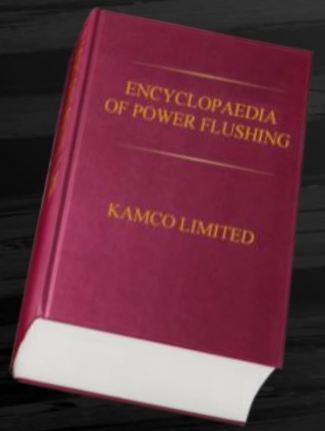
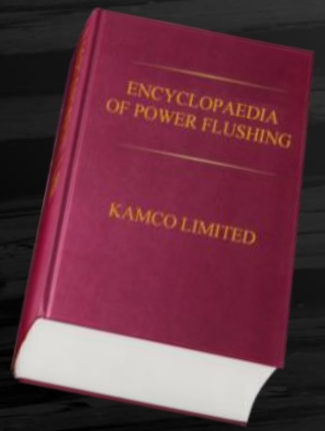
Power flushing heating systems

Kamco built the first reversible flow ‘one man’ operated power flushing pump in 1992, for British Gas North Thames. Since that time we have acquired a wealth of knowledge about power flushing. The following slides are based on content from the regular Kamco training sessions. We hope that you find them informative, but you’re welcome to call our help line on 01727 875020 for further help and advice.



Power flushing heating systems

The slides explain how to operate and connect up a power flushing pump to a heating system. They explain how to flush different types of heating system, such as open vented, sealed, combi boiler systems, micro-bore, gravity hot water, single-pipe systems, and thermal store systems.



We also tell you what not to do, and warn you how to identify which heating systems may be considered to be beyond power flushing.

Power flushing central heating systems

Wet central heating systems - water side problems.

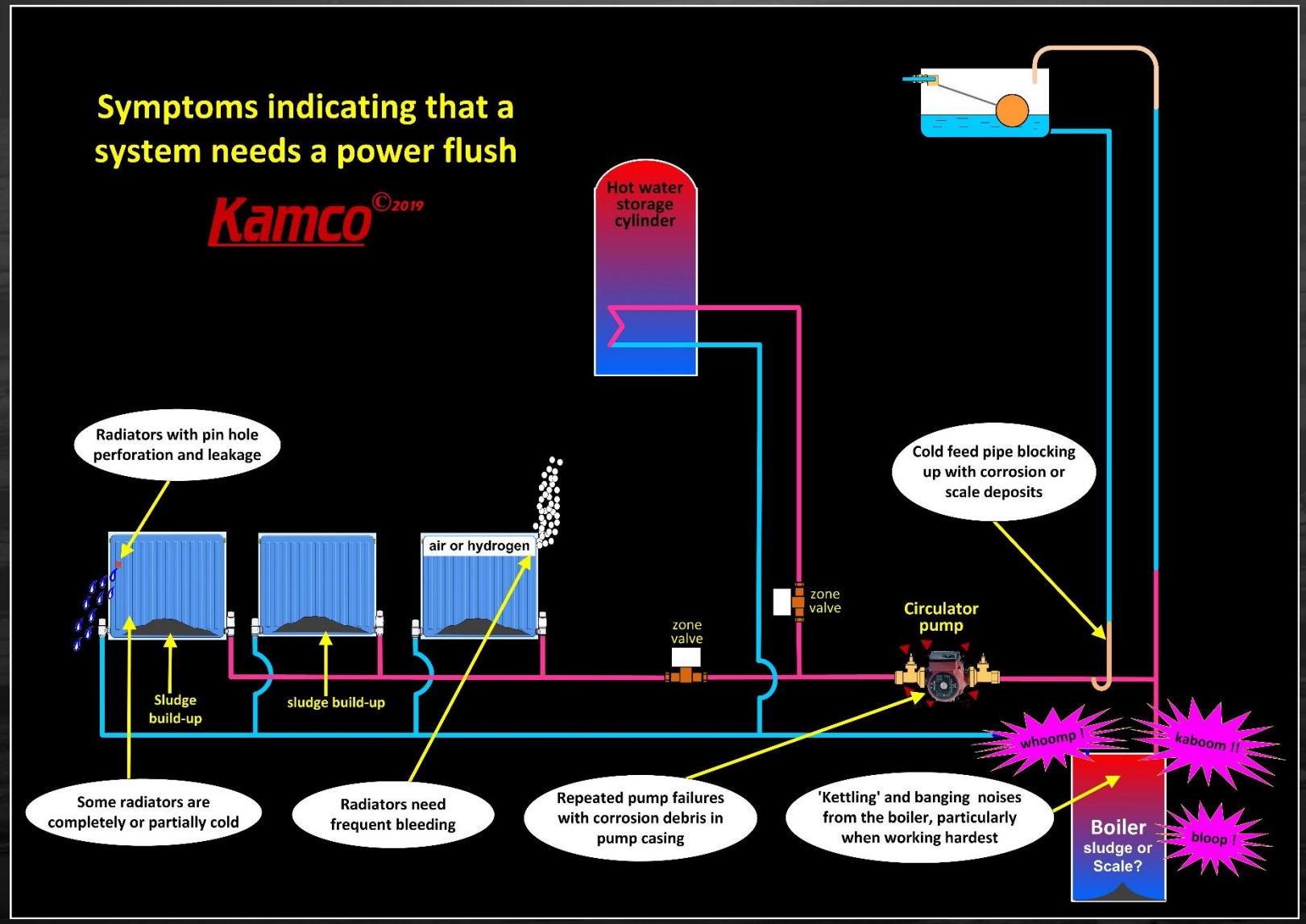
Corrosion, sludge, and black iron oxide deposits in heating systems result from decay of the system metals, which can begin as soon as the system is completed and filled with water.

These contaminants cause fouling and failure of zone valves, circulating pumps, radiators and valves.

Obvious symptoms are cold areas in the lower parts of radiators, boiler noises, and long recovery times after drawing off hot water.

The following diagram shows problems often found in heating systems, and which may be resolved by a power flush.

Symptoms indicating that a heating system may need power flushing



Power flushing central heating systems

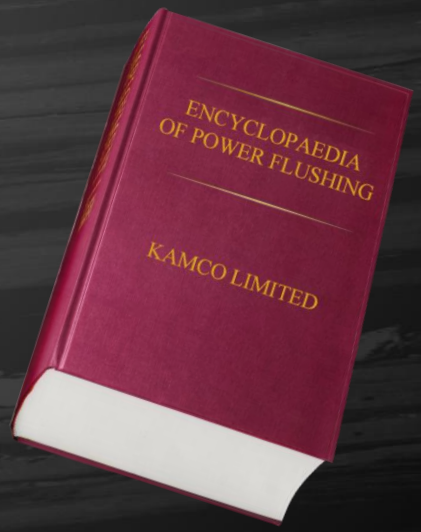
Why is power flushing the most effective way of cleaning heating systems?

1. The water is circulating at high velocity with a lot of kinetic energy.

2. Instantaneous flow reversal creates high turbulence in the radiators to batter debris loose.

3. Large bore dump valves for maximum flow when discharging to waste – no chance for debris to settle out.

4. No reliance on gravity – dirty water is forced out by fresh clean water, even from underfloor areas below the level of drain points.



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A dirty system is guaranteed to kill a boiler prematurely

Where to locate the Clearflow pump in the house?

Indoors, or outdoors?

If indoors, chose a location where there is a good water supply – bathroom or kitchen.

If outdoors, look for a garden tap to connect your water inlet hose – or consider running the water supply hose indoors to your pump, from an outside garden tap.

Make hose connections to the Clearflow pump

Water inlet hose

8 metre dump hose

2 x 5 metre flow
and return hoses

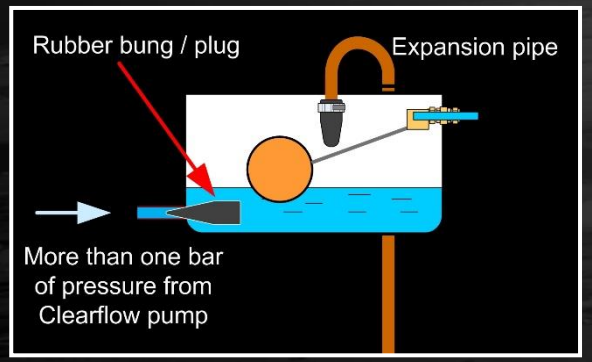
Overflow hose

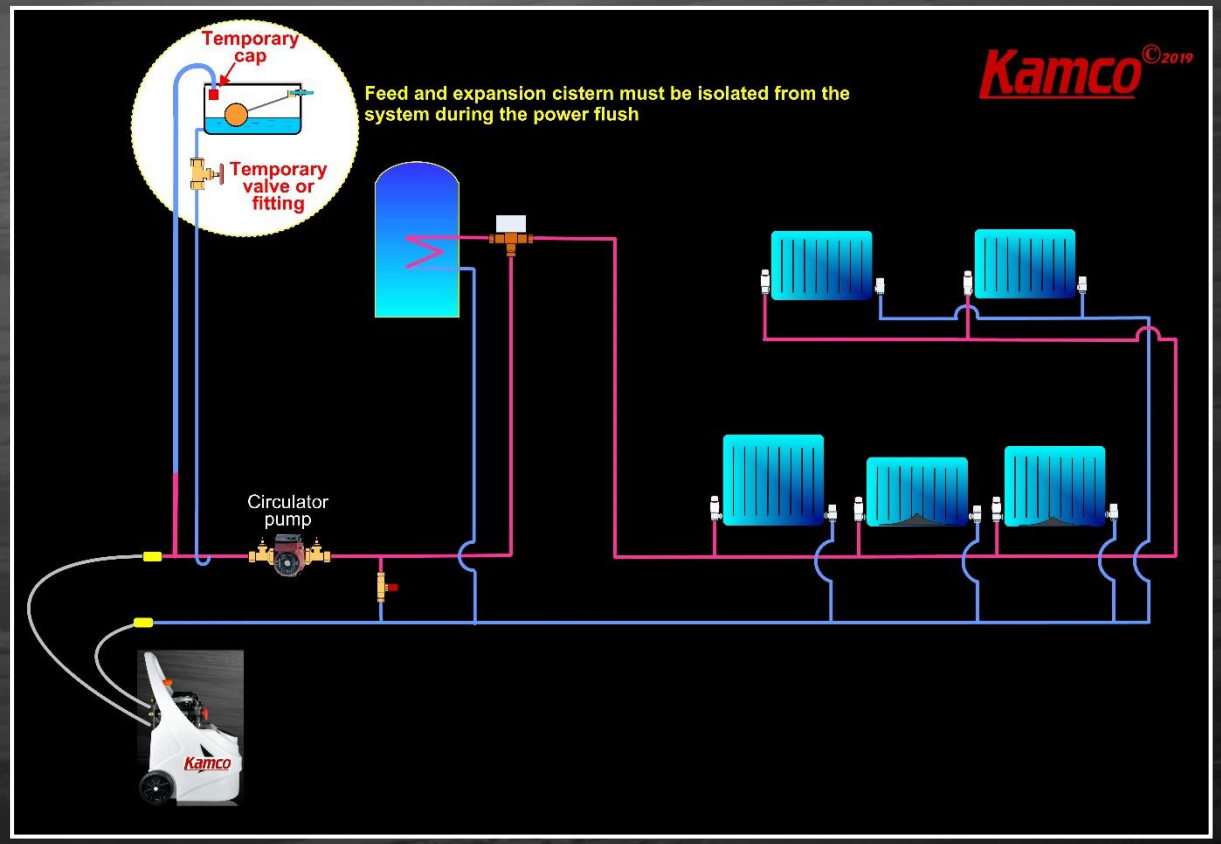
Before you start – vented systems must be sealed for duration of power flush.

Cap off the cold feed and expansion pipes using temporary valves, compression or push-fit fittings.

Clean out the tank, removing solids and slime

N.B. Don’t use rubber plugs to seal cold feed and expansion pipe work.





‘Pipestoppers’ expanding plugs are a quick and easy way to seal the vent pipe.

Before you start –
adjust thermostatic radiator valves and by-passes

Thermostatic radiator valves:

Set thermostatic radiator valves on the maximum setting and remove the heads so that they don’t close and shut off the water flow.

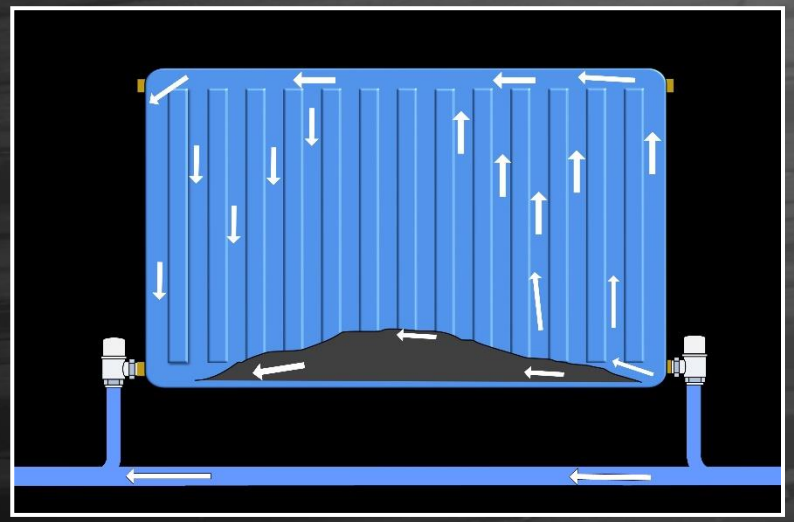
(This is also effective with older one way thermostatic valves.)

By-pass if present:

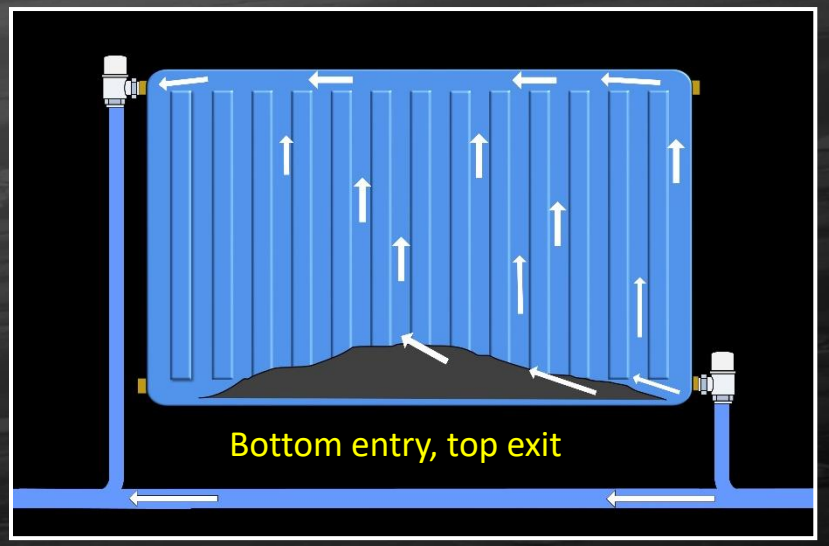
Close the by-pass on the system before starting the power flush. If there is an automatic by-pass close it down to the maximum.

Single pipe system – you can't power flush them effectively

With single pipe systems, the water will take the course of least resistance.



Whilst the flow through the pipes will clean them very well, there will be little cleansing effect on the radiators themselves, and success cannot be guaranteed.



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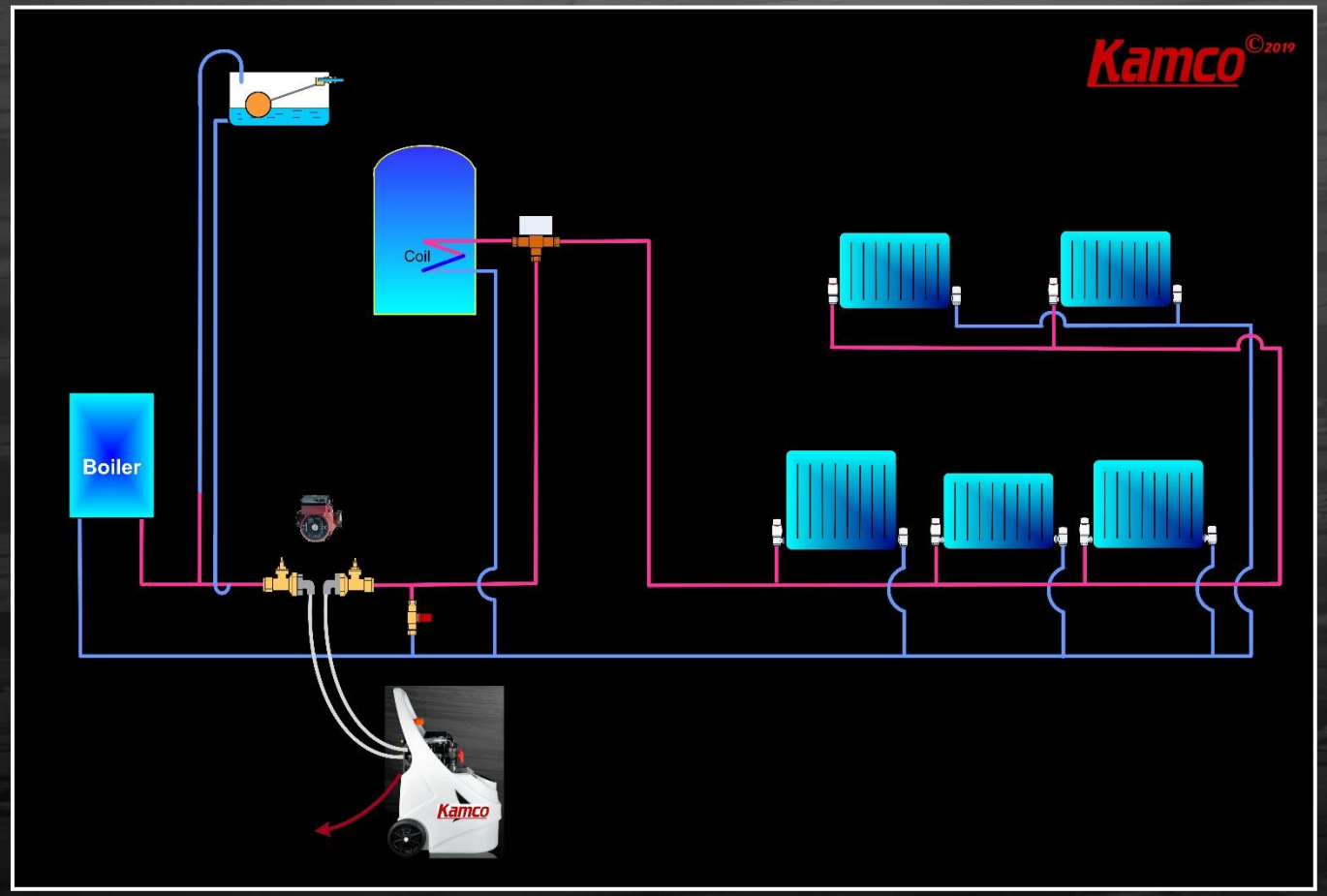
If you decide to power flush a single pipe system, pre-treat the system a week beforehand with **HYPERFLUSH**, to break down sludge deposits as much as possible.

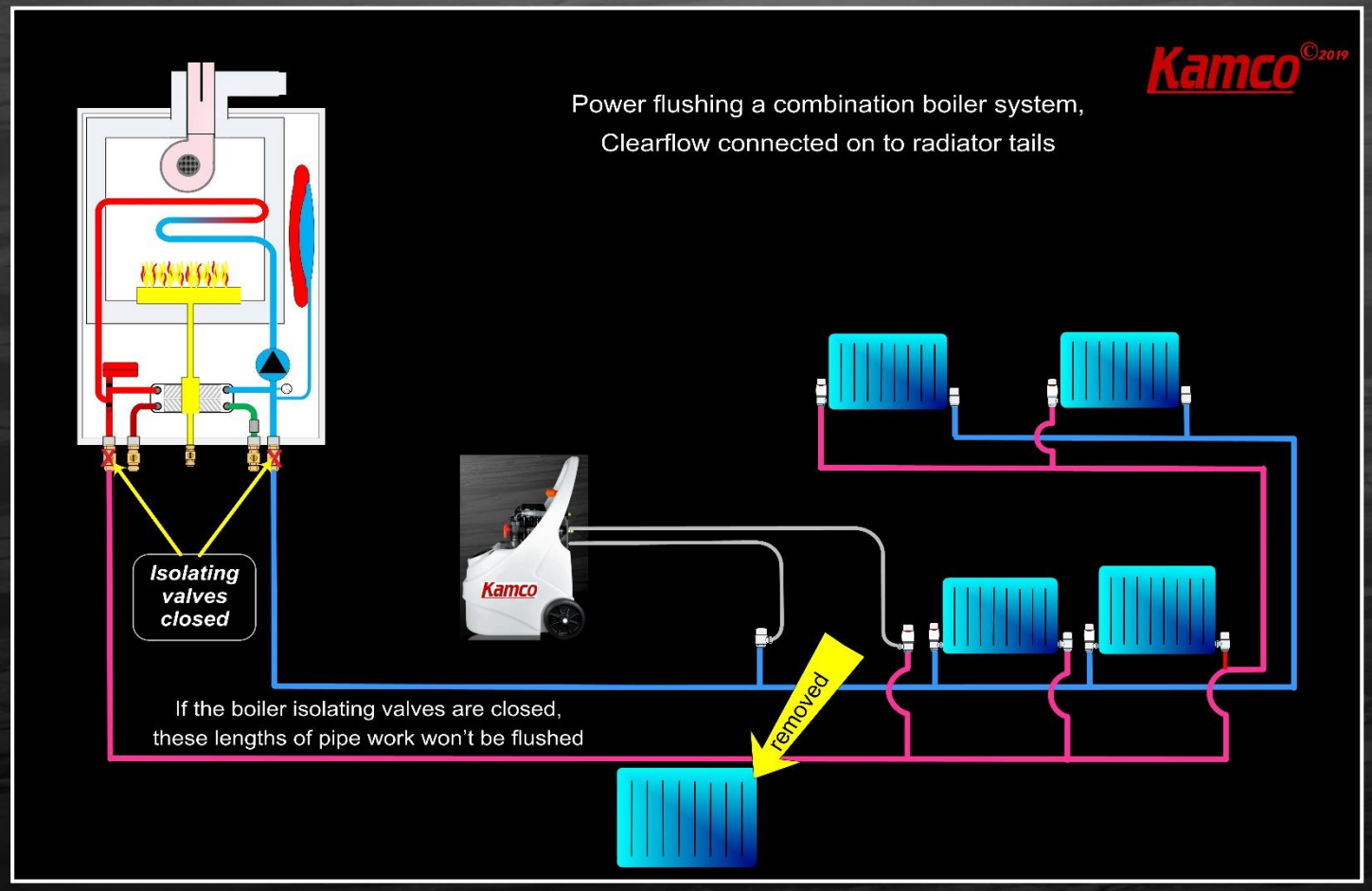
Connecting your Clearflow pump into a heating system

Option 1. Connect across the circulator pump connections, using supplied adaptor leads, after removing the complete pump.



