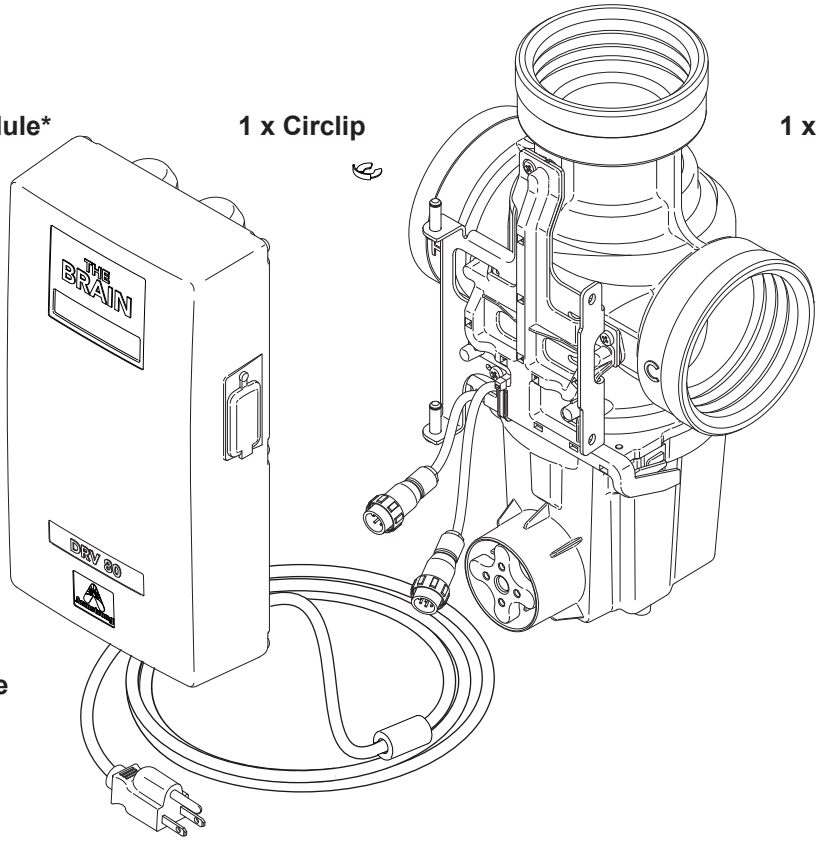
S.I. 2016/1101 - Electrical Equipment (Safety) Regulations

S.I. 2012/3032 - Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment

S.I. 2021/904 The REACH etc. (Amendment) Regulations 2021 (Plus, subsequent amendments)

S.I. 2013/3113 - The Waste Electrical and Electronic Equipment Regulations

Single DRV80 Pack Contents



2x CR - P2 6V Batteries (not supplied with product)
See Technical Specifications on page 10 for more details.

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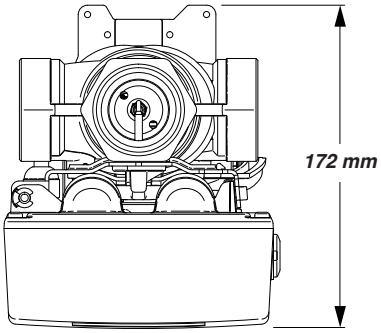
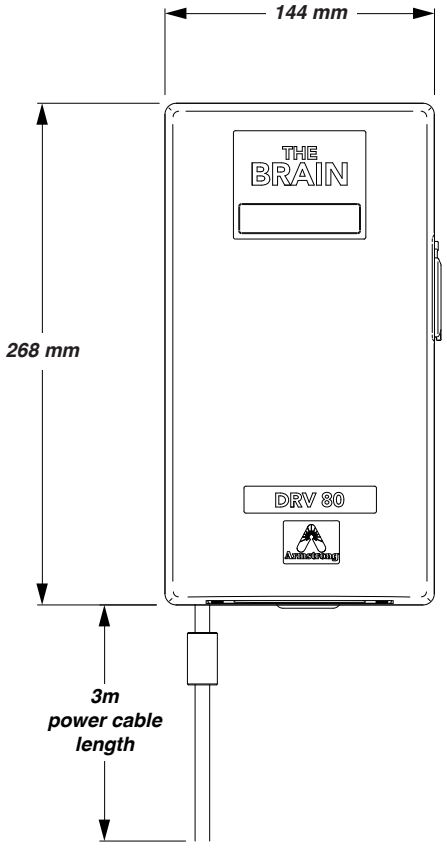
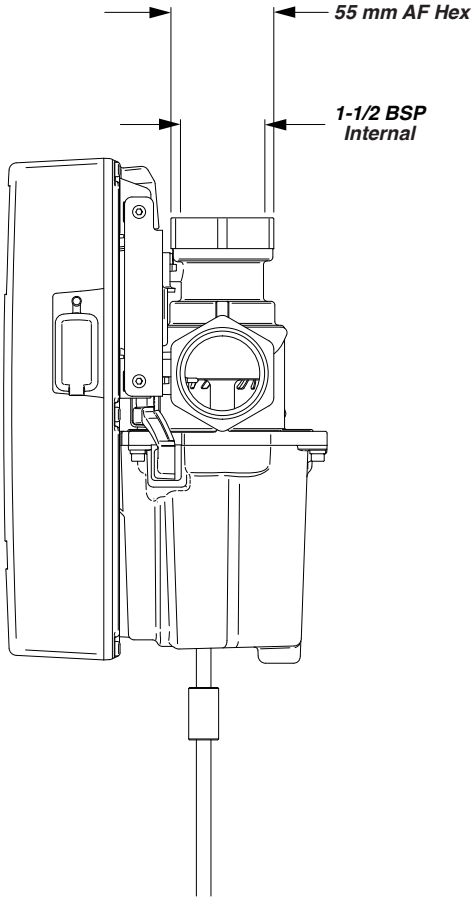
DRV80 Dimensions







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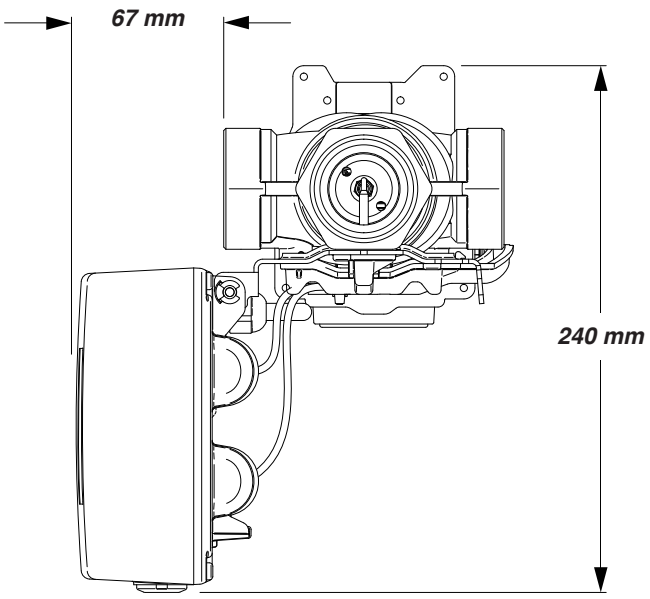

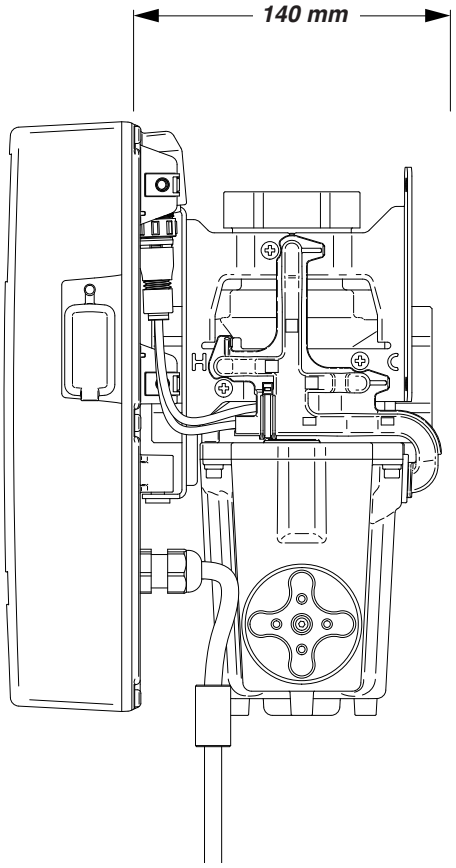

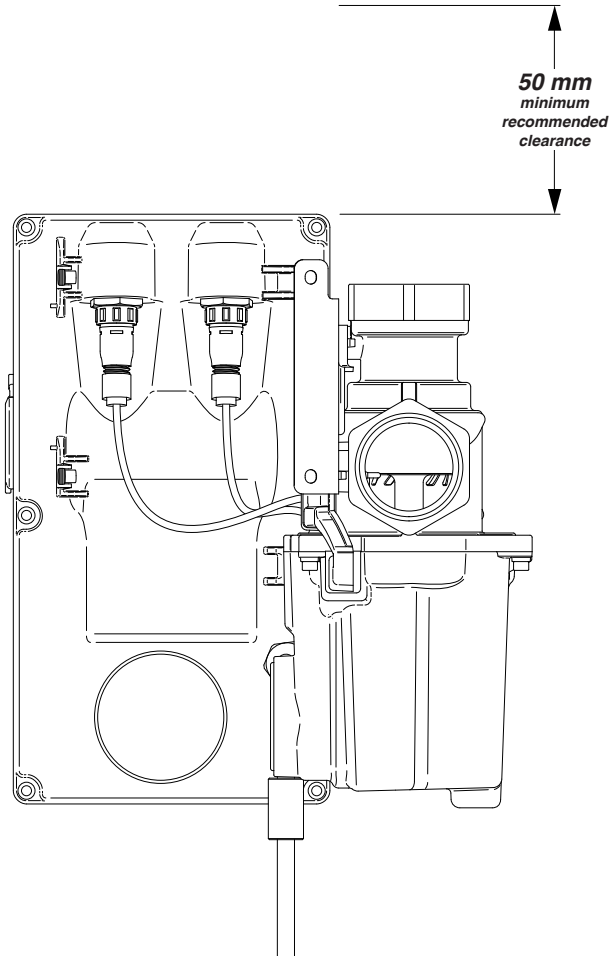

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Technical Specifications

General	
Protection	NEMA 3S
Ambient Temperature	Minimum ambient temperature of 35 °F (2 °C) maximum 122 °F (50 °C)
Ambient Humidity	95% Non-condensing
Connections	3” NPT Internal (female)
Installation Environment	Suitable for indoor use only
Normal Environmental Conditions	Altitude up to 2000 m
IP Rating	IPx4
Materials	Electronics Module: PC / ABS DRV: Stainless Steel, engineering plastics and elastomers Motor: Electronic microstepper motor
Safety	Thermal shutdown upon inlet supply failure and / or power failure
Weight DRV80	23.15 lbs (10.5 kg)
Pressures	
Maximum Inlet Supply Pressure	200 psi (1379 kPa = 13.8 bar)
Supply Pressure Differential	Inlet supply pressures must be nominally equal
Temperatures	
Maximum Inlet Hot Water Supply	185°F (85°C), 131°F (55°C) During group control
Minimum Inlet Hot Water Supply	5°F (2°C) above set point
Maximum Inlet Cold Water	75°F (25°C) (minimum set temp = 81°F)
Minimum Inlet Cold Water	34°F (1°C)
Set Point Range	81°F to 158°F (27 - 70°C)
Minimum Recirculation Loop Temperature Loss	2°F (1°C)
Recirculation Circuit	
Minimum distance to First Outlet	25 ft (7.6 m)
Flow Rates	
Maximum Suggested Flow Rate	165 gpm (625 lpm) at 20 psi drop
Minimum Recirculation Flow Rate	10 gpm (37.8 lpm)
Minimum System Draw-off	0 gpm (0 lpm) during recirculation
Electrical	
Power Supply	120V AC ~ 60Hz, 1.0 Amp
Supply Fuse / Circuit Breaker	Grounding is required. Switched type 3 Amp (no plug), 15 Amp Grounding-type receptacle (plug).
Battery	2 x CR - P2 6V (Panasonic CR-P2)
Duty Cycle	Continuously rated
Overvoltage	Category II
Classification	Pollution Degree 2
Rated Impulse Voltage	4 kV AC
Auxiliary Relay (see *Alerts - Activate Relay on Alert*)	
Relay Type	Single pole changeover relay contacts
Power Supply	250V AC / 24V DC
Supply Fuse	2 Amp

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Default Settings

DRV80 is preprogrammed to customer requirements prior to shipment
The settings are derived from the ***Installation Detail Form (IDF)*** filled out by the customer when placing an order.

Armstrong

THE BRAIN® DIGITAL RECIRCULATION VALVE (DRV), DIGITAL MIXING CENTER (DMC), SAGE® (BS) INSTALLATION DETAILS FORM (IDF)

The review and acceptance of the information on the IDF by Armstrong:

1. Approves the order for processing which triggers an e-mail confirmation
2. Indicates that AHWG supports you by endorsing the application
3. Initiates the warranty
4. Delivers a complete, AHWG supported performance guarantee to the final user of the product
5. Drives the relevant point of specification-influence, point of installation and point of order financial allocation if appropiate

Section 1 – Ordering Processing/Tracking Detail:

In order to enter P.O.s and guarantee delivery dates, a technically accurate and complete IDF is required.
Complete this page and email with the Order to hotwater@armstronginternational.com

Point of Order / Sold To: _____ *(eg: ABC Mechanical)*

City: _____ State: _____ Rep Firm: _____

Point of Installation: _____ *(eg: Heinz Ketchup)*

City: _____ State: _____ Rep Firm: _____

Point of Specification: _____ *(eg: DEF Consulting Engineers)*

City: _____ State: _____ Rep Firm: _____

Other Influence: _____ *(eg: Source of Recommendation)*

Section 2 – Secondary Domestic Water Side

Size: DRV25 ☐ DRV40 ☐ DRV50 ☐ DRV80 ☐

Inlet Hot Water Temperature to DRV: _____ °F

Inlet Hot Water Pressure to DRV: _____ PSI

Inlet Cold Water Temperature to DRV: _____ °F

Inlet Cold Water Pressure to DRV: _____ PSI

Maximum System Demand: _____ GPM

Continuous Recirc to DRV: _____ GPM

DRV25 for Group Control: ☐

Minimum Recirc: Each DRV 25 requires 2 GPM, each DRV 40 requires 5 GPM, and each DRV50/80 requires 10 GPM

SAGE® for BAS Interface

Protocol Options

- ☐ BACnet IP
- ☐ BACnet Metasys N2
- ☐ BACnet MSTP
- ☐ LonWorks
- ☐ Modbus RTU
- ☐ Modbus TCP

SAGE® for the Web

☐ Complete Sage® IDF
Fee-Based Subscription Options

Section 4 – Digital Recirculation Valve (DRV) Setpoint Programming Detail

The Brain® Mixed Water Outlet Temp Setpoint: _____ °F

SAGE® (BS) No ☐ Yes ☐ **If Yes - Select ProtoCessor, or SAGE® for the Web**

Reference Drawing Number: _____ Armstrong Model Number: _____

List any non-standard options or details here:

_____

_____

_____

Armstrong International – Hot Water Group
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The Installation Detail Form (IDF) is available to download at ***www.armstronginternational.com/resource-library/*** *or consult factory*

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Installation

General

Installation must be carried out in accordance with these instructions, and must be conducted by designated, qualified and competent personnel.
L'installation doit être réalisée conformément à ces instructions, et doit être effectuée par un personnel qualifié désigné.

The installation **must** comply with all relevant local and state water plumbing codes.

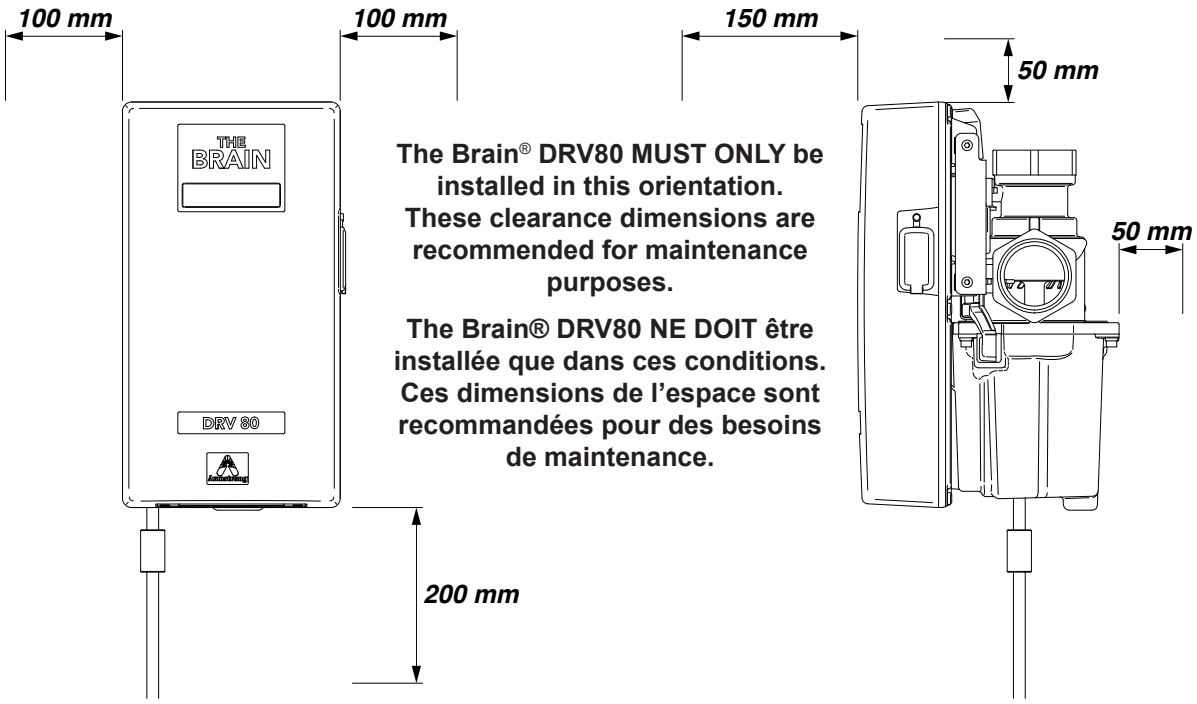
The DRV80 **must** be installed per the piping diagrams (pages 14 - 15). All plumbing components are to be supplied by the installer. Failure to include these components will compromise the product, system performance and will void the warranty.

Caution! The DRV80 **must** be installed in a dry area where it will not be able to freeze (minimum ambient temperature of 35 °F (2 °C)).

Attention! L'installation du DRV80 **doit** se faire dans un endroit sec où il ne pourra pas geler (à une température ambiante minimale de 35°F (2°C)).

Notes:

1. DRV80 is supplied fully performance and pressure tested.
2. The DRV80 ***must*** be installed in an area where it is accessible to do any maintenance tasks e.g. connecting Laptop / PC, removal of the cover, replacing worn parts etc.
3. Suitable connections for ease of maintenance should be used on the inlet and outlet ports. *(Isolation valves and unions.)*
4. The hot and cold water inlet supply pressures must be nominally equal.
5. The cold inlet supply feed to the DRV80 must be "tapped" directly from the cold inlet supply to the water heater.
6. The inlet supply pipework ***must*** be thoroughly flushed before fitting the DRV80.



The Brain® DRV80 MUST ONLY be installed in this orientation. These clearance dimensions are recommended for maintenance purposes.

The Brain® DRV80 NE DOIT être installée que dans ces conditions. Ces dimensions de l'espace sont recommandées pour des besoins de maintenance.

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Installation Requirements

1. **Inlet isolating valves (full flow type) must be installed close to the DRV80 for ease of maintenance. It is recommended that outlet isolating valves (full flow type) are also installed.**

2. **The use of supply / return strainers will reduce debris entering the DRV80. The recommended gauge for such strainers is 35 mesh (mesh aperture dimension = 0.5mm).**

3. **Inlet pressure tappings which allow measurement of the inlet pressures to the DRV80 under operating conditions are particularly recommended for in-service testing.**

4. **Pipework must be rigidly supported to avoid any strain on the connections.**

5. **Make sure the pipe layout will avoid the build up of trapped air in the system. Air release valves can be used where this is not possible.**

6. **Inlet and outlet threaded joint connections should be made with PTFE thread sealing tape or liquid sealant. Do not use oil-based, non-setting joint compounds.**

7. **To eliminate pipe debris it is essential that supply pipes are thoroughly flushed before connection to the DRV80.**

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Piping Diagrams

System Layout

- Legend -

- Recirculation Pump
- Check Valve
- Stop Valve
- Isolation Valve
- Sink
- Shower
- Thermometer
- Strainer
- Cold Water
- Hot Water
- Mixed Water

DRV80 Assembly

- Legend -

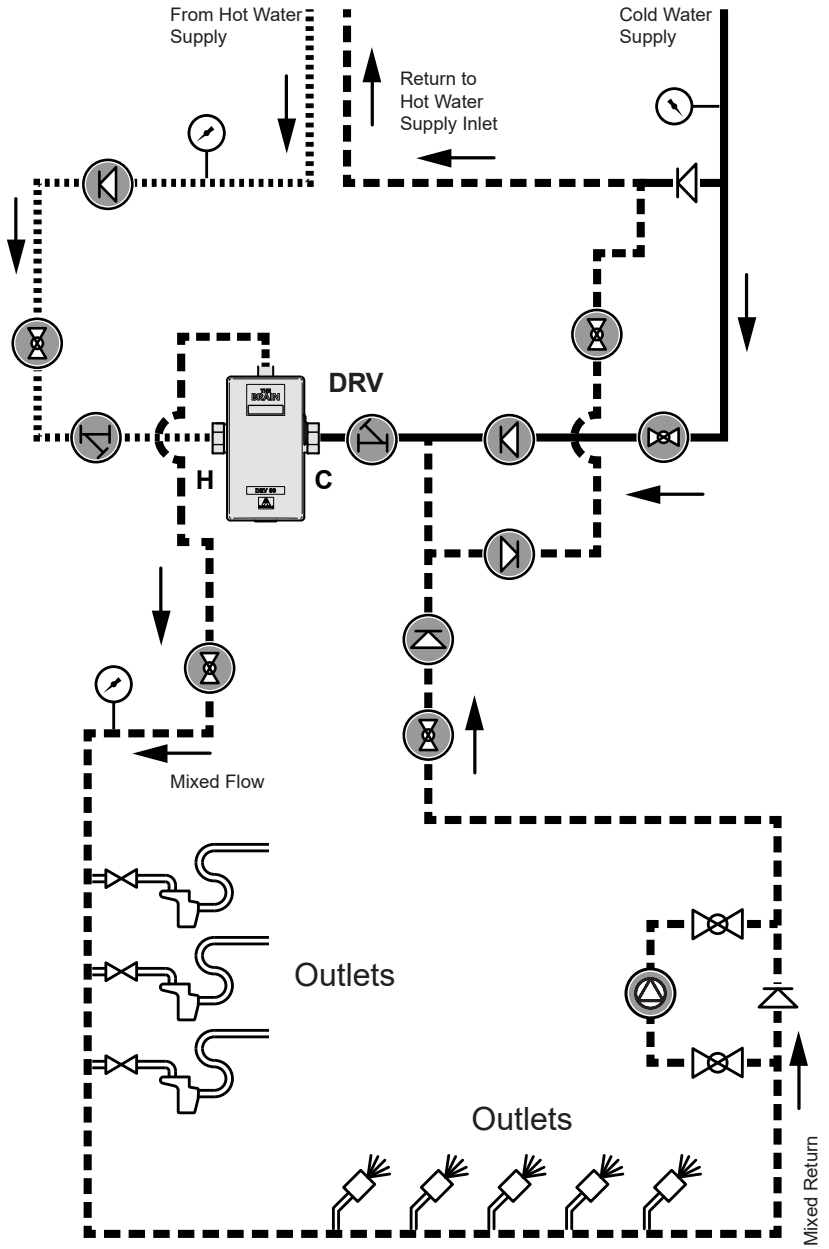
- Thermometer
- Isolation Valve
- Swing Check Valve*

*Orientated for piping schematic detail only. Must be installed in horizontal plane.

