



CAREMIX®

THERMOSTATIC
TAPS

High performance
TMV3 approved
thermostatic taps for
healthcare applications



The Safety Valve Specialist

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The Conflict: Legionella or Burns?

Not much of a choice, but this conflict is at the heart of every plumbing system. Water heated and stored at sufficiently high temperatures to control and kill bacteria such as legionella can cause severe scalding injuries in a matter of seconds but water that is heated and stored at safe non-scalding temperatures provides the ideal medium and temperatures for bacteria growth.

Legionnaire's Disease

Legionnaire's Disease comes from a naturally occurring organism that can be found in low levels in the water supply. It is a bacterial disease that may cause pneumonia, and is contracted from small droplets of water that are contaminated with legionella bacteria and which have become suspended in the air. The time from infection to start of the illness (the incubation period) is between two and ten days and the disease can be particularly deadly to the very young or old, especially if infirm.

Aerosol droplets that allow transmission of legionella are found in: whirlpool spas, showers, cooling towers, taps with sprays etc. Legionella can grow in any water system that is not properly maintained.



The effect of temperature on legionella

Temperature Range	Effect On Legionella
70-80°C	Disinfection range
66°C	Legionella will die in 2 minutes
60°C	Legionella will die in 32 minutes
55°C	Legionella will die in 5-6 hours
50-55°C	Legionella can survive but do not multiply
20-50°C	Legionella growth range
Below 20°C	Legionella can survive but are dormant

Elimination of legionella from a system

Methods to eliminate legionella include chlorination: more than 10mg injection of chlorine per water litre in the sanitary installation. This method of treatment is used when a system is cleaned prior to commissioning. It has real disadvantages if a system is being used.

Another option is to use heat treatment, ie running water above 70°C for 30 minutes in the whole sanitary system. This can also have serious

drawbacks if no temperature control is used on the outlets.

If temperature control down to a completely safe level is exercised at the water heater, ie turning the cylinder down to a non-scalding temperature so that all the stored water is below 50°C, the following will occur:

- The system will not comply with building regulations
- Water usage will increase as users run taps for longer periods, in the hope of getting hot water
- Users will not get a hot bath unless the water heater is close to the bath because of the temperature loss from the pipework between the water heater and the point of use
- Washing up becomes a problem as lukewarm water will not shift grease

Building regulations state that the circulation of hot water must be at temperatures sufficiently high to stop the legionella that naturally occurs in the water supply from multiplying to a level that will cause health problems to susceptible people. In the UK building regulations stipulate that hot water should be stored at no less than 60°C and circulated at no less than 55°C to prevent the growth of legionella.

Duty of care

In all buildings used by the public, the owner/manager has a duty of care to ensure that those using his facility are not injured or, in extreme cases, killed while on the property. A key question the designer or specifier must consider is whether or not the installation is likely to be used by people who, on the basis of a risk assessment, are deemed to be at high risk of being injured by high temperature hot water. If it is thought that there is a high risk of this, then the system must be designed to meet the criteria of the NHS model engineering specification D08 and the hot water temperatures must be controlled by a TMV3 thermostatic mixing valve, tap, or shower valve. If the risk is deemed to be slight then the system can be designed and built to the lower domestic specification TMV2. In all cases where an area is likely to be used by very young children, the elderly or the disabled, regardless of whether the majority of the rest of the site is TMV2 level, these specific areas should always be TMV3.

The Reliance Caremix® range of thermostatic tapware has been designed with all of these performance considerations in mind and as this range is specifically targeted at the healthcare market many other things have been taken into account in the design process. Durability and aesthetics are of a very high quality and the surface finish on the taps is done using a special process called PVD, which provides a highly scratch resistant, long lasting finish. Servicing must be a key design consideration for this type of product as regular testing and maintenance are always necessary. That is why all the Caremix® taps have isolators, strainers, flow regulators and check valves either supplied as part of the package or built into the body of the tap. In addition, each tap in the entire range uses the same one piece sequential thermostatic cartridge.

What's the problem?

Every year 570 people are admitted to the UK hospitals suffering from severe scald injuries. In addition to this, 23 people are killed every year from being immersed in hot water. The main victims of scalds are either the very young or the elderly.

The severity of a burn will be affected by the temperature and the time of exposure to hot water:

Type of Burn	Time of exposure in minutes and seconds							
	45°C	50°C	55°C	60°C	65°C	70°C	75°C	80°C
Adult 3rd	>60 m (e)	300 s	28 s	5.4 s	2.0 s	1.0 s	0.7 s	0.6 s (e)
Adult 2nd	>60 m (e)	165 s	15 s	2.8 s	1.0 s	0.5 s	0.36 s	0.3 s (e)
Child 3rd	50 m (e)	105 s	8 s	1.5 s	0.52 s	0.27 s	0.18 s	0.1 s (e)
Child 2nd	30 m (e)	45 s	3.2 s	0.7 s	0.27 s	0.14 s	<0.1 s	<0.1 s (e)

(e) = estimated.