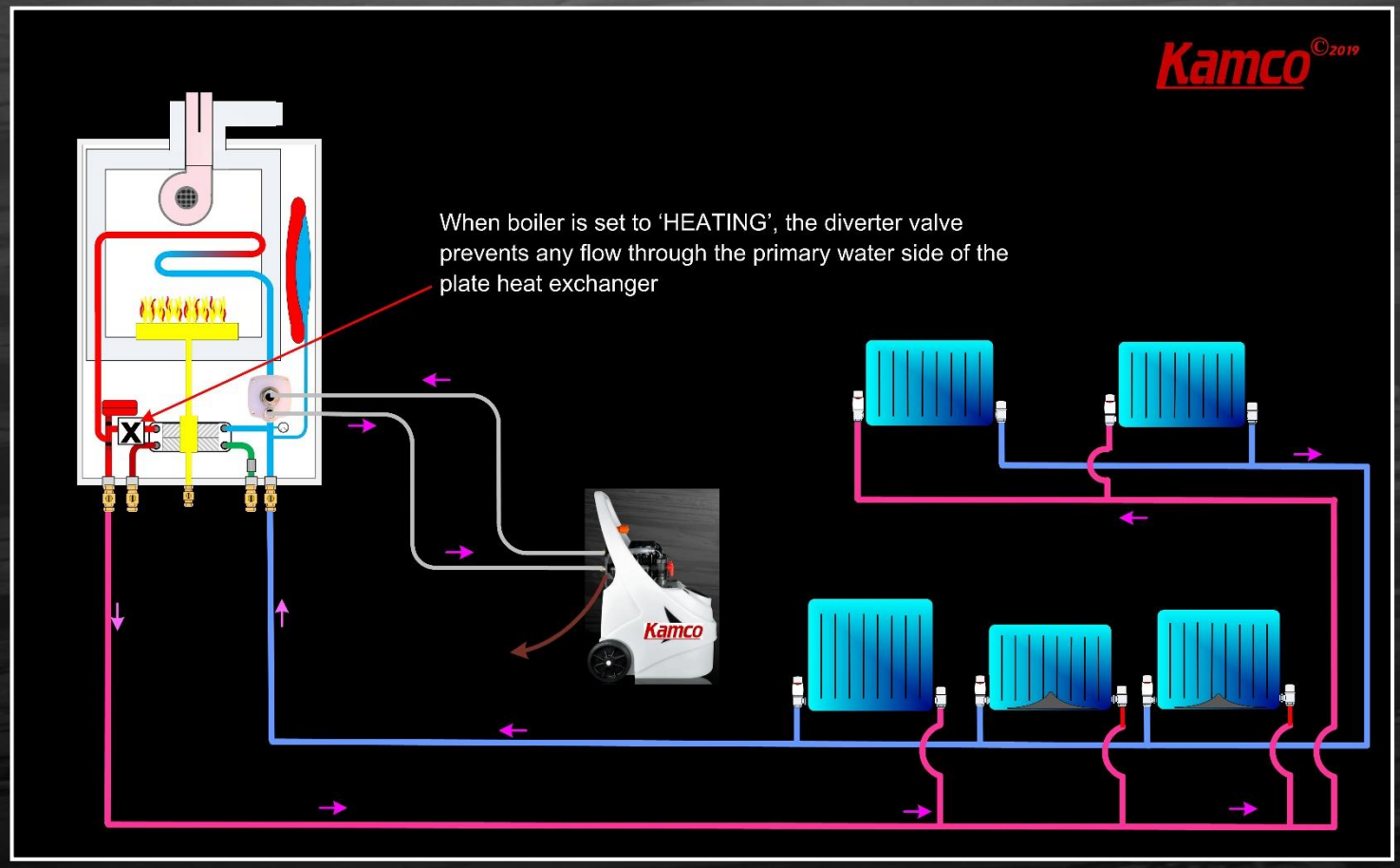
Connecting your Clearflow pump into a heating system

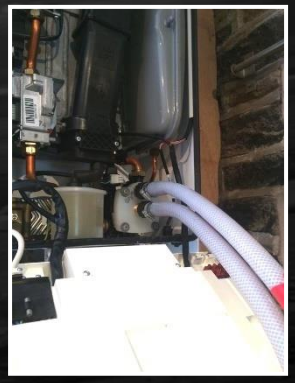
Option 2. Connect across the copper tails of one radiator, connecting onto the valve bodies after removing the radiator. If you isolate the boiler you risk leaving debris in the pipe work to and from the boiler.



Connecting your Clearflow pump into a heating system

Option 3A. Use a CP2 pump head adapter to connect on to the body of the circulator pump after removing the electric motor. First flush the radiators and boiler primary heat exchanger.





Connecting your Clearflow pump into a heating system

The CP2 adaptor - developed to improve power flushing of combination boiler systems

The advantages of using the CP2 adapter.

1. It saves time in connecting the power flushing pump into the heating system.

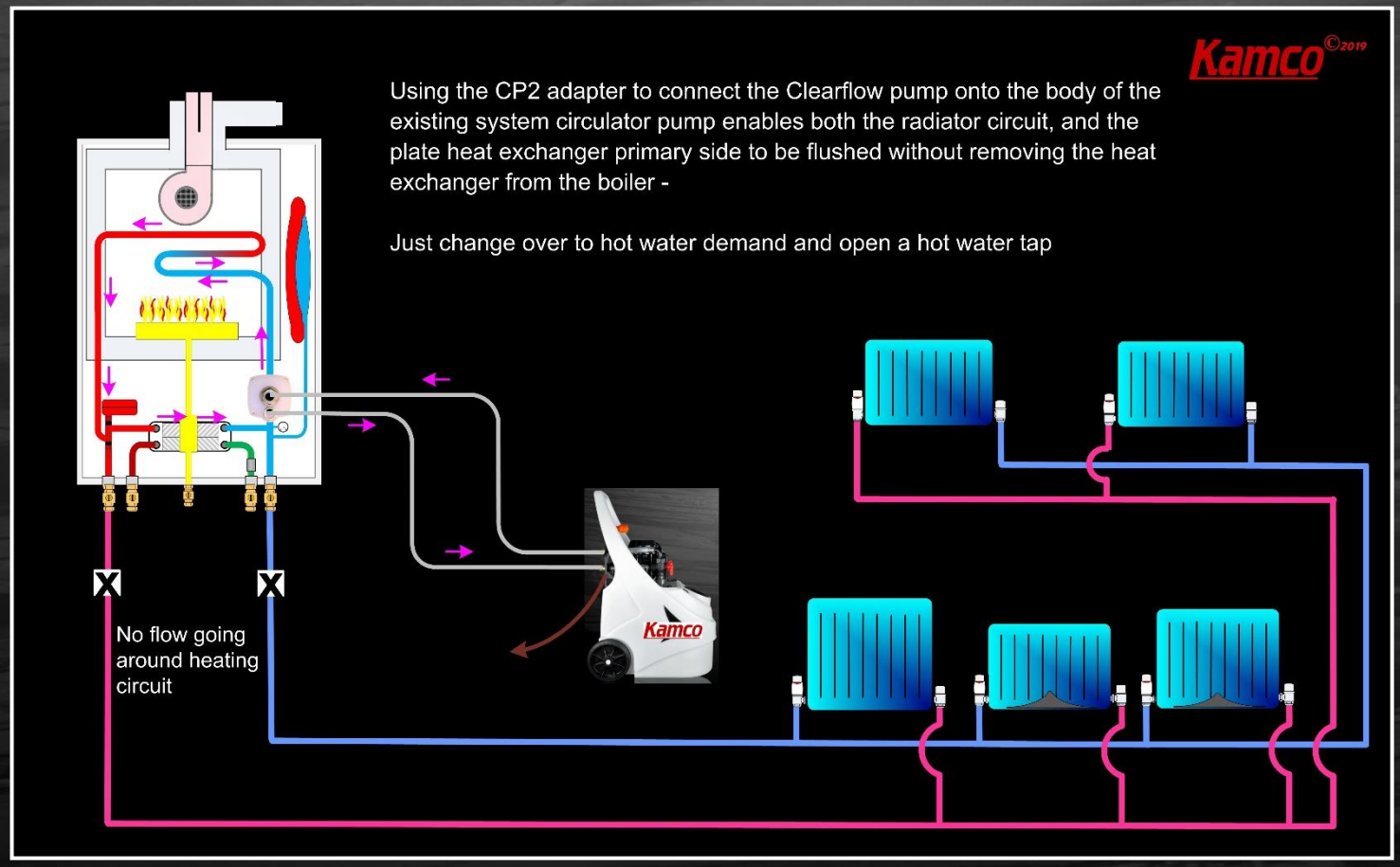
2. It avoids having to undo corroded circulator pump connections.

3. It enables connection on to 22m equivalent pipe work.

4. It enables a combination boiler plate heat exchanger to be flushed without relocating the power flushing pump.

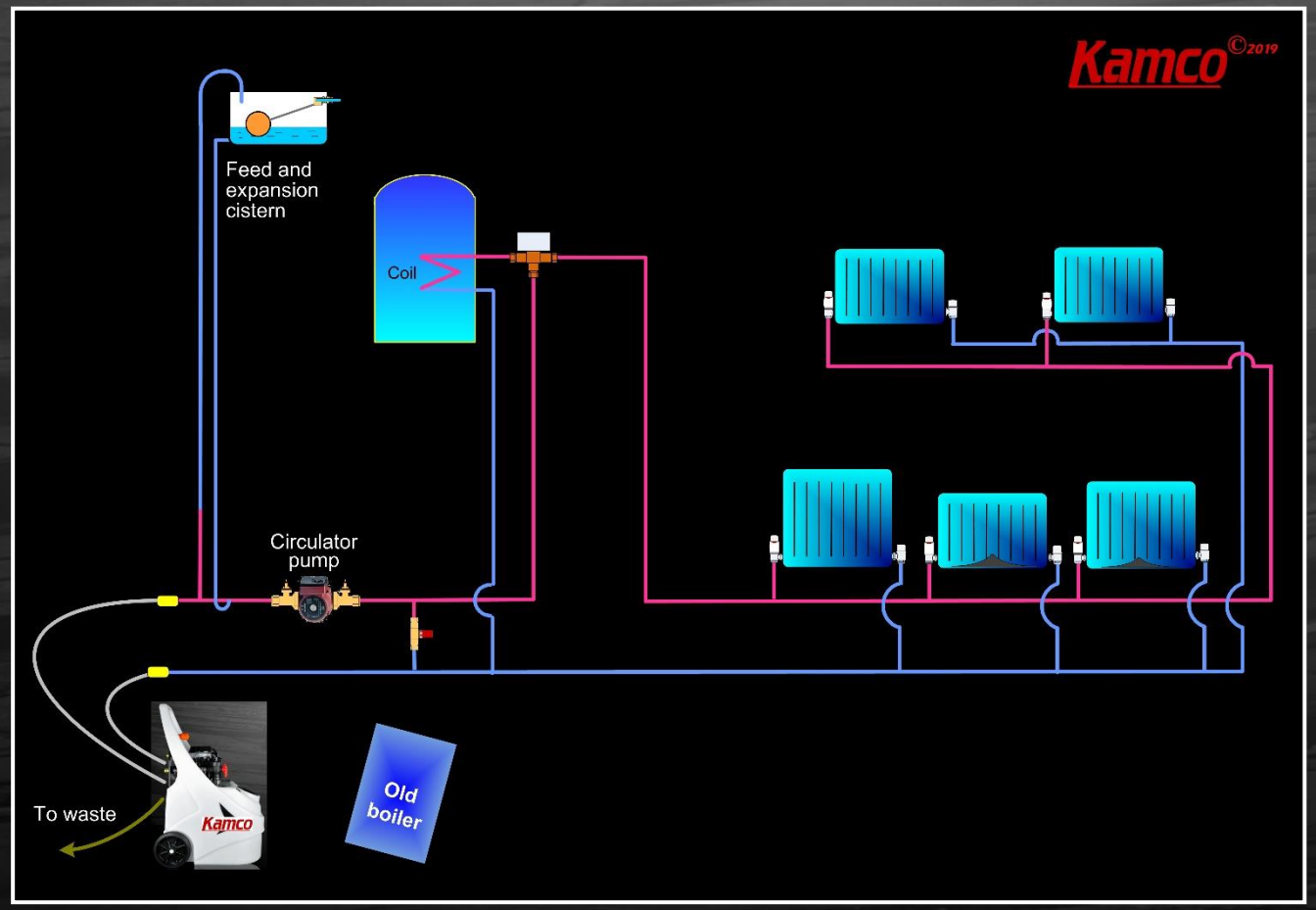
Connecting your Clearflow pump into a heating system

Option 3B. Use a CP2 pump head adapter. After flushing the radiator circuit, switch to hot water and open a tap to flush the primary water side of the plate heat exchanger.



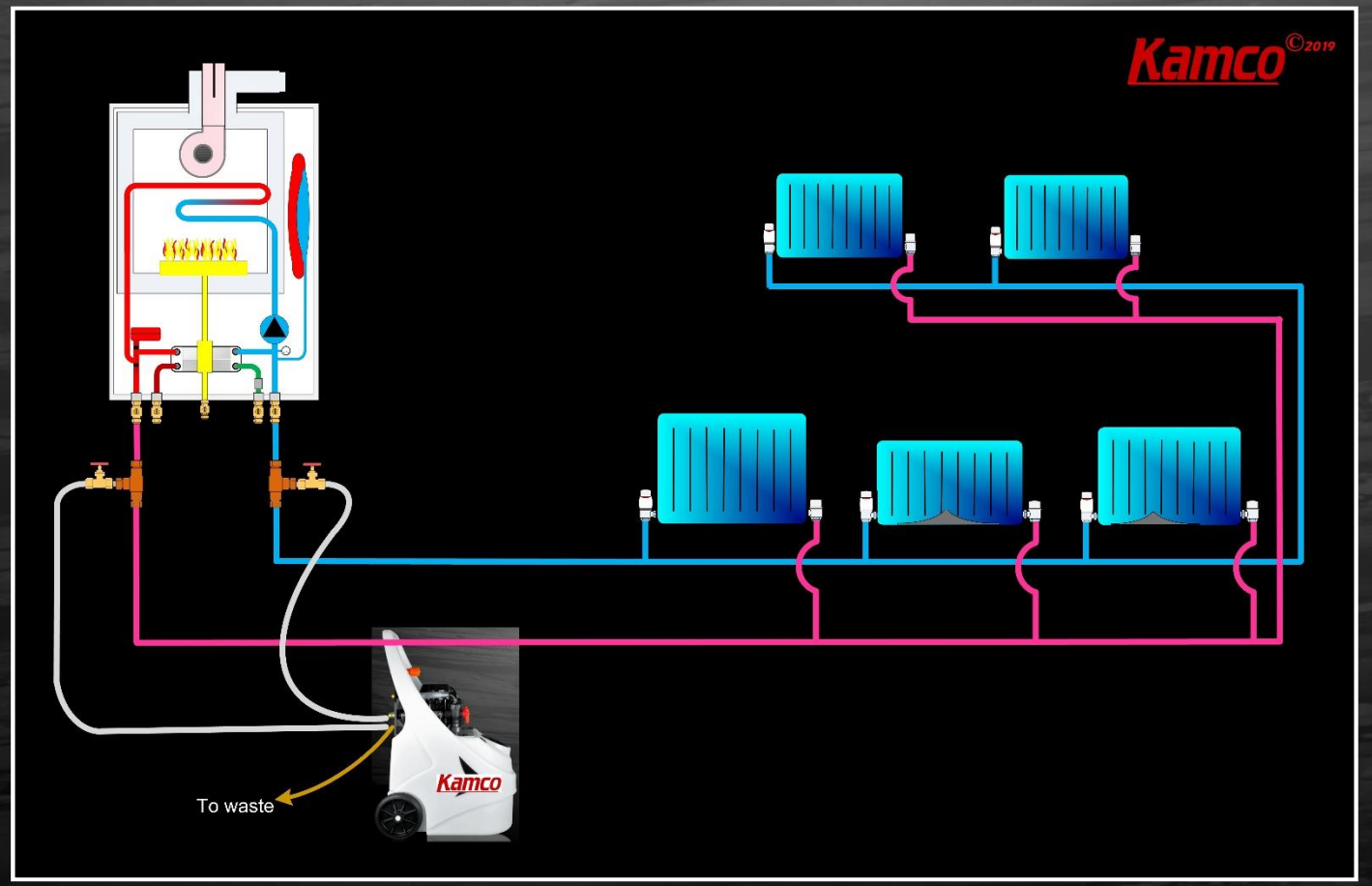
Connecting your Clearflow pump into a heating system

Option 4. Connect onto the flow and return piping to the boiler, after removal of the boiler.



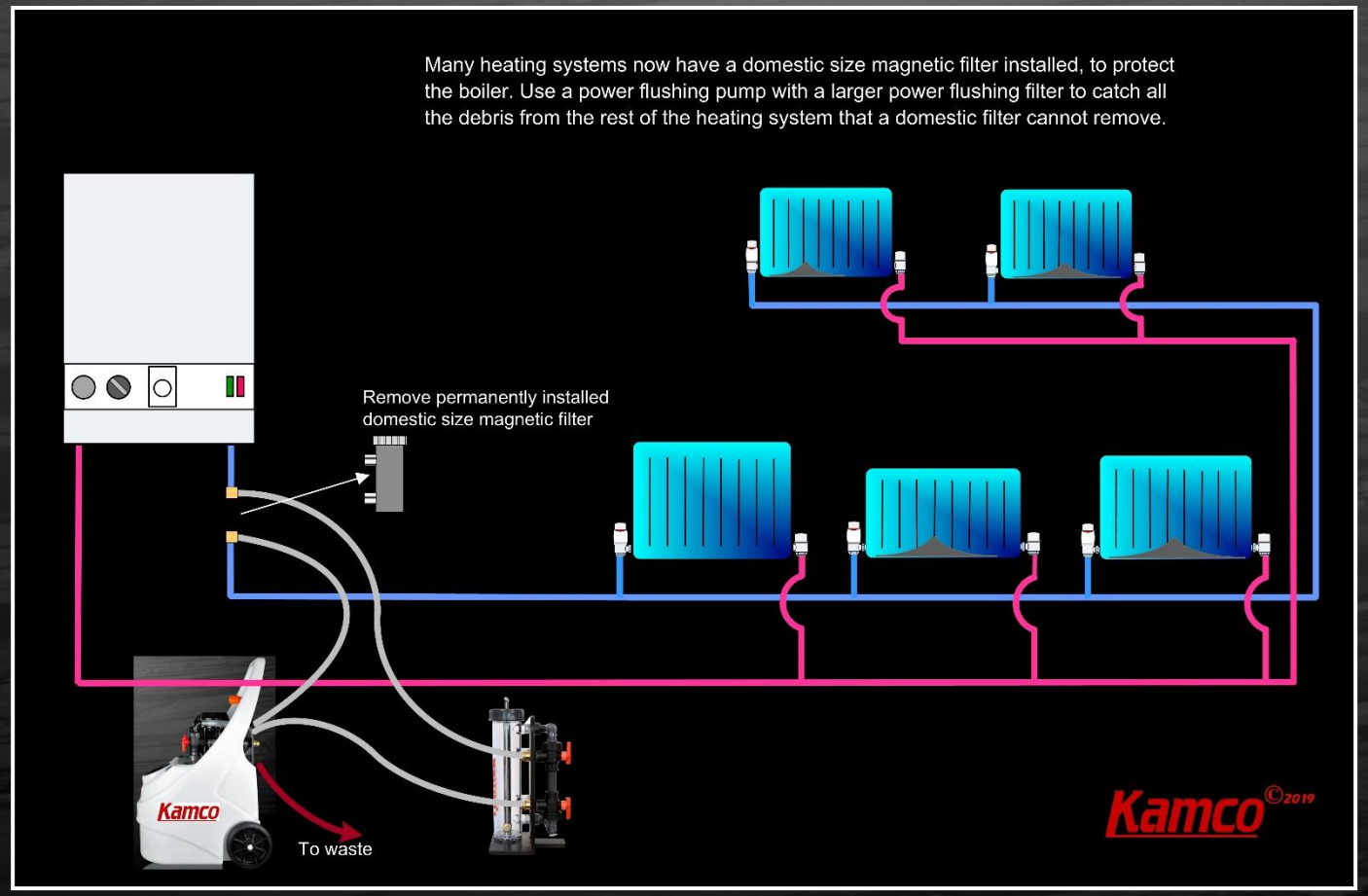
Connecting your Clearflow pump into a heating system

Option 5. Connect onto the flow and return piping to the boiler without removing the boiler. Install valved tee pieces into flow and return close to the boiler to keep any dirty water out of the boiler.