Items are installer supplied

Figure 12-1. Single Valve Installation

Note: For 0-90 GPM Systems the DRV80 inlet connections are 2”
Note: For 0-150 GPM Systems the DRV80 inlet connections are 3”
Bon à savoir: Pour les systèmes 0-90 GPM, les connexions d’entrée de DRV80 sont au nombre de 2”
Bon à savoir: Pour les systèmes 0-150 GPM, les connexions d’entrée de DRV80 sont au nombre de 3”



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System Layout

- Legend -

- Recirculation Pump
- Check Valve
- Stop Valve
- Isolation Valve
- Sink
- Shower
- Thermometer
- Strainer
- Cold Water
- Hot Water
- Mixed Water

DRV80 Assembly

- Legend -

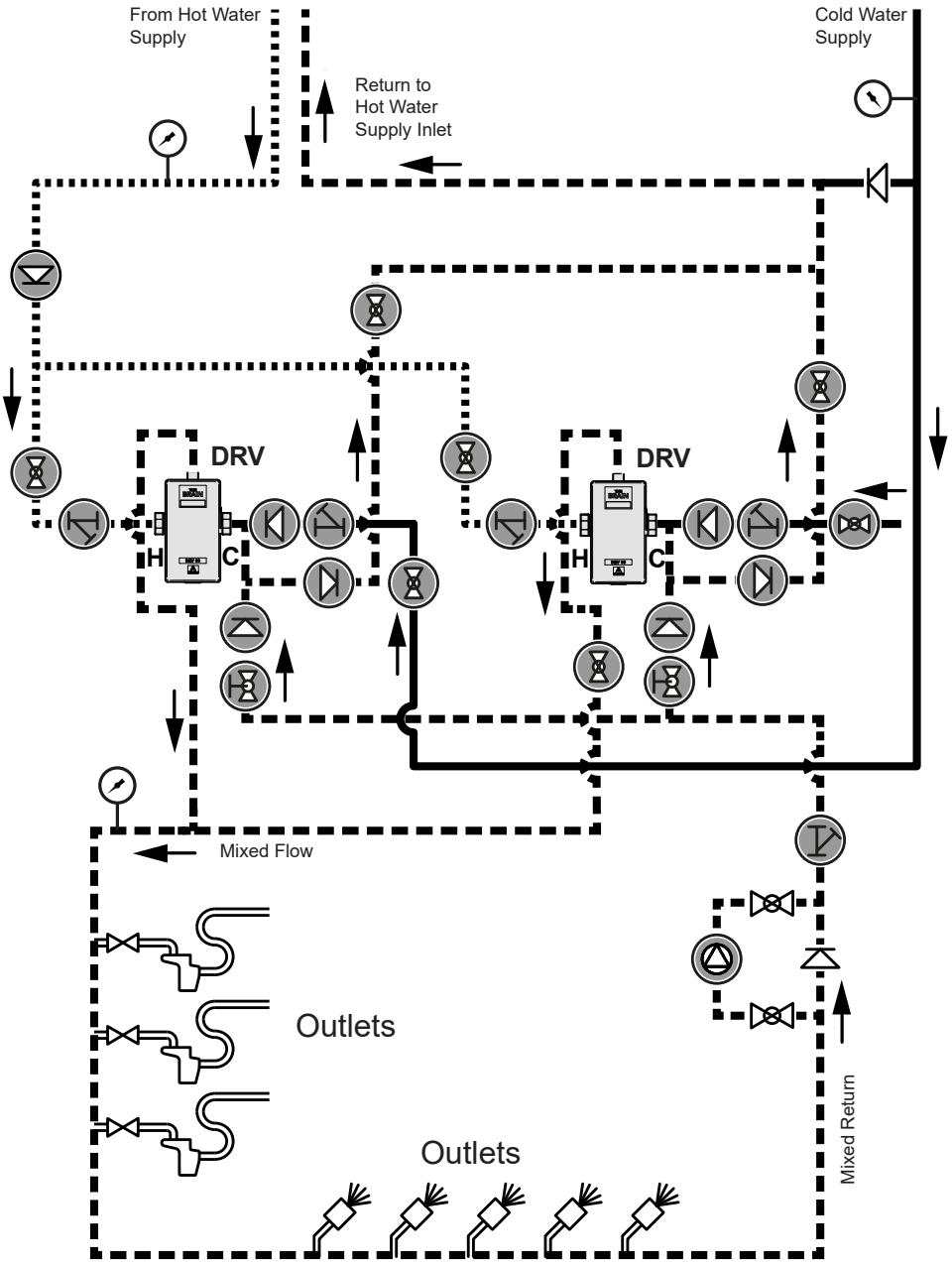
- Thermometer
- Isolation Valve
- Swing Check Valve*

*Orientated for piping schematic detail only. Must be installed in horizontal plane.

Items are installer supplied

Figure 13-1. Dual Valve 300 GPM Installation

Note: DRV80 inlet connections are 3".
Bon à savoir: La tubulure d'entrée du DRV80 est 3".



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System Layout

- Legend -

- Recirculation Pump
- Check Valve
- Stop Valve
- Isolation Valve
- Balancing Valve
- Sink
- Shower
- Thermometer
- Strainer
- Cold Water
- Hot Water
- Mixed Water

DRV80R Assembly

- Legend -

- Thermometer
- Isolation Valve
- In-Line Check Valve
- Wafer Style Spring Check Valve
- Swing Check Valve*

*Orientated for piping schematic detail only. Must be installed in horizontal plane.

Items are installer supplied

Figure 14-1. Single Valve Installation

Note: For 0-90 GPM Systems the DRV80R inlet connections are 2”
Note: For 0-150 GPM Systems the DRV80R inlet connections are 3”
Bon à savoir: Pour les systèmes 0-90 GPM, les connexions d’entrée de DRV80R sont au nombre de 2”
Bon à savoir: Pour les systèmes 0-150 GPM, les connexions d’entrée de DRV80R sont au nombre de 3”

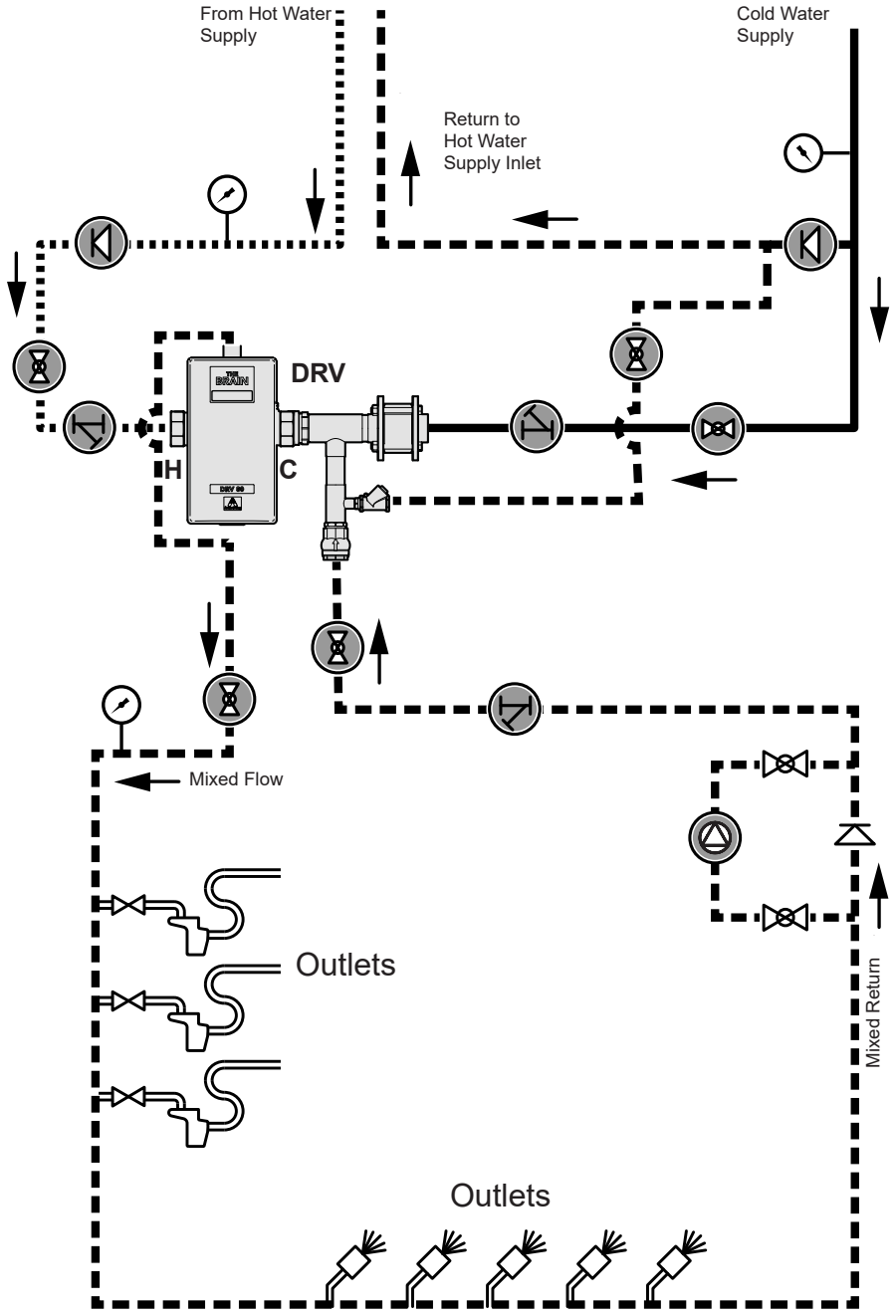

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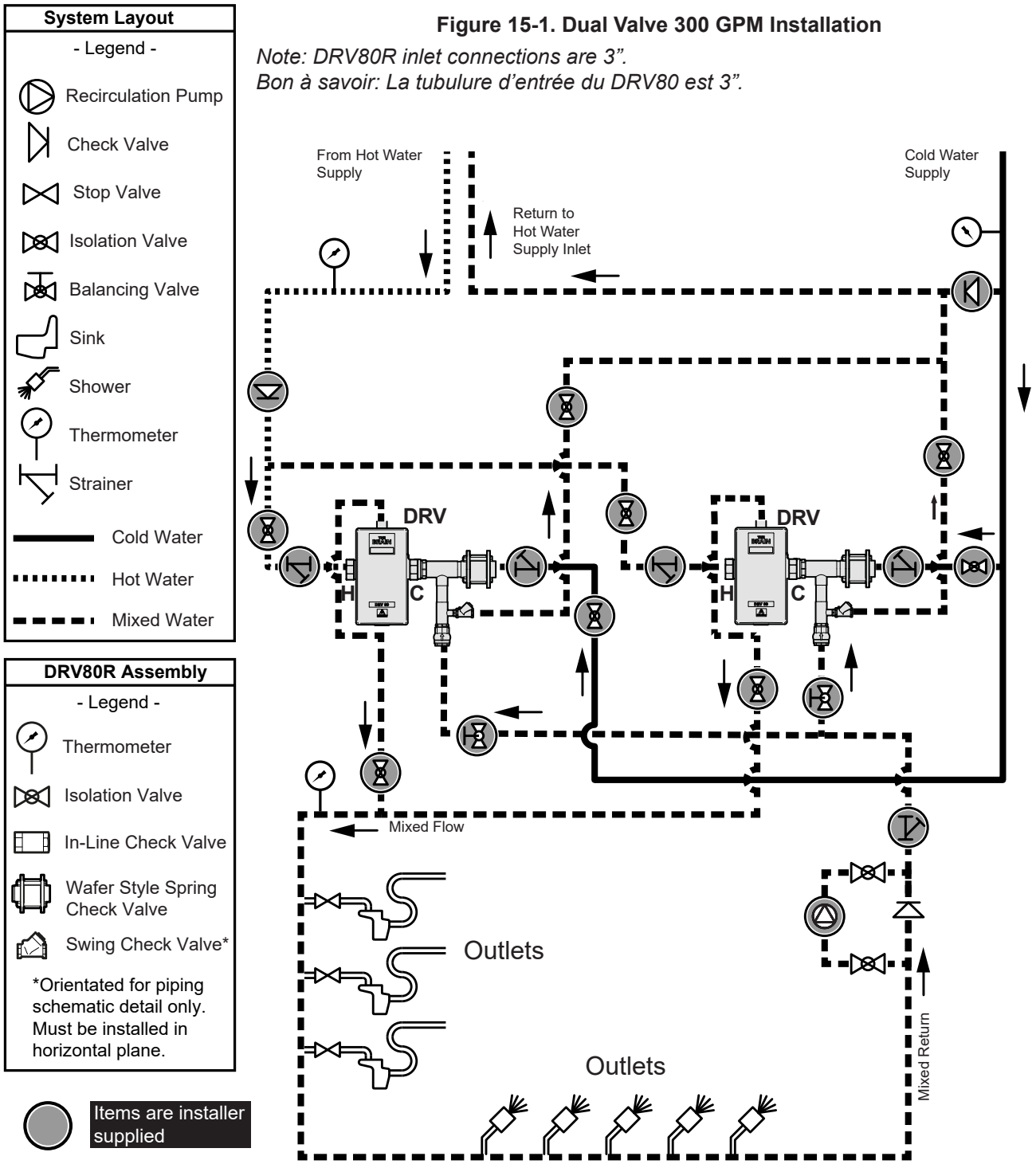
Figure 15-1. Dual Valve 300 GPM Installation

Note: DRV80R inlet connections are 3".
Bon à savoir: La tubulure d'entrée du DRV80 est 3".



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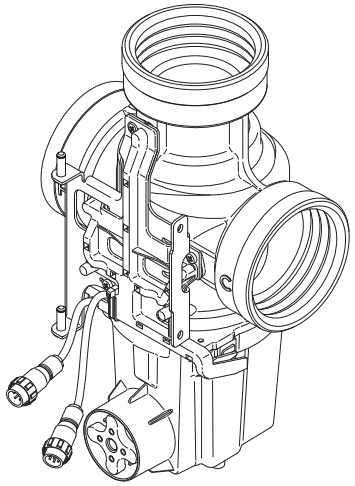
Installation - DRV80

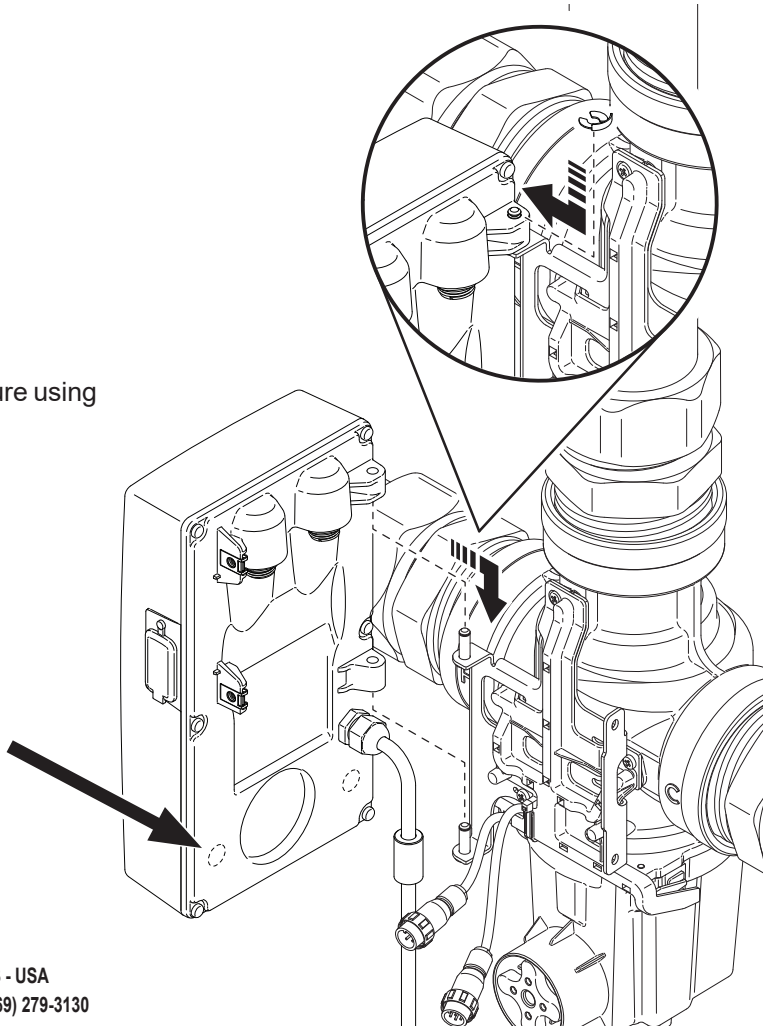
1. Before fitting to the pipework, it is recommended that connectors are fitted to the inlets and outlet. This will enable the DRV to be easily removed, if required.



2. Flush pipework thoroughly (minimum of 5 minutes).

3. Fit the DRV to the pipework.

4. Attach the Electronics Module and secure using the circlip supplied.



*Hole markers inside the Electronics Module case indicate where cables can be fitted for options such as **SAGE BS®** or an **error relay**. If these are required but have not been prefitted, contact Armstrong for further advice.*

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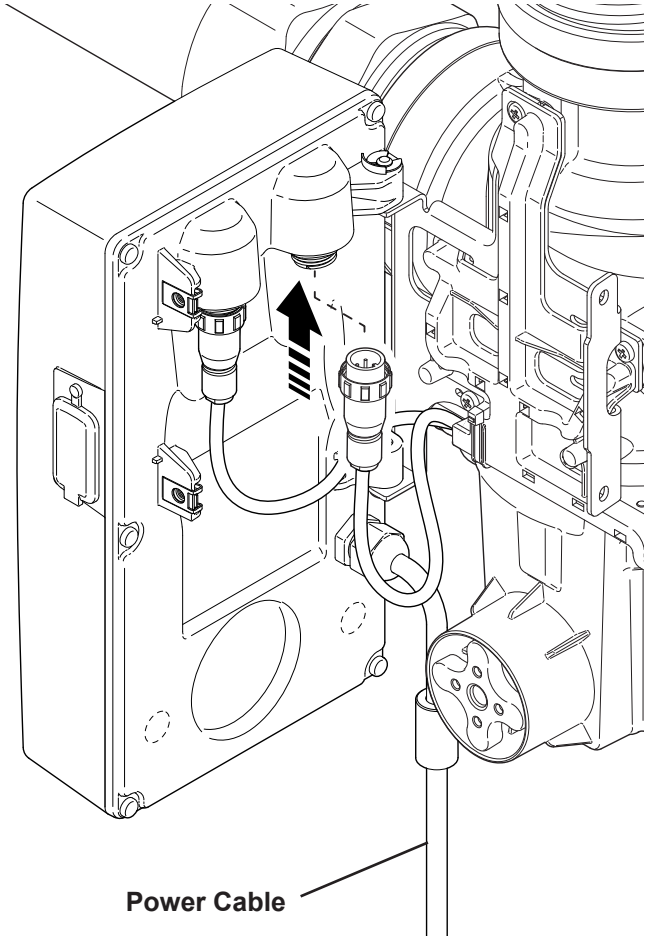

5 Connect and secure the 8 pin plug to the back of the Electronics Module.

***Important!* Do not fit the 4 pin plug at this stage. To prevent a back EMF the system must be flooded with water before the 4 pin plug is fitted.**

Important! Ne pas fixer le connecteur à 4 pôles à ce stade. Pour éviter un retour du EMF, le système doit être inondé d'eau avant l'installation du connecteur à 4 pôles.

6 Grounding is required, connect the power cable to the primary power supply via switched circuit breaker with a 3 Amp fuse or a 15 Amp grounding-type receptacle (socket).

DO NOT fit or replace a power cable plug!

The supply cord of this control can be replaced only by the manufacturer or his accredited service agent.

7 Commission the DRV80 and recirculation system using the following instructions...

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Commissioning

Commissioning must be carried out in accordance with these instructions by designated, qualified and competent personnel.

1. Ensure the system is powered off and the 4 pin plug is unplugged on the electronics module.

2. Flood the system in the following sequence:
   - Open the cold water supply isolation valve(s).
   - Open the outlet flow isolation valve(s).
   - Open the hot water supply isolation valve(s).
   - Once flooded, connect and secure the 4 pin plug to the electronics module.