The table has been taken from a 1993 ASSE paper. There are a number of different published figures used to indicate the effect of temperature and time on the severity of the resultant burn. All figures used must be taken as indicators only as from the difference in published figures it is clear that the results will vary from person to person.

Legionella or Burns? The Solution

As indicated in the time versus temperature chart above, water below 50°C can be considered 'safe' as even for a child to receive a second degree burn would take 45 seconds, however water stored below 50°C creates a breeding ground for legionella bacteria.

The best solution to both problems is to fit a thermostatic tap at the point of use or a thermostatic mixing valve in the pipeline leading up to the point of use, ie local to the taps. This will allow the hot water to be stored at a sufficiently high temperature in the water heater to prevent bacteria growth but the tap or valve will mix cold water and hot together and discharge it at a controlled and stable temperature, typically 39°C-43°C in a hospital or nursing home, to prevent scalding the end user.



The TMV3 Scheme and NHS Model Engineering Specification D08

In 1996 the UK market for thermostatic mixing valves was largely unregulated; the regulations that did exist in terms of British Standards were woefully inadequate for modern plumbing systems and were essentially self certification standards. At about the same time, the Department of Health realised that the issue of scalding within NHS properties was a serious threat to the health and safety of both patients and staff, and that the tempering valves then being fitted in order to protect the people under their care were not up to the job.

Part of the problem laid in the fact that the tempering valves being installed at that time were mainly of Continental or North American design and could not cope with the vagaries of UK supply conditions, such as low pressure from gravity fed systems or having a mixed pressure system (ie high pressure mains cold and low pressure gravity hot water). Another, far greater problem was that the UK standard at the time, BS1415 part 2, was a self certification standard, so anyone could claim compliance. The standard was also very weak in terms of how much of the functionality of the valve was tested, and virtually everything was done at low, equal pressures.

To address the scalding threat and the issue of insufficient regulation NHS Estates enlisted the help of WRc and industry, including Reliance Water Controls, to discuss what could be done to ensure that the thermostatic mixing valves fitted in hospitals and nursing homes were: (a) of suitable quality, (b) capable of functioning under extreme supply conditions which were then and are still common in the UK, (c) identifiable and traceable after installation, and most importantly (d) independently third party tested by an approved test house, and not self certified. From initial discussions around these issues, the 1997 NHS model engineering specification D08 – which forms the basis for the testing requirements of the TMV3 scheme – was born.

The key as to why the D08 specification has worked so well lies in the fact that it was written collaboratively by the UK regulators, test houses, industry and NHS Estates: all of whom understand that the unique qualities found in UK plumbing systems create challenges that are different from anywhere else in the world. In consideration of this, the specification was written to investigate performance at both high and low pressures, and with mixed high and low pressures, and to cover a multitude of other requirements never before considered: such as thermal shut down on hot or cold supply failure (ie the failsafe test), testing for hot spikes, testing for temperature control at equal and unequal pressures, testing for temperature stability under changing inlet temperatures, and many others. In the years since the D08 was first written it has had some updates but it has proven its validity and quality as the core of the specification has remained largely unchanged from the 1997 version, and it has become a benchmark for many countries to use as the basis for their own national standards for thermostatic mixing valves.



Buildcert and the TMV3 Scheme

The TMV3 scheme is the third party accreditation scheme administered by Buildcert (a division of WRc-NSF). This scheme has been set up to independently test that taps and valves submitted are suitable for use in high risk applications within the UK. The performance testing carried out on a tap or valve in order for it to gain compliance is based on the NHS D08 model engineering specification, but many other factors are also considered. In addition, an applying company must prove that they comply with ISO 9001 or a suitable equivalent quality control system, the product is checked for correct marking so it can be identified in the field, packaging and instructions are checked to make sure they comply with guidelines issued by Buildcert. If the TMV3 scheme's technical assessment panel is convinced that all the performance and non performance related requirements have been met, then they will issue a certificate granting a five year period of approval for the thermostatic mixing valve. The tap or valve will also be added to a list of approved products which is kept on the Buildcert website and is updated regularly. During this five year period of approval Buildcert will carry out two audit tests, usually after 18 months and again after 36 months; this involves Buildcert removing product from a company's stock and subjecting it to specific tests to ensure that production taps or valves comply with the requirements of the TMV3 scheme as well as the valves originally submitted for testing. This level of third party compliance testing is unheard of in the rest of the world and helps to keep the UK at the forefront of hot water safety and the development of thermostatic mixing valve technology.

Product Range

The Caremix® range of TMV3 thermostatic taps are designed for use in high risk environments such as hospitals or nursing homes to protect vulnerable people from the dangers of scalding.