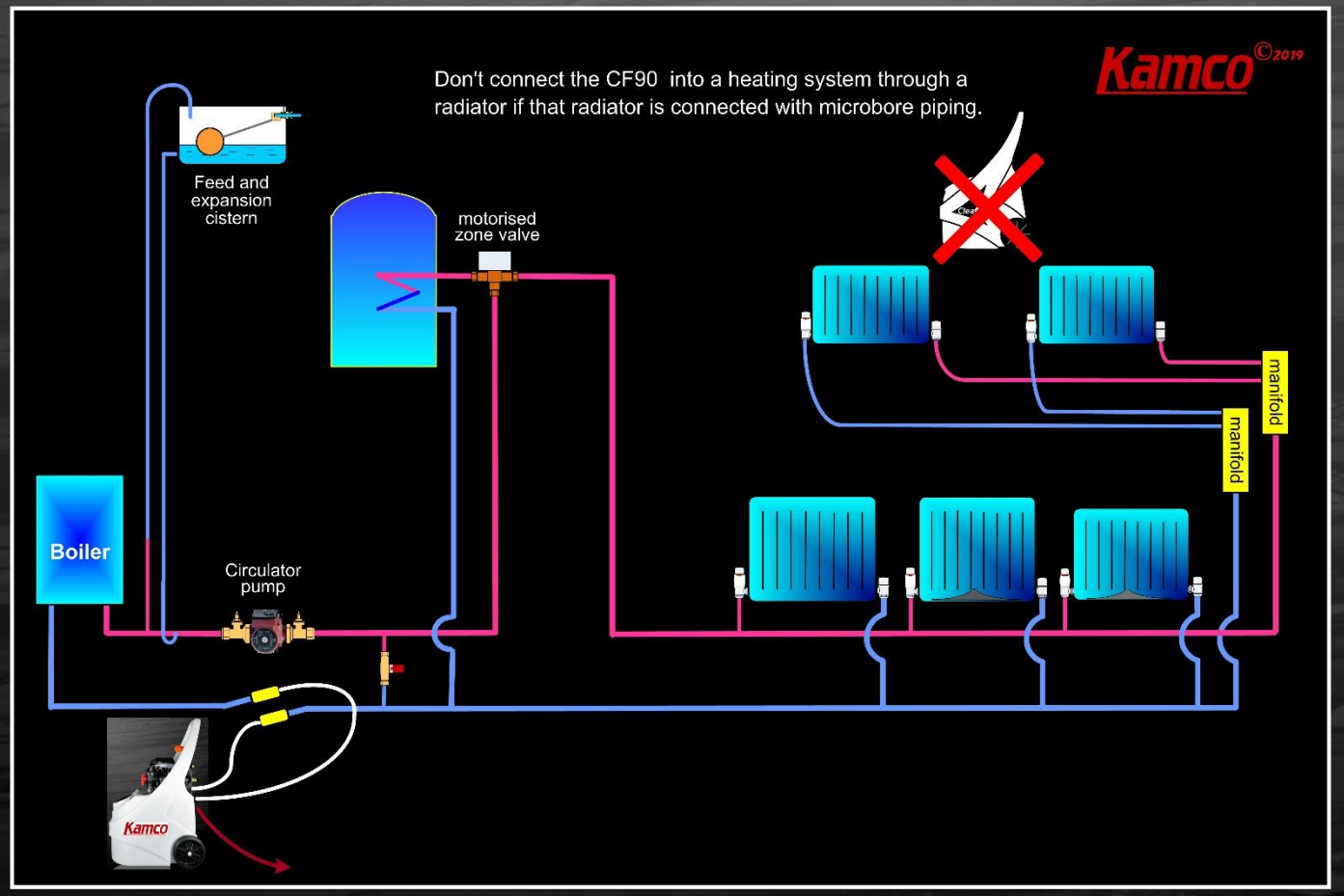
Connecting your Clearflow pump into a heating system

Option 6. If there is a permanent domestic filter fitted, connect on to the filter unions in the return pipe work to the boiler, after removing the filter. Some filter manufacturers supply an adapter.



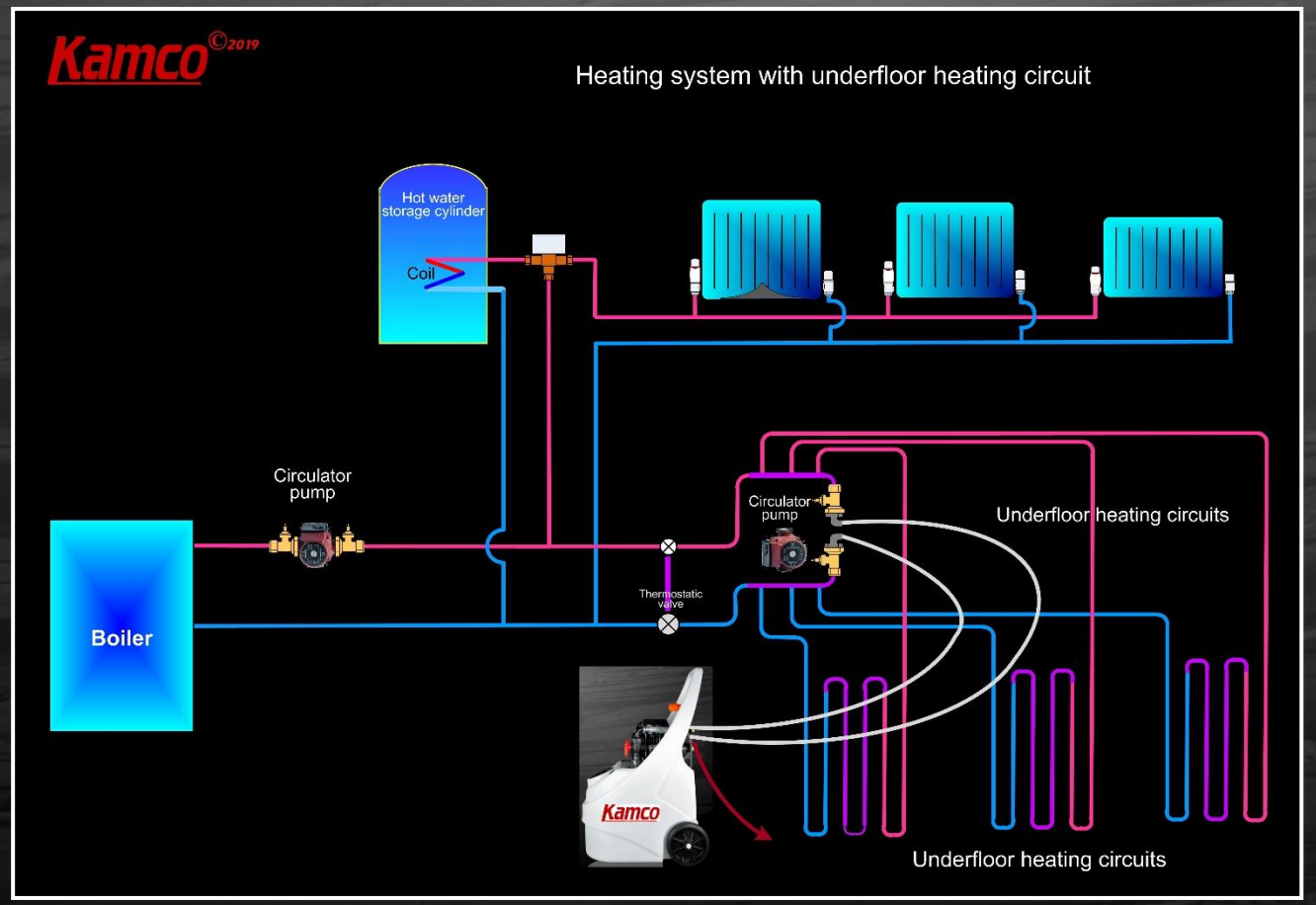
Connecting your Clearflow pump into a heating system

Option 7. If the circulator pump is difficult to access, and the pipework to the radiators is small diameter, a Clearflow pump can be connected in to a length of larger diameter pipe, using push-fit connectors, after first draining the heating system.



Connecting your Clearflow pump into a heating system

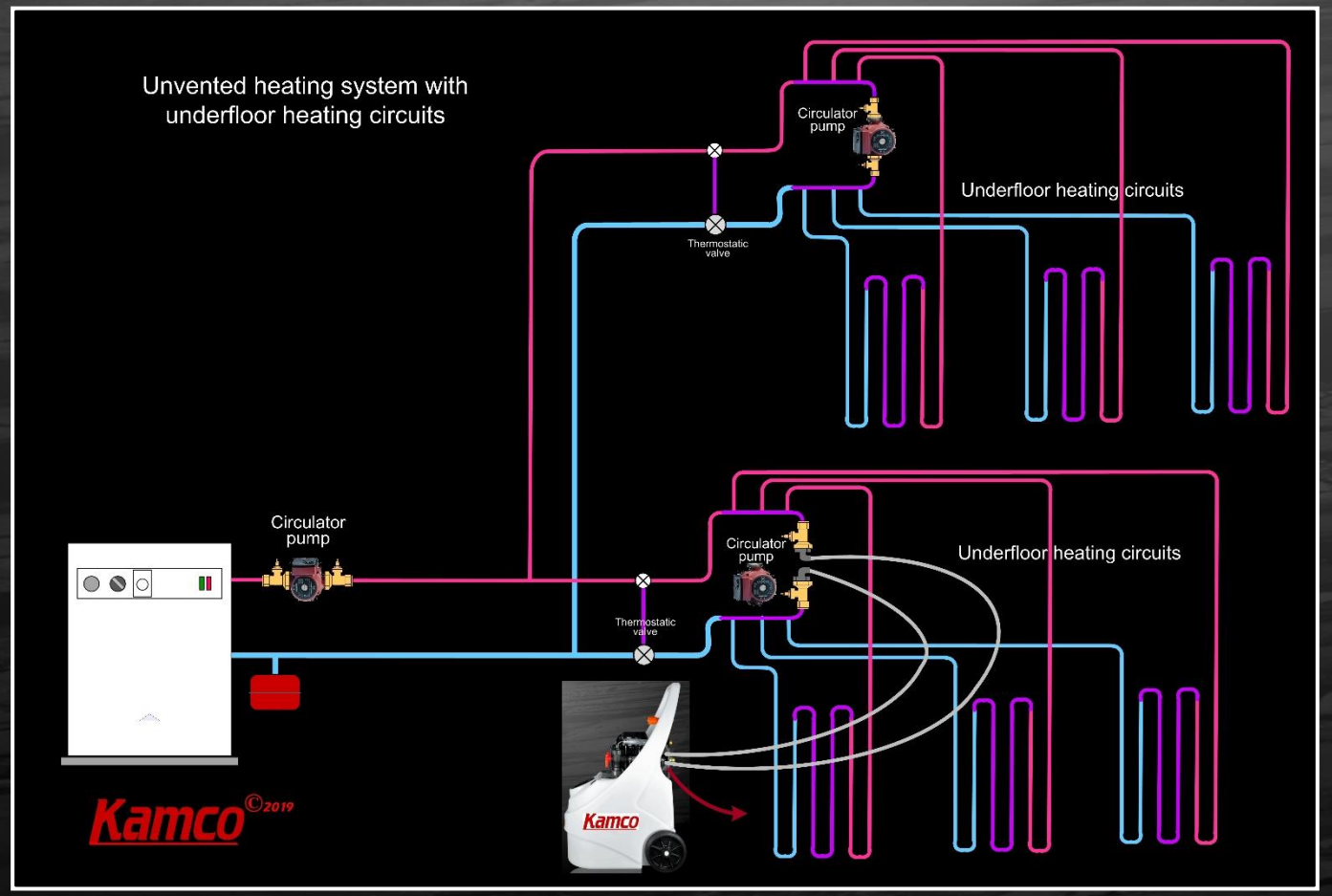
Option 8. If the heating system is a combination of radiators and underfloor circuits, the radiator circuit can be flushed using conventional connection methods. The underfloor circuit is best flushed by either removing the underfloor circuits pump and using adapter leads, or by using a CP2 adapter.



Flush underfloor heating systems with Systemsafe-Bio to break down and remove biological growths.

Connecting your Clearflow pump into a heating system

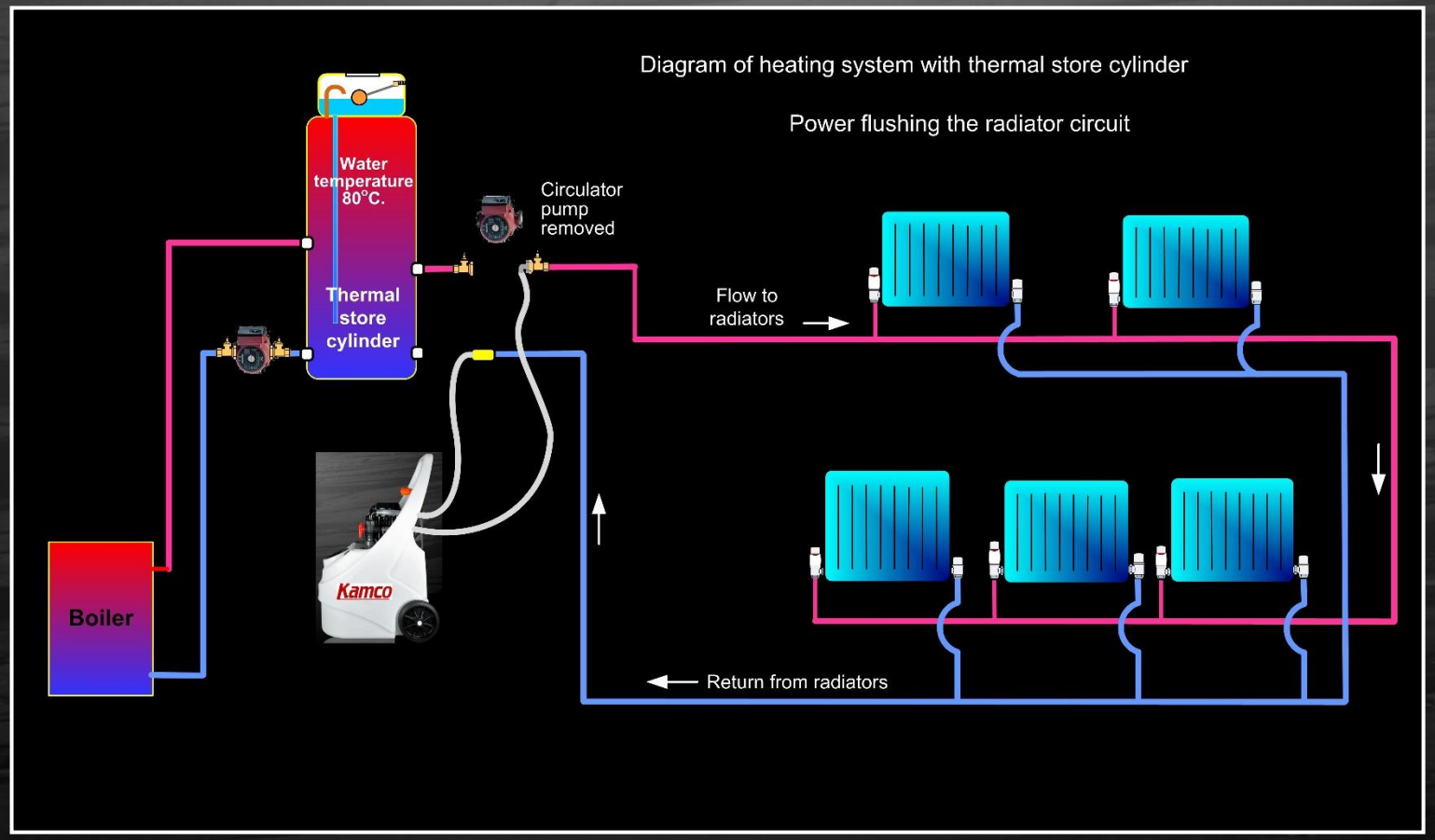
Option 9. If the heating system only has underfloor circuits the circuits are best flushed by removing the underfloor circuit pumps and using adapter leads, or by using a CP2 adapter. Flush the boiler circuit by closing off underfloor valves and opening up flow and return to the boiler.



Flush underfloor heating systems with Systemsafe-Bio to break down and remove biological growths.

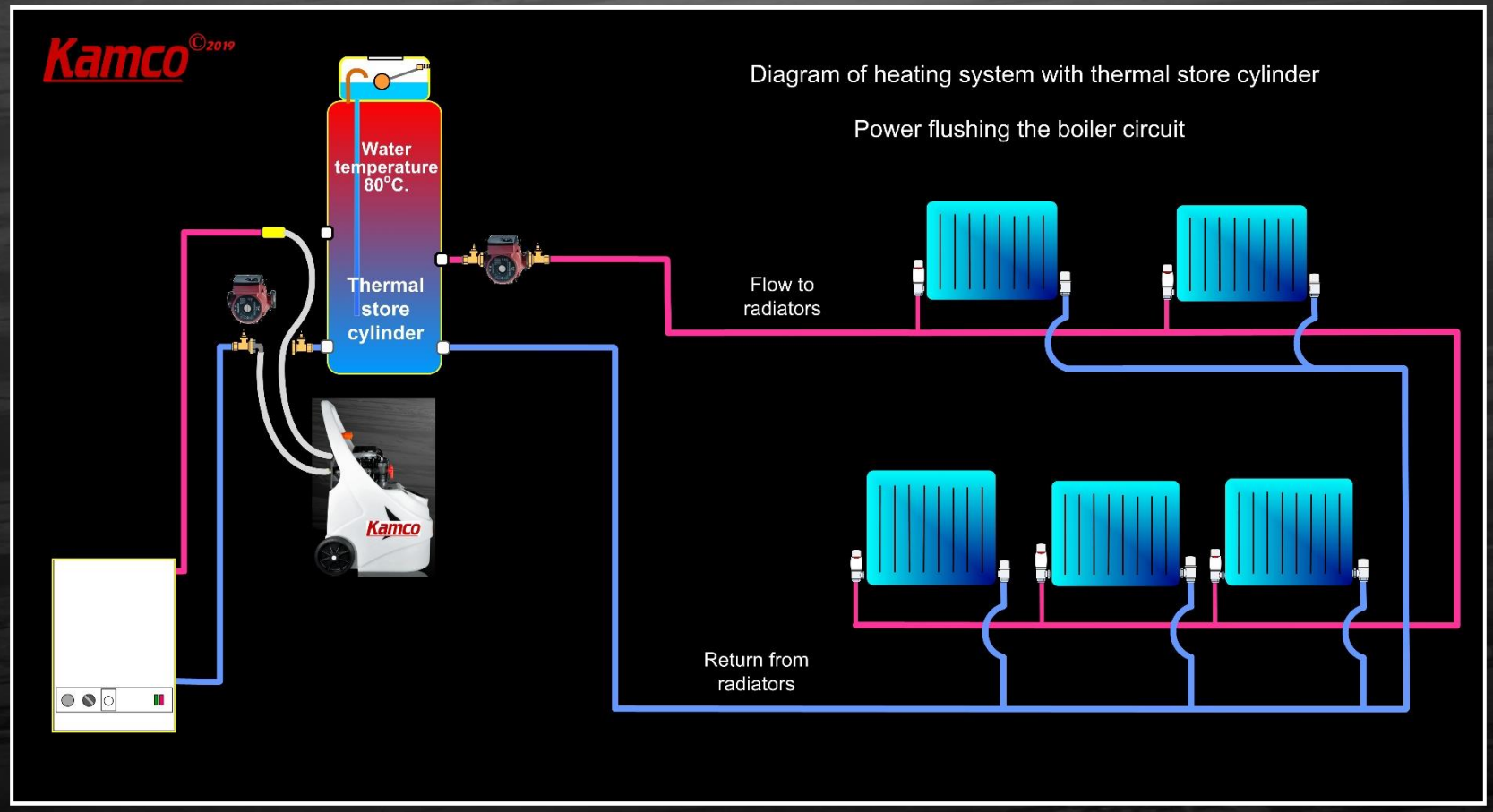
Connecting your Clearflow pump into a heating system

Option 10B. Thermal store system radiator circuit. Flush the radiator circuit by connecting one Clearflow hose onto a radiator circuit pump connector, and connecting the other hose onto the pipe work leading back from the radiators to the thermal store (see diagram).



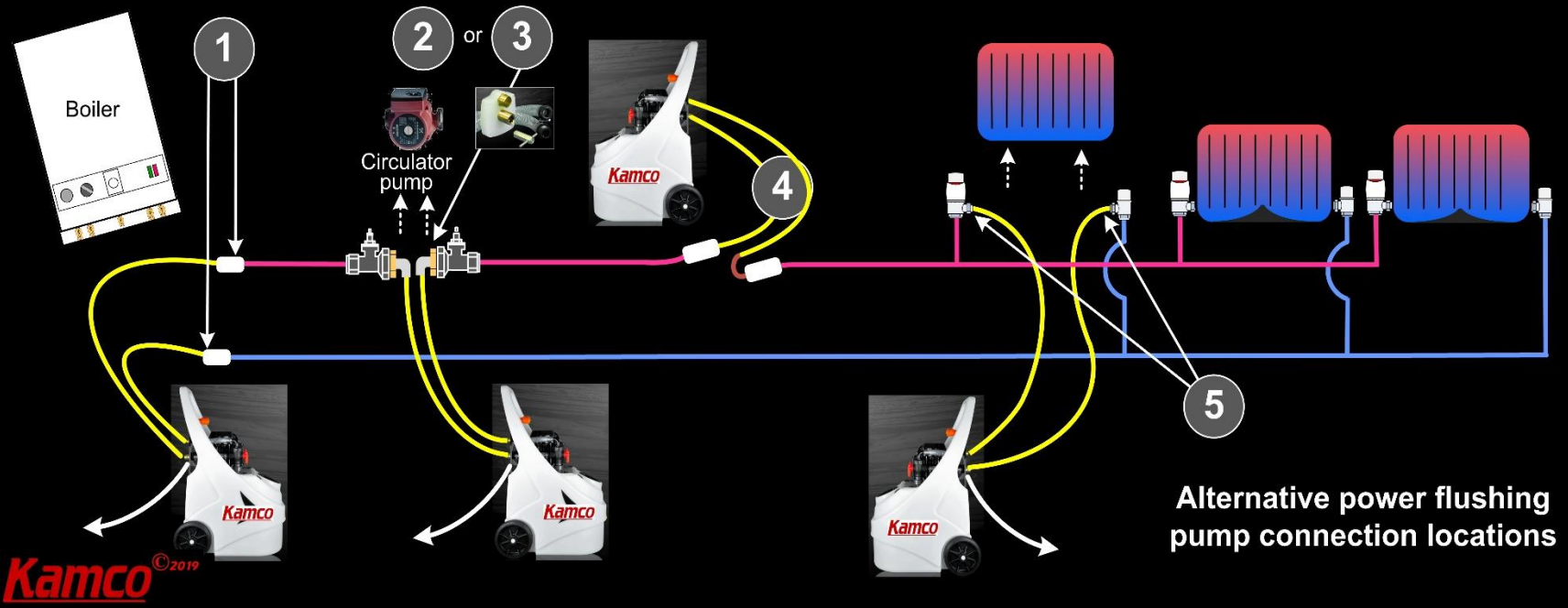
Connecting your Clearflow pump into a heating system

Option 10A. Thermal store system boiler circuit. Flush the boiler circuit by connecting one Clearflow hose onto a boiler circuit pump connector, and connecting the other hose onto the pipe work leading back to the thermal store (see diagram).