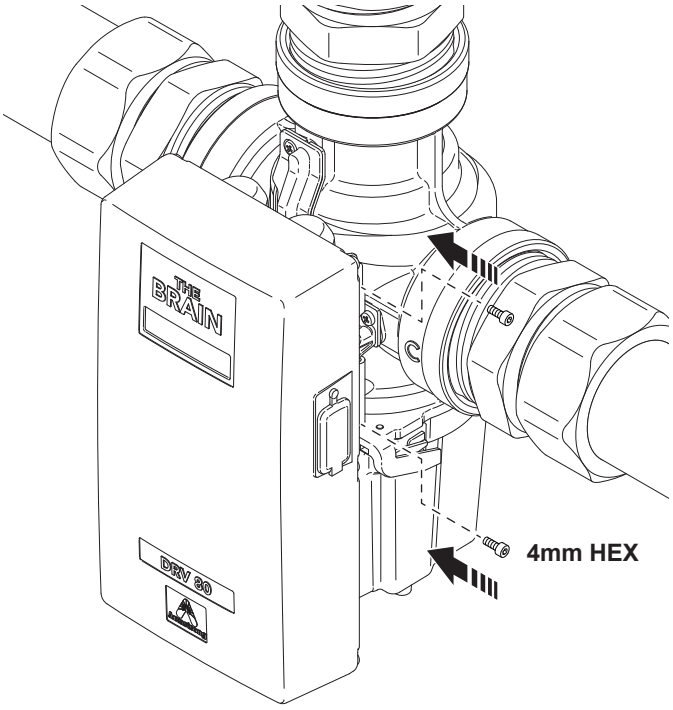
3. Close and secure the Electronics Module with the 2 x 4mm hexagon socket screws provided.

   Note! ***The Electronics Module must be closed for the DRV80 to function.***

4. Ensure that the system is powered and the display on the Electronics Module is illuminated.

5. Make sure the hot and cold inlet supplies are at their designated pressures and temperatures.

6. Close all the mixed water outlets and turn on the circulating pump.



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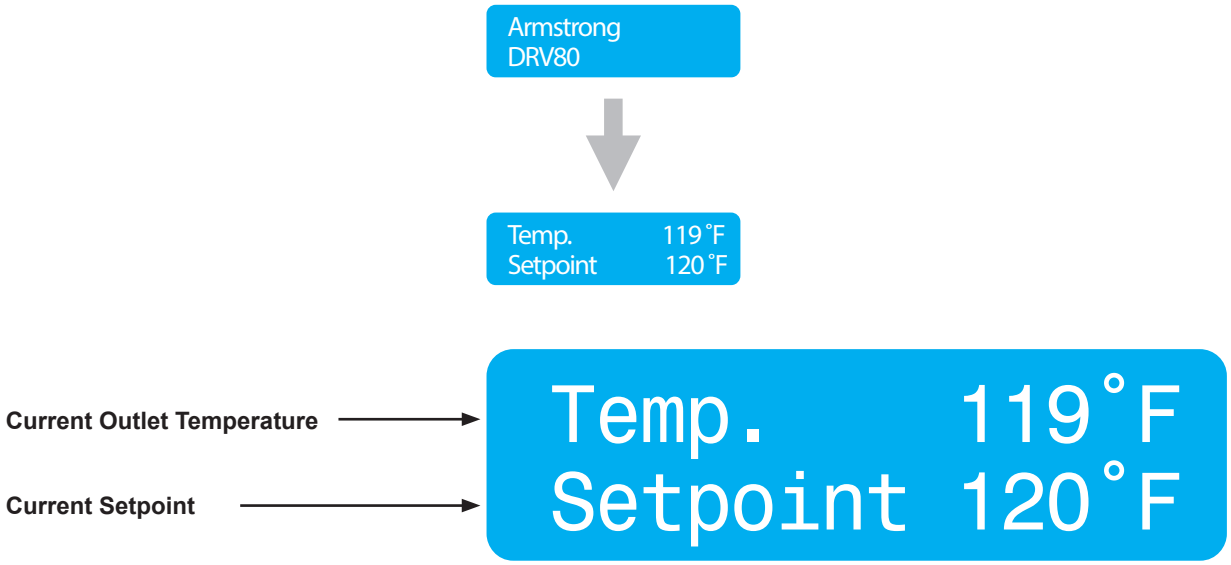
7 The LCD display will indicate the outlet water temperature and the outlet water temperature setpoint. The setpoint was preprogrammed at the factory according to the installation details specified on the ***Installation Detail Form (IDF)***.



Display as seen during normal operating mode

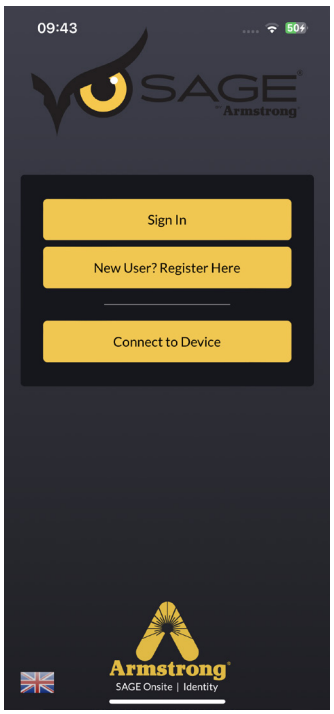
8 Open SAGE® mobile app on your mobile device and tap on the 'Connect to Device' to pair with Armstrong.

Note: Ensure Bluetooth is enabled on your device.

Note: The "SAGE® by Armstrong" mobile app is available free to download from the Apple App Store and Google Play Store.

Download on the App Store

GET IT ON Google Play



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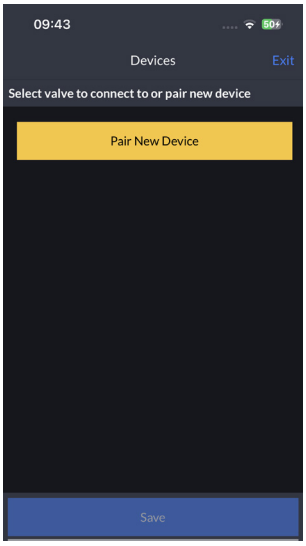
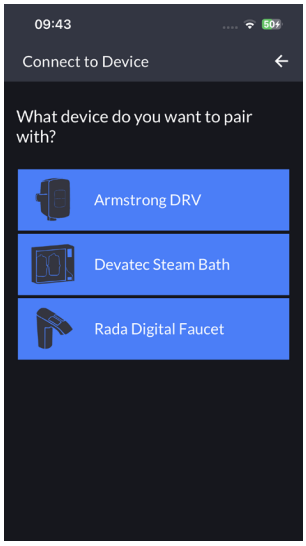
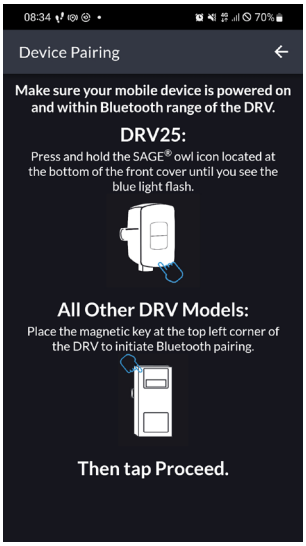
9 Tap on the ***'Pair New Device'*** to search available devices using Bluetooth.

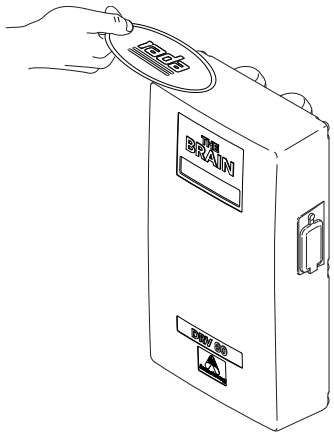


10 Select ***'Armstrong DRV'*** on the screen.

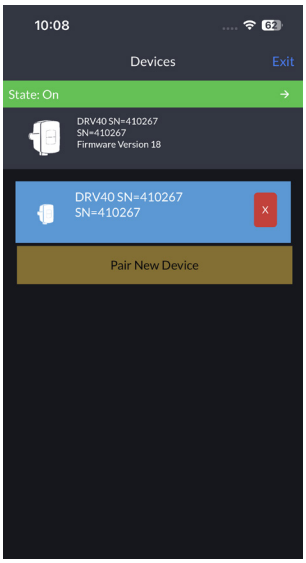


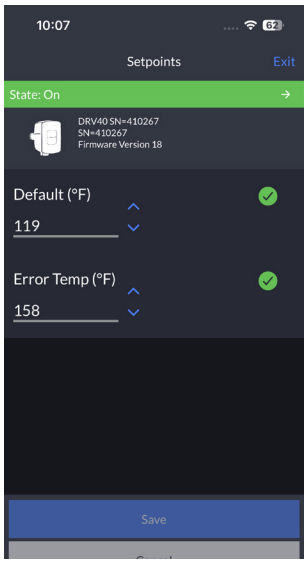
11 Ensure your mobile device is within Bluetooth range of the DRV80 and that Bluetooth is enabled. Use the magnetic key (supplied separately - contact Armstrong for more details) to activate configuration mode by placing it on the left side of the top face of the DRV80 unit. Hold the magnetic key until the display shows 'Bluetooth Pair', then tap 'Proceed' on your mobile device. On the next screen, select the DRV80 you wish to pair with.





12 Once paired, tap on the ***'Default'*** icon to change the default Setpoint if required. The setpoint was preprogrammed at the factory according to the installation details specified on the ***Installation Detail Form (IDF)***.





13 Amend the other default settings as required and tap on ***'Save'*** to update new settings.

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Mobile App

Dashboard

Once connected to the mobile device, the control screens can be selected individually by tapping on each of the tabs at the bottom of the screen.

The general status of the DRV80 is displayed by default upon connection.

The mixed water (outlet) temperature as well as the hot water supply inlet and system return inlet temperatures are displayed and refreshed every few seconds. The DRV80 setpoint is also displayed for reference.

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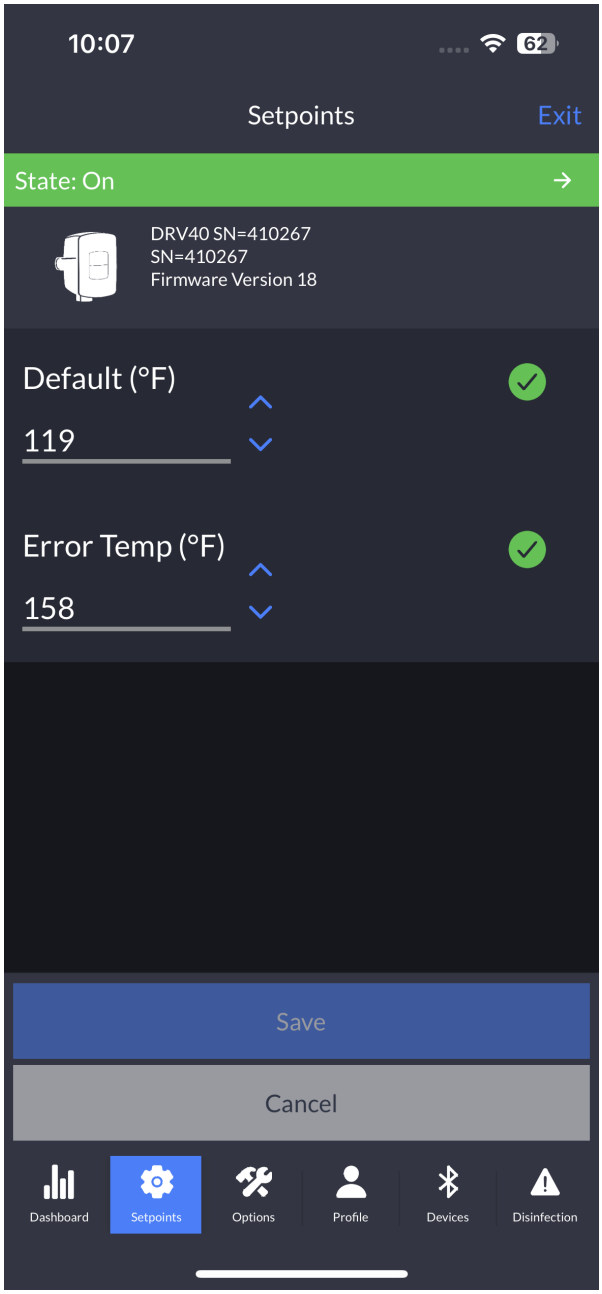
Configure Setpoints



1. Adjust the ***Default Blend Temperature Setpoint*** by tapping on the Up or Down arrow to configure the desired outlet temperature of the DRV80.

2. Adjust the ***Error Temperature*** setting as required. This temperature setting will be the point at which the DRV80 alarms and reverts to recirculation mode due to an over temperature condition.

3. Tap on the ***Save button*** to transfer the new settings to the DRV80.

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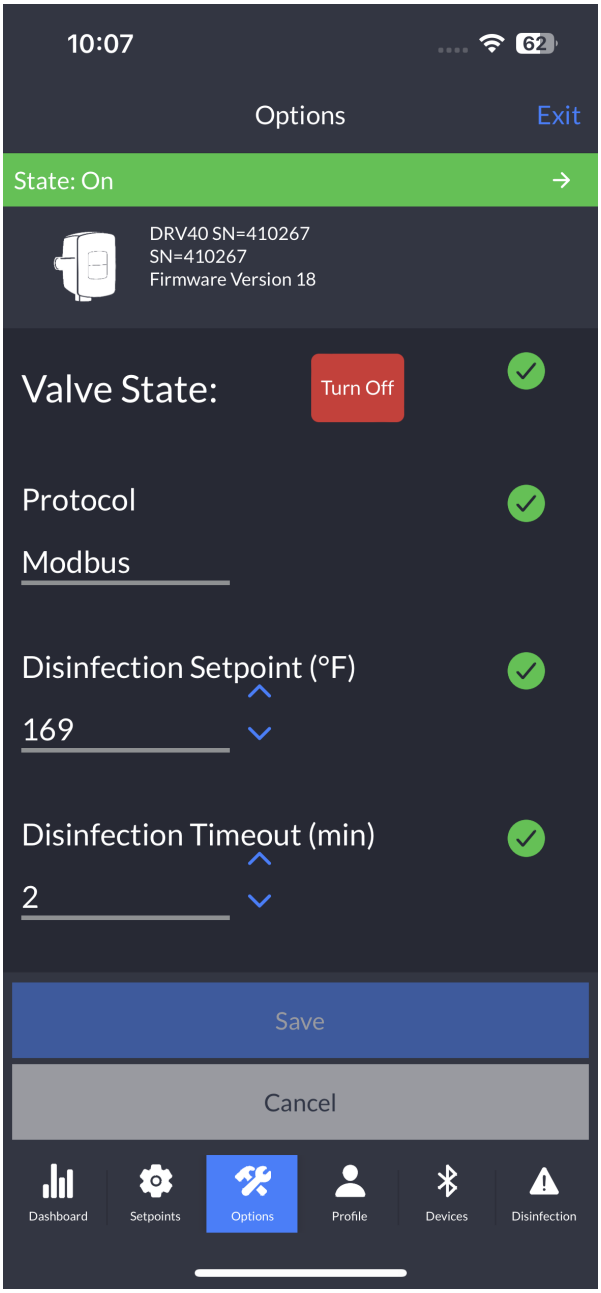
Options



Valve State -
Allows the user to manually switch between the ***Blend Mode (ON)*** and the ***Recirculation Mode (OFF)***.

Protocol -
Switches the protocol standard on the wired connector port CN7 (see page 35 for more details).

Baud Rate -
Allows the protocol baud rate to be adjusted (options depend on selected protocol).

Disinfection Setpoint -
This is the temperature at which the thermal disinfection will be carried out (must not exceed 185 °F / 85 °C).

Disinfection Timeout -
This is the number of minutes the error alarm is disabled to allow for disinfection and cool down of the blend circuit before switching back on automatically, i.e. if ***Disinfection Timeout*** is set to 100 minutes then the DRV80 has that time to complete the disinfection and cool down before entering an over temperature error condition and switching to full cold.
Please note the following:
• Disinfection Timeout starts when the disinfection cycle is triggered. (Refer to the ***"Thermal Disinfection"*** section on pages 28 - 32 for more details)
• During the Disinfection Timeout, the disinfection and cool down must be completed manually and the DRV80 returned to Setpoint (normal operation within the setpoint limits).
• The Disinfection Timeout can be set up to a maximum of 1800 minutes (30 hours).

Address -
This is the network address of the DRV80 for the selected protocol.

ID -
Update the device ID, alias as required to give the DRV80 a more meaningful name. e.g. "Bayfront Loop 1"

Disinfection Enabled -
This is the master disinfection enable switch. It must be set to the ON position before disinfection can be carried out.

Reboot -
Forces the DRV80 to reboot. This will potentially deliver full hot water whilst this is carried out. This function can be used to clear some error conditions.

Redémarrage -
Oblige le DRV80 à redémarrer. Cette opération va éventuellement aboutir à la libération d'une eau très chaude. Cette fonctionnalité peut servir à corriger certains cas d'erreurs.

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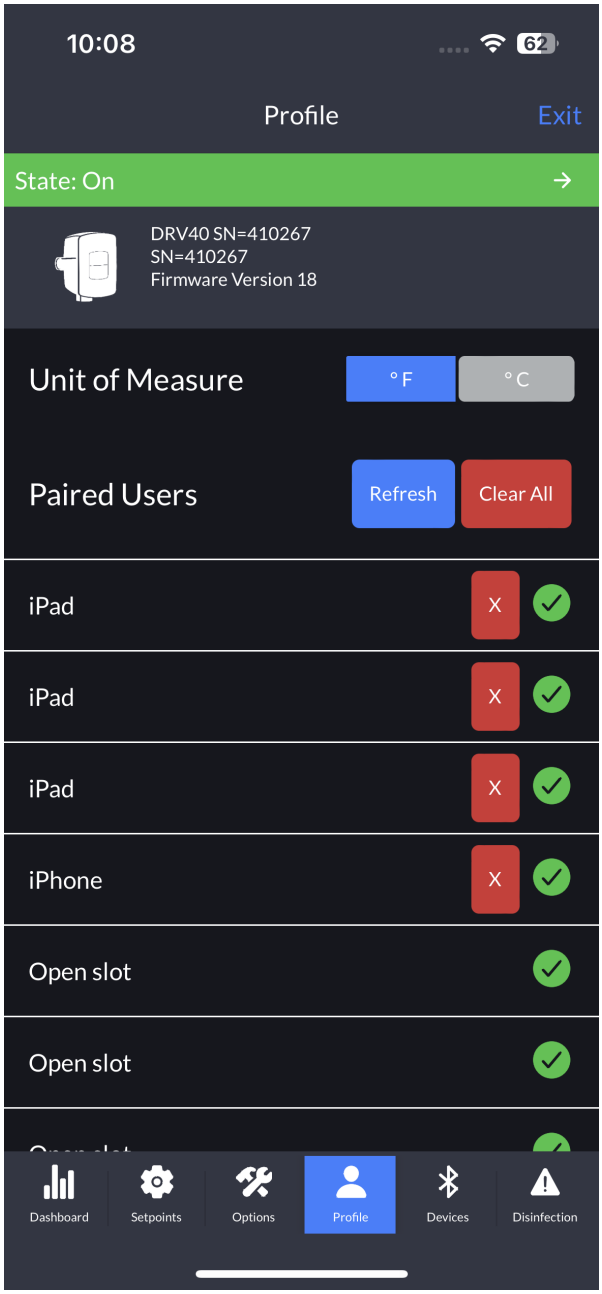
Profile Settings



1. The Units of temperature measurement can be changed to °F / °C as required.

2. Paired users to the DRV80 can be managed as required.

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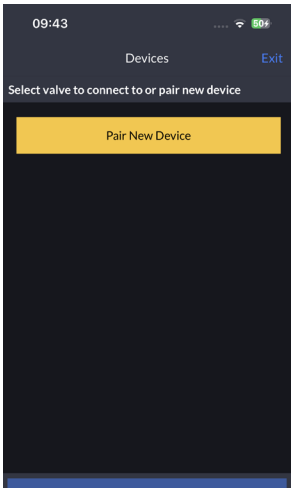
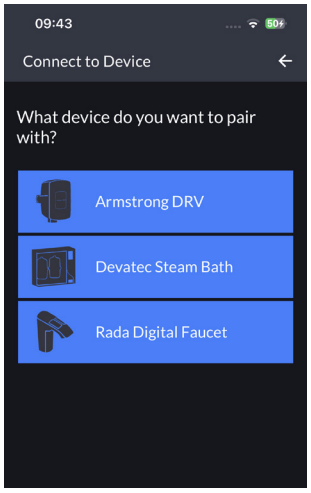
Devices

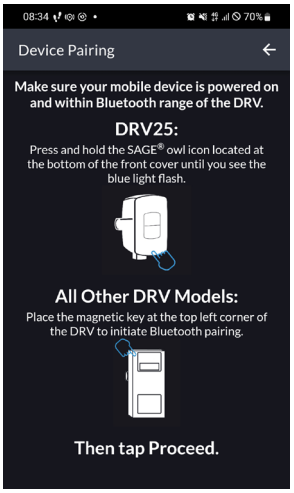


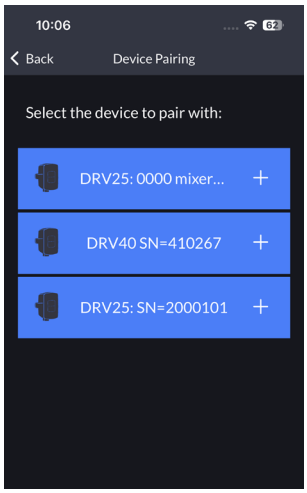


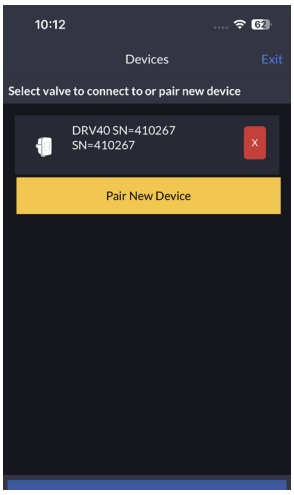
1. Additional DRV80 products can be connected to your mobile device if required.

See page 20 ***Commissioning*** for more details.

Note! Any currently connected DRV80 product must be disconnected prior to pairing to a new device.