- CTAP 100 001** **Monobloc TMV3 approved sequential thermostatic tap**
- CTAP 100 002** **Monobloc TMV3 approved sequential thermostatic tap with extended lever**

- CTAP 100 005** **Wall mounted TMV3 approved sequential thermostatic tap**
- CTAP 100 006** **Wall mounted TMV3 approved sequential thermostatic tap with extended lever**

- CTAP 100 010** **Deck mounted 2 hole TMV3 approved sequential thermostatic tap**
- CTAP 100 011** **Deck mounted 2 hole TMV3 approved sequential thermostatic tap with extended lever**

- CTAP 100 015** **Wall mounted infra-red controlled TMV3 approved thermostatic tap mains powered**
- CTAP 100 016** **Wall mounted infra-red controlled TMV3 approved thermostatic tap battery powered**

Spares

- SKIT 100 008 Caremix® TMV3 Thermostatic Cartridge
- ZNOB100001 Caremix® Standard Handle
- ZNOB100002 Caremix® Extended Lever Handle
- SERV 950 100 Caremix® Service Valve c/w integral flow regulator, check valve isolator and strainer
(For the Caremix® S3 tap only)

Other spares available upon request

Standards

- BS 7942
- BSEN 15091 (CTAP 100 015 & 016 only)
- MES D08
- HTM 64 compliant

Approvals

- WRAS
- TMV3

Approved Applications

Code	Operating Pressure	Application	Recommended Temperature	Maximum Temperature
HP-W	High Pressure	Washbasin	41°C	43°C
LP-W	Low Pressure	Washbasin	41°C	43°C

For hand washbasins it is assumed washing will be under running water.

Caremix[®] S3

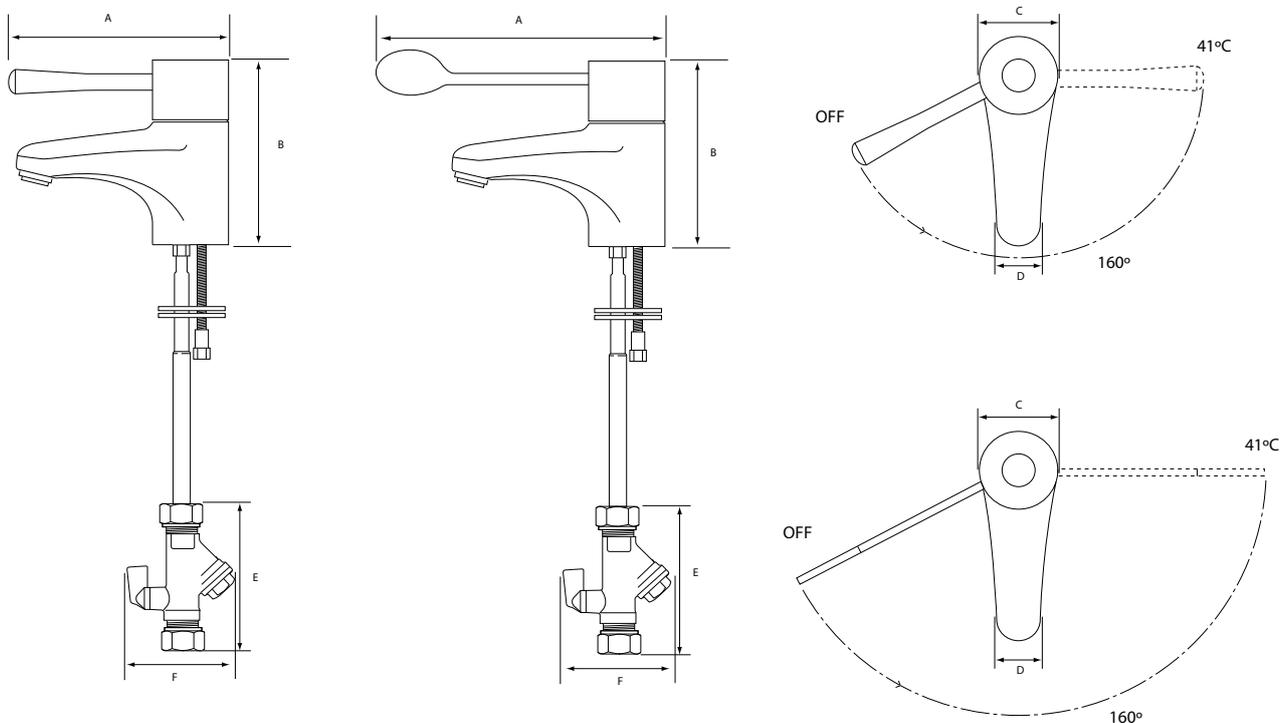
CTAP 100 001 MONOBLOC TMV3 APPROVED SEQUENTIAL THERMOSTATIC TAP

CTAP 100 002 MONOBLOC TMV3 APPROVED SEQUENTIAL THERMOSTATIC TAP WITH EXTENDED LEVER

The Caremix[®] S3 is a sequential D08 approved thermostatic tap for use on single hole basins in high risk environments like hospitals or nursing homes to prevent vulnerable people from being scalded by hot water. The tap is designed for ease of operation and installation and is supplied complete with combination valves incorporating isolation, filtration, check valves and flow regulators.