Summary of most frequently used Clearflow connection methods

1. Connect across the flow and return pipe work after removing the boiler.
2. Remove the complete circulator pump, and connect onto the BSP threaded pump fittings using adapter leads supplied with the power flushing pump.
3. Use a CP2 circulator pump head adapter fastened on to the pump body after removal of the circulator pump motor.
4. Break in to a length of copper pipe and use push-fit connections.
5. Remove one radiator only, and connect power flushing pump flow and return hoses onto the valve bodies.

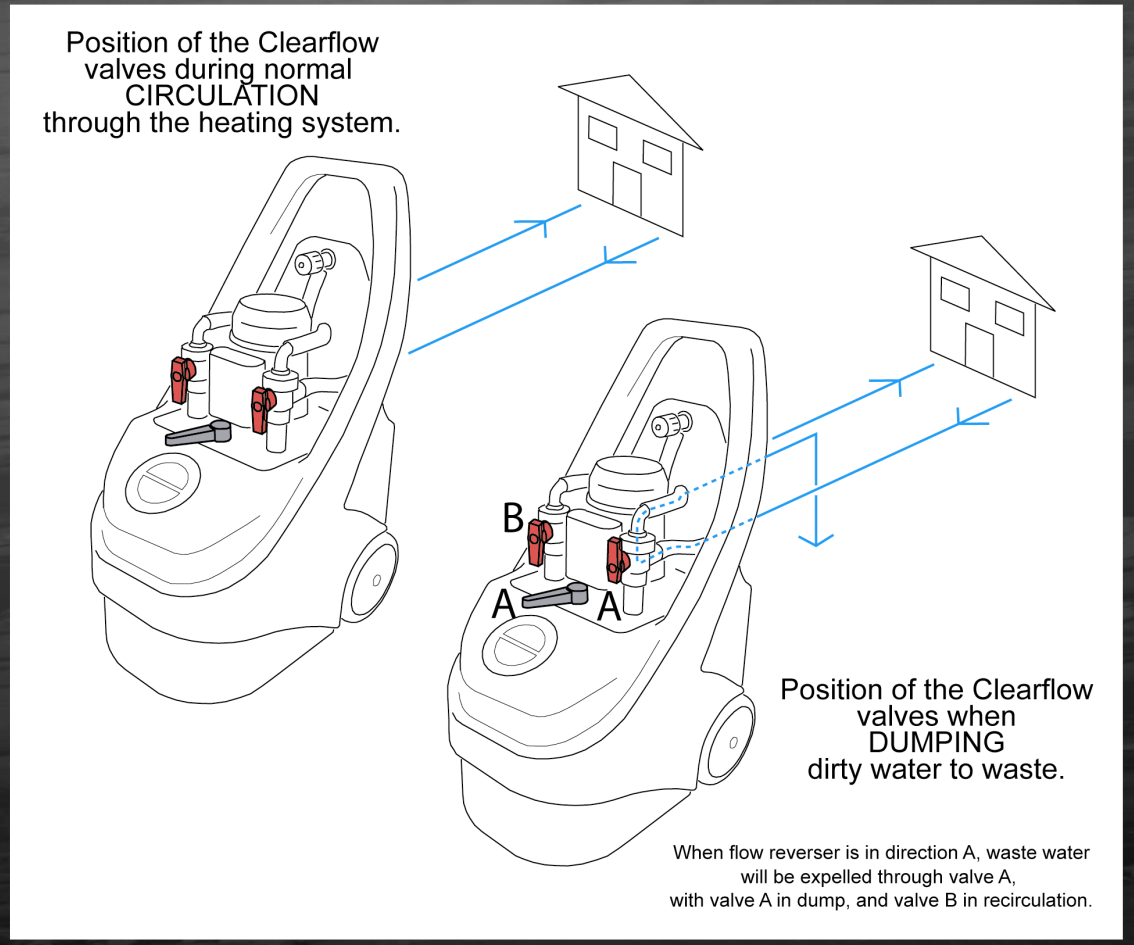


Alternative power flushing pump connection locations

Clearflow valve positions when circulation mode, and when in dumping mode

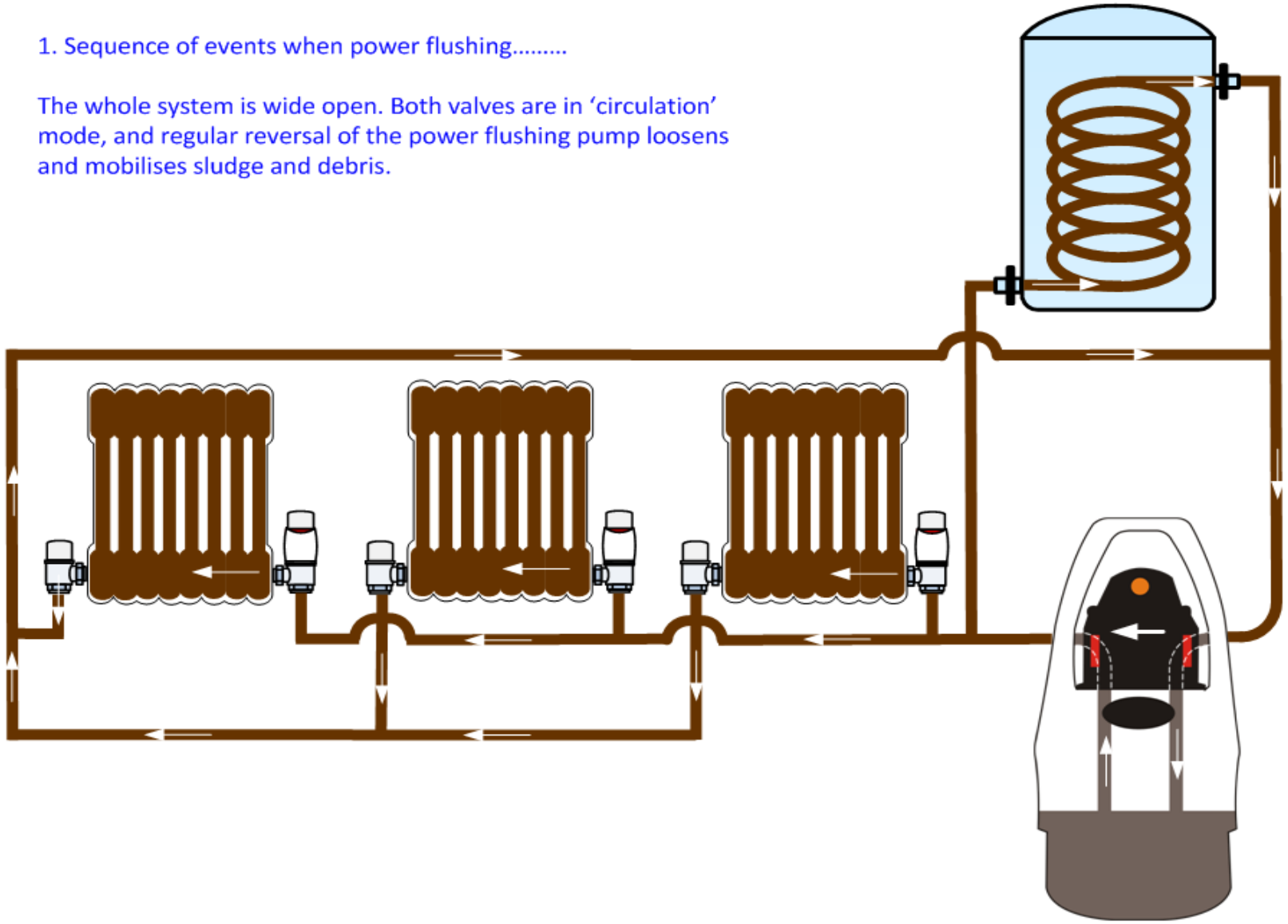
Remember:

always operate the dump valve on the opposite side of the pump from the direction in which the flow reverser lever is pointing



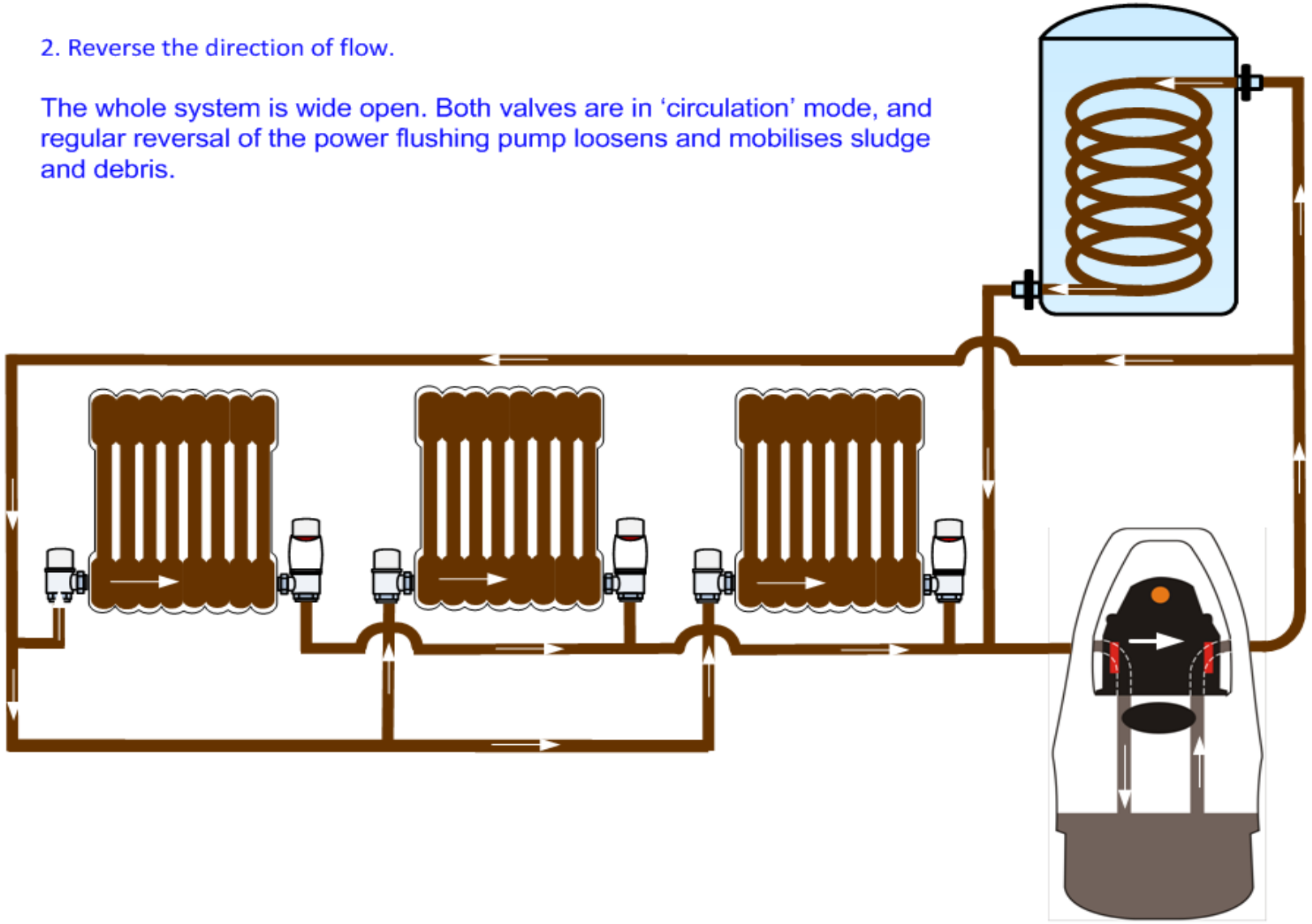
1. Sequence of events when power flushing.....

The whole system is wide open. Both valves are in 'circulation' mode, and regular reversal of the power flushing pump loosens and mobilises sludge and debris.



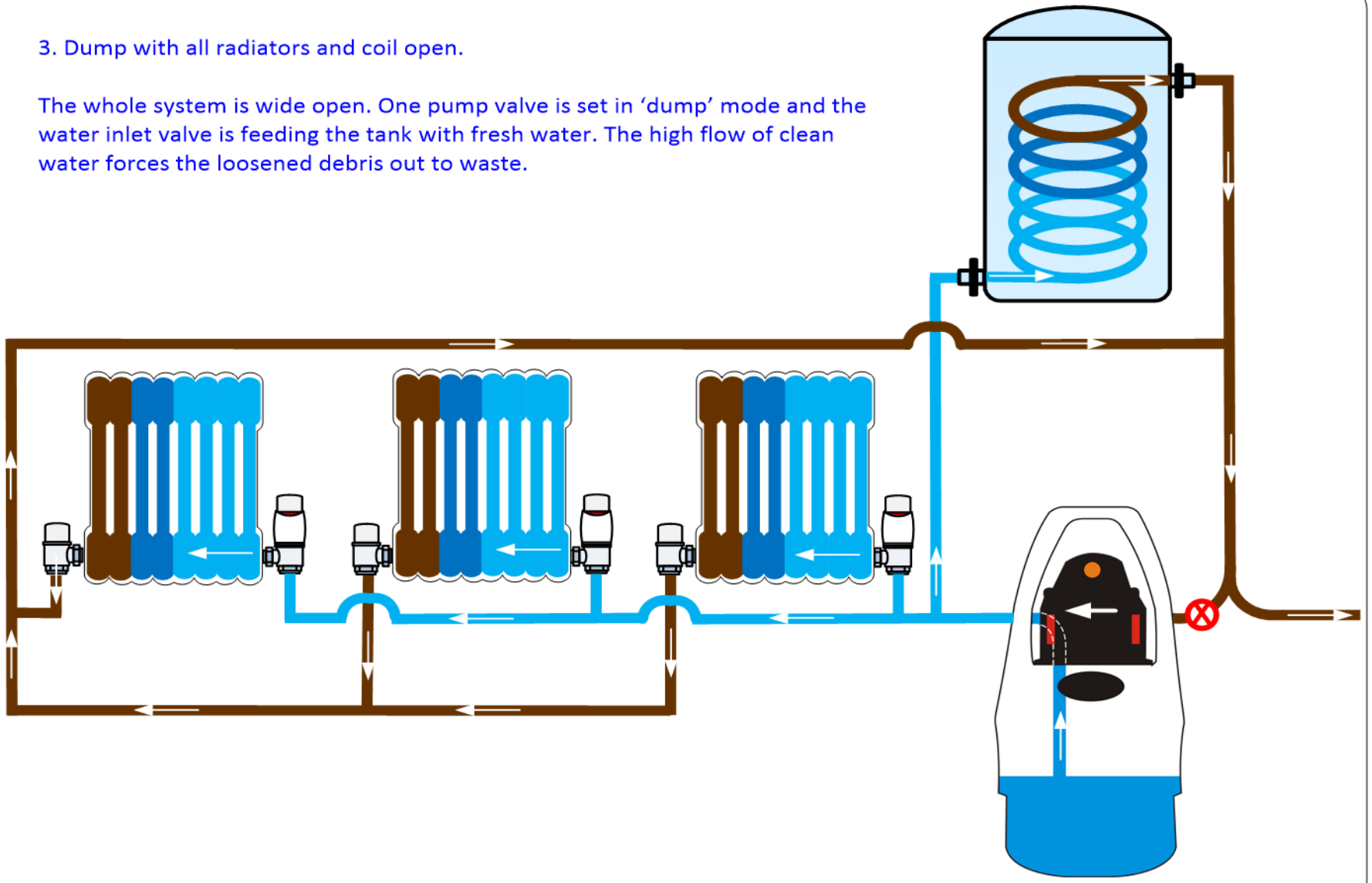
2. Reverse the direction of flow.

The whole system is wide open. Both valves are in ‘circulation’ mode, and regular reversal of the power flushing pump loosens and mobilises sludge and debris.



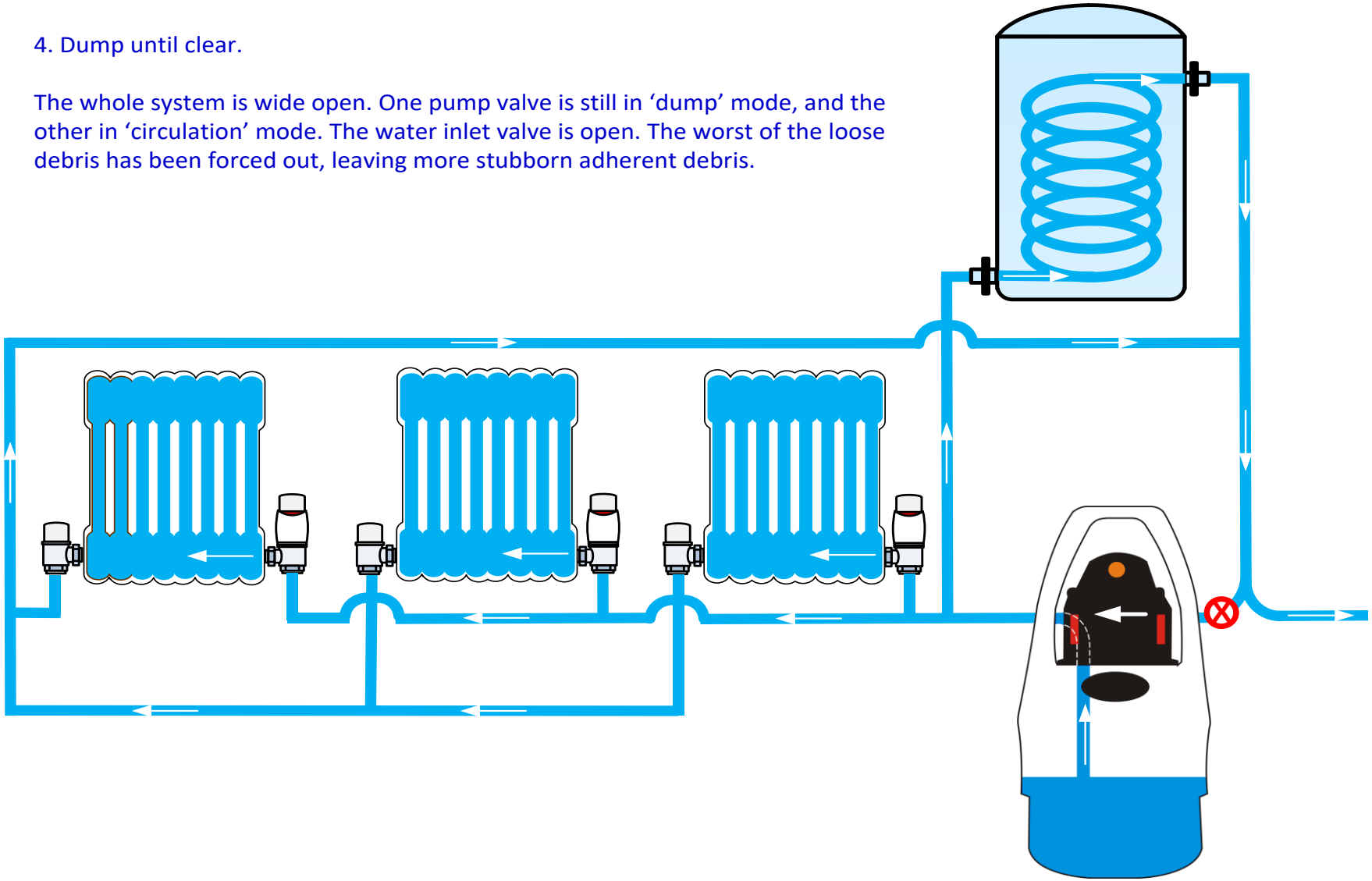
3. Dump with all radiators and coil open.

The whole system is wide open. One pump valve is set in ‘dump’ mode and the water inlet valve is feeding the tank with fresh water. The high flow of clean water forces the loosened debris out to waste.