2. Tap the ‘Exit’ on the top right to disconnect the current DRV80 connection. Tap the red ‘X’ to delete the connection.

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Thermal Disinfection

IMPORTANT! PLEASE READ CAREFULLY

IMPORTANT! BIEN VOULOIR LIRE ATTENTIVEMENT

The thermal disinfection mode of the DRV80 is ***not*** an automated process. It is manually activated by the supervisor to increase the temperature of the blend circuit to equal the temperature of the hot supply. The circuit pipework and outlets can be thermally disinfected as part of a bacterial infection control regimen.

DO NOT USE THE THERMAL DISINFECTION FEATURE IF THE HOT WATER SUPPLY CAN EXCEED 185°F (85°C)!

THE MAXIMUM TEMPERATURE FOR DISINFECTION SETPOINT MUST BE 185°F (85°C).

NE PAS UTILISER LA FONCTIONNALITÉ DÉSINFECTION THERMIQUE SI L'ALIMENTATION EN EAU CHAUDE PEUT ALLER AU DELÀ DE 180°F (85°C)!

LA TEMPÉRATURE MAXIMALE POUR LE POINT DE CONSIGNE DE DÉSINFECTION DOIT ÊTRE DE L'ORDRE DE 185°F (85°C).

Warning! Thermal disinfection is a potentially hazardous process to raise the water temperature to a level that will scald or even kill. It is therefore the responsibility of the person supervising the process to make sure it is carried out correctly and safely.

Avertissement! La désinfection thermique est un processus potentiellement dangereux pour augmenter la température de l'eau à un certain niveau pouvant brûler ou même tuer. Il revient donc à la personne en charge de la supervision de cette opération de s'assurer qu'elle se déroule correctement et en toute sécurité.

ALL DRV80 ALERTS AND ERRORS ARE DISABLED DURING THE PROCESS!

It is the responsibility of the supervisor to make sure that:

1. An appropriate Risk Assessment is carried out in accordance with the local or national regulations.
2. The water temperature is raised to and held at the required level at all parts of the circuit for the required duration as stated in the Risk Assessment.
3. All outlets are flushed for the correct amount of time if required by the Risk Assessment.
4. Appropriate measures are taken to make sure that none of the outlets are used while the water is at an unsafe temperature.
5. Once thermal disinfection is complete, the supervisor should return the DRV80 to its normal operating mode using the ***Cool Down*** button within the ***Disinfection screen***. This will switch the DRV80 to its full cold position and allow the blend circuit to be reduced gradually to a safe temperature level*. Make sure the blend circuit temperature returns to normal operation within the ***Disinfection Timeout*** period (see page 32).
6. The Disinfection cycle is monitored constantly and the supervisor is able to stop the cycle using the ***Abort*** button in the ***Disinfection*** screen.
7. In the event of the user failing to enter cool down mode within the **Disinfection Timeout** period, the DRV80 will automatically enter the cool down phase for 5 minutes.

Without a draw off, the water in the blend circuit will remain hot for a long time. In order to speed up the temperature reduction, a draw-off must be made during **Cool Down using the last outlet of the blend circuit, or a dump valve fitted near to the end of the blend circuit. Check with local water authorities with regard to water temperature limitations to drain.*

*Failure to complete a sufficient cool down of the blend circuit may result an **Error Temp shut down to full cold**.*

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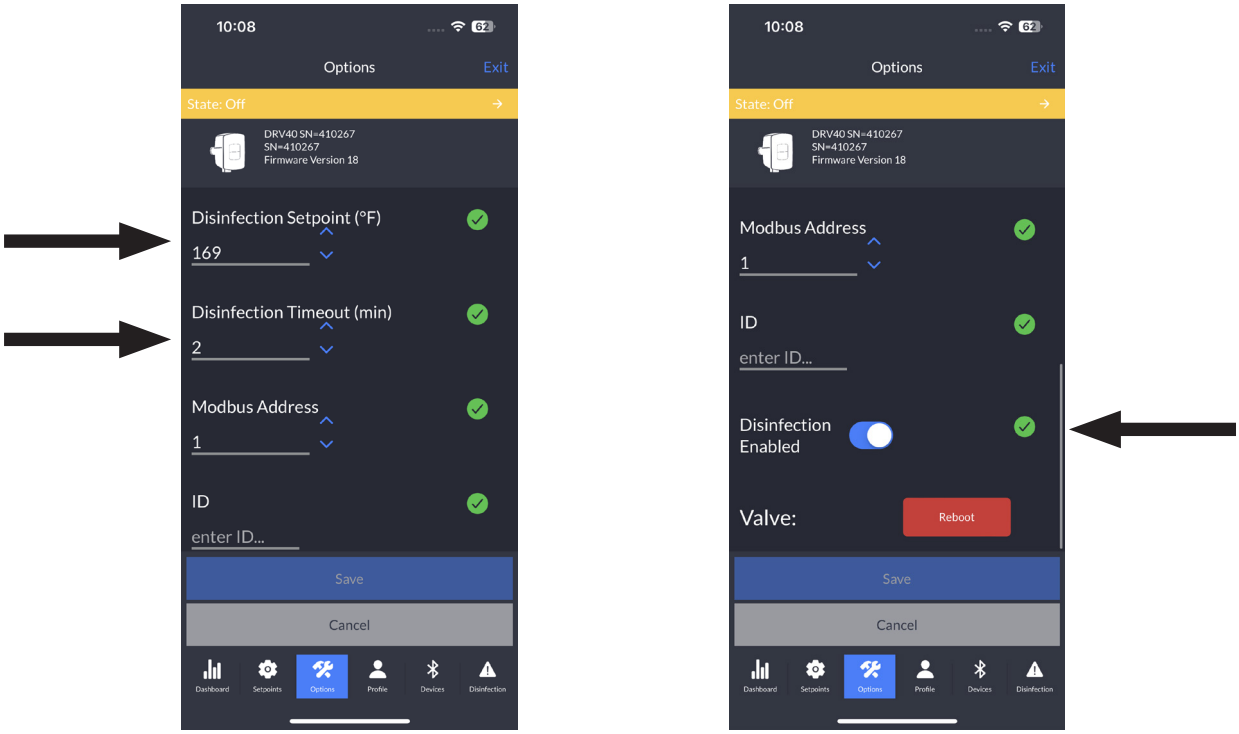


Disinfection Setpoint and Timeout

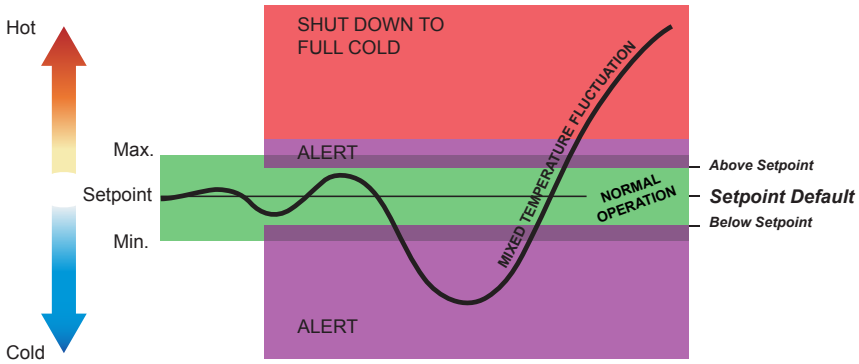
Verify and confirm the ***Disinfection Setpoints*** and ***Timeout*** are set correctly in the ***Options tab*** prior to starting the disinfection cycle (see page 32 for more details). Tap on the ***Disinfection*** tab to proceed

Disinfection Timeout

Note: The timeout is the number of minutes the temperature alert and error alarms are disabled to allow for disinfection and cool down of the blend circuit before switching back on automatically, i.e. if ***Disinfection Timeout*** is set to 100 minutes then the DRV80 has that time to complete the disinfection and cool down before entering an error condition and switching to full cold (recirculation).

Please note the following:

- ***Disinfection Timeout*** starts when ***Trigger*** is tapped.
- During the ***Disinfection Timeout*** the disinfection and cool down must be completed manually and the DRV80 returned to ***Setpoint*** (normal operation within the setpoint limits).
- The ***Disinfection Timeout*** can be set up to a maximum of 1800 minutes (30 hours).
- In the event of failing to cool the DRV80, an automatic cool down period of 5 minutes will take effect.



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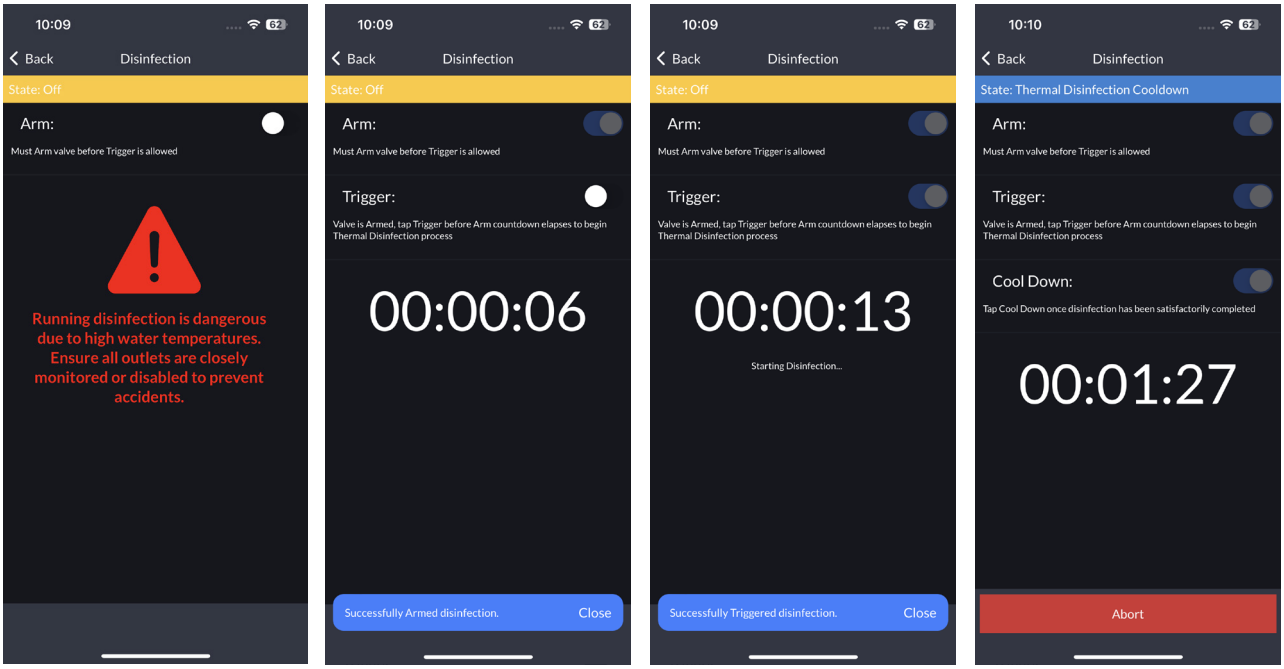

1. Close all outlets in the system.

2. Toggle Arm and Trigger to ON position
Note! Trigger will be available to toggle within 10 seconds of arming to activate the disinfection.

3. Disinfection cycle will then commence after a 10 seconds delay.

4. Toggle Cool Down to ON position once disinfection has been satisfactorily completed.

5. Ensure each outlet is flushed of high temperature water and the system has returned to safe temperature prior to opening for use. At the end of the Disinfection Timeout period, the DRV80 will return to normal operating mode and the alerts and errors will be re-enabled.

6. ***EMERGENCY STOP! -*** *Tap* ***Abort**** *at any time to stop the cycle.*
ARRÊT D'URGENCE! - *Appuyer sur le bouton* ***Annuler**** *à tout moment pour interrompre le cycle.*

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IMPORTANT! The DRV80 is locked in disinfection mode until one of the following actions has been performed:

a. The Disinfection Timeout period has expired (automatic).

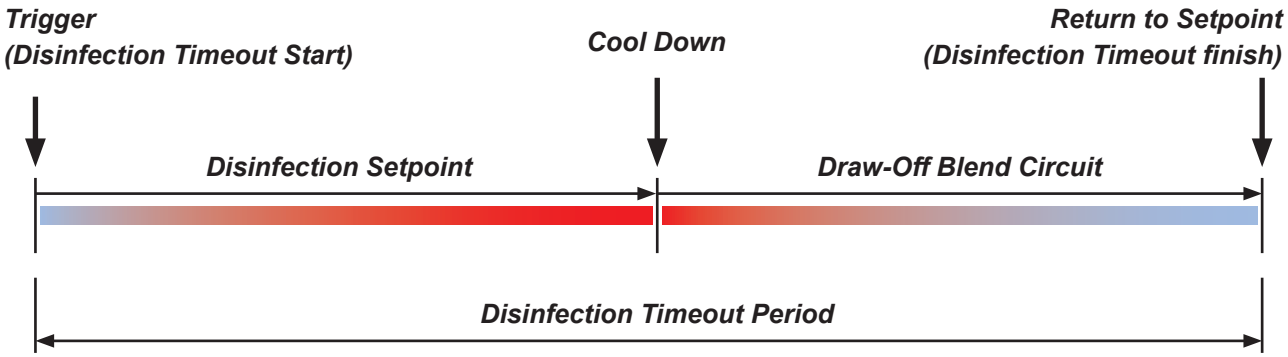
b. The Abort button is pressed (manual).

IMPORTANT! Le DRV80 se bloque en mode désinfection jusqu'à l'exécution de l'une des opérations suivantes :

a. The Disinfection Timeout period has expired (automatic).

b. The Abort button is pressed (manual).

Disinfection Timeline



****Abort***

If *Abort* is used when the cycle is disinfecting, the DRV80 switches to full cold / recirculation. Use the mobile app to change the valve state back to ON and make sure the blend circuit is at a safe temperature before allowing any outlets to be used.

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Disinfection Quick Start Guide - 1

(setting parameters for cycle)

Follow these steps to determine the total disinfection cycle time and store that value in the *Disinfection Timeout* parameter of *the SAGE® mobile app*. At the end, the parameters will be set to run all future disinfection cycles reliably.

You are about to run a test cycle to determine, in total, how long it takes to disinfect the blend circuit. Before you begin, make sure there is an adequate supply of hot water for this test. You will also require a reliable clock or stopwatch to monitor the duration of the test. Make sure all warnings, cautions and responsibilities on page 28 are observed during the test.

1. Verify and confirm the ***Disinfection Setpoints*** and ***Timeout*** are set correctly in the ***Options tab***.
2. Tap on the ***Disinfection tab*** to proceed.

MAKE SURE ALL OUTLETS ON BLEND CIRCUIT ARE NOT IN USE UNTIL TEST IS COMPLETE!
No one should be allowed to approach within 10 feet (3 meters) of any affected outlets.

SE RASSURER QUE TOUTES LES SORTIES DU CIRCUIT FUSIONNÉ SONT HORS SERVICE JUSQU'À LA FIN DU CYCLE!
Personne ne doit s'approcher des sorties affectées à une distance de moins de 10 pieds (3 mètres).

3. Toggle ***Arm*** to ***ON*** position.
4. Toggle ***Trigger*** to ***ON*** position and start the stopwatch or note the time of day..
5. Monitor the temperature and time until a satisfactory disinfection of the blend circuit has been achieved.
6. Toggle ***Cool Down*** to ***ON*** position once disinfection has been satisfactorily completed.
7. Draw-off hot water from the blend circuit. Use either the last outlet on the circuit or a dump valve fitted near to the end of the circuit.
8. When the DRV80 temperature is within normal operation, stop the draw-off.
9. Tap on ***Abort & Confirm***.
10. Stop stopwatch or note the time of day. The time difference is the future ***Disinfection Timeout*** period.
11. Change ***Disinfection Timeout*** to new value.
12. Tap ***Save***.

For all further disinfection cycles, use Quick Start Guide - 2.

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Disinfection Quick Start Guide - 2 *(running a routine cycle)*

You are about to run a disinfection cycle of the blend circuit. Before you begin, make sure there is an adequate supply of hot water for the cycle. You will also require a reliable clock or stopwatch to monitor the duration of part of the cycle.

Make sure all warnings, cautions and responsibilities on page 28 are observed during the cycle.

MAKE SURE ALL OUTLETS ON BLEND CIRCUIT ARE NOT IN USE UNTIL TEST IS COMPLETE!
No one should be allowed to approach within 10 feet (3 meters) of any affected outlets.

SE RASSURER QUE TOUTES LES SORTIES DU CIRCUIT FUSIONNÉ SONT HORS SERVICE JUSQU'À LA FIN DU CYCLE!
Personne ne doit s'approcher des sorties affectées à une distance de moins de 10 pieds (3 mètres).

1. Tap on the **Disinfection tab** to proceed
2. Toggle ***Arm*** to ***ON*** position.
3. Toggle ***Trigger*** to ***ON*** position.
4. Start the stopwatch or make a note of the time of day. Monitor the temperature and time until a satisfactory disinfection of the blend circuit has been achieved.
5. Toggle ***Cool Down*** to ***ON*** position once disinfection has been satisfactorily completed.
6. Draw-off hot water from the blend circuit. Use either the last outlet on the circuit or a dump valve fitted near to the end of the circuit.
7. When the DRV80 temperature is within normal operation, stop the draw-off.
8. Allow the DRV80 to return to normal operation automatically.

IMPORTANT! - CHANGES TO THE PLUMBING SYSTEM.
Any alteration to the plumbing system that may affect the blend circuit may, as a consequence, also affect the Disinfection Timeout period. Repeat all steps in Quick Start Guide -1 to maintain a reliable disinfection cycle for the system.

IMPORTANT! - MODIFICATIONS DU SYSTÈME DE PLOMBERIE.
Toute modification apportée au système de plomberie susceptible d'affecter le circuit fusionné peut, en conséquence, également affecter la période de temporisation de la désinfection. Reprendre toutes les étapes présentées dans le Guide de démarrage rapide - 1 pour garantir un cycle de désinfection fiable pour le système.

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DRV80 Display Alerts

Temp High	140˚F
Setpoint	120˚F

Outlet temperature is higher than 18˚F above the setpoint. This condition causes a relay to be activated. (if it is configured).

Temp Low	100˚F
Setpoint	120˚F

Outlet temperature is higher than 18˚F above the setpoint. This condition causes a relay to be activated. (if it is configured).

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Connectivity

The integral RS485 Serial Port (CN2 on the DRV80 PCB) can be used to connect to either ***SAGE BS®*** or directly to ***Building Automation Systems (BAS)*** which operates on a ***Modbus RTU*** or ***BACNet MS/TP*** protocol.

See ***Options*** screen on page 25 for details on how to switch DRV80 for either ***SAGE BS®***, ***Modbus*** or ***BACNet***.

SAGE BS®

SAGE BS® is an optionally selected control module from Armstrong which enables an interface with ***Building Automation Systems (BAS)*** which utilize ***Modbus, Bacnet™*** or ***LonWorks™*** protocols via the use of specific ProtoCessor cards.

SAGE BS® also has an ethernet port and operates as a web server for remote network access.

SAGE BS® includes remote hot water supply, cold / recirculation water supply, blended water outlet temperature outputs and is supplied with a system graphic, memory card for data storage and web based software.

SAGE BS® includes terminals for additional installer supplied RTDs, pressure transducers and pulse type flow meters and this data can be forwarded via the ***SAGE BS®*** interface.

A separate SAGE BS® specific Installation, Operation and Maintenance (IOM) Guide is available upon request. Please consult factory or visit:

www.armstronginternational.com/wp-content/uploads/IOM_SAGEBS_503_EN_20180102.pdf

Modbus

Modbus – DRV80 can be configured to communicate directly with BAS which utilize Modbus RTU.

When configured for Modbus the DRV80 becomes a ***Remote Terminal Unit (RTU)***.

When connected directly to a BAS using Modbus RTU, the DRV80 will be assigned a unique network address which is programmed via the integral DB9 external port.

BACnet

DRV80 can also be configured to communicate directly with a BAS which utilizes BACnet. When configured for BACnet, the DRV80 will be assigned a unique network address which can be reconfigured using a BACnet communications tool.

A separate Modbus specific Installation, Operation and Maintenance (IOM) Guide is available upon request. Please consult factory or visit:

www.armstronginternational.com/wp-content/uploads/IOM_GuidetotheBrainNetworking_776_GL_EN_20230116.pdf

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System Performance

For effective DRV80 performance, the DRV must be able to experience a minimum flow and a minimum temperature differential between its inlet and outlet supplies when the system is in ***zero demand***.

Zero demand is defined as periods when there is no mixed water outlet usage on the system.

Pre-installation calculations should have already determined the system heat loss characteristics. For optimum performance the DRV80 requires a minimum of 2°F (1°C) differential between the digital display on the unit (the outlet temperature) and the thermometer which is installed on the system return line.

When there is no system draw-off, the DRV80 reverts to a zero demand. The recirculation temperature is continuously monitored and adjusted appropriately by the DRV80. The circulating pump must operate continuously, the DRV80 requires a minimum flow of 10 gpm (37.8 lpm).

Pump Capacity

The circulating pump is only required to keep water gently moving around the system. The pump should be sized and selected to overcome the system resistance (feet of head) at the minimum specified flow rate of 10 gpm (37.8 lpm) while also accounting for system heat loss.

System Safety Measures

System safety measures such as the installation of an aquastat linked to the circulating pump which shuts the pump off if the system exceeds a given temperature setpoint is not required. DRV80 can be programmed to issue suitable alerts and / or system hot water shutoffs (DRV80) and shutdowns (Independent Solenoid Valve).

Preventative Maintenance and Fitting Spare Parts

Warning! Isolate power to the DRV80. Ensure that the circulating pump is not operating. Avertissement! Couper l'alimenation électrique dans le DRV80. Vérifier que la pompe de circulation ne fonctionne pas.

DRV80 components should be inspected annually, or more frequently where acknowledged site conditions such as high mineral content water dictate.

Each DRV80 has a serial number that is maintained on file with the technical department at Armstrong.

For any installation, operation, maintenance or technical support details not covered in this guide, please call our Technical Department quoting the model and / or serial number.

Batteries

Batteries are used to ensure the DRV switches to ***Recirculation Mode*** in the event of a primary power supply failure, they should ***not*** be considered to be a backup power supply.

Battery life is variable depending upon usage. A battery error message appears on the DRV display when they require replacing.

Where primary power supply failure occurs regularly or the DRV is installed within a supply system where safety is critical, the batteries ***must*** be changed at least every 12 months as part of an annual maintenance routine.