Dimensions



Part Code	A	B	C	D	E	F	G	H	I
CTAP 100 001	155	148	55	33	110	70	70	118	237
CTAP 100 002	237	148	55	33	110	70	70	118	237

All dimensions in mm unless otherwise stated

Caremix[®] S3 (continued)

Specifications

Hot temperature supply range	50°C - 85°C
Recommended hot supply temperature	55 - 60°C
Cold temperature supply range	5°C - 25°C
Maximum static pressure	10 bar
Maximum working pressure	6 bar
Minimum working pressure	0.2bar
Permitted supply pressure variation	10:1
Factory set temperature	41°C +/-2
Minimum temperature differential (between the hot supply and the outlet temperature)	10°C
Flow rate (regulated)	6 LPM



Caremix[®] T3

CTAP 100 005 WALL MOUNTED TMV3 APPROVED SEQUENTIAL THERMOSTATIC TAP

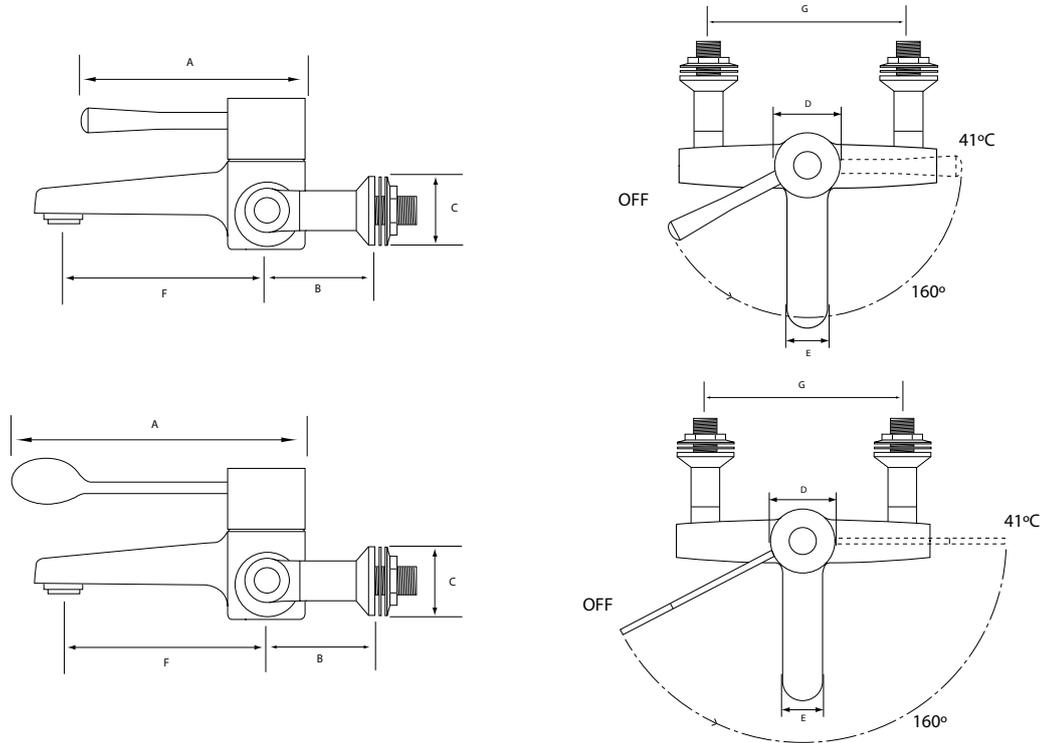
CTAP 100 006 WALL MOUNTED TMV3 APPROVED SEQUENTIAL THERMOSTATIC TAP WITH EXTENDED LEVER

The Caremix[®] T3 is a sequential D08 approved thermostatic tap typically used in areas with a panel system where the tap is mounted on a wall or panel with a void behind which carries the service pipework as is common in many commercial sites. The Caremix[®] T3 tap is perfectly suited for high risk environments like hospitals or nursing homes to prevent vulnerable people from being scalded by hot water. The tap is designed for ease of operation and installation and incorporates isolation, filtration, check valves and flow regulators in the design of the body.



Caremix® T3 (continued)

Dimensions



Part Code	A	B	C	D	E	F	G
CTAP 100 005	155	105	56	55	40	130	200
CTAP 100 006	237	105	56	55	40	130	200

All dimensions in mm unless otherwise stated

Specifications

Hot temperature supply range	50°C - 85°C
Recommended hot supply temperature	55 - 60°C
Cold temperature supply range	5°C - 25°C
Maximum static pressure	10 bar
Maximum working pressure	6 bar
Minimum working pressure	0.2bar
Permitted supply pressure variation	10:1
Factory set temperature	41°C +/-2
Minimum temperature differential (between the hot supply and the outlet temperature)	10°C
Flow rate (regulated)	6 LPM