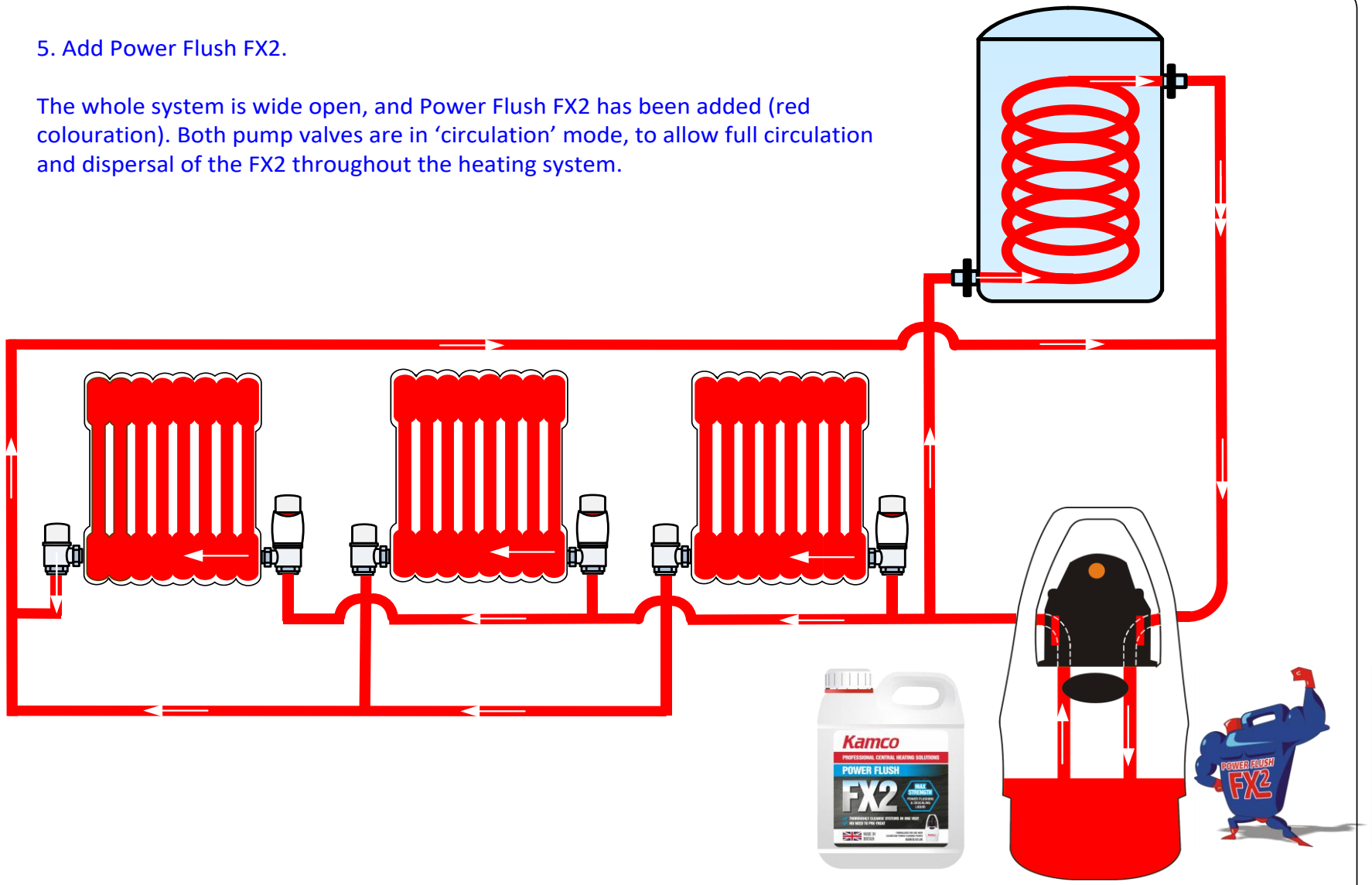
4. Dump until clear.

The whole system is wide open. One pump valve is still in ‘dump’ mode, and the other in ‘circulation’ mode. The water inlet valve is open. The worst of the loose debris has been forced out, leaving more stubborn adherent debris.



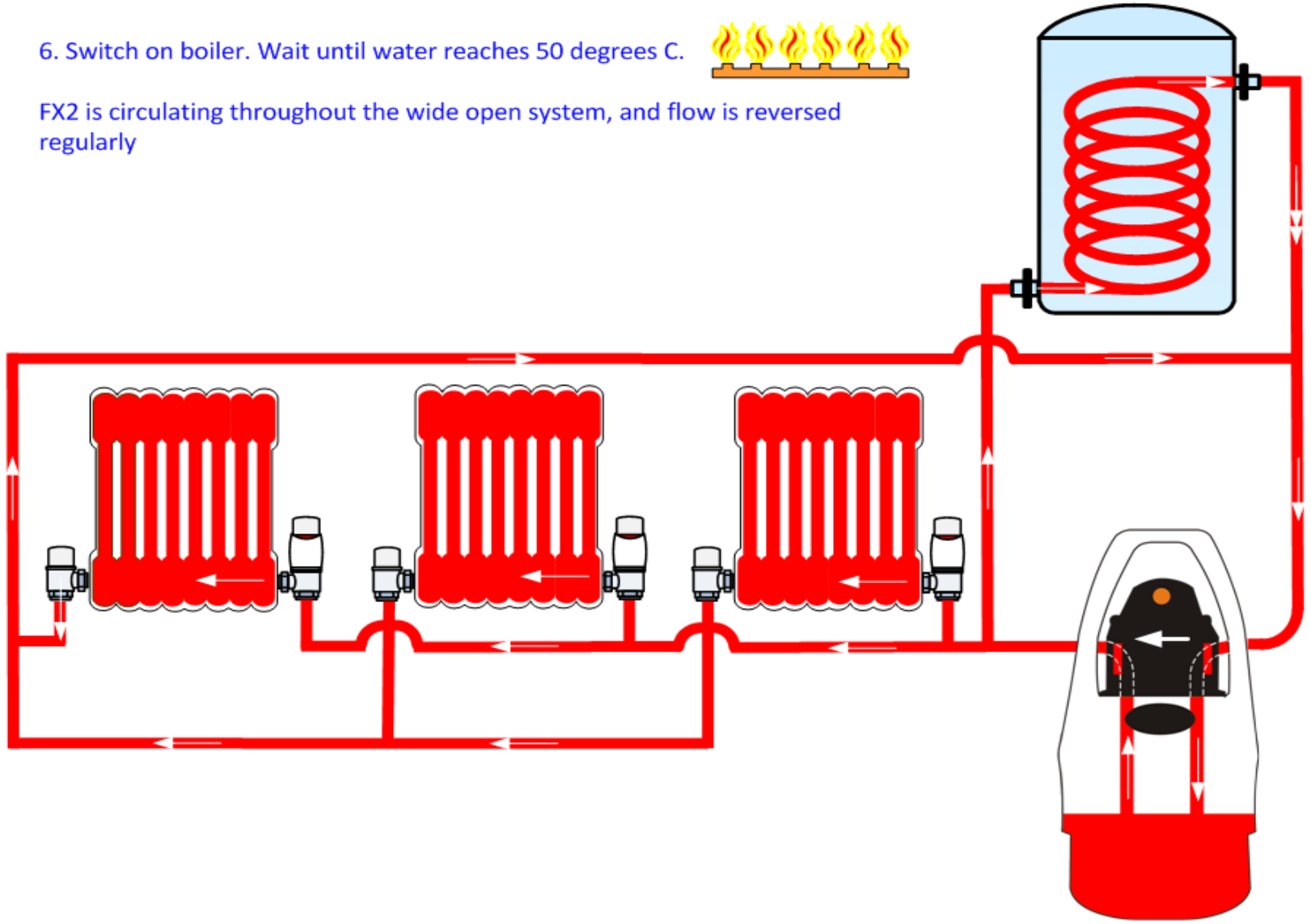
5. Add Power Flush FX2.

The whole system is wide open, and Power Flush FX2 has been added (red colouration). Both pump valves are in ‘circulation’ mode, to allow full circulation and dispersal of the FX2 throughout the heating system.



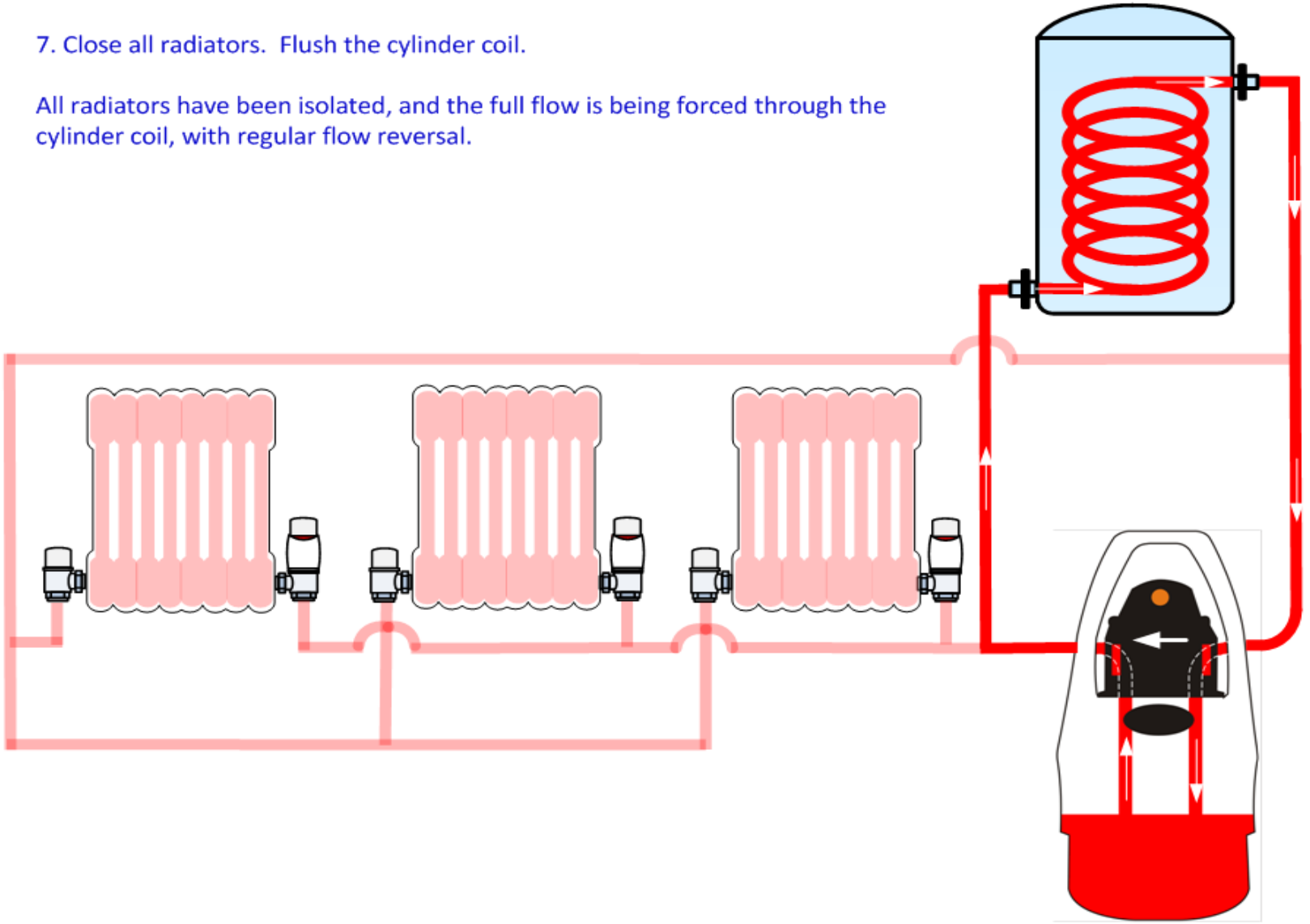
6. Switch on boiler. Wait until water reaches 50 degrees C.

FX2 is circulating throughout the wide open system, and flow is reversed regularly



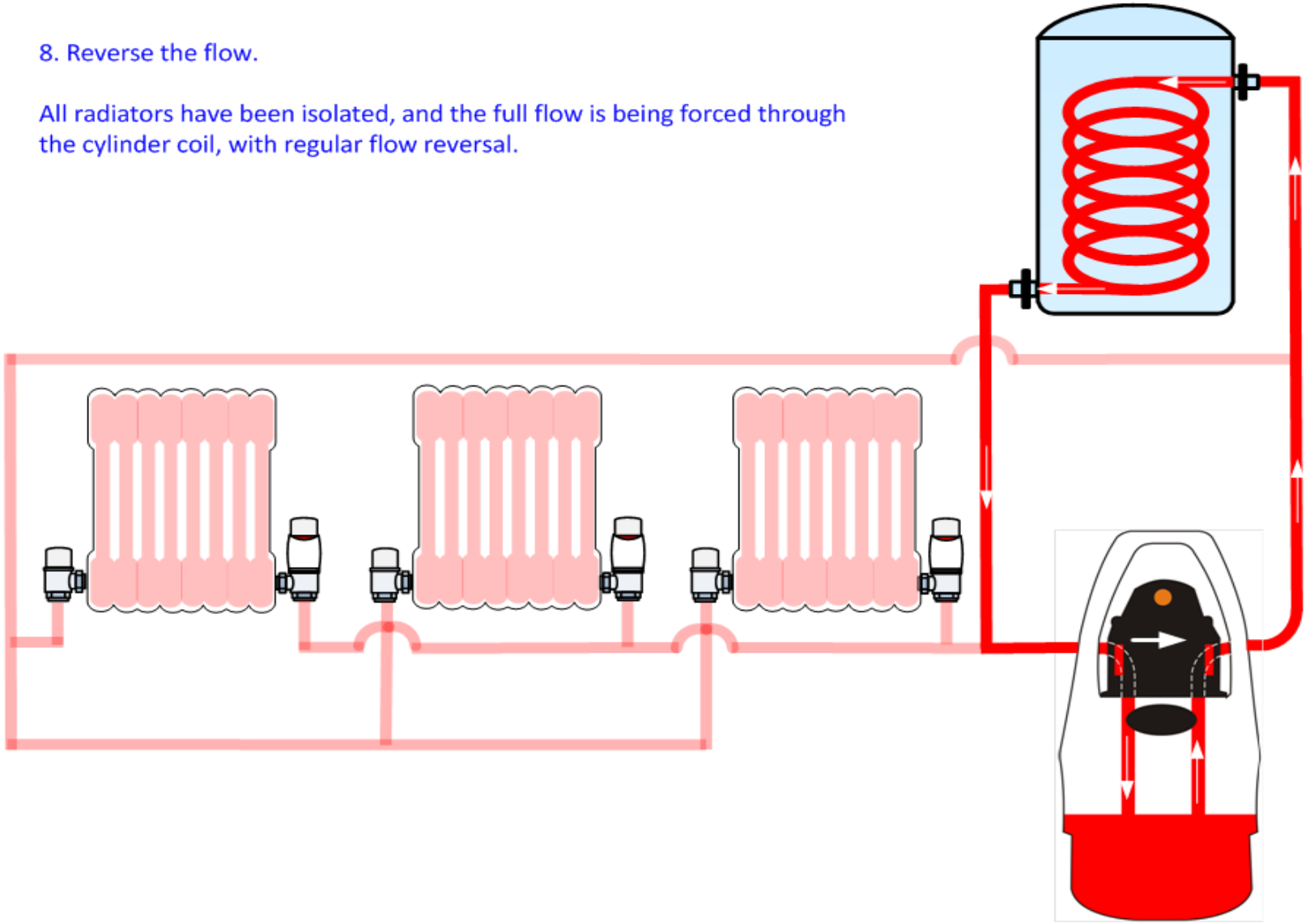
7. Close all radiators. Flush the cylinder coil.

All radiators have been isolated, and the full flow is being forced through the cylinder coil, with regular flow reversal.



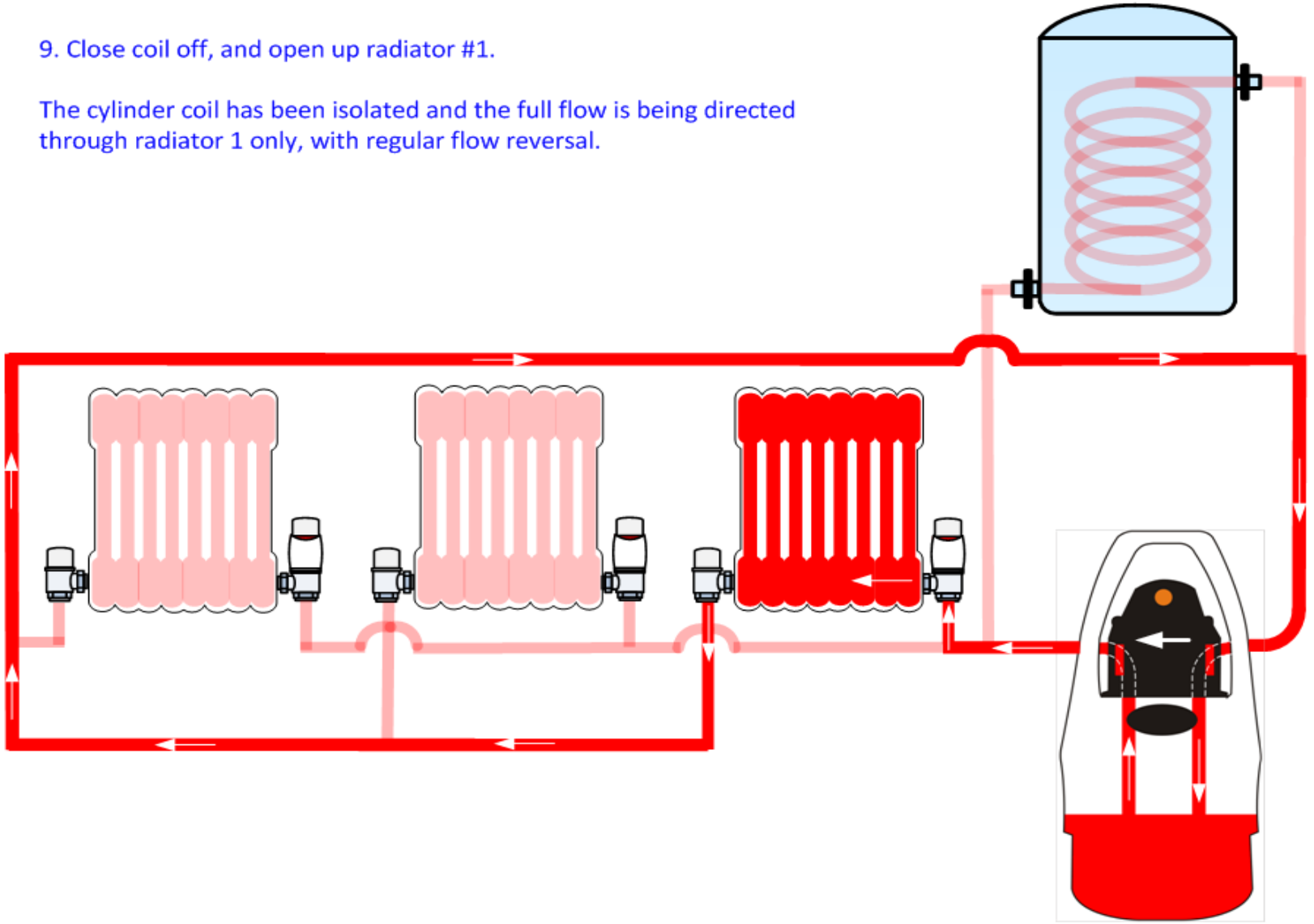
8. Reverse the flow.

All radiators have been isolated, and the full flow is being forced through the cylinder coil, with regular flow reversal.



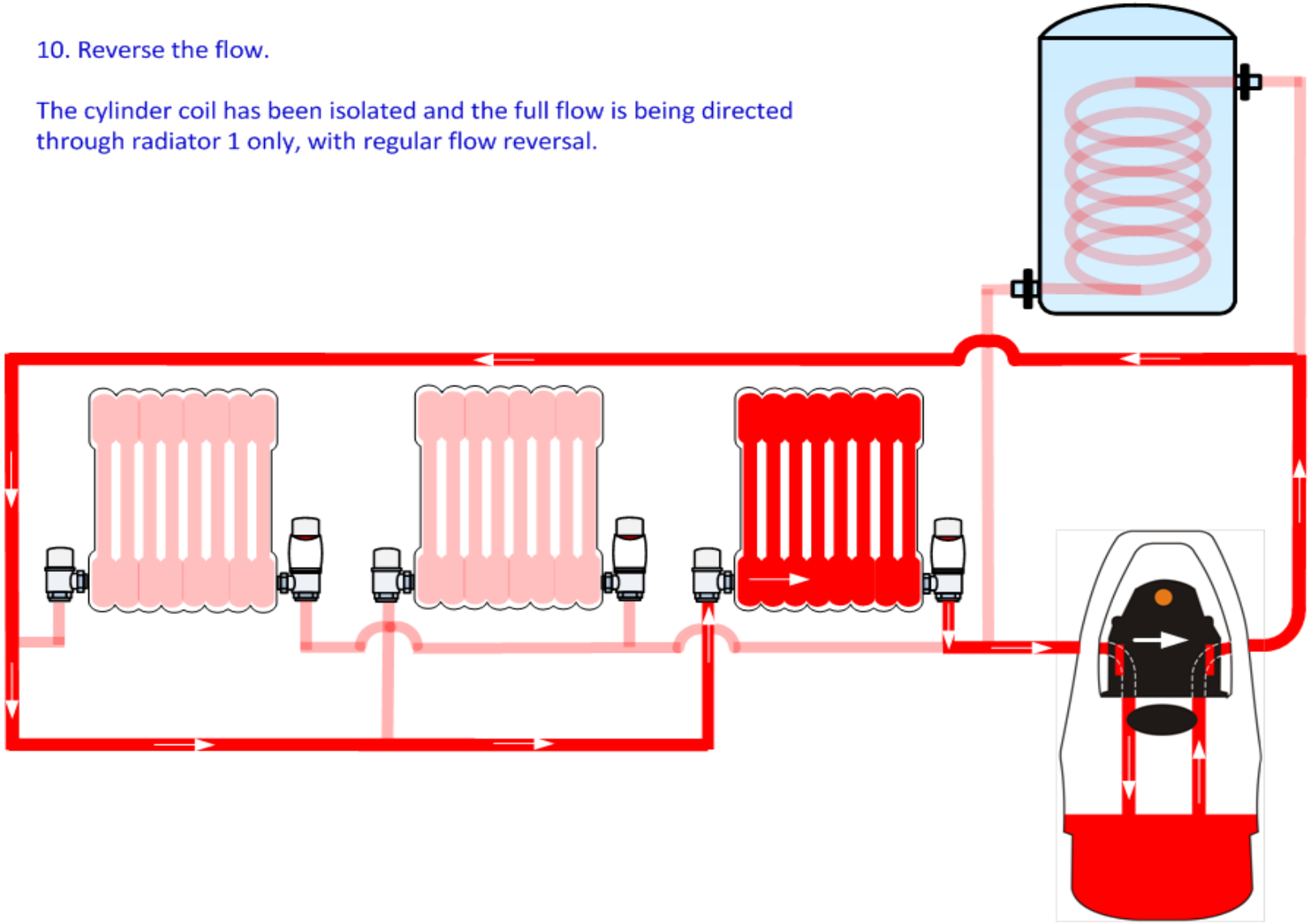
9. Close coil off, and open up radiator #1.