In noncritical systems or where battery usage is low, longer replacement cycles may be considered up to a maximum of 5 years. Inspection of critical components and / or assemblies.

DRV80 uses Panasonic CR-P2 battery type.

Caution! Replacing the battery with an incorrect type poses a risk of explosion. Please dispose of used batteries according to the provided instructions.

O - Rings / Seals

All 'wetted' O -Rings / Seals must be replaced at least every 12 months as part of an annual maintenance routine. In systems where water quality conditions are poor, more frequent replacement may be required.

Strainers

All supply strainers must be thoroughly cleaned at least every 12 months as part of an annual maintenance routine. Cleaning includes physically taking the strainer screen / basket out of the body and cleaning as well as flushing water through the body. In systems where water quality conditions are poor, more frequent cleaning may be required.

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DRV80 Disassembly

Warning!

Before disassembly observe the following:

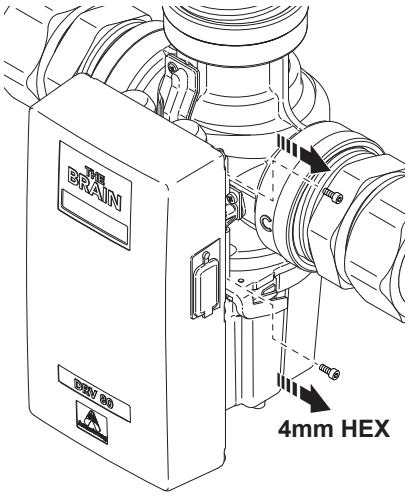
- Isolate the electrical supply to the DRV80.
- Isolate the water supplies to the DRV80.
- Allow the hot water inlet to cool sufficiently to reduce the risk of injury through contact with the hot pipe or DRV.

Avertissement!

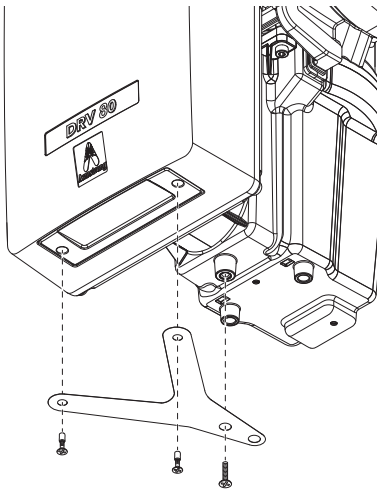
Avant de démonter, exécuter les opérations suivantes :

- Couper l'alimenation électrique dans le DRV80.
- Couper l'alimentation en eau dans le DRV80.
- Faire en sorte que l'entrée de l'eau chaude se refroidisse suffisamment pour limiter le risque de blessure à travers le contact avec le tuyau chauffant ou le DRV.

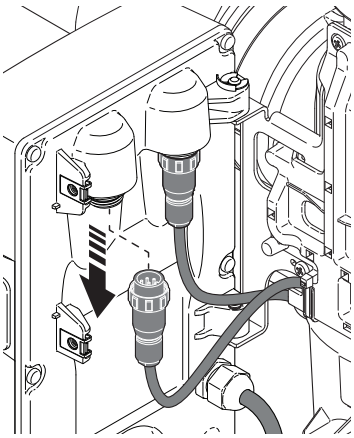
Step 1



Step 2



Step 3

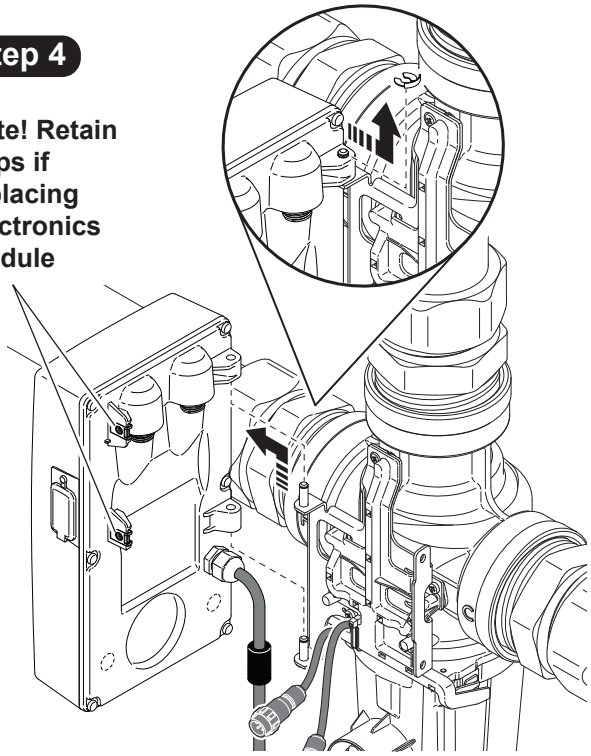


Failure to disconnect the incoming power supply before removing the plugs may result in product damage. Any damage caused in this way is not covered by the *Limited Warranty*. (See back page for full details.)

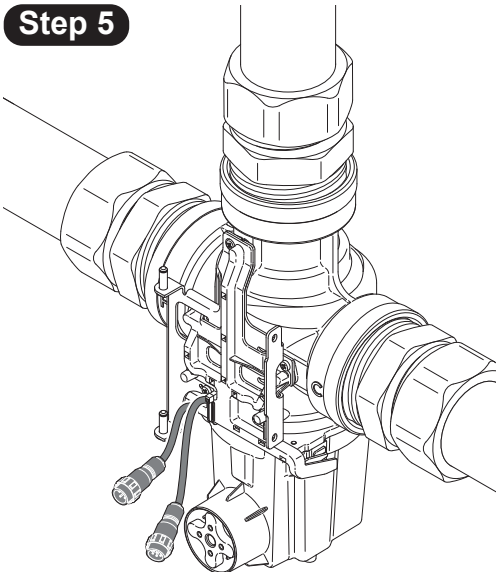
Si l'alimentation en énergie électrique n'est pas coupée avant la déconnection des fiches, le produit peut être endommagé. Tout dommage survenu dans ces conditions n'est pas couvert par la garantie limitée. (Voir page de couverture arrière pour plus amples renseignements.)

Step 4

Note! Retain Clips if replacing electronics module



Step 5



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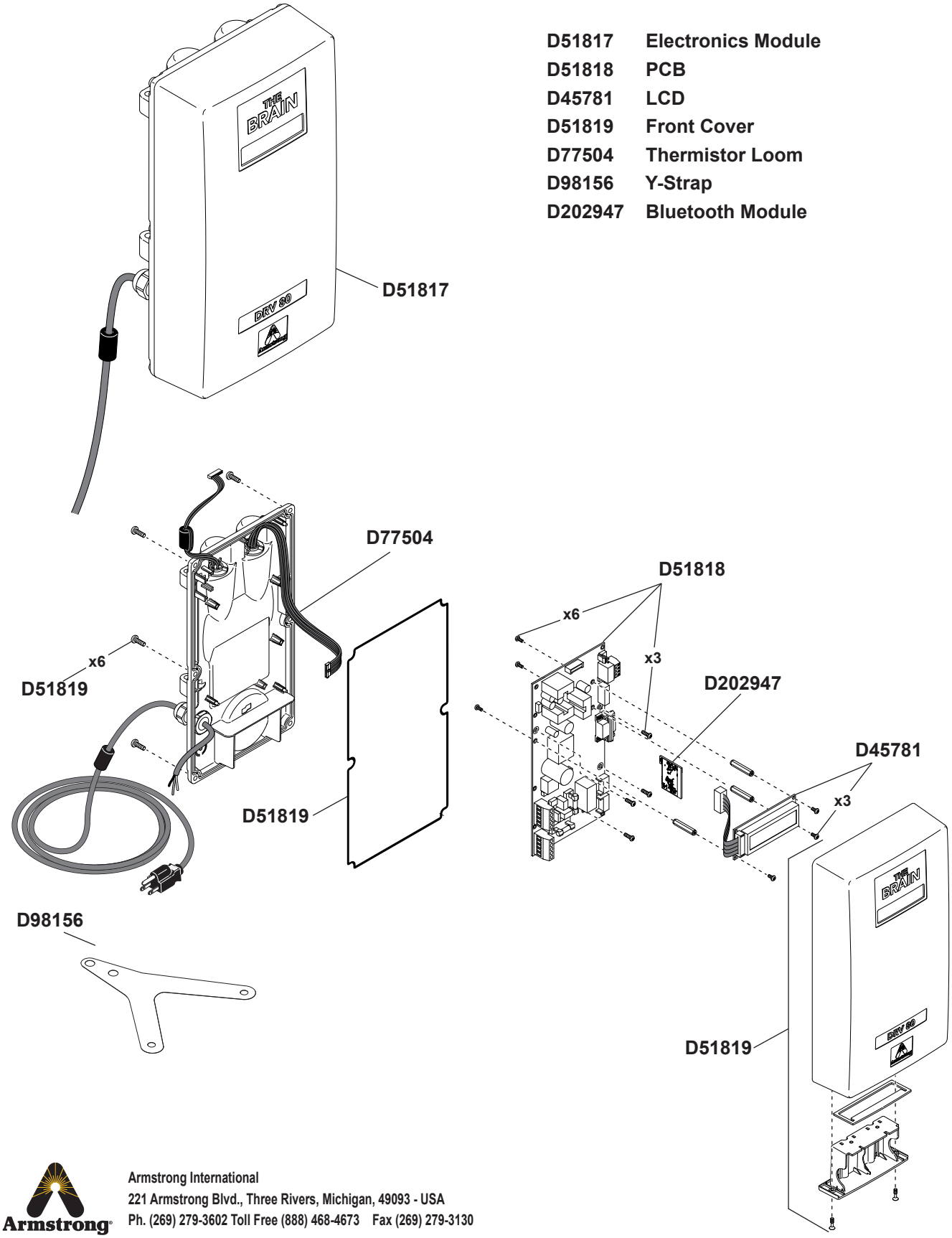
Electronics Module

DRV80 Electronics Module Spare Parts

D51817	Electronics Module
D51818	PCB
D45781	LCD
D51819	Front Cover
D77504	Thermistor Loom
D98156	Y-Strap
D202947	Bluetooth Module



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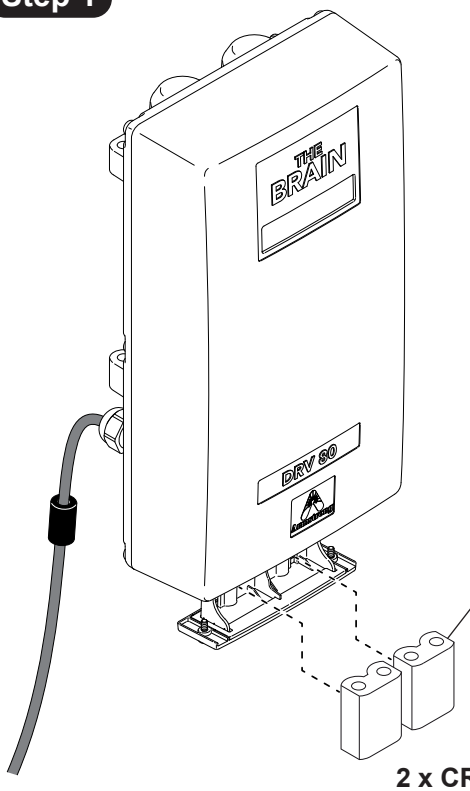
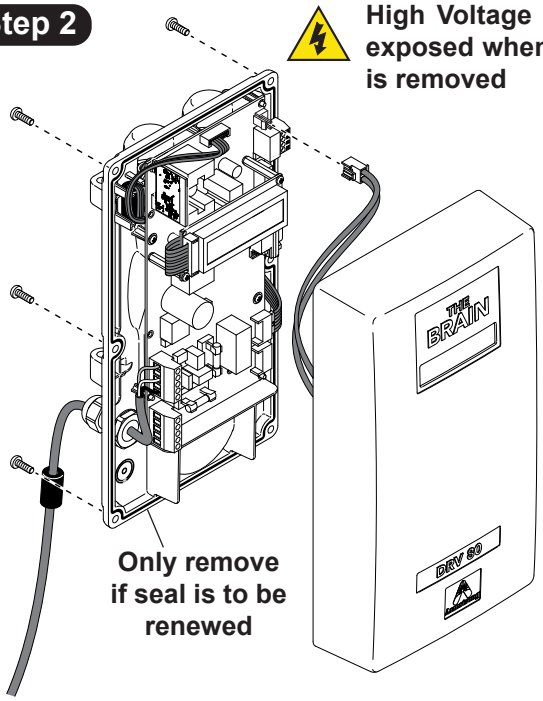
Step 1



Note! Retain batteries if replacing electronics module

2 x CR - P2 6V

Step 2

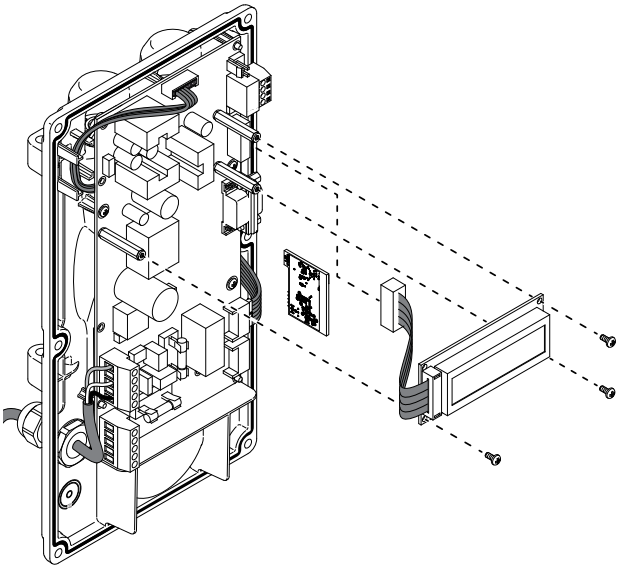


High Voltage supply exposed when cover is removed

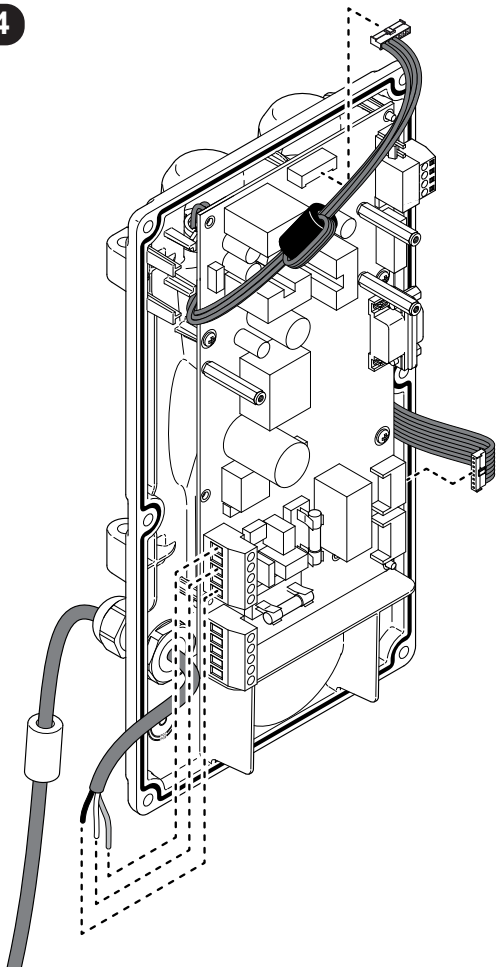
Only remove if seal is to be renewed

Caution! When unscrewing the D45782 screw, please be cautious not to fully remove it. Doing so could cause the PCB to detach and potentially fall from its fixture. Handle it carefully to prevent any damage.

Step 3



Step 4



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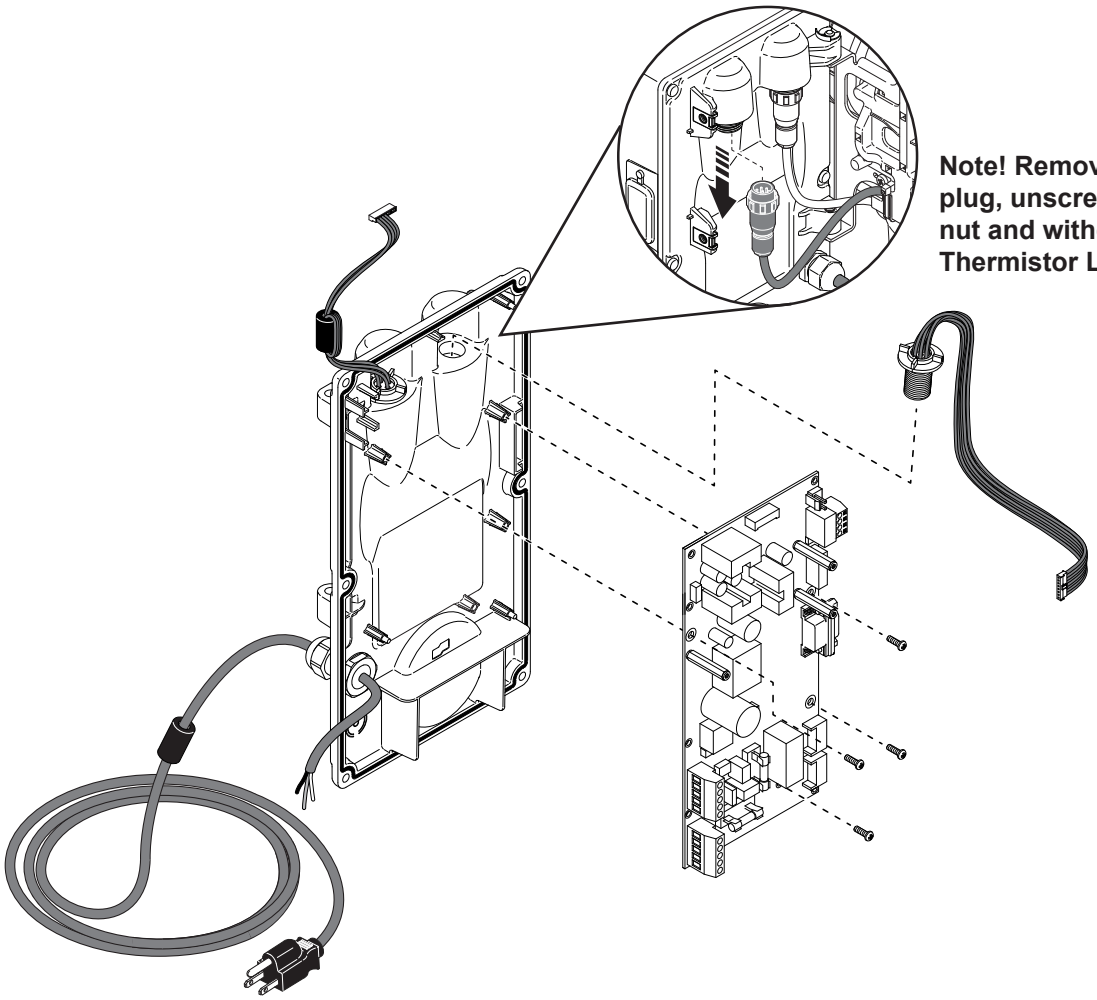
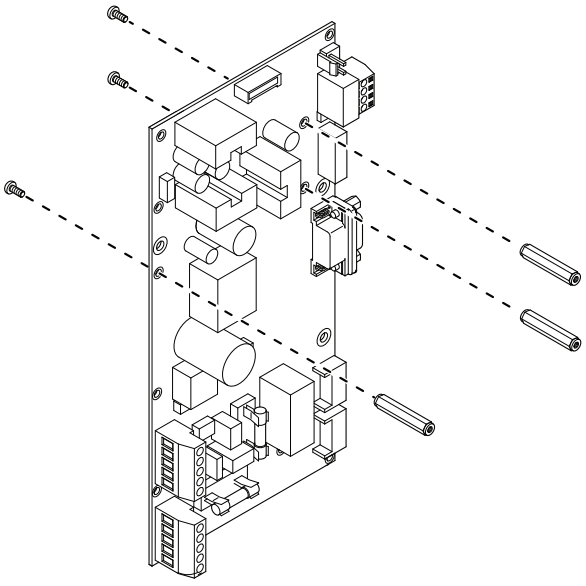
Step 5



Note! Remove 8 pin plug, unscrew lock nut and withdraw Thermistor Loom

Step 6



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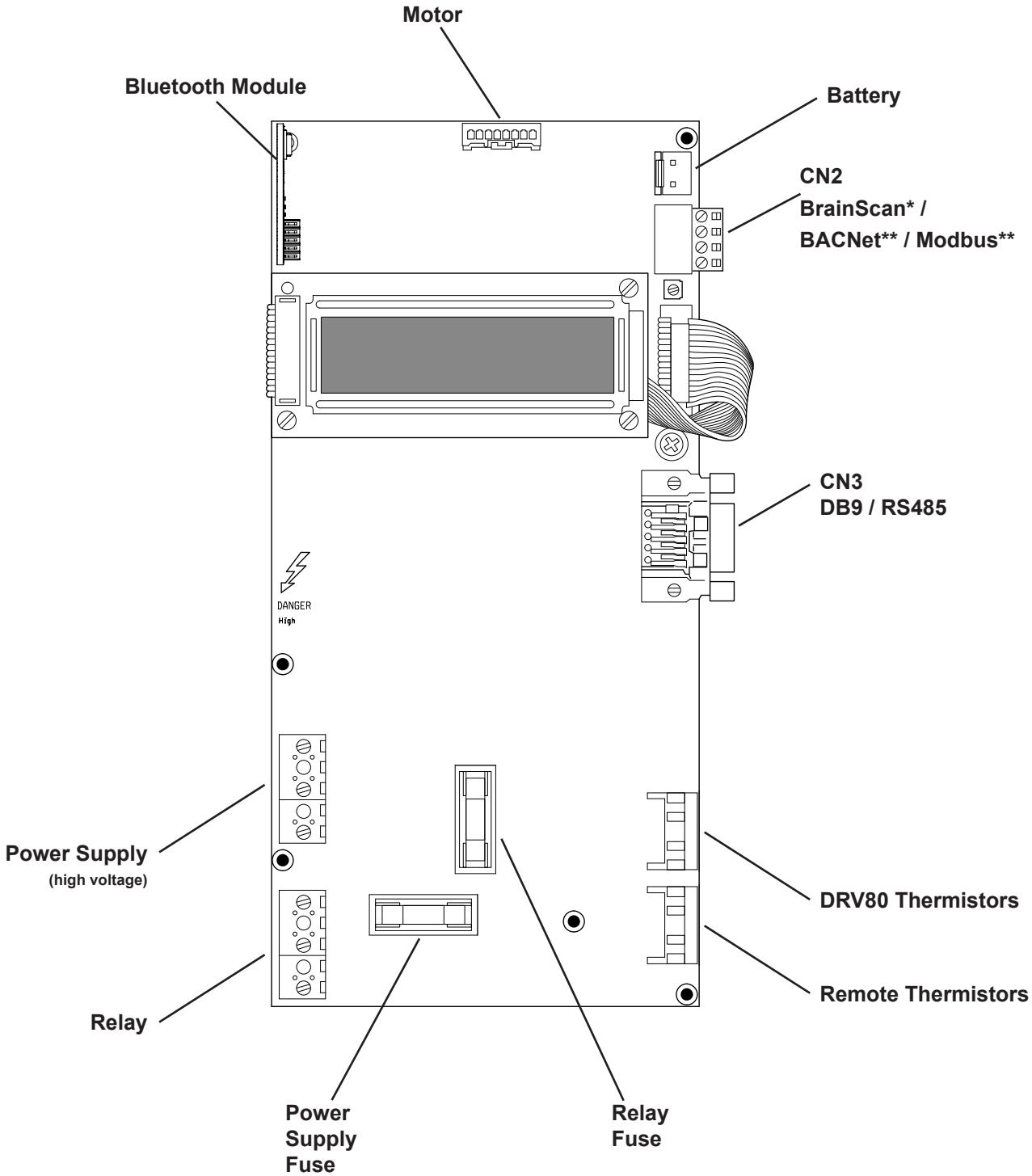
PCB Connections