Caremix[®] H3

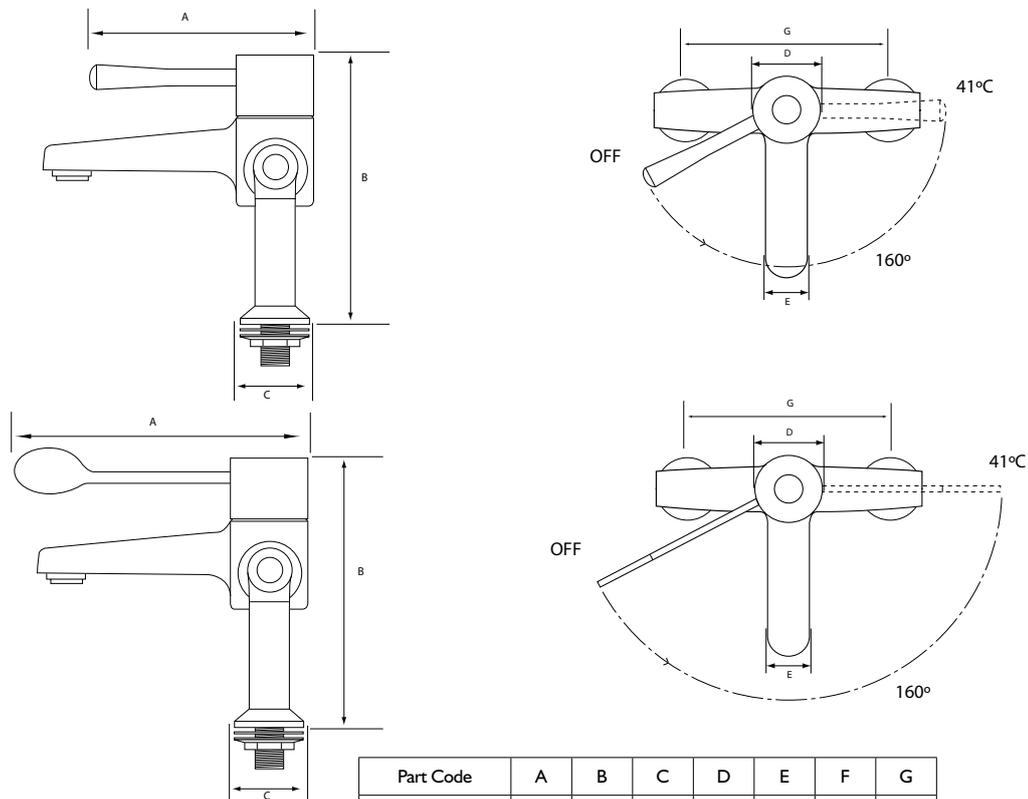
CTAP 100 010 DECK MOUNTED 2 HOLE TMV3 APPROVED SEQUENTIAL THERMOSTATIC TAP

CTAP 100 011 DECK MOUNTED 2 HOLE TMV3 APPROVED SEQUENTIAL THERMOSTATIC TAP WITH EXTENDED LEVER

The Caremix[®] H3 is a sequential D08 approved thermostatic tap for use on two hole basins in high risk environments like hospitals or nursing homes to prevent vulnerable people from being scalded by hot water. The tap is designed for ease of operation and installation and is supplied complete with integral isolation, filtration, check valves and flow regulators.



Dimensions



Part Code	A	B	C	D	E	F	G
CTAP 100 010	155	235	56	55	40	143	200
CTAP 100 011	237	235	56	55	40	143	200

All dimensions in mm unless otherwise stated

Caremix[®] H3 (continued)

Specifications

Hot temperature supply range	50°C - 85°C
Recommended hot supply temperature	55 - 60°C
Cold temperature supply range	5°C - 25°C
Maximum static pressure	10 bar
Maximum working pressure	6 bar
Minimum working pressure	0.2bar
Permitted supply pressure variation	10:1
Factory set temperature	41°C +/-2
Minimum temperature differential (between the hot supply and the outlet temperature)	10°C
Flow rate (regulated)	6 LPM



Caremix[®] IR3

CTAP 100 015 WALL MOUNTED INFRA-RED CONTROLLED TMV3 APPROVED THERMOSTATIC TAP MAINS POWERED

CTAP 100 016 WALL MOUNTED INFRA-RED CONTROLLED TMV3 APPROVED THERMOSTATIC TAP BATTERY POWERED

The Caremix[®] IR3 is a TMV3 approved thermostatic tap which is infra-red controlled. It is designed to be used in areas with a panel system, where a void behind the wall or panel carries the service pipework, concealing the solenoid valves, strainers and power supply. This type of panel system is common in many commercial sites.