The cylinder coil has been isolated and the full flow is being directed through radiator 1 only, with regular flow reversal.



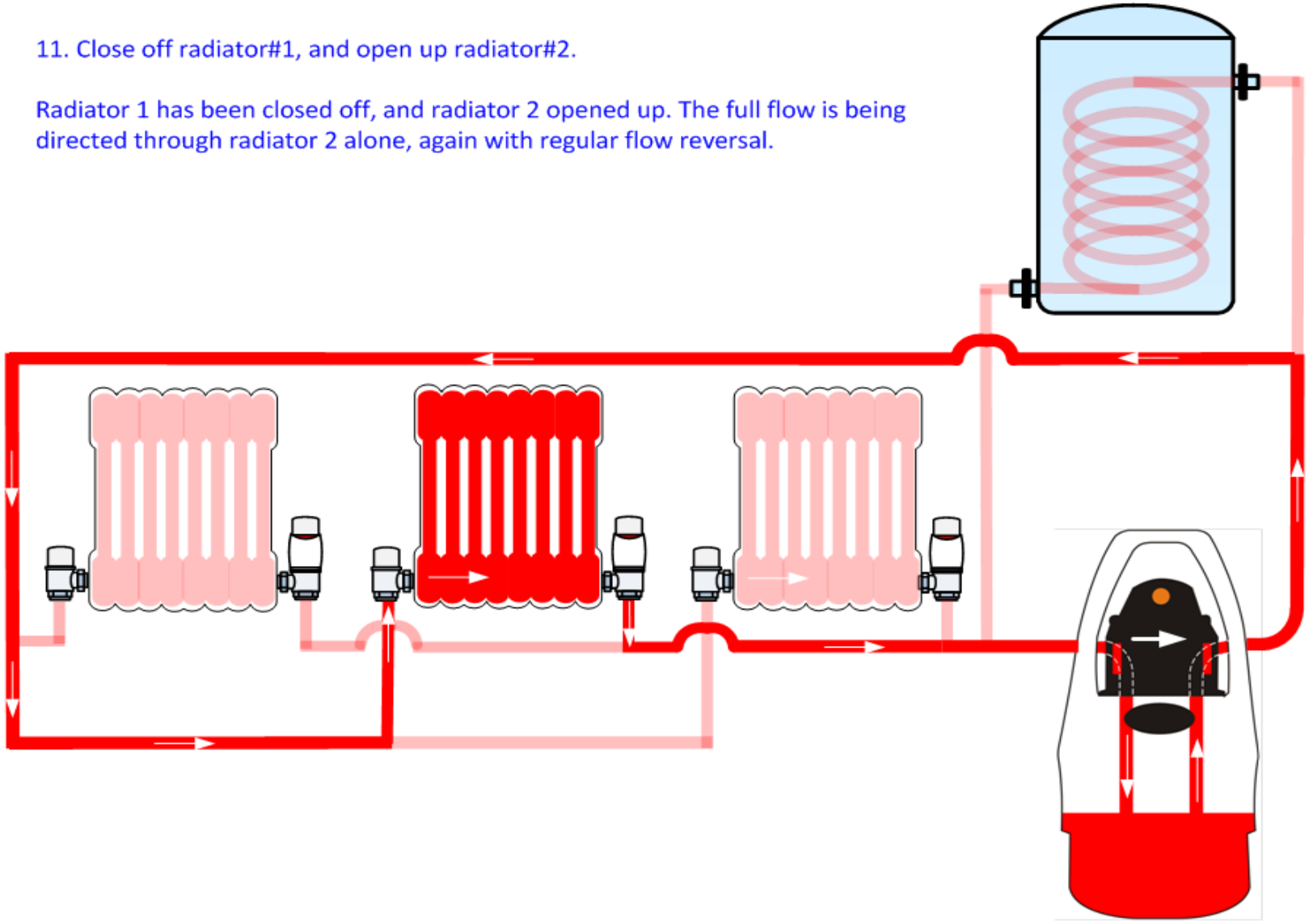
10. Reverse the flow.

The cylinder coil has been isolated and the full flow is being directed through radiator 1 only, with regular flow reversal.



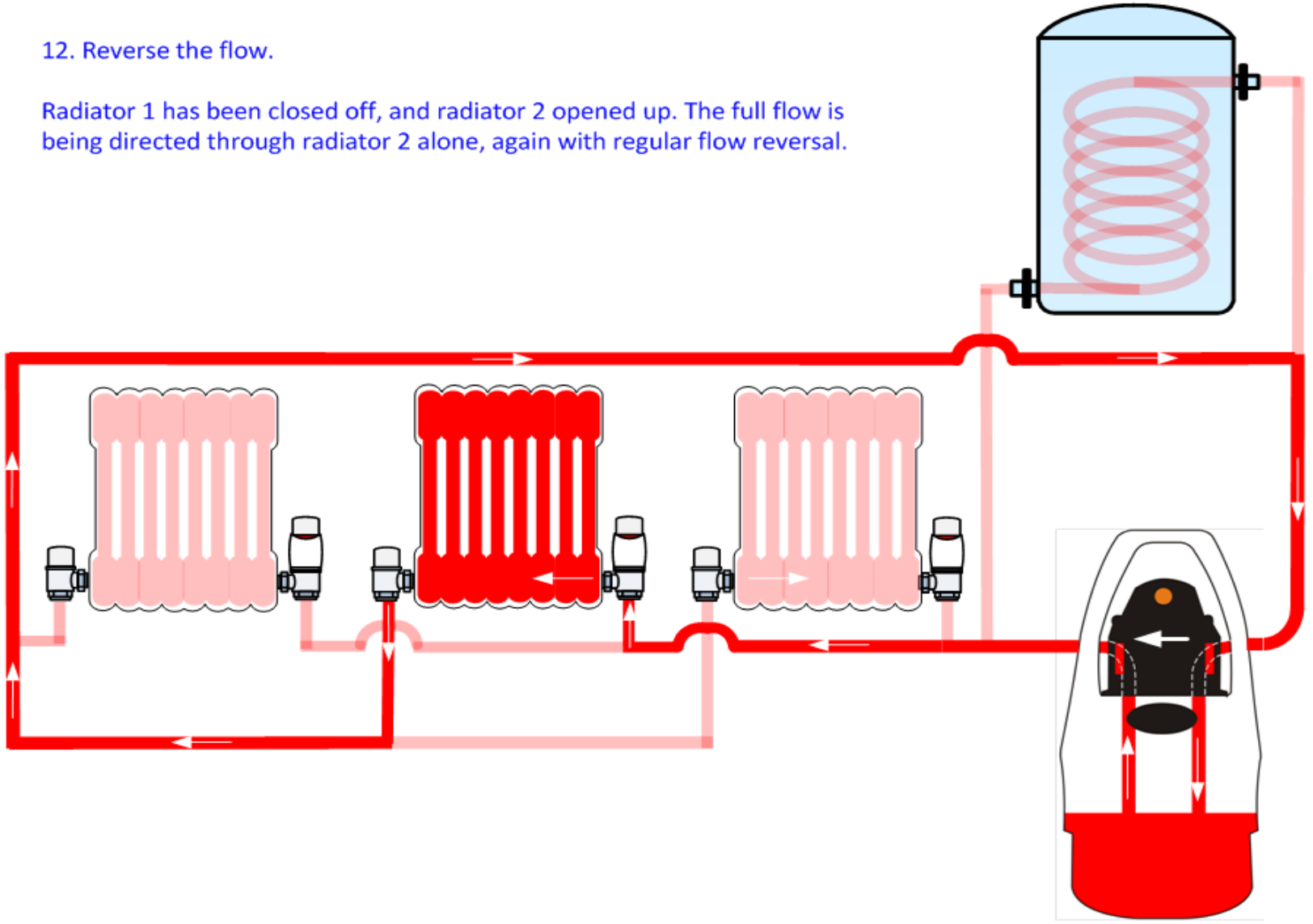
11. Close off radiator#1, and open up radiator#2.

Radiator 1 has been closed off, and radiator 2 opened up. The full flow is being directed through radiator 2 alone, again with regular flow reversal.



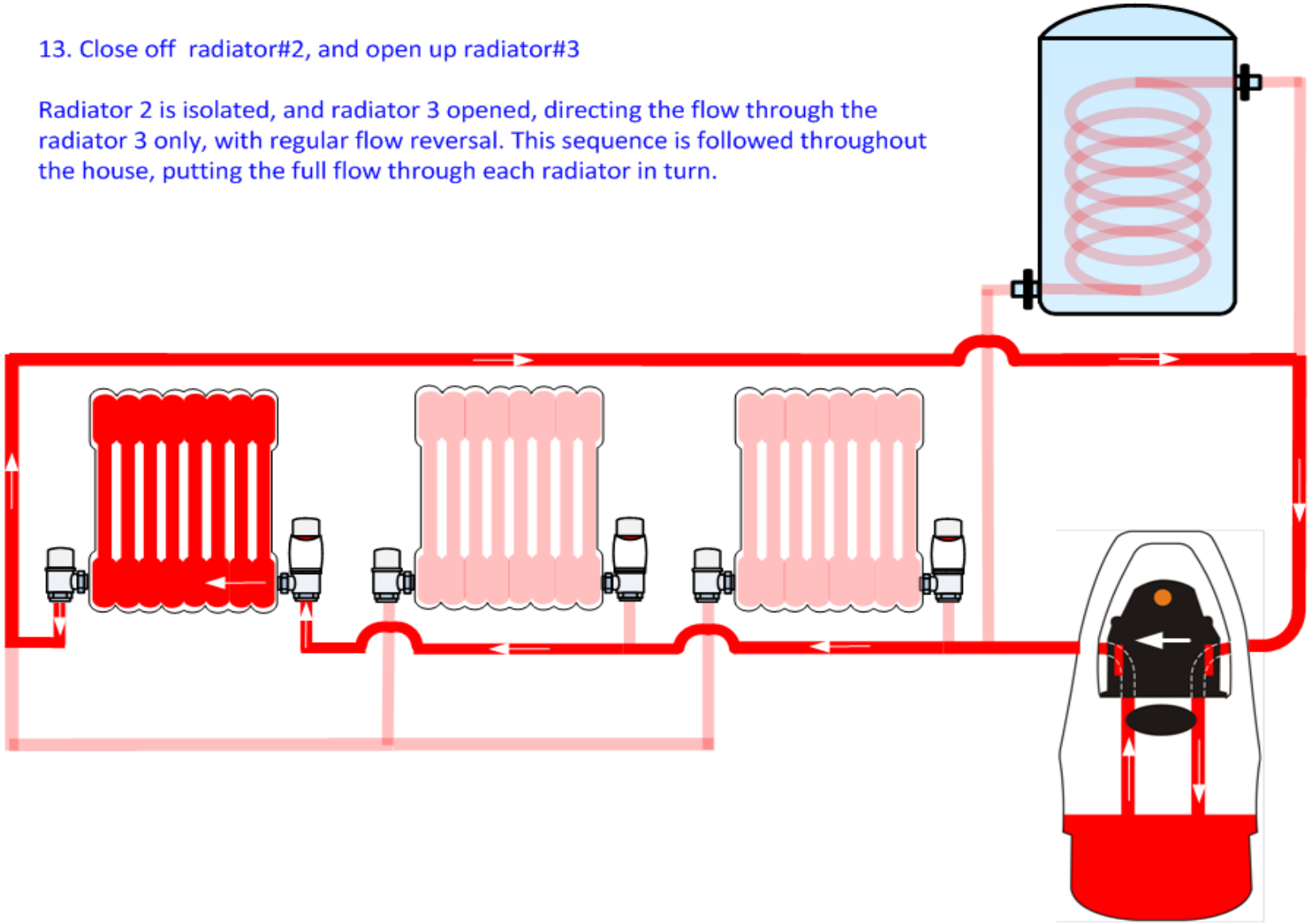
12. Reverse the flow.

Radiator 1 has been closed off, and radiator 2 opened up. The full flow is being directed through radiator 2 alone, again with regular flow reversal.



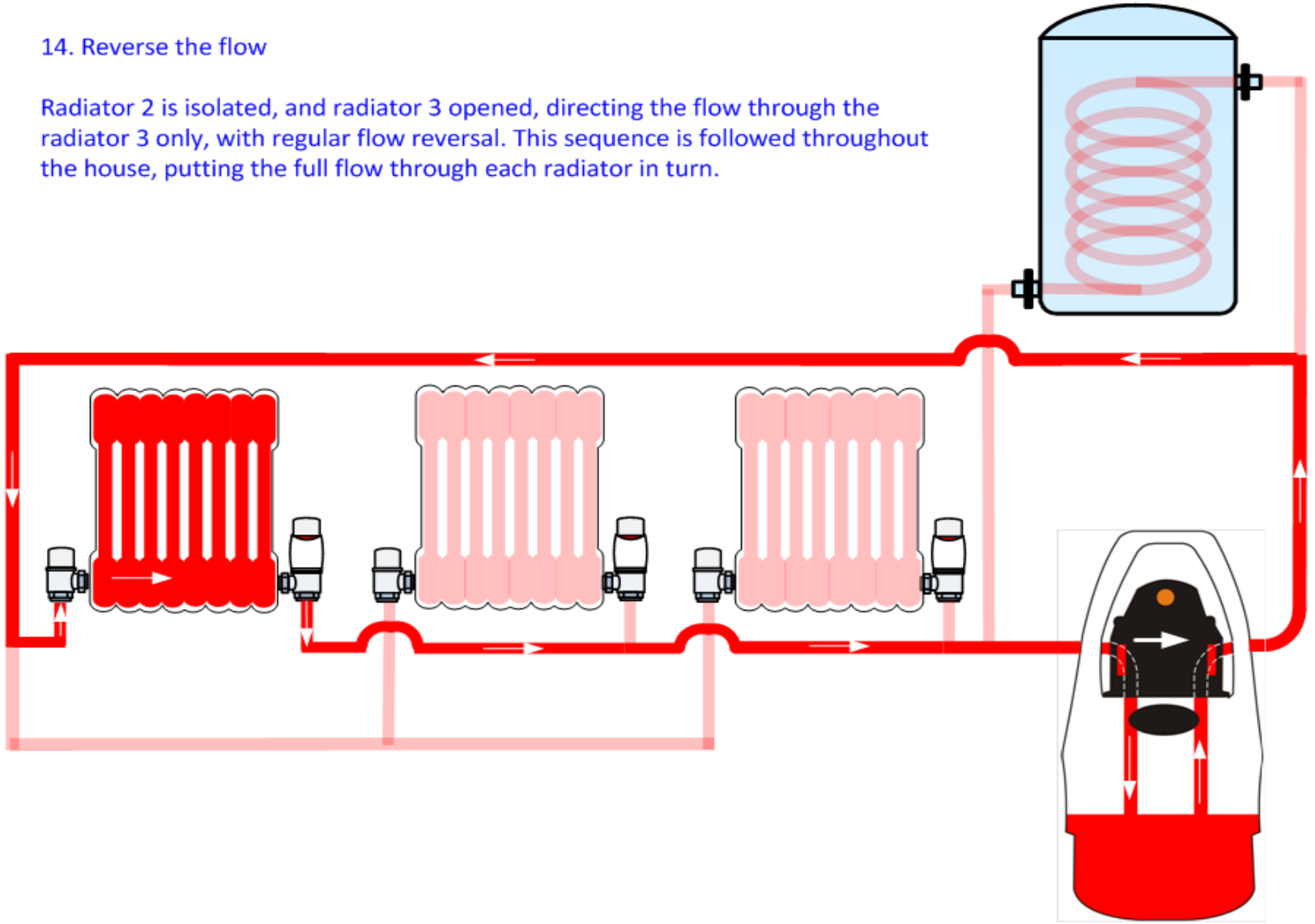
13. Close off radiator#2, and open up radiator#3

Radiator 2 is isolated, and radiator 3 opened, directing the flow through the radiator 3 only, with regular flow reversal. This sequence is followed throughout the house, putting the full flow through each radiator in turn.



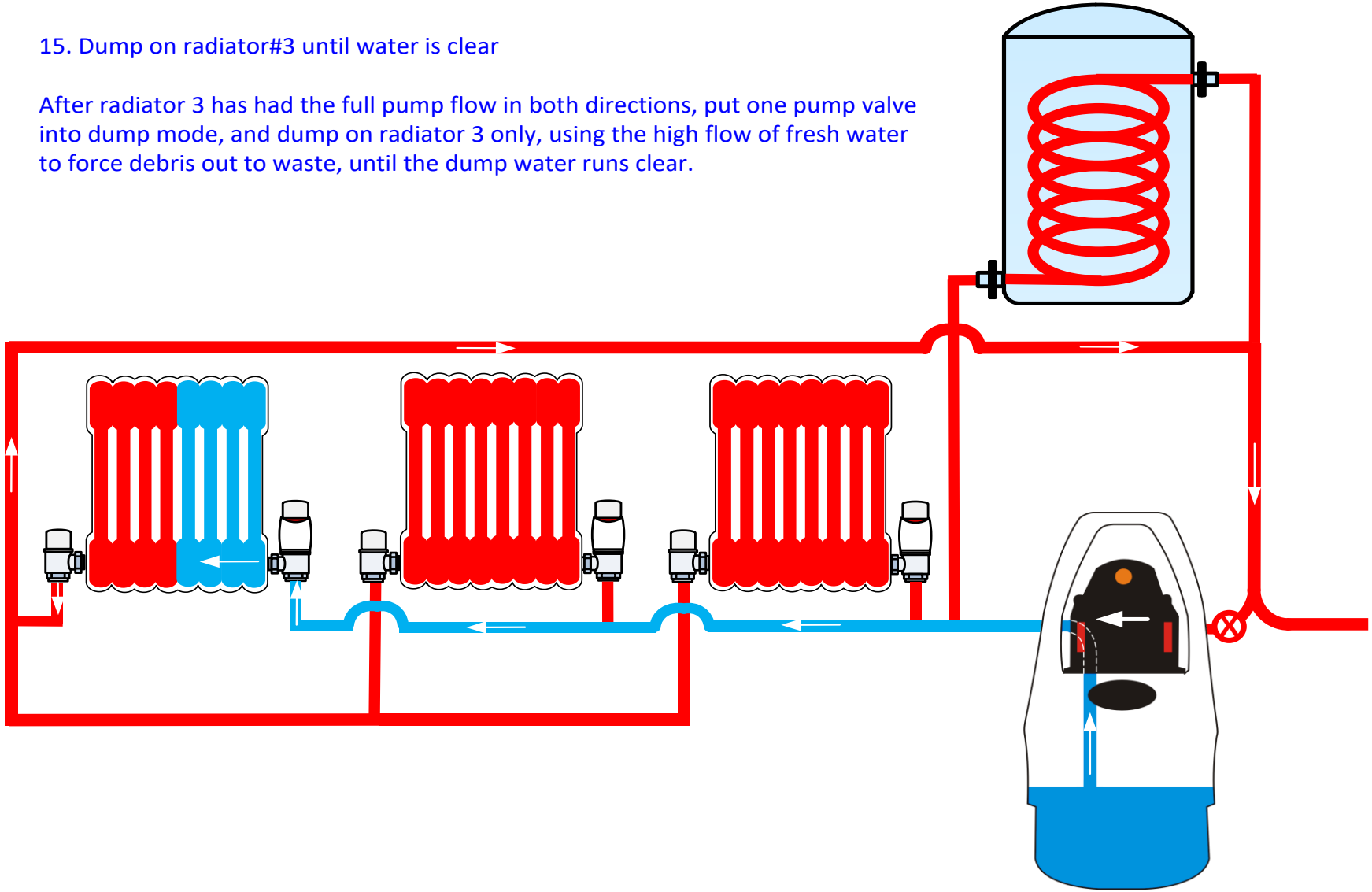
14. Reverse the flow

Radiator 2 is isolated, and radiator 3 opened, directing the flow through the radiator 3 only, with regular flow reversal. This sequence is followed throughout the house, putting the full flow through each radiator in turn.



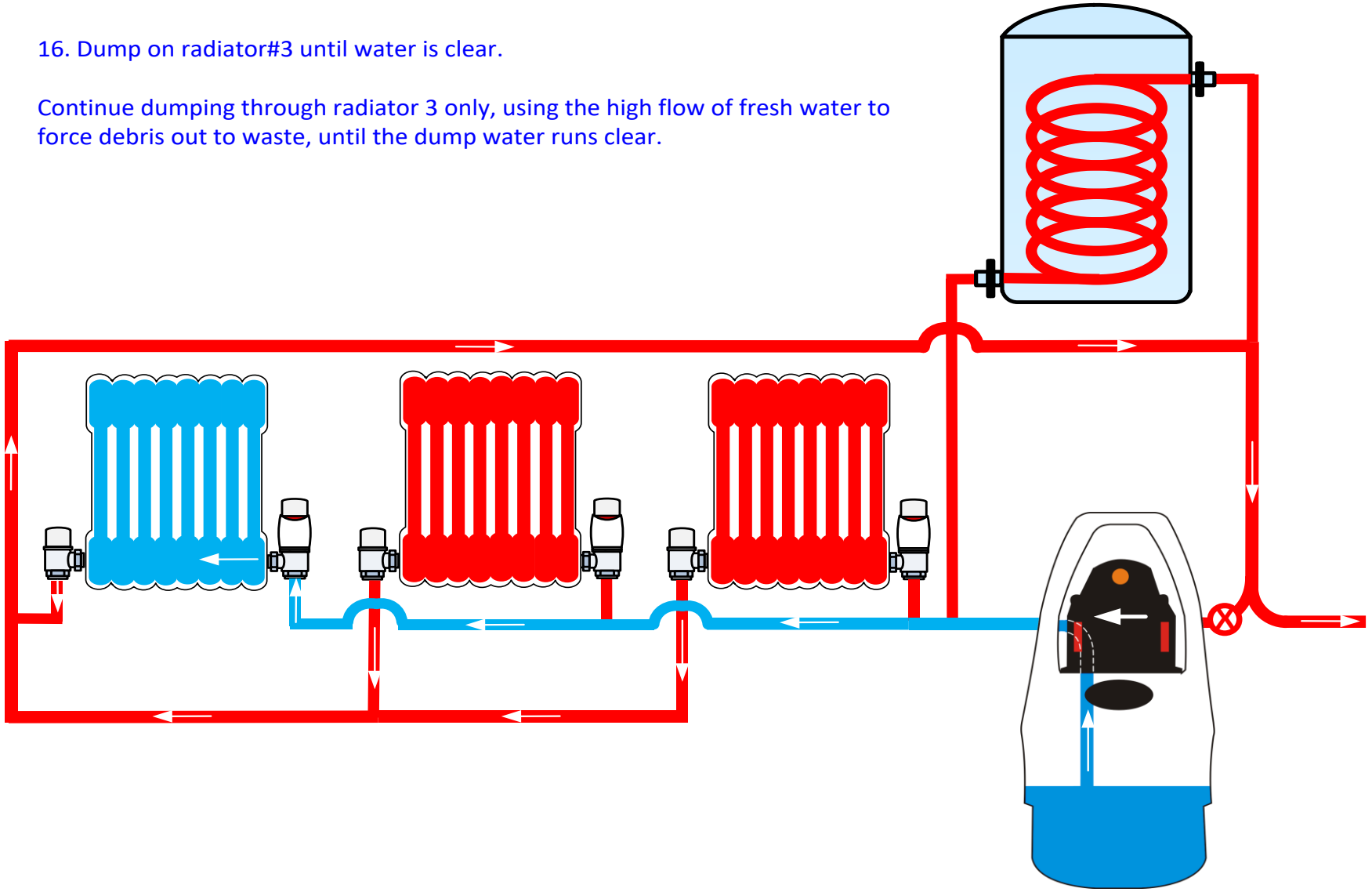
15. Dump on radiator#3 until water is clear

After radiator 3 has had the full pump flow in both directions, put one pump valve into dump mode, and dump on radiator 3 only, using the high flow of fresh water to force debris out to waste, until the dump water runs clear.