** See separate guide - www.armstronginternational.com/wp-content/uploads/IOM_SAGEBS_503_EN_20180102.pdf*

***See separate guide - www.armstronginternational.com/wp-content/uploads/IOM_GuidetotheBrainNetworking_776_GL_EN_20230116.pdf*

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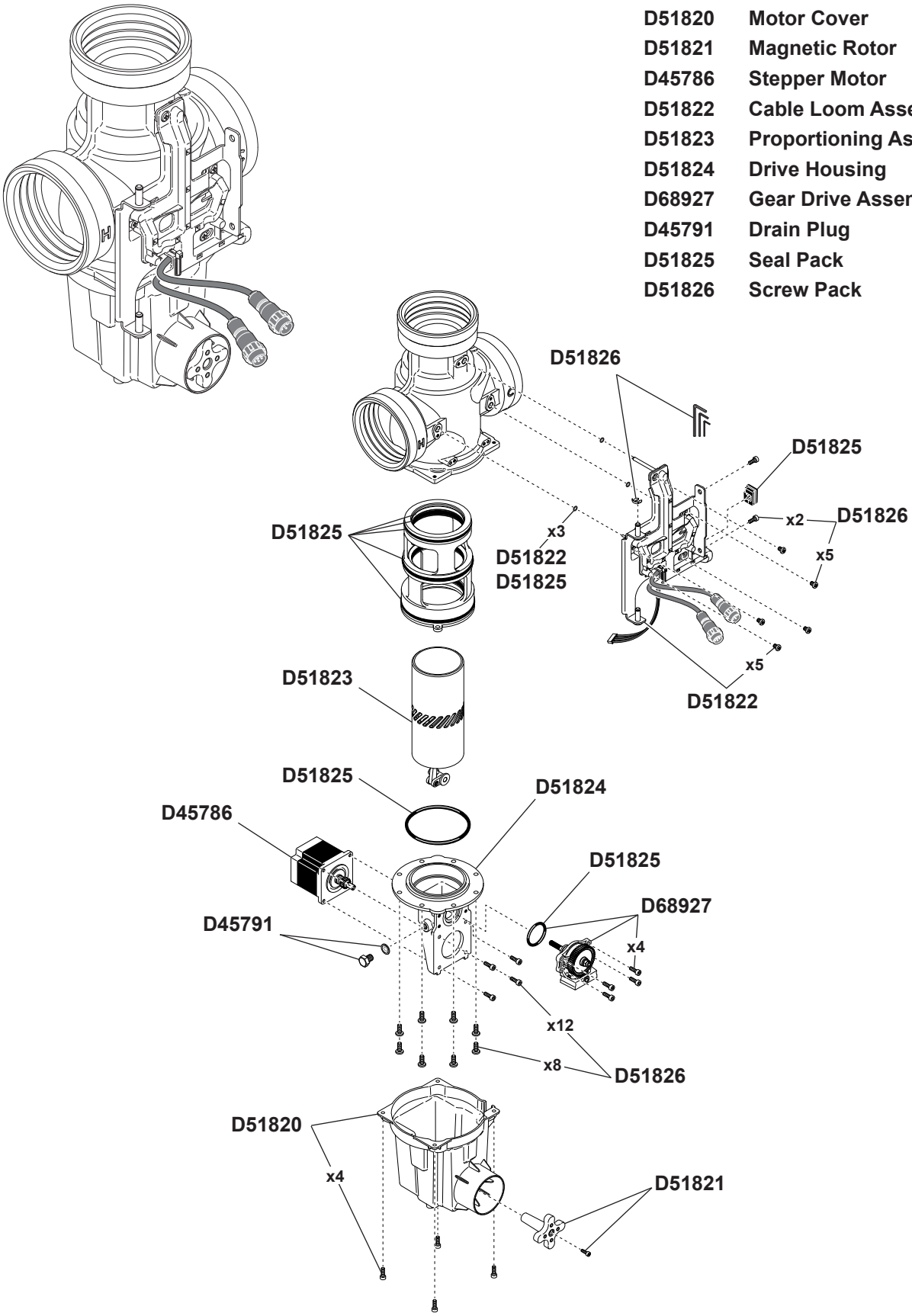
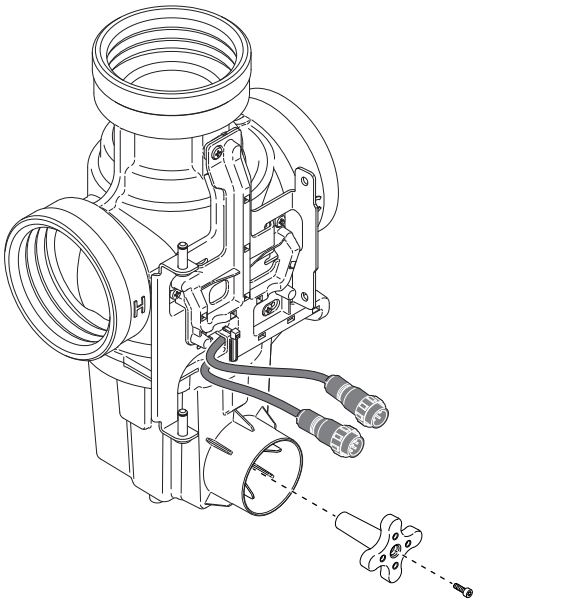
DRV

DRV80 DRV Spare Parts

D51820	Motor Cover
D51821	Magnetic Rotor
D45786	Stepper Motor
D51822	Cable Loom Assembly
D51823	Proportioning Assembly
D51824	Drive Housing
D68927	Gear Drive Assembly
D45791	Drain Plug
D51825	Seal Pack
D51826	Screw Pack

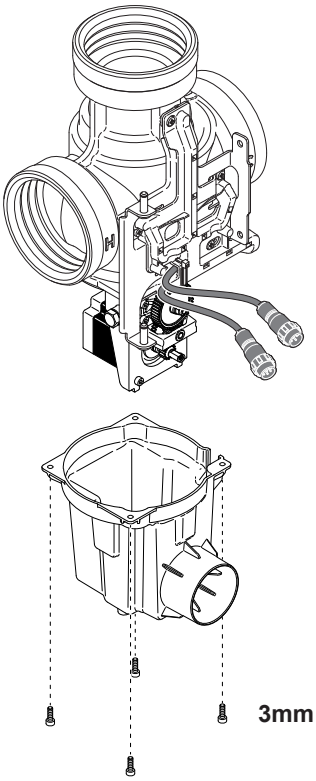


Step 1



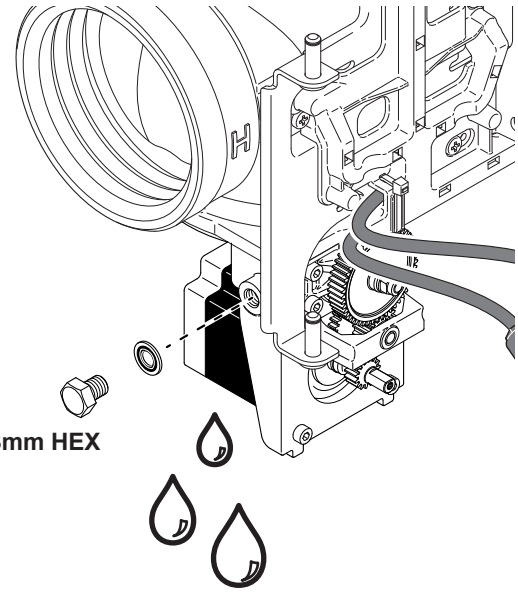
2.5mm HEX

Step 2



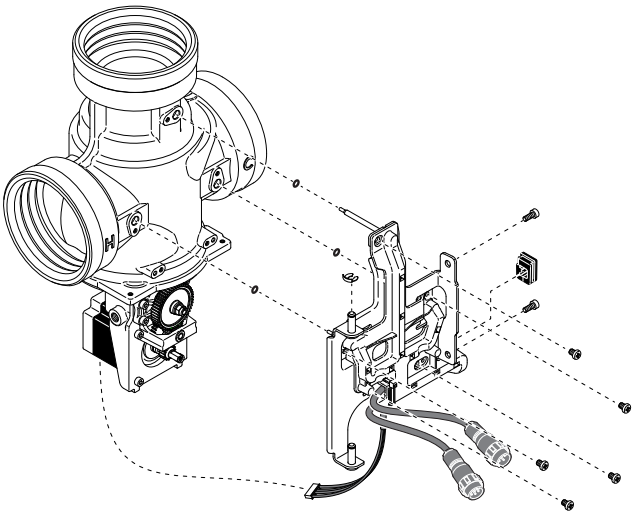
3mm HEX

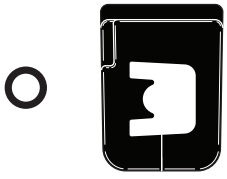
Step 3



13mm HEX

Step 4





Seals shown 1:1 when printed at Full Scale

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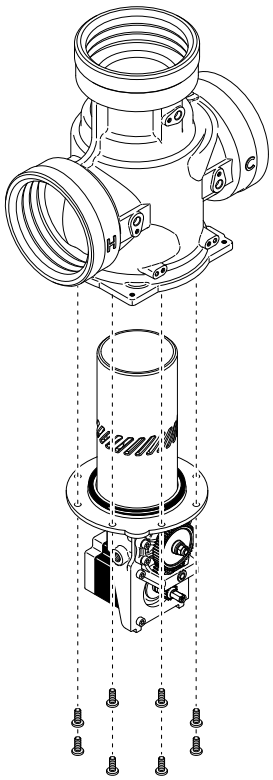
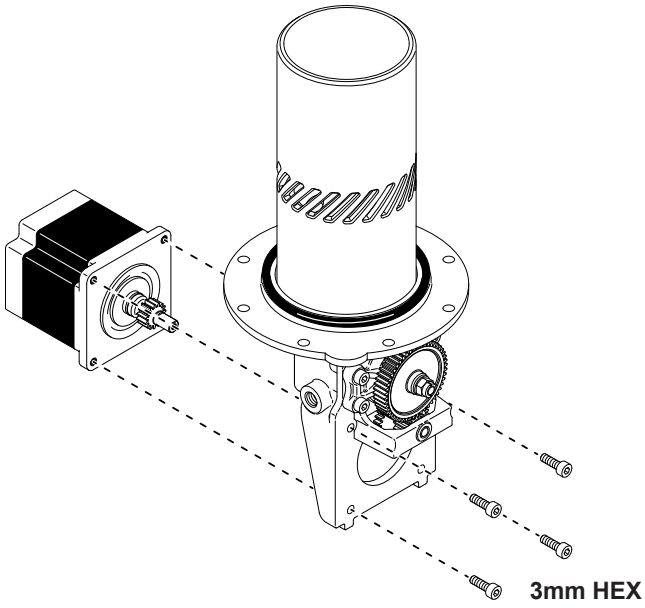
Step 5



Step 6



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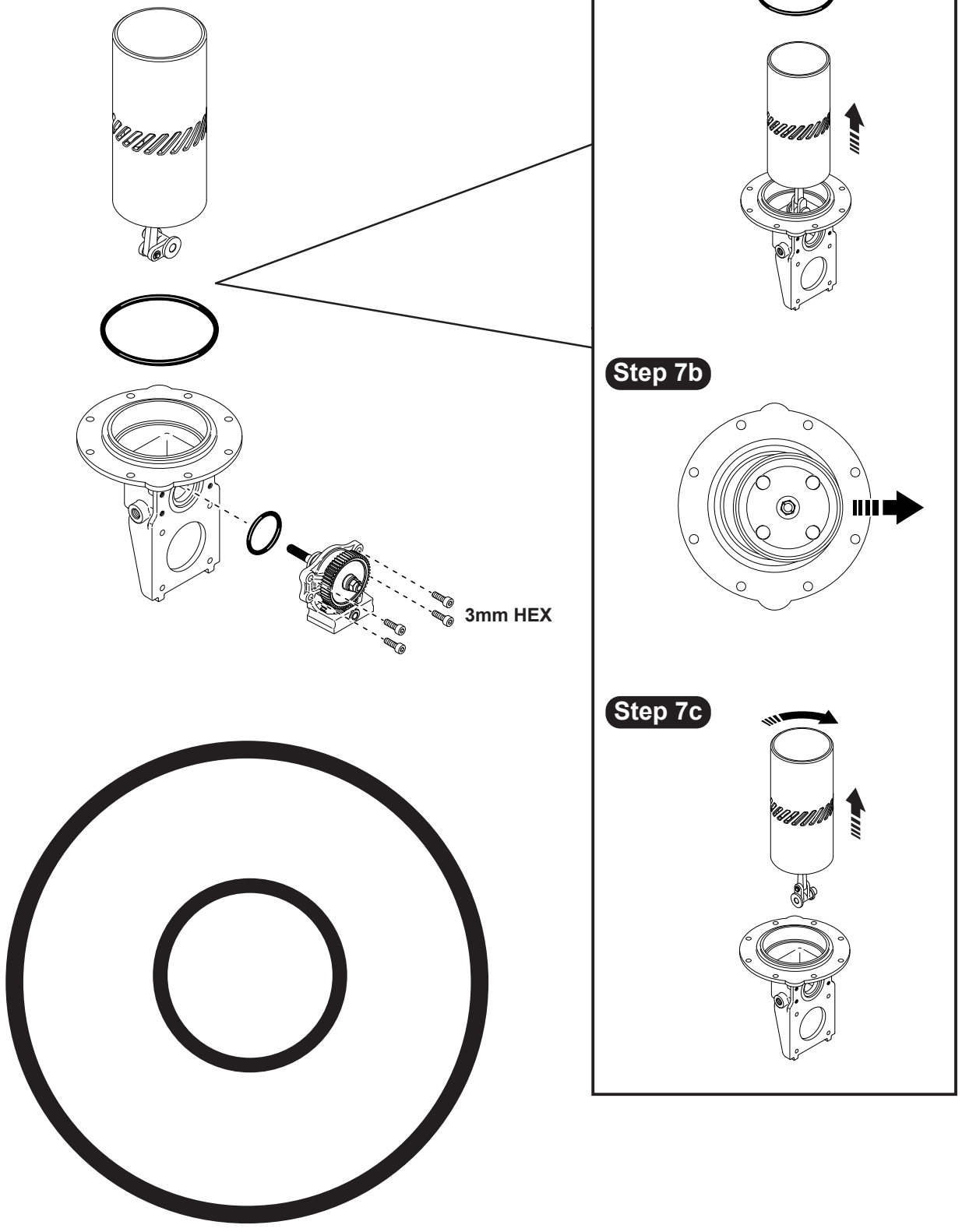
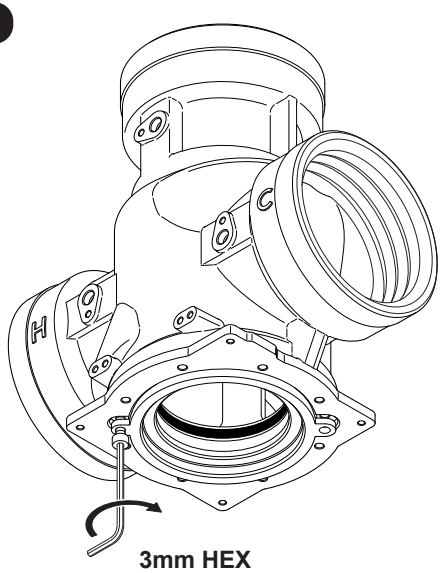
Step 7



Seals shown 1:1 when printed at Full Scale

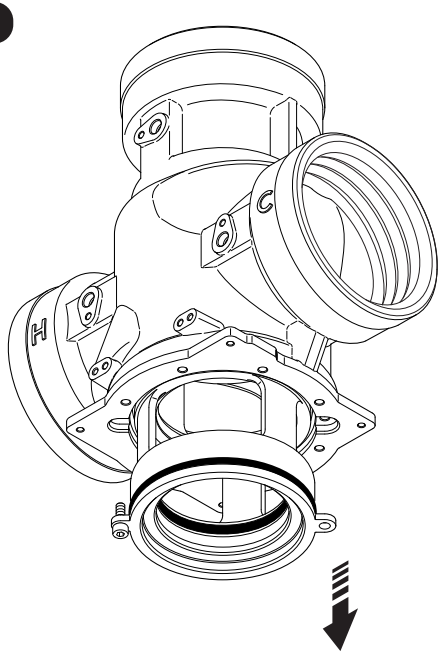
Step 8



3mm HEX

Use one of the 3mm Hex screws to assist in removing the cartridge.

Step 9



Cartridge will fall when loose.
La cartouche va tomber une fois détachée.

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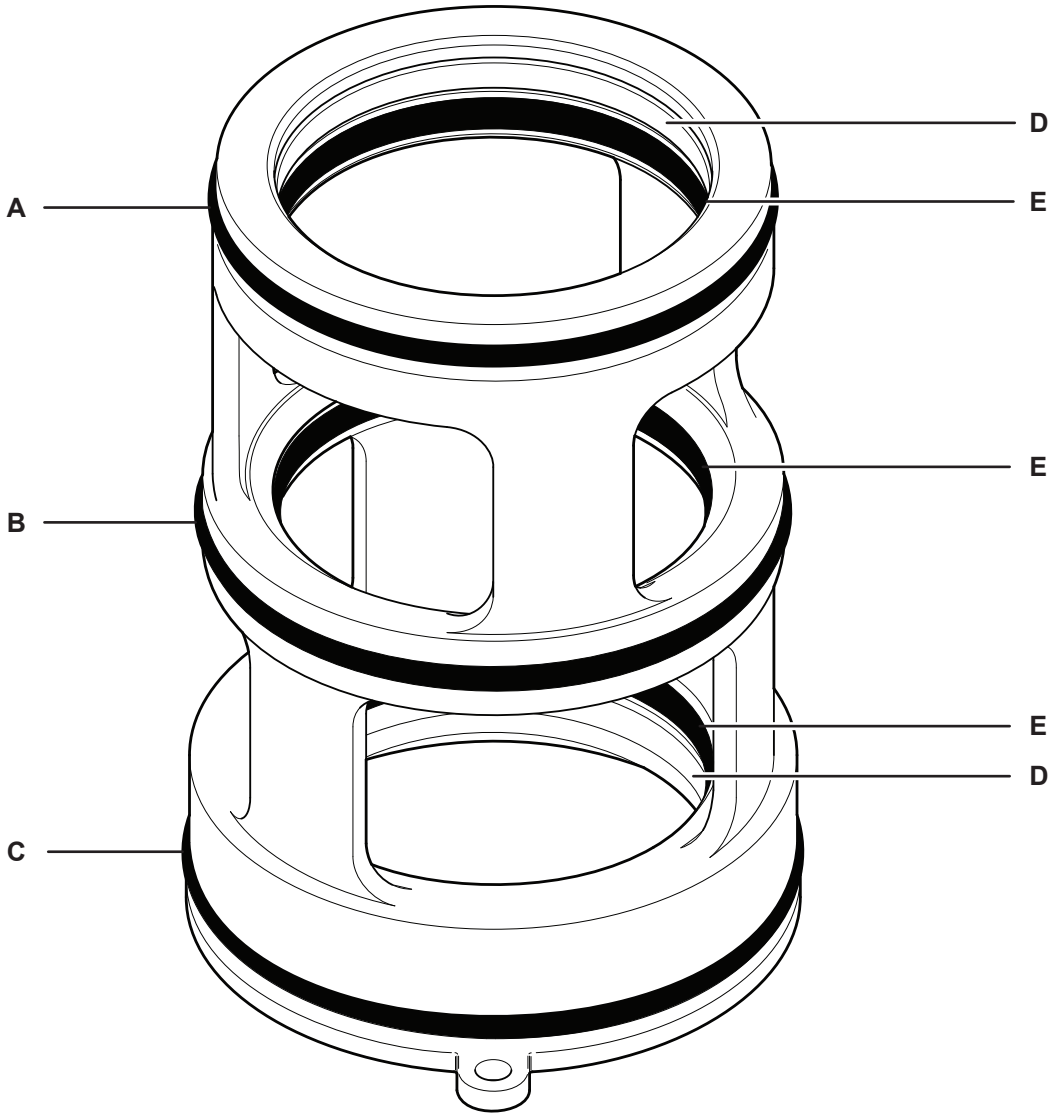
Step 10



D51825 Cartridge Seal Pack
(Cartridge not included)

Only use silicone based lubricants on rubber seals.
N'utiliser que des lubrifiants faits à base de silicone sur des joints en caoutchouc.