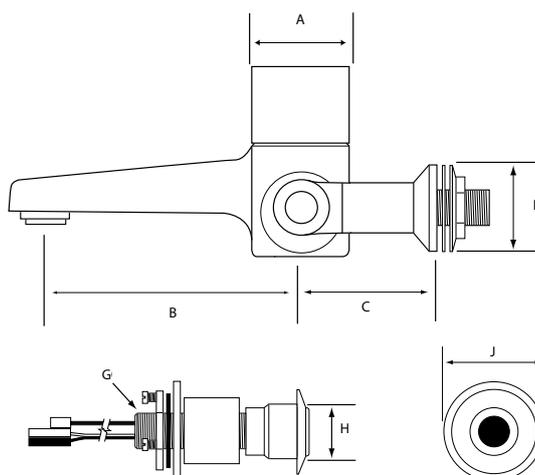
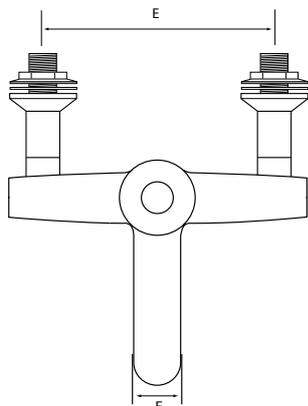
The Caremix[®] IR3 tap is ideal for high risk environments like hospitals or nursing homes to protect vulnerable people from the risk of being scalded by hot water. With the use of infra-red controlled technology, a no touch 'hands-free' system of operation can be achieved: valuable in many environments and particularly in healthcare premises where the risks and potential consequences of cross contamination can be a very serious and potentially health threatening problem.

The tap is designed for ease of operation and installation, as it incorporates isolation, filtration, check valves and flow regulators all within the design of the body. In addition: solenoid valves, link cables, a power supply and the infra-red sensor are all provided.



Caremix[®] IR3 (continued)

Dimensions



Part Code	A	B	C	D	E	F	G	H	J
CTAP 100 015 & 016	55	130	105	56	200	40	½"	32	50

All dimensions shown in mm unless otherwise stated

Specifications

Hot supply temperature range	50°C - 85°C
Recommended hot supply temperature	55°C - 60°C
Cold supply temperature range	5°C - 25°C
Maximum static pressure	10 bar
Maximum working pressure	5 bar
Minimum working pressure	0.5 bar
Permitted supply pressure variation	10:1
Factory set temperature	41°C +/-2°C
Minimum temperature differential (between the hot supply and the outlet temperature)	10°C
Flow rate (regulated)	6 LPM
Power supply	6 volt/1300mAh
Consumption	28 µA (typical) – 40 µA (max)
Adjustable sensing range	50mm to 250mm
Factory set sensing distance	120mm
Detection angle	8°
Convenience delay	2 secs
Security delay	30 secs
Valve pulse time	20 ms
Sensor cable length	800mm
Link cable length	360mm

Typical Installation



Wired Remote Control

SENS 250 000 SENSELEC® WIRED REMOTE CONTROL

For use with the Caremix® IR3 infra-red controlled taps



The remote control gives the installer the ability to accurately set up the product and to monitor usage. Functions include: monitoring the number of operations completed by the tap, the setting of the detection distance, the comfort interval, security settings, the hygiene flush interval and many more. The remote control is powered by a replaceable 9 volt battery.

To use the remote control simply disconnect the cable connections from the solenoid valve and re-connect them to the terminals on top of the remote control.

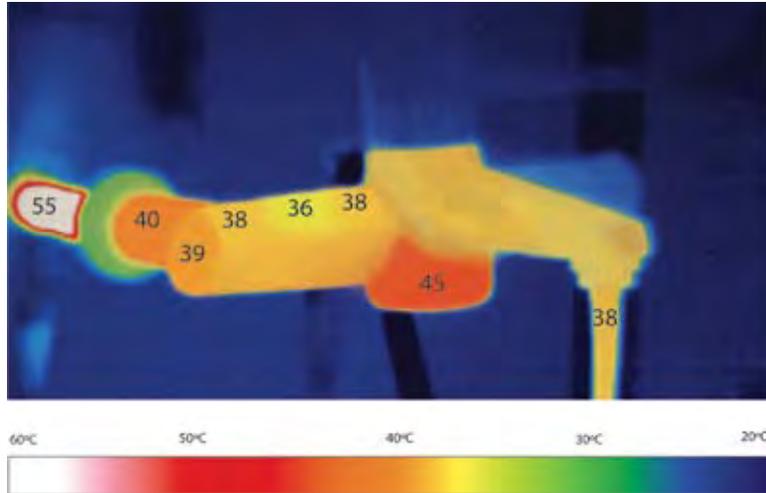
When the remote control is turned on, four core menus are presented which allow the user to select language, monitoring functions, sensor type and parameter. Having selected one of the core menus, sub menus are presented that can be selected to monitor the operation of the tap or to change the operation parameters.

One of the parameters that can be changed is that of the hygiene flush which is normally in the inactive mode for the standard tap set up but can be set to be active at a 6, 12 or 24 hourly interval with the flow set for any duration between 10 to 180 seconds. In addition to this the detection range, comfort timeout and safety timeout can also be set.

Note: - Wired remote control is only suitable for use with the Caremix® IR3 infra-red controlled taps, not the other Caremix® taps.