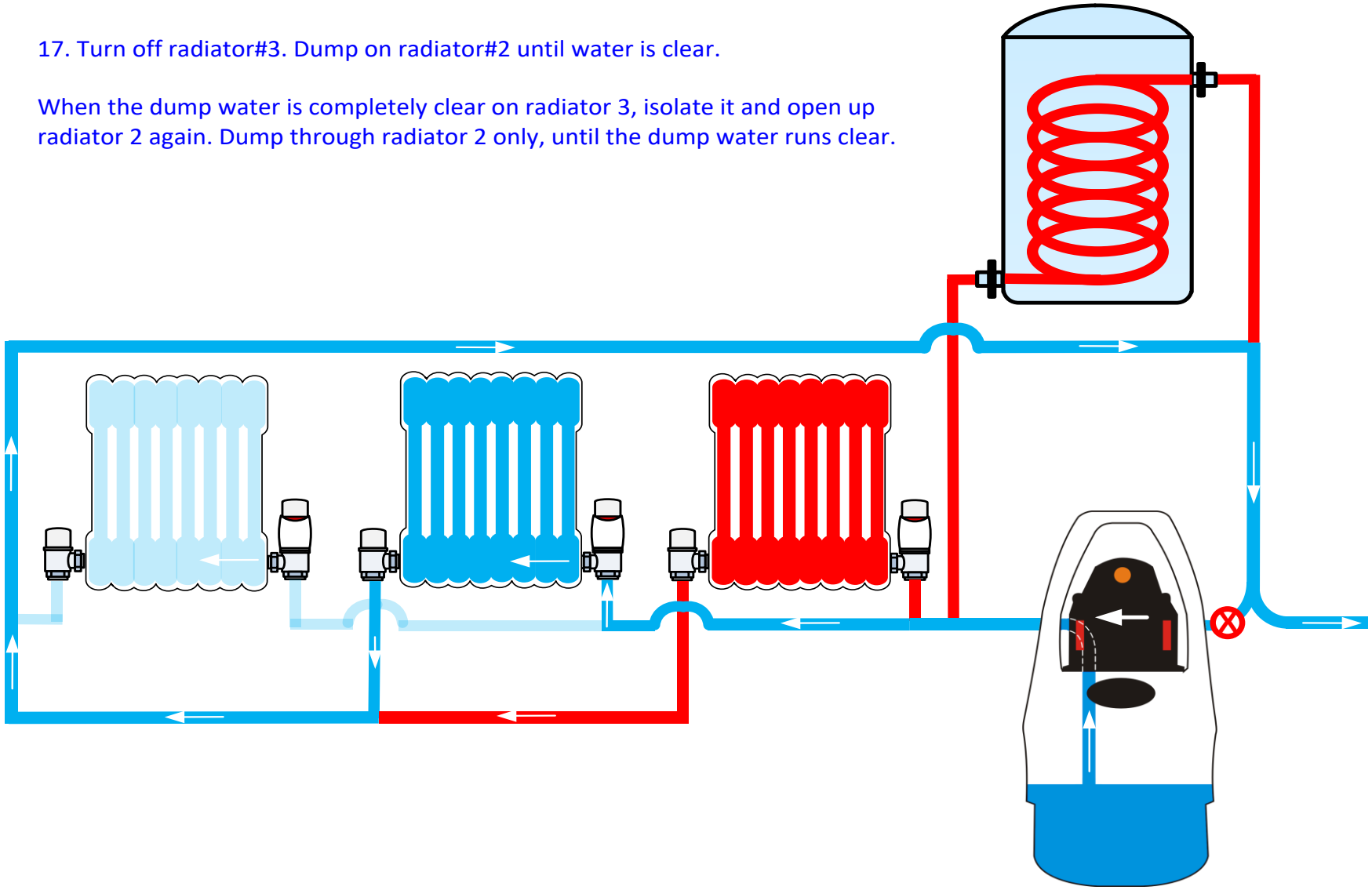
16. Dump on radiator#3 until water is clear.

Continue dumping through radiator 3 only, using the high flow of fresh water to force debris out to waste, until the dump water runs clear.



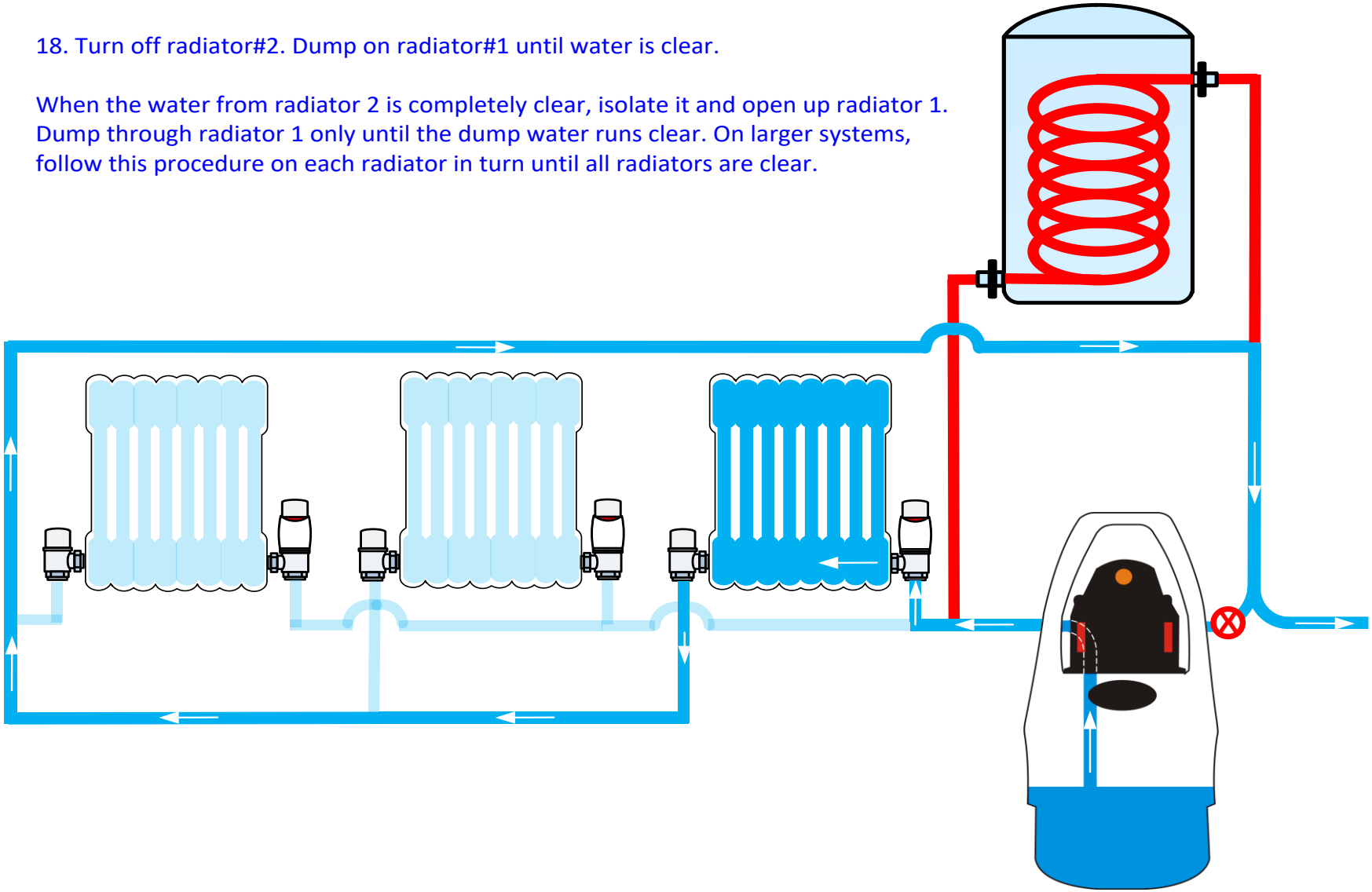
17. Turn off radiator#3. Dump on radiator#2 until water is clear.

When the dump water is completely clear on radiator 3, isolate it and open up radiator 2 again. Dump through radiator 2 only, until the dump water runs clear.



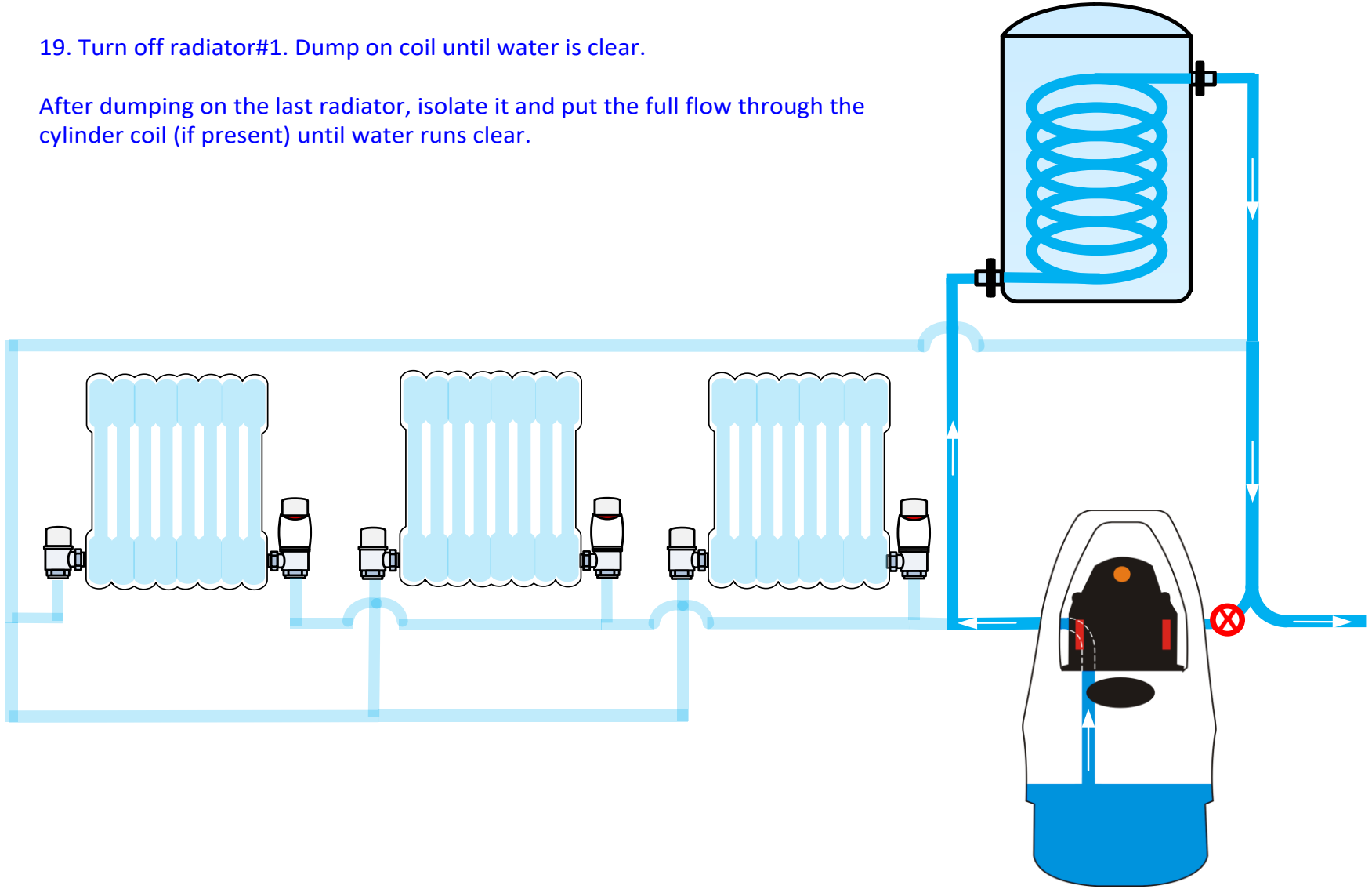
18. Turn off radiator#2. Dump on radiator#1 until water is clear.

When the water from radiator 2 is completely clear, isolate it and open up radiator 1. Dump through radiator 1 only until the dump water runs clear. On larger systems, follow this procedure on each radiator in turn until all radiators are clear.



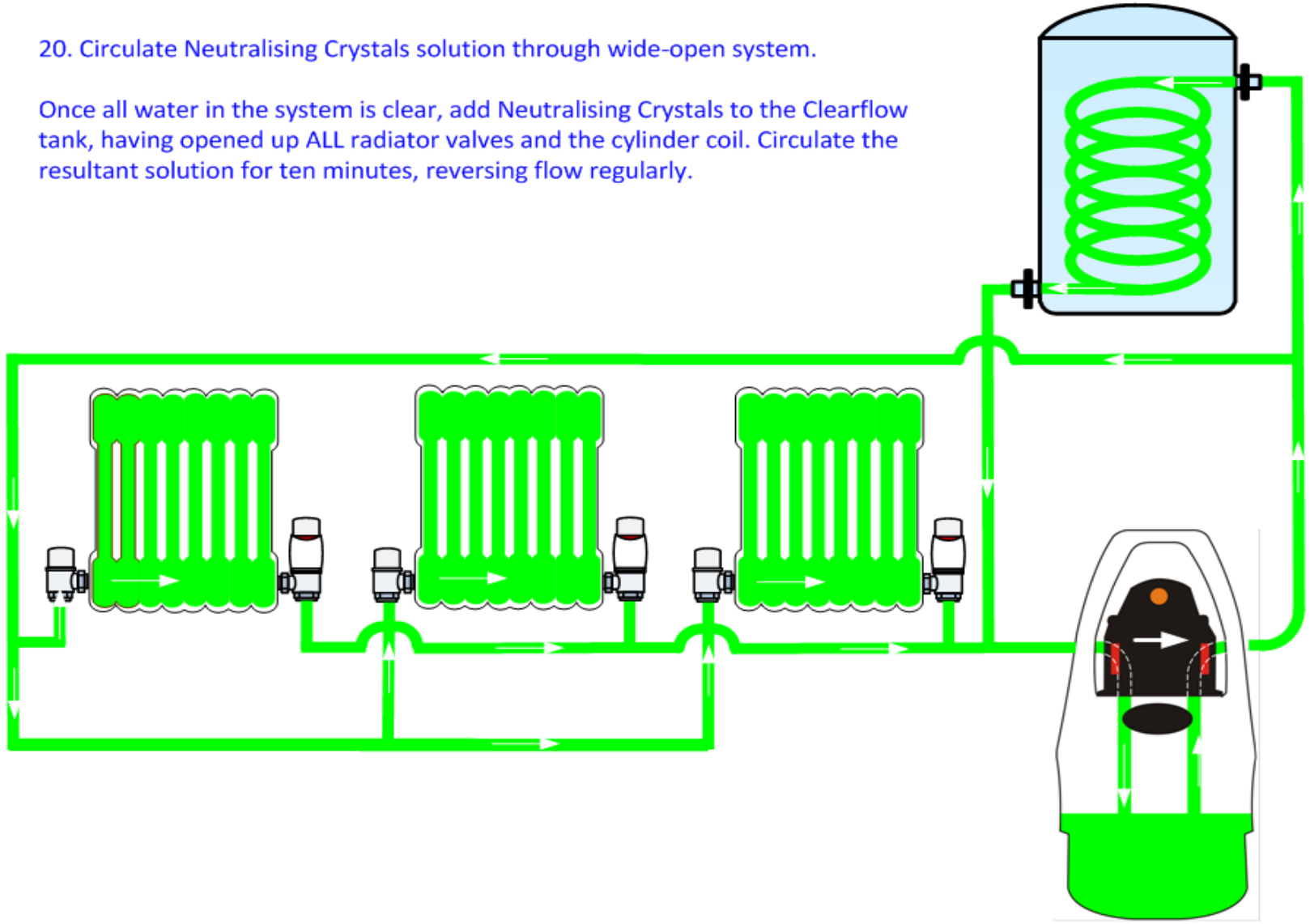
19. Turn off radiator#1. Dump on coil until water is clear.

After dumping on the last radiator, isolate it and put the full flow through the cylinder coil (if present) until water runs clear.



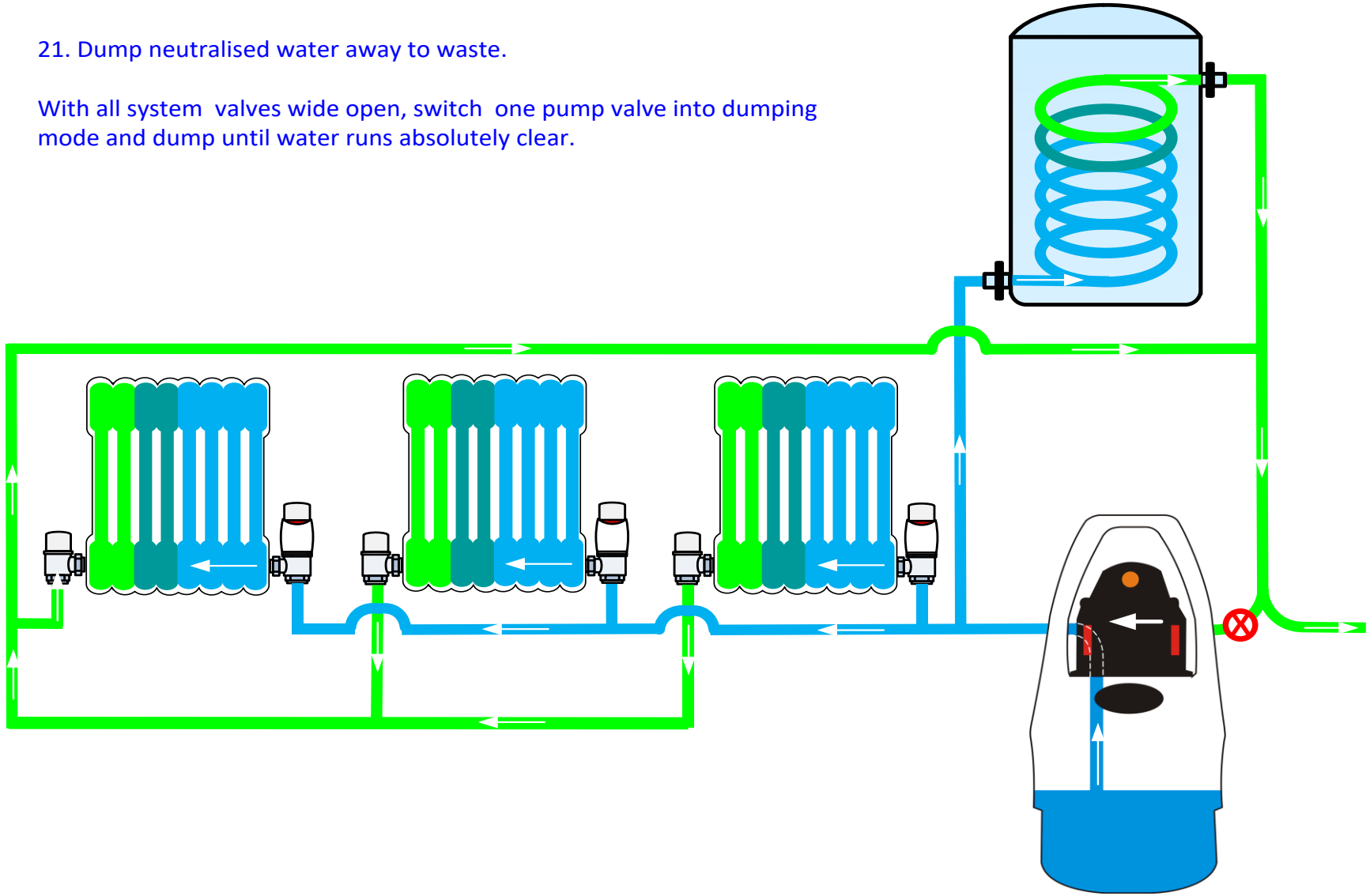
20. Circulate Neutralising Crystals solution through wide-open system.

Once all water in the system is clear, add Neutralising Crystals to the Clearflow tank, having opened up ALL radiator valves and the cylinder coil. Circulate the resultant solution for ten minutes, reversing flow regularly.