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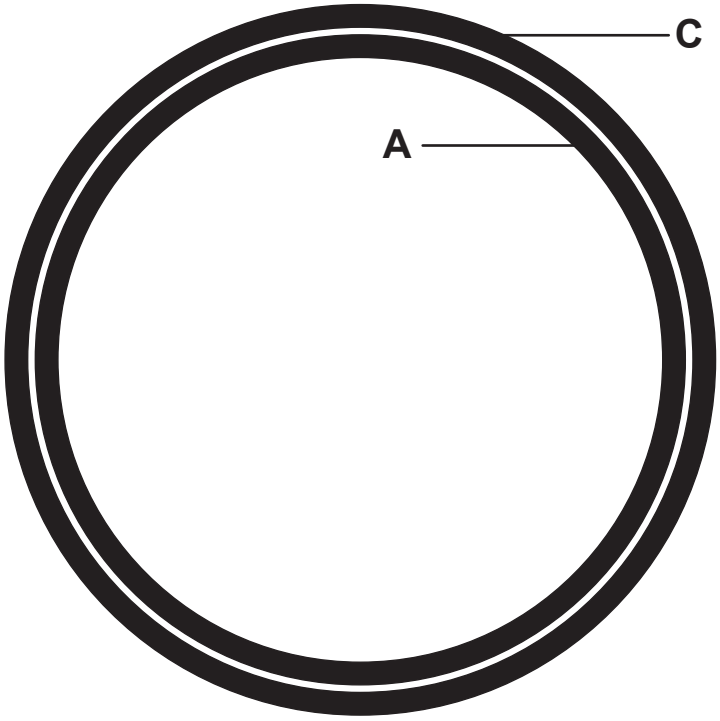
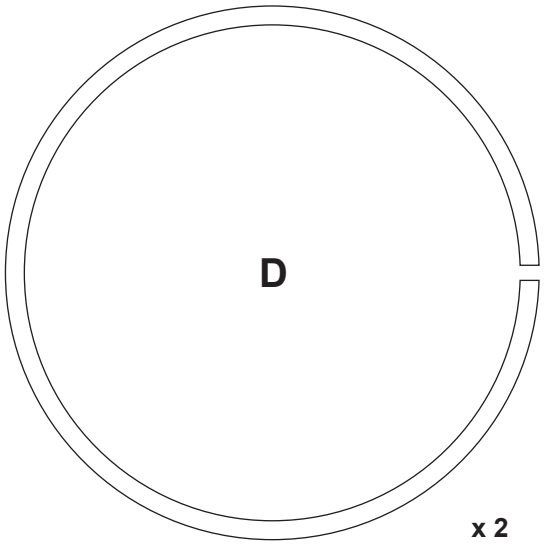
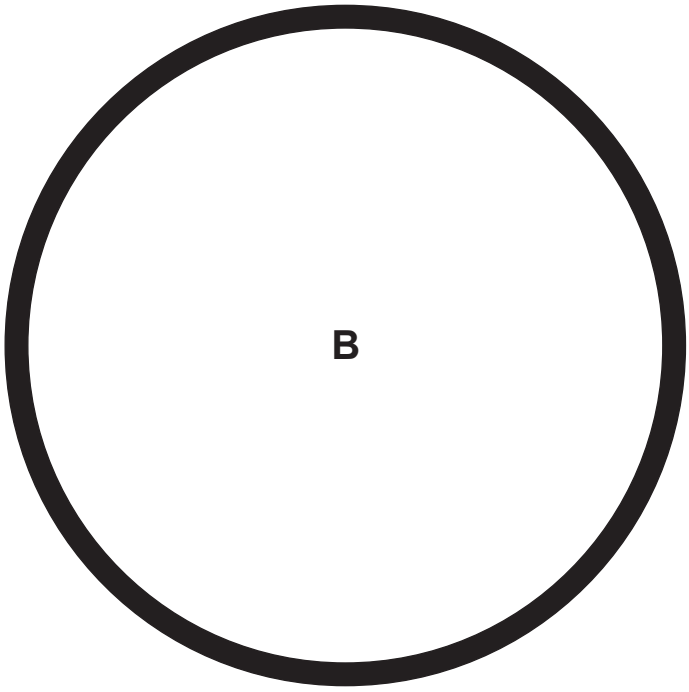
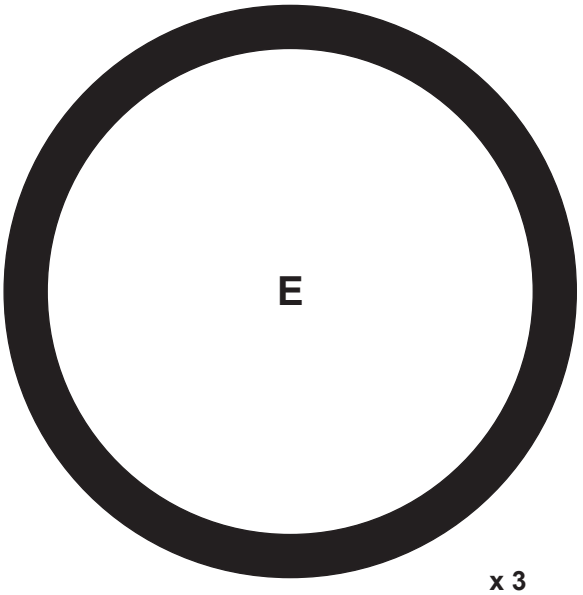
continued...





x 2





x 3

Seals shown 1:1 when printed at Full Scale

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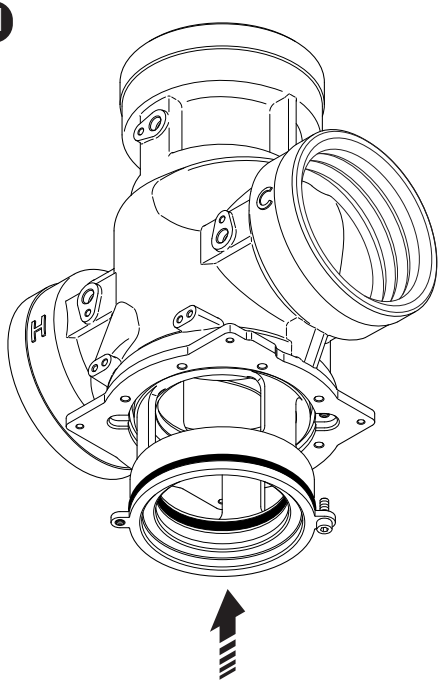
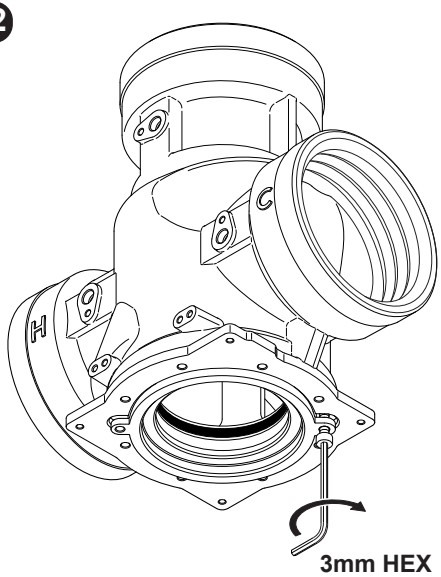
Step 11



Step 12



Use one of the 3mm Hex screws to assist in refitting the cartridge.

Remove the screw when the cartridge is inserted fully.

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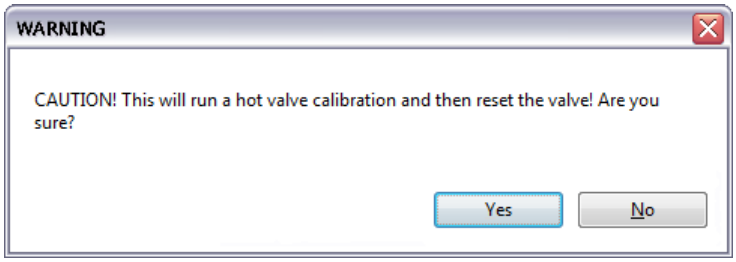
Step 13

Valve Calibration

Must be used after replacing the following parts:

- **Proportioning Assembly**
- **PCB**
- **Drive Housing**
- **Gear Drive Assembly**

1. Turn power on to the reassembled DRV80 and connect to a Laptop / PC device.
2. Run the ***The Brain® DRV Programming Software*** and go to the ***Options*** screen.
3. Click ***Off*** under ***Valve Control***.
4. Click ***Calibration Set***.



5. Click ***Yes*** to proceed with the calibration. Monitor the DRV80 display.

6. Wait for the DRV80 to reset.

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continued...

Troubleshooting

Contents

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DRV80 Display Errors

Emergency Mode
Setpoint 120˚F

Maintenance to the DRV80 internal mechanism is required. DRV80 continues to operate safely, but with reduced performance. Check for the following:

- Motor damage or signs of wear
- Proportioning Assembly damage or signs of wear
- Debris in the Drive Housing
- Anything that could impair the movement of the Proportioning Assembly

If this mode is not addressed then it is likely the DRV80 will stop working and display any of the errors below.

Temp 120˚F
Error PCB 0

Temp 120˚F
Error PCB 5

Temp 120˚F
Error PCB 16

Temp 120˚F
Error PCB 32

Indicates the PCB has failed, replace the PCB.

P/N - D51818 PCB, or

P/N - D51817 Electronics Module

see pages 38 - 42.

Temp 120˚F
Error PCB

\+ Temp 120˚F
Error Reset 6

\+ Temp 120˚F
Error Reset 8

\+ Temp 120˚F
Error Reset 37

\+ Temp 120˚F
Error Reset 40

\+ Temp 120˚F
Error Reset 90

Indicates the PCB has failed. Turn power off for 10 seconds and restart. If the error persists, replace the PCB.

P/N - D51818 PCB, or

P/N - D51817 Electronics Module

see pages 38 - 42.

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Temp 120˚F
Error Thermistor
+
Temp 120˚F
Error Check 4

Indicates thermistor / cable loom failure. Turn power off for 10 seconds and restart. If the error persists, check for the following.

- Connectors from DRV to electronics module are disconnected or wet
- Thermistors are loose

If the problem persists, replace the thermistor loom.

P/N - D77504 Thermistor Loom, or

P/N - D51817 Electronics Module

see pages 38 - 42.

Temp 120˚F
Error Temp 3

Temp 120˚F
Error Temp 7

Outlet temperature exceeds the ***Error Temp*** value. This condition causes the DRV80 to switch to full cold. Check for the following:

- Internal seal damage
- Debris in the internal mechanism
- Internal mechanism damaged / disconnected

Temp 120˚F
Error Drive
+
Temp 120˚F
Error Check 60
+
Temp 120˚F
Error Check 70

Indicates motor / cable loom failure or a malfunction of the positioning sensor. Reset the DRV80. If the error persists, check for the following:

- Electronics module is assembled to the DRV correctly
- Dirt or debris in gear mechanism
- Dirt or debris around motor
- Motor is disconnected
- Magnetic rotor is not coupled to the motor
- Proportioning Assembly is sticking or has seized
- Motor is loose
- Gear Drive assembly is loose

Replace in the following order if the problem still persists after each:

1. **P/N - D51822 Cable Loom**
2. **P/N - D51817 Electronics Module**
3. **P/N - D51821 Magnetic Rotor**
4. **P/N - D45786 Stepper Motor**

see pages 38 - 46.

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Indicates the batteries are flat or disconnected. Check for the following:

- Battery is connected to PCB
- Battery connections, signs of wear or debris / corrosion
- Batteries are at minimal power or flat

Replace batteries (see ***Preventative Maintenance and Fitting Spare Parts*** on page 37. Do not use rechargeable batteries).

Rogue characters appear on display. Reset DRV80, if the error persists, replace LCD.

P/N - D45781 LCD

See pages 38 - 42

Brightness of LCD. Adjust setting on PCB. (See ***Common Faults - Cannot read the LCD display*** on page 64.

No power to DRV80. Check circuit breaker and electrical supply. Check wiring connections at power supply terminal block on PCB (see page 42). Check power supply fuse on PCB (see page 42). If problem persists, replace PCB and / or LCD.

P/N - D45781 LCD, or

P/N - D57396 PCB

See pages 38 - 42.

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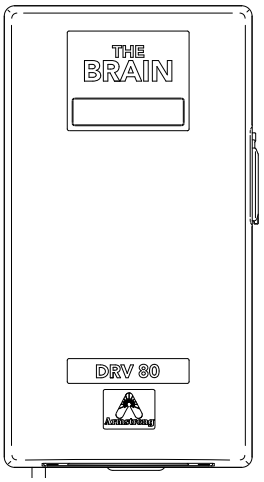
Common Faults

Problem: ***"Blend temperature rises when system is in zero demand..."***

DRV80 display errors




```
Temp          120°F
Error Temp      3
```

```
Temp          120°F
Error Temp      7
```

These are the most likely error messages to be displayed during this problem. For the most probable causes and solutions see ***DRV80 Display Errors*** *on page 52.*

If any other error message is displayed see ***DRV80 Display Errors*** *on page 53 - 56.*

Check blend circuit flow rate.

Flow rate is less than 10 gpm (37.8 lpm). Reset circuit flow rate and check for the following:

- *Air locks*
- *Blocked strainers*
- *Closed valves*
- *Pump failure*

Check mixed return temperature.

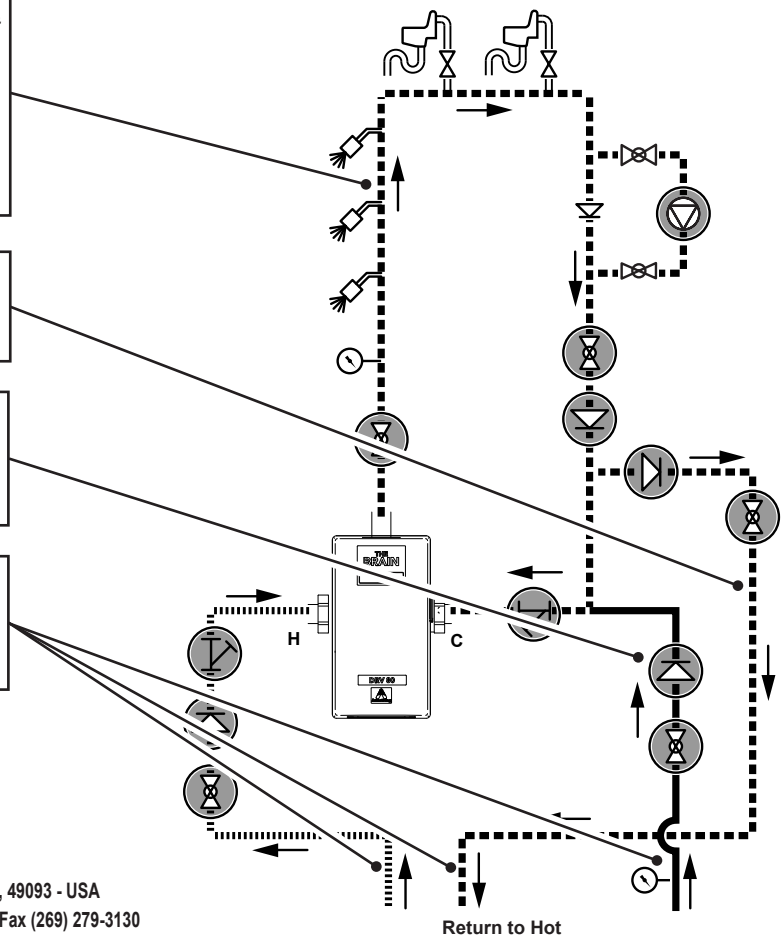
Minimum recirculation loop temperature loss = 2°F (1°C)

Checkvalves

Check circuit to make sure checkvalves are correct positioned and operating normally. (See ***Piping Diagrams*** *on pages 14 - 17)*

Water pressure

Make sure supply pressures are balanced. Make sure mixed return is flowing correctly to water heater.



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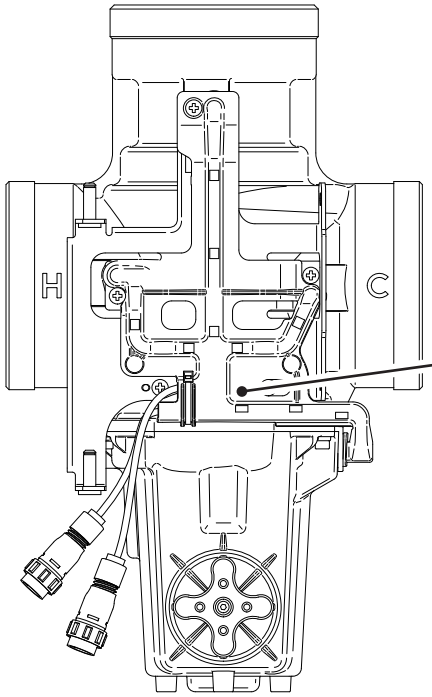
Problem: *"Outlet temperature fluctuates more than ± 5°F..."*



Check internal mechanism

Mechanism is jamming or slow to control. Clean and descale the following parts:

- *Proportioning Assembly*
- *Gear Drive Assembly*
- *Magnetic Rotor*

Renew separator seal and lubricate internal mechanism.

Check blend circuit flow rate.

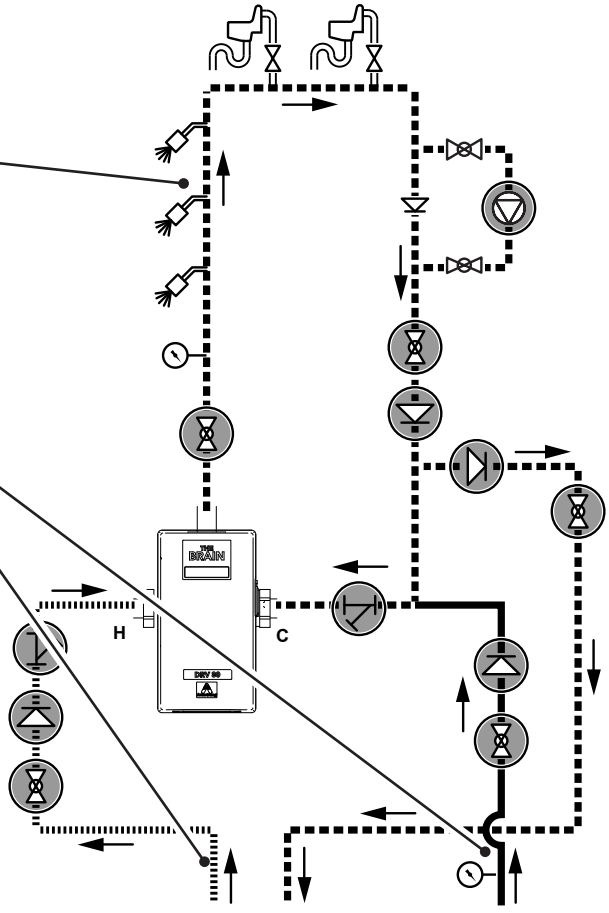
Flow rate is less than 10 gpm (37.8 lpm). Reset circuit flow rate and check for the following:

- *Air locks*
- *Blocked strainers*
- *Closed valves*
- *Pump failure*

Water pressure

Make sure supply pressures are balanced. Check for the following:

- *Air locks*
- *Blocked strainers*
- *Closed valves*



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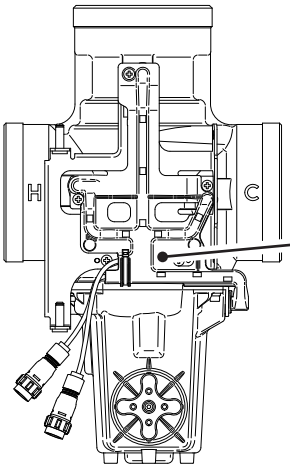
Problem: *"LCD Display shows any of the following..."*

Temp High 140˚F Setpoint 120˚F	*Outlet temperature exceeds the **above setpoint** value. This condition causes an alert signal to be activated.*
Temp Low 100˚F Setpoint 120˚F	*Outlet temperature is below the **below setpoint** value. This condition causes an alert signal to be activated.*
Temp 120˚F Error Temp 3	*Outlet temperature exceeds the Error Temp value.* This condition causes the DRV80 to switch to full cold. *For the most probable causes and solutions see **DRV80 Display Errors** on page 55.*

*If any other error message is displayed see **DRV80 Display Errors** on page 53 - 56.*



Check internal mechanism

Mechanism is jamming or slow to control. Clean and descale the following parts:

- *Proportioning Assembly*
- *Gear Drive Assembly*
- *Magnetic Rotor*

Renew separator seal and lubricate internal mechanism using silicone based grease suitable for plumbing applications

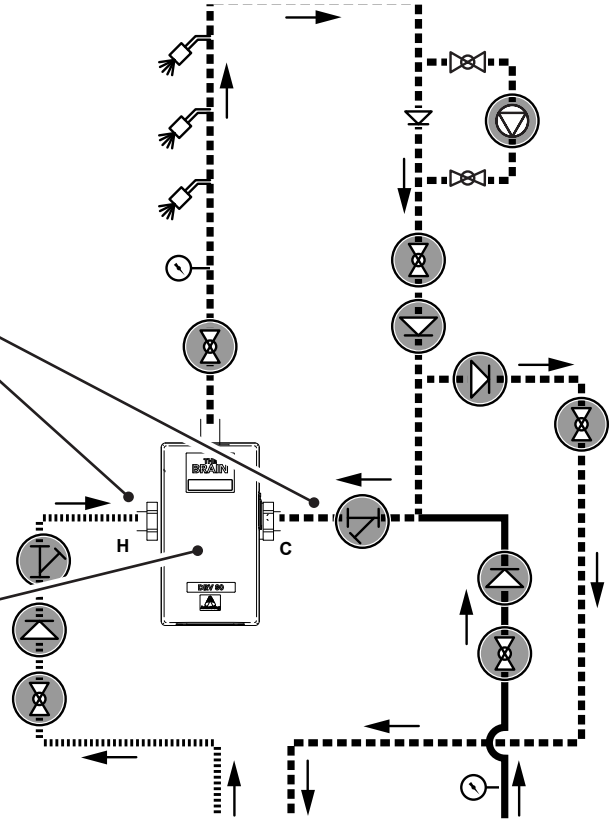
Inlet water temperatures

Check water supplies are connected to the correct inlet ports.

Check inlet supply temperature

Reset DRV80

Turn power off for 10 seconds and restart.



continued...