Controlled surface temperatures

When thermostatic mixing valves first became a requirement to prevent scalding in healthcare establishments, the vast majority were 'T' pattern valves that are installed in the pipework leading up to a terminal fitting like a pillar tap or non-thermostatic mixer tap. This meant that the surface of the terminal fitting would only achieve the temperature of the mixed



Above: Surface temperature readings (in °C) taken after 4 minutes continuous running, with hot supply temperature of 55°C, cold water supply 12°C, mixed water temperature 38°C.

water being supplied to it (typically 41°C). With the increased popularity of terminal fittings like the Caremix taps where the thermostatic control is integral within the tap, the exposed surface of the tap can potentially achieve the full hot system temperature (typically 55°C-60°C). In a hospital or other healthcare environment every aspect of the tap must be safe for use by a vulnerable person and the potential for injury from using the tap as a grab bar is a clear risk. In order to counter this risk the Caremix taps have been engineered and designed so that the system hot water does not come into contact with the outer brass surface of the tap. This is done through a combination of jacketing the supply line in non heat conducting material and by using a pipe within pipe concept so that the inner pipe does not touch the outer surface.

Design

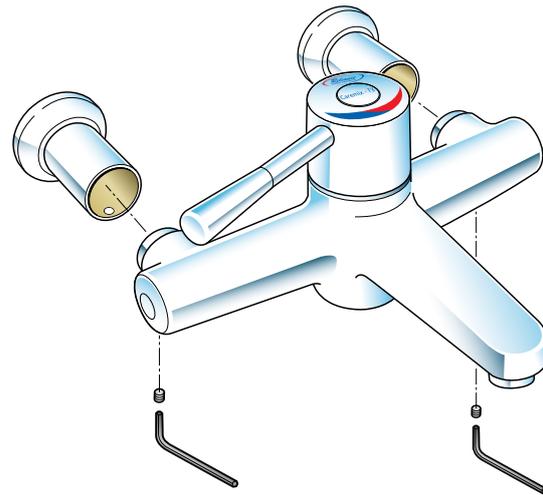
When Reliance was developing the Caremix taps many important design attributes were considered. In addition to the regulatory requirements like D08 and HTM64 compliance, many of the range's built-in features are carefully designed to make the taps easy to use and easy to clean, also to prevent excessive consumption of water and to eliminate internal stagnation as much as possible.

Cleaning

It is clear that in a healthcare environment, the product designer must ensure that taps can be cleaned quickly and easily so that a high level of hygiene can be maintained. The frequency of cleaning is likely to be much greater in a healthcare setting than in other types of public building and stronger cleaning materials and chemicals are likely to be used.

With this requirement in mind, the surface finish of the Caremix taps has been protected by a super hard coating on top of the chrome plating, applied using a special process known as PVD (Physical Vapour Deposition). Before applying a PVD coating, the taps must be meticulously cleaned several times, first ultrasonically and then several times with pure and super pure water. This is important to the process as any mark or blemish like a fingerprint that is visible before the process can not be removed afterwards. After cleaning, the taps are loaded into a vacuum chamber and when all the air has been pumped out, metal is evaporated into the chamber and a little pure nitrogen is bled in. The metal vapour reacts with the nitrogen to form a hard nitride compound. A high DC voltage is then applied to the taps, attracting the metal vapour which adheres to the surface and builds up into a dense coating. Although the coating is very thin (between 2 and 6 microns), it is extremely hard and far more durable than ordinary nickel or chrome plating. The PVD coating will significantly increase the useable life of the taps and maintain the aesthetic appearance for a longer period, even if harsh or abrasive cleaning materials are used.

When designing a range of taps such as the Caremix to be easy to clean, it is clearly desirable to keep the product with as many smooth and unbroken surfaces as possible. Hidden nooks and crevices offer collection points for detritus which will be difficult to clean effectively and could ultimately become a breeding ground for bacteria or at the very least be unsightly. In addition to having a smooth and uncomplicated design, the Caremix H3 two hole deck mounted tap and the Caremix T3 wall mounted tap also have a unique design feature whereby the entire tap body can be detached from the inlet legs by undoing two locating Allen screws, after first shutting off the integral isolating ball valves, so that the entire tap can be removed quickly and easily from the installation for deep cleaning or refurbishment.



Ease of use

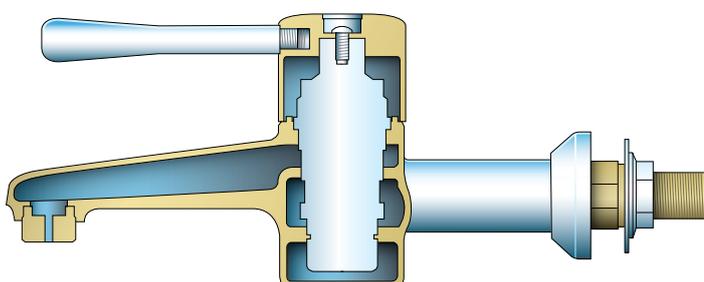
The best built product in the world is of no value to anyone if it can not be used by its intended target market, and the Caremix taps are no exception. As the Caremix range is intended for use in healthcare environments, it must allow easy operation by the infirm and less able. To aid in this the taps come with two alternative handles: a shorter, lever style handle which is suitable for general use in commercial buildings and a longer handle with a flat section at its end so that it can be easily operated with an elbow - the additional length also gives more leverage, assisting the end user who may not be able to apply as much force as others. The longer 'paddle' style handle is designed so that it clears the spout, so there is no interference as it is moved.