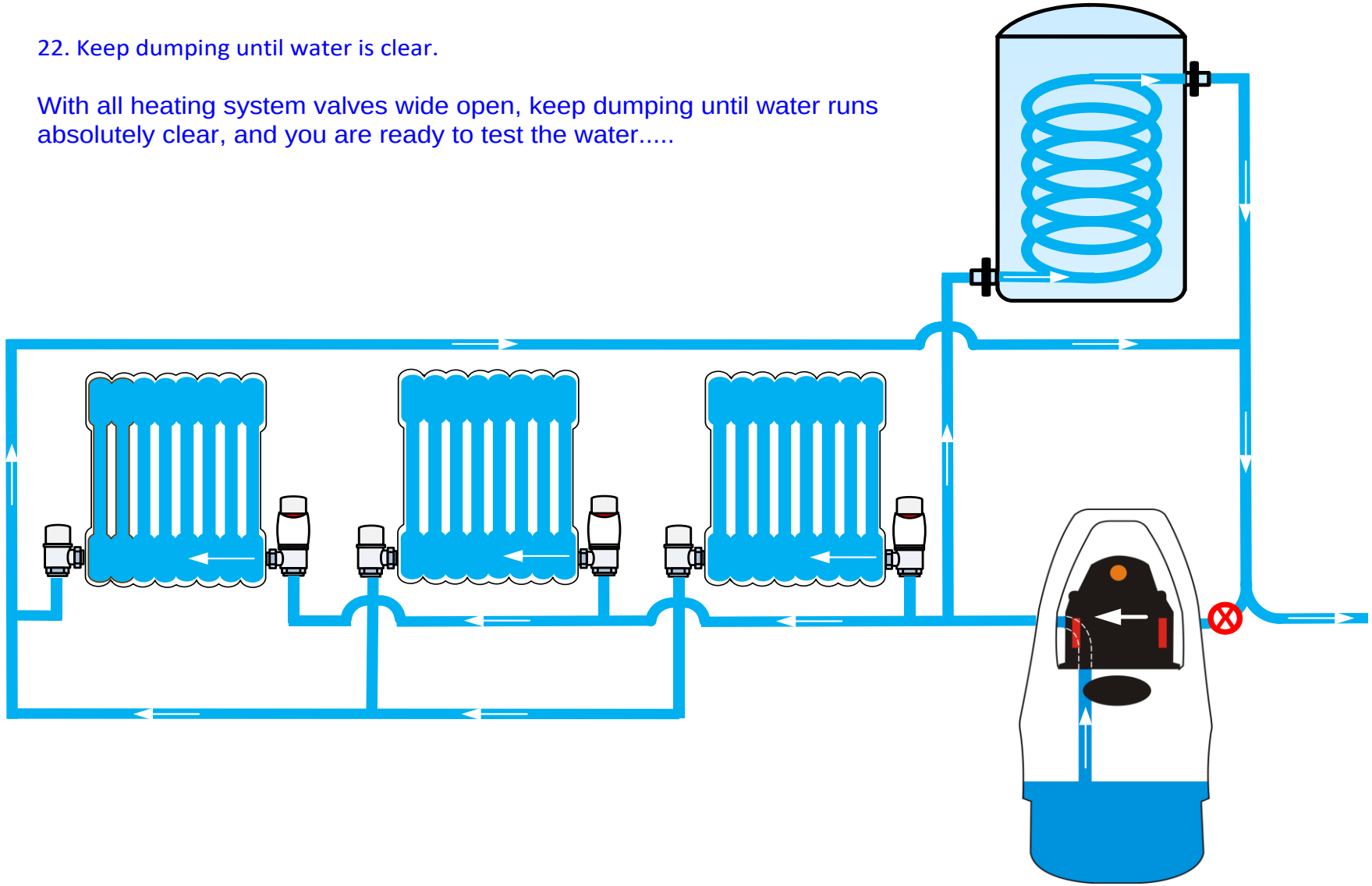
21. Dump neutralised water away to waste.

With all system valves wide open, switch one pump valve into dumping mode and dump until water runs absolutely clear.



22. Keep dumping until water is clear.

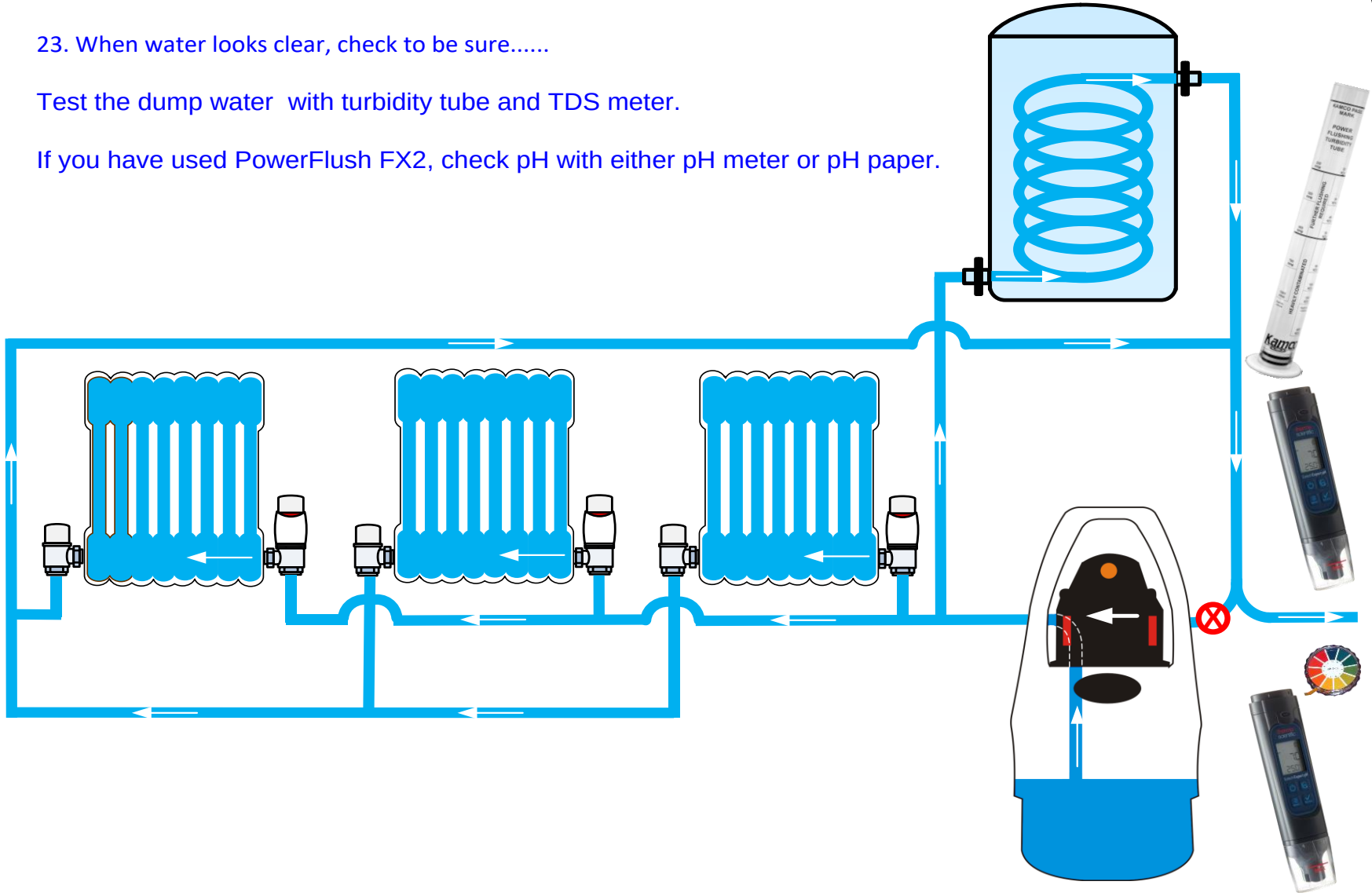
With all heating system valves wide open, keep dumping until water runs absolutely clear, and you are ready to test the water.....



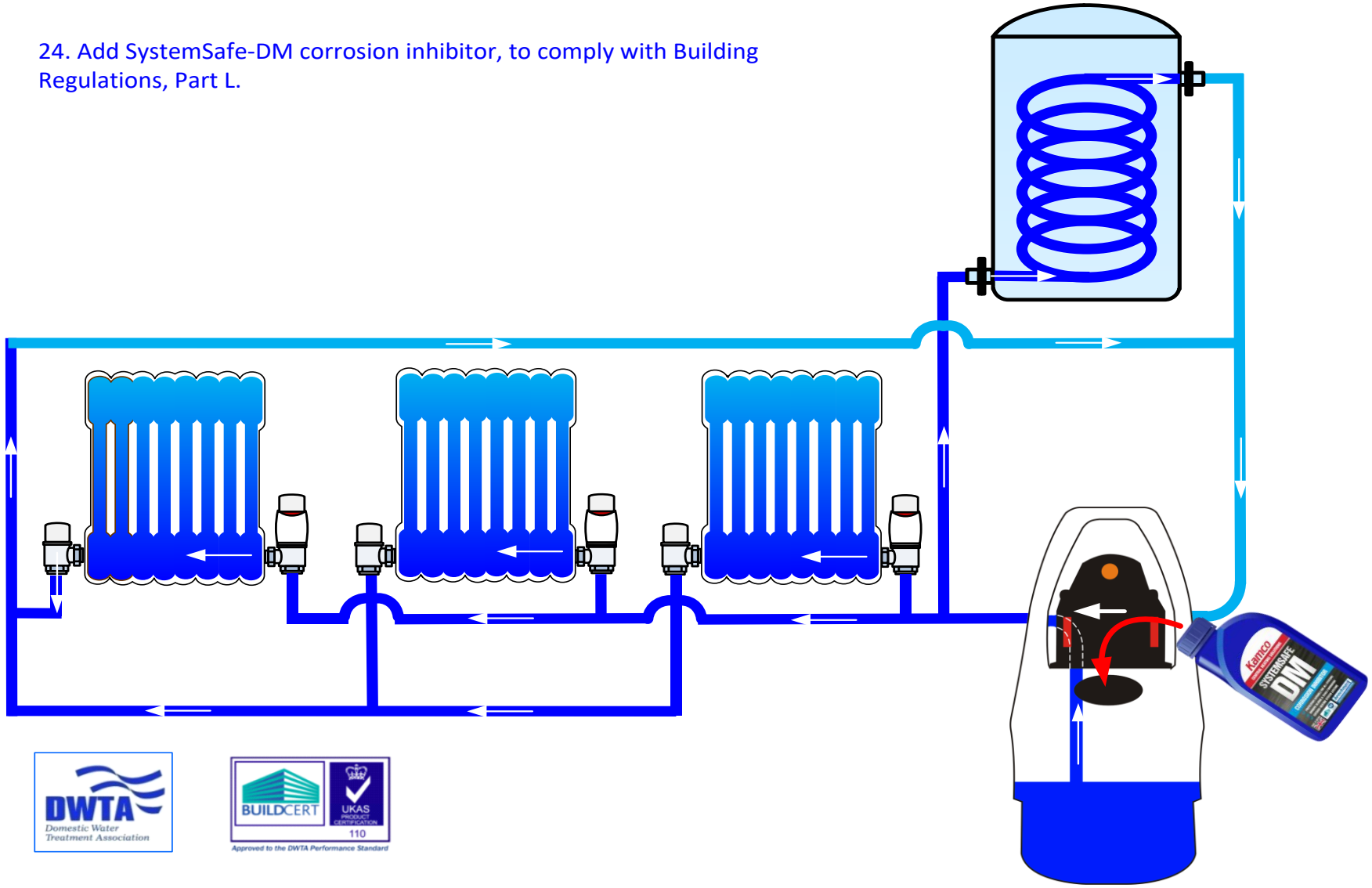
23. When water looks clear, check to be sure.....

Test the dump water with turbidity tube and TDS meter.

If you have used PowerFlush FX2, check pH with either pH meter or pH paper.



24. Add SystemSafe-DM corrosion inhibitor, to comply with Building Regulations, Part L.



DWTA
Domestic Water Treatment Association

BUILDCERT
UKAS PRODUCT CERTIFICATION
110
Approved to the DWTA Performance Standard

Testing -

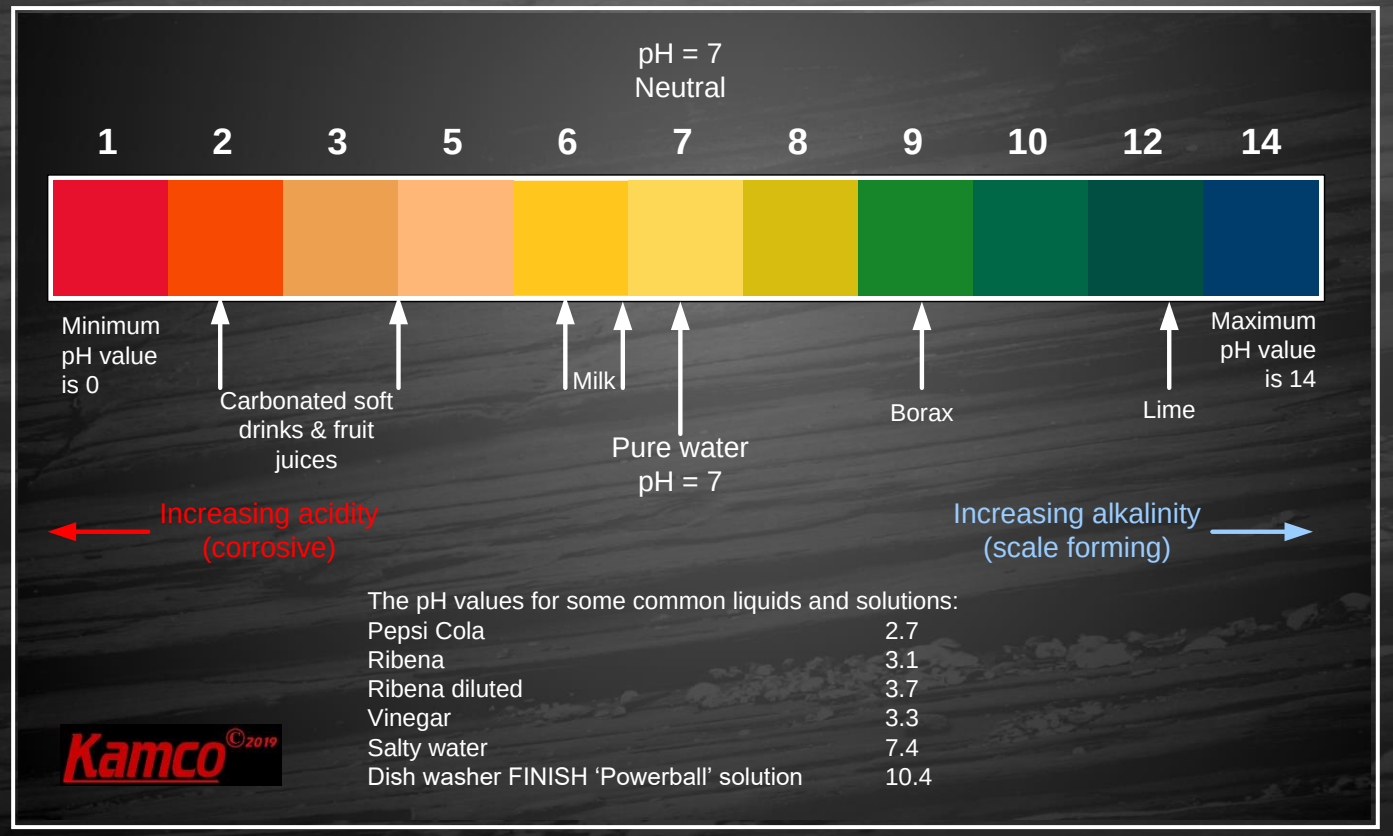
How to ensure that the water is clean and neutral

pH paper to check no acidity left in system.

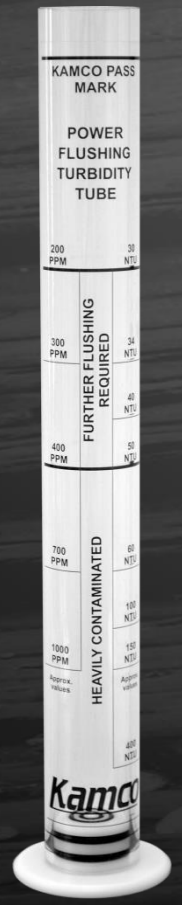
pH meter to check no acidity left in system.

What does the pH value mean?

pH paper to check no acidity left in system.



Testing -



How do you know that you've got the water clear?

Use a turbidity tube to ensure that no particulate or solid contaminants still present.

Testing -

How do you know that there isn't something else dissolved in the water?

Use a TDS meter to ensure that no soluble contaminants are still present.

Testing -

Turbidity Tube

TDS meter

pH meter

Testing -

What else can show that you've cleaned the system?

An infra-red thermometer can show that radiators are getting warmer.

How could you speed up the cleaning process?

The primary constituent of sludge is black iron oxide (known as magnetite).

Remove it from the circulating water with a CombiMag magnetic power flushing filter, and it will:

1. reduce the time for water to run clear.

2. reduce total water usage.

3. show your customer what WAS in their heating system!

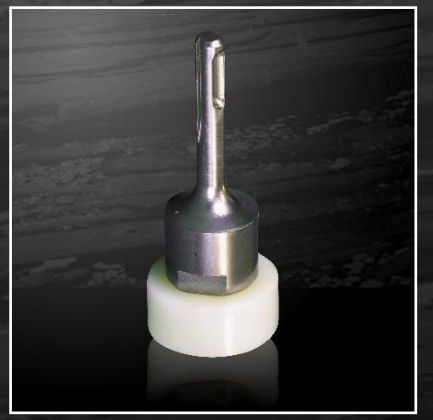
Standard
CombiMag

CombiMag
Dual Digital

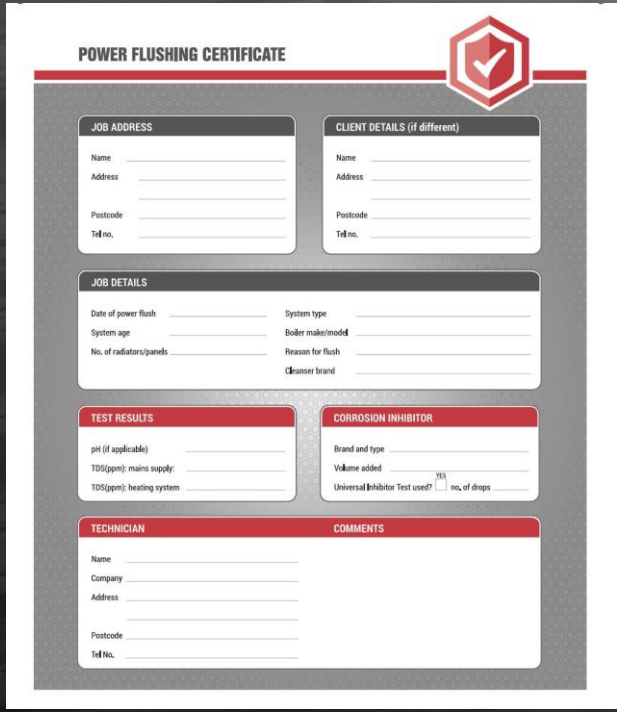
How could you speed up the cleaning process?

Vibration

Use a rubber mallet or an SDS powered radiator vibrator to shake debris loose even faster – especially from the base of radiators.



Leaving a record of the work carried out -



POWER FLUSHING CERTIFICATE

JOB ADDRESS

Name
Address
Postcode
Tel no.

CLIENT DETAILS (if different)

Name
Address
Postcode
Tel no.

JOB DETAILS

Date of power flush
System age
No. of radiators/panels
System type
Boiler make/model
Reason for flush
Cleanser brand

TEST RESULTS

pH (if applicable)
TDS(ppm): mains supply:
TDS(ppm): heating system

CORROSION INHIBITOR

Brand and type
Volume added
Universal Inhibitor Test used? YES
no. of drops

TECHNICIAN

Name
Company
Address
Postcode
Tel No.

COMMENTS

Power flushing completion certificates to leave with the householder, with a carbon copy for your records.

What's the most powerful and effective flushing chemical?

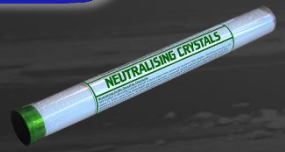
PowerFlush FX2
followed by Neutralising Crystals

Systemsafe-DM
corrosion inhibitor
(must be left in system to protect it)

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

What chemical do I use when there is an aluminium heat exchanger or radiator?

or the system is in poor condition?



PowerFlush FX2
followed by Neutralising Crystals

Systemsafe-DM
corrosion inhibitor
(must be left in system to protect it)

HyperFlush is also very good at loosening up deposits when used as a pre-treatment…..

What about when the system has serious flow problems as a result of corrosion debris?

HyperFlush
As a pre-treatment
a few days before
the power flush

On the day -
PowerFlush FX2
followed by
Neutralising Crystals

Systemsafe-DM
corrosion inhibitor
(must be left in system
to protect it)

Kamco ©2019

benchmark

CF40 EVOLUTION

CF90 QUANTUM

CF210 TITAN

Kamco ©2019

Do you need a power flushing pump?
Will a magnetic filter alone do as good a job?

Compare the flow from a circulator pump with that from a Clearflow power flushing pump to see why trying to clean a system with only a magnetic filter can never be as effective.

In the picture the left hand jet of water is from a Grundfos 15-50 pump, the right hand jet is from a Kamco pump……

When your reputation and a boiler warranty is at stake, you need to power flush!

Why is the flow from a Clearflow pump so much greater than that of a heating system circulator pump

Compare the size of a Clearflow impellor with that of a Grundfos 15-50 circulator pump.

Designed to gently circulate water through a heating system.

Designed to blast water through a heating system to dislodge and remove corrosion debris.

1. You won’t have the high water velocity flow which is critical to drive debris from the farthest point in the system and to lift debris up from under the floor or from drop feed radiators.

2. You can’t reverse the flow to generate turbulence and to move debris which is sheltered from the normal one-directional flow.

3. The magnetic field of the system circulator pump attracts debris, reducing its performance further.

4. You won’t remove non-magnetic debris with a magnetic filter – blast it out with a power flushing pump!