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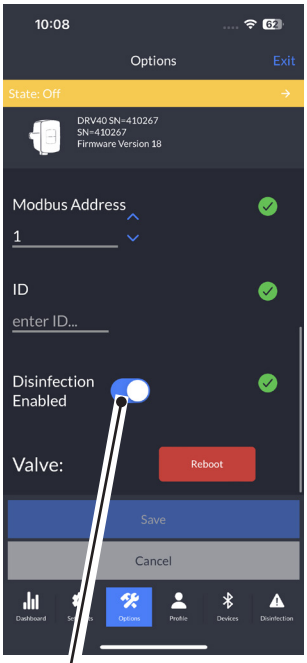
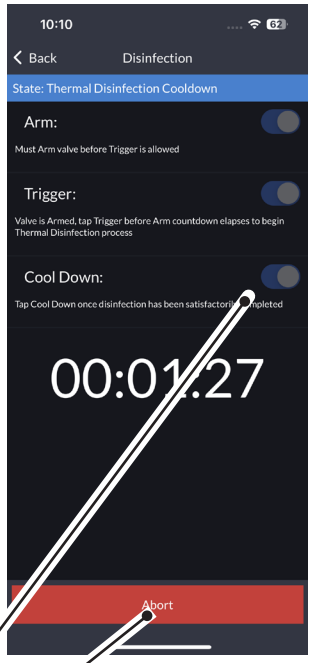
Problem: ***"Blend circuit does not fully return to normal within the Disinfection Timeout period..."***

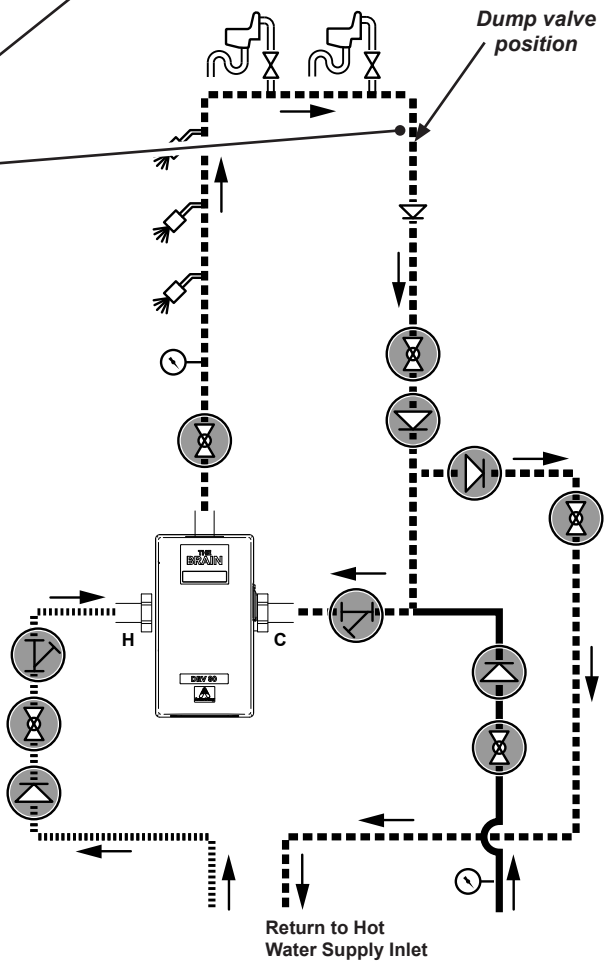




Blend circuit / Control software

Check the following:

- *Disinfection Timeout value.*
- *Cool Down start and finish times.*
- *Early abort of disinfection cycle.*
- *Use of a dump valve to speed up cool down time.*



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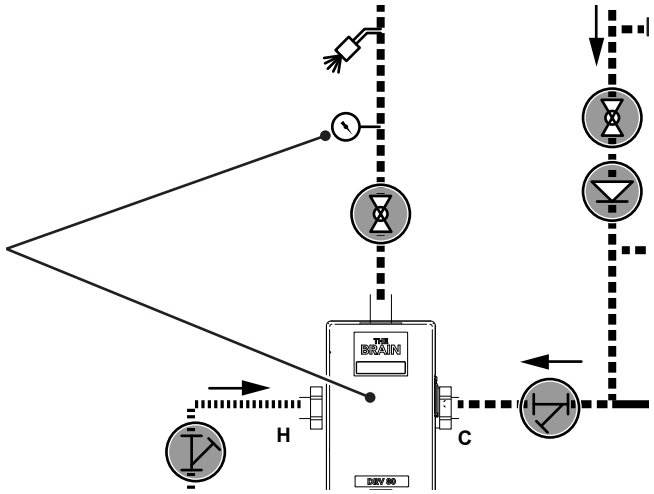
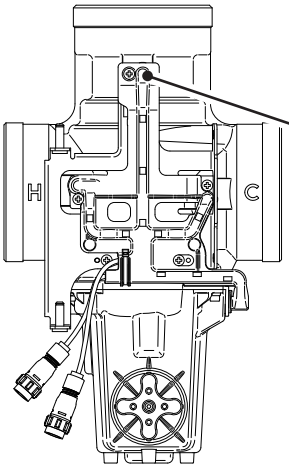
Problem: ***"Constant difference between blend circuit temperature reading and DRV80 temperature display..."***

Readings are not equal after outlet temperature has stabilized



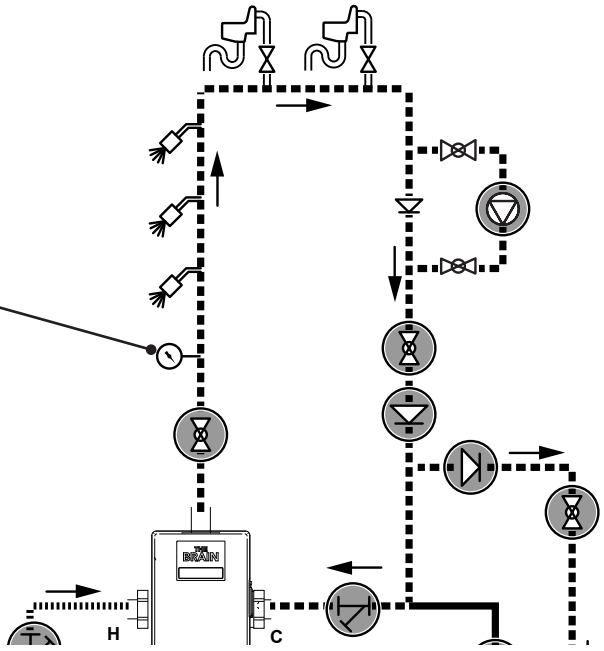


Check outlet thermistor

Turn power off for 10 seconds and restart. If the error persists, check the thermistor connections or replace the thermistors.

Blend circuit thermometer

Check or replace.



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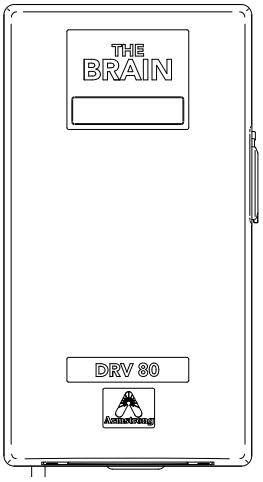
Problem: *"Unable to adjust outlet temperature..."*

DRV80 display errors



Temp 120˚F
Error PCB

Temp 120˚F
Error Drive

Temp 120˚F
Error Thermistor

Temp 120˚F
Error Temp

These are the most likely error messages to be displayed during this problem. For the most probable causes and solutions see ***DRV80 Display Errors*** *on page 53-56.*

If any other error message is displayed see ***DRV80 Display Errors*** *on page 53 - 56.*

Check blend circuit flow rate.

Flow rate is less than 10 gpm (37.8 lpm). Reset circuit flow rate and check for the following:

- *Air locks*
- *Blocked strainers*
- *Closed valves*
- *Pump failure*

Check mixed return temperature.

Minimum recirculation loop temperature loss = 2°F (1°C)

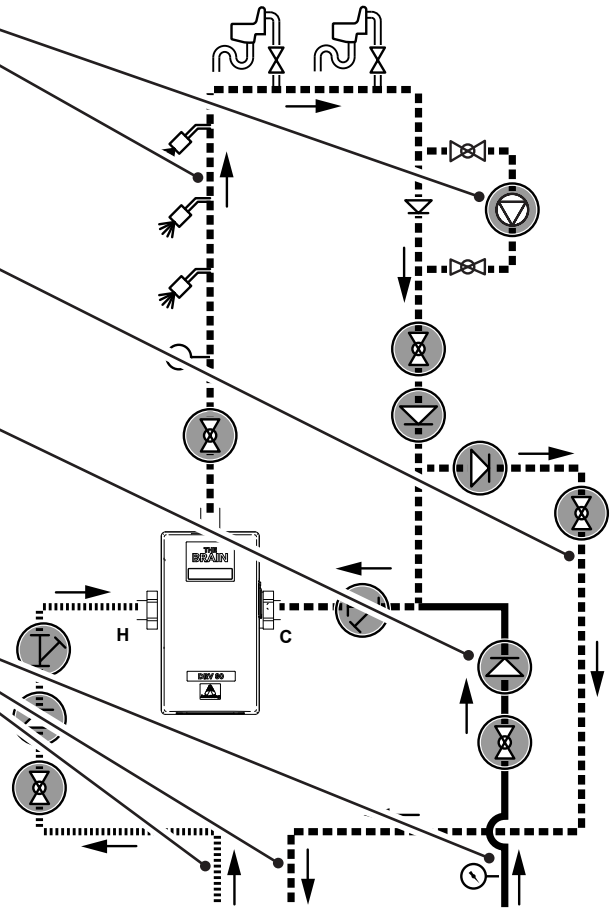
Checkvalves

Check circuit to make sure checkvalves are correct positioned and operating normally. (See ***Piping Diagrams*** *on pages 14 - 17)*

Water pressure / flow

Make sure supply pressures are balanced. Make sure mixed return is flowing correctly to water heater. Check for the following:

- *Air locks*
- *Blocked strainers*
- *Closed valves*



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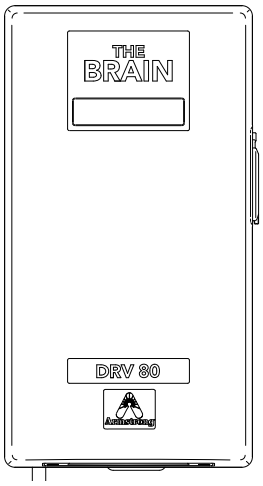
Problem: *"No display..."*

DRV80 display errors

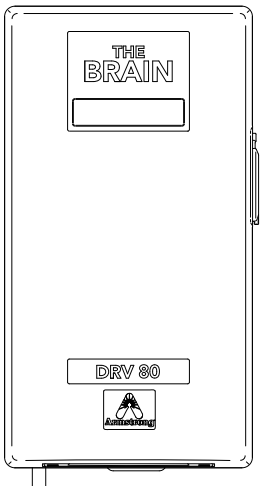


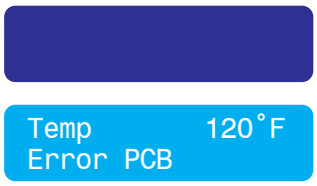
Blank display.
For the most probable causes and solutions see ***DRV80 Display Errors*** *on page 56.*

If any other error message is displayed see ***DRV80 Display Errors*** *on page 53 - 56.*

Problem: *"No display or no control..."*

DRV80 display errors





These are the most likely error messages to be displayed during this problem. For the most probable causes and solutions see ***DRV80 Display Errors*** *on page 53 - 56.*

If any other error message is displayed see ***DRV80 Display Errors*** *on page 53 - 56.*

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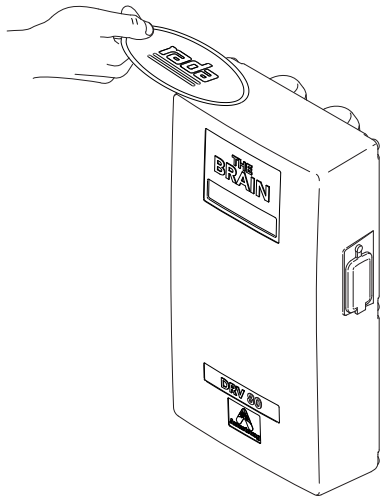
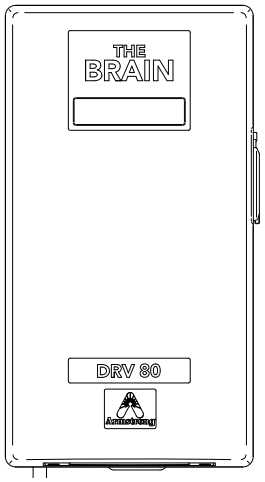
Problem: *"DRV80 is not going into Bluetooth pairing mode..."*



Check the magnetic key is placed correctly on the top left of the electronics module. If the problem persists, check the Bluetooth module PCB connection or replace the module.

Problem: *"Bluetooth Connectivity issue..."*

DRV80 display errors



Check the Bluethooth Module, PCB connections. If issue persists, replace Bluetooth Module, PCB.

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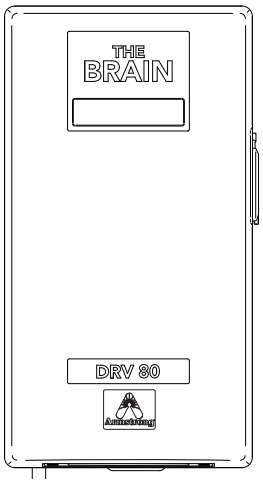
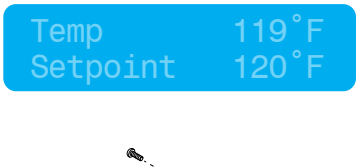
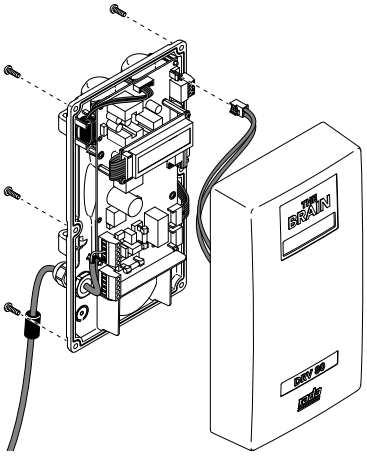
Problem: ***"Cannot read the LCD display..."***

DRV80 display errors



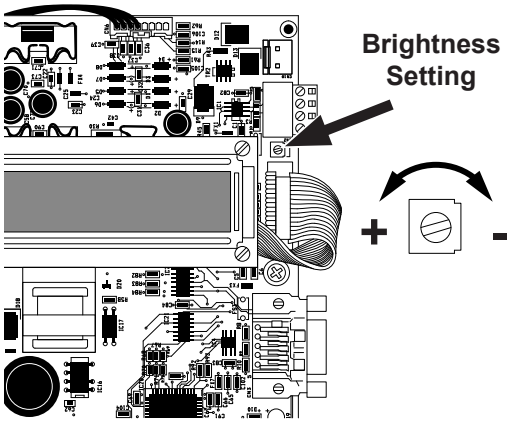




High Voltage supply exposed when cover is removed

Alimentation haute tension exposée après retrait du capot

Isolate power to the DRV80 ***before*** *disconnecting and removing the Electronics Module,* see pages 38 - 43. *Adjust the brightness setting on the PCB and reconnect the Electronics Module.*



If any other error message is displayed see ***DRV80 Display Errors*** *on page 53 - 56.*

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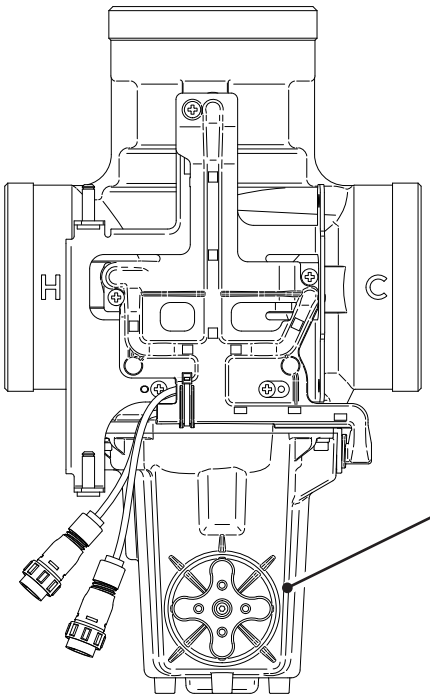
Problem: ***"High pitched noise from DRV80..."***



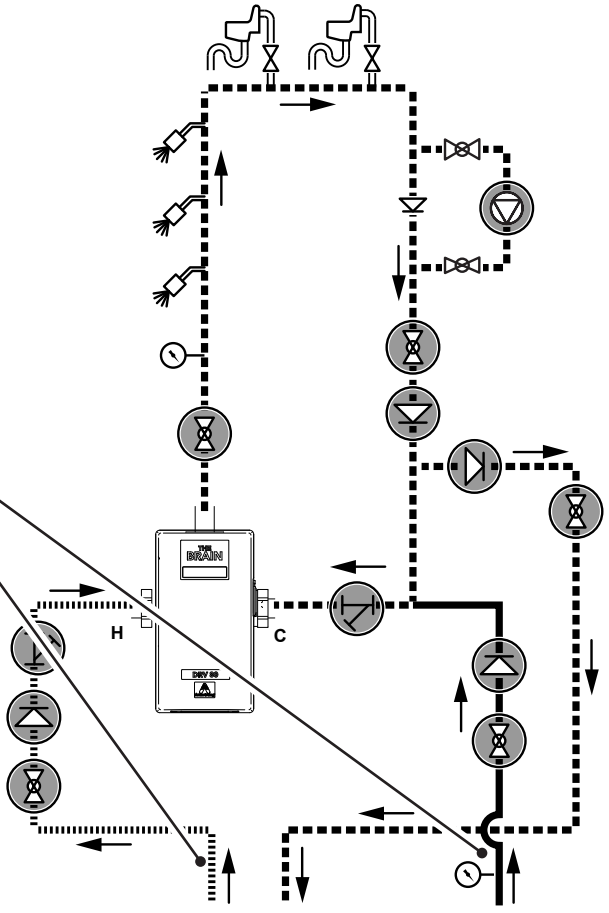
Check motor

Motor may be worn, replace.

Water pressure

Make sure supply pressures are balanced. Check for the following:

- *Air locks*
- *Blocked strainers*
- *Closed isolator valves*
- *Check inlet flow rates are within specified parameters. See* ***Technical Specifications*** *on page 10.*



Return to Hot Water Supply Inlet

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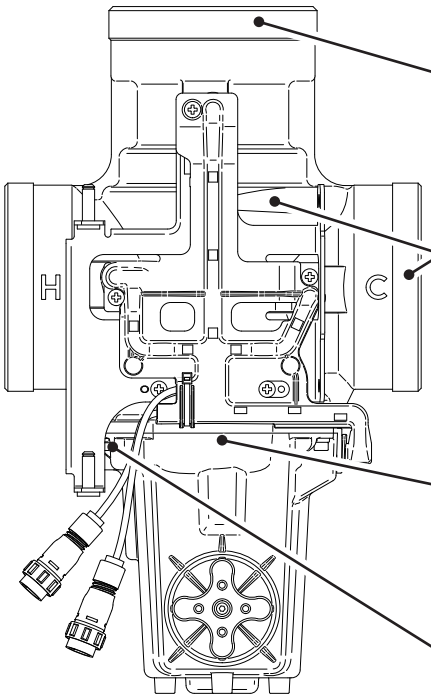
Problem: ***"Water leaking from DRV80..."***



Check inlet and outlet connections

Check inlet and outlet thread joints. Check a correct seal has been made with PTFE thread sealing tape or liquid sealant. Oil-based, non-setting joint compounds should not be used.

DRV body failure

DRV80 replacement required.

Check all DRV seals

Check all internal seals for wear and / or damage. Clean and refit seals. If problem persists, replace seals. Only use silicone based lubricants on rubber seals in cartridge (see page 48).

Check drain plug

Check drain plug and seal for wear and / or damage. Make sure drain plug and seal are fitted and tightened adequately. If problem persists, replace both plug and seal.

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Limited Warranty and Remedy

Armstrong Hot Water, Inc. (“Armstrong”) warrants to the original user of those products supplied by it and used in the service and in the manner for which they are intended, that such products shall be free from defects in material and workmanship for a period of one (1) year from the date of installation, but not longer than 15 months from the date of shipment from the factory [unless a Special Warranty Period applies, as listed below]. This warranty does not extend to any product that has been subject to misuse, neglect, or alteration after shipment from the Armstrong factory. Except as may be expressly provided in a written agreement between Armstrong and the user, which is signed by both parties, Armstrong **DOES NOT MAKE ANY OTHER REPRESENTATIONS OR WARRANTIES, EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, ANY IMPLIED WARRANTY OF MERCHANTABILITY OR ANY IMPLIED WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE.**

The sole and exclusive remedy with respect to the above limited warranty or with respect to any other claim relating to the products or to defects or any condition or use of the products supplied by Armstrong, however caused, and whether such claim is based upon warranty, contract, negligence, strict liability, or any other basis or theory, is limited to Armstrong’s repair or replacement of the part or product, excluding any labor or any other cost to remove or install said part or product, or, at Armstrong’s option, to repayment of the purchase price. As a condition of enforcing any rights or remedies relating to Armstrong products, notice of any warranty or other claim relating to the products must be given in writing to Armstrong: (i) within 30 days of last day of the applicable warranty period, or (ii) within 30 days of the date of the manifestation of the condition or occurrence giving rise to the claim, whichever is earlier. **IN NO EVENT SHALL ARMSTRONG BE LIABLE FOR SPECIAL, DIRECT, INDIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES, INCLUDING, BUT NOT LIMITED TO, LOSS OF USE OR PROFITS OR INTERRUPTION OF BUSINESS.** The Limited Warranty and Remedy terms herein apply notwithstanding any contrary terms in any purchase order or form submitted or issued by any user, purchaser, or third party and all such contrary terms shall be deemed rejected by Armstrong.

Special Warranty Periods are as follows:

The Brain - Model DRV80 **s**hall have a 5-year parts warranty on all components other than preventative maintenance service items, mentioned on page 37, which includes batteries and all ‘wetted’ O-rings / Seals.

Designs, materials, weights, performance ratings and prices are subject to change without notice.

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