Prevention of excessive consumption and stagnation of water

The UK water regulations clearly state that undue consumption and waste of water must be avoided at all times, and requirements under Part G of the building regulations, effective from April 2010 limit the amount of water that can be used in domestic properties to 125 litres per person per day. It is clear that the government is set to make a sustained effort to reduce our overall water consumption. All of the Caremix taps are supplied with flow regulators that will limit the flow rate to 6lpm; if the taps are used in a very low pressure system (0.2 bar and below), the flow regulators can be removed to achieve a sufficient flow.

HTM64 (Health Technical Memorandum) dictates that whenever possible stagnation of water inside the taps should be avoided: this is to prevent the potential growth of bacteria in the spout or valve body. In practice this means that swan neck style taps and aerators should not be used. The Caremix taps have been designed so that the spout is self draining; they are also fitted with flow straighteners which do not trap water and sediment as aerators do.

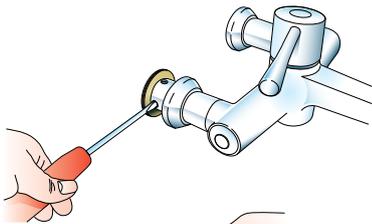


Left: The spout is sloped down to the outlet to minimise water collecting and stagnating when the tap is not in use.

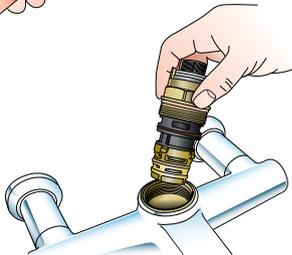
Caremix Taps: Safe and Practical

Servicing and maintenance

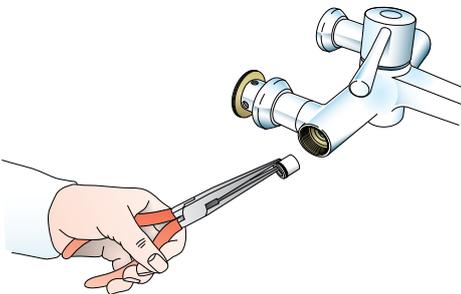
Amongst the many factors considered in the development of products like the Caremix thermostatic taps, future servicing and ongoing maintenance are key. The NHS D08 specification lays out clear requirements for the performance and construction of thermostatic valves and is also very clear on the need for regular testing and - if necessary - servicing of the valves. In order to make the testing and servicing of the Caremix taps as quick and easy as possible, several design features have been included.



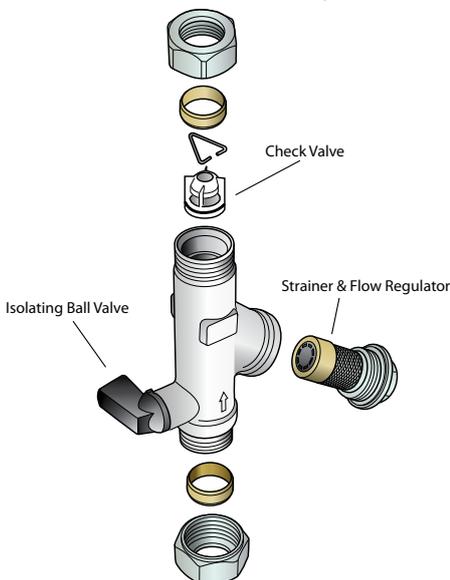
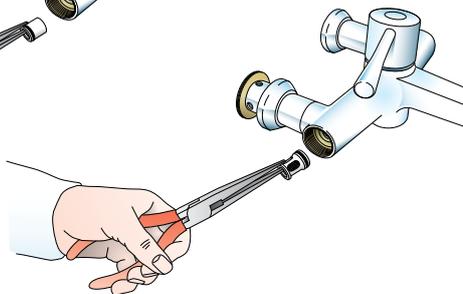
- Integral isolation valves on the Caremix H3 deck mounted tap and the Caremix T3 wall mounted tap that are hidden behind cover plates and accessible without removing any panels or other fixtures.



- The thermostatic control and on/off functions are contained within a single one-piece thermostatic cartridge, which is common and interchangeable between all three Caremix taps.



- The check valves, strainers and flow regulators on the Caremix H3 deck mounted tap and the Caremix T3 wall mounted tap are sited downstream of the isolating valves and are easily accessed for service or replacement.



- As the Caremix S3 is a deck mounted monobloc tap, the isolation, check valves, strainers and flow regulators are provided in separate multi-function valves which are fitted to the supply lines.

CAREMIX®

THERMOSTATIC

TAPS



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The Safety Valve Specialist