

enFlow® IV fluid and blood warming system

The right temperature, in the right place, at the right time



Vital Signs®



The enFlow IV fluid and blood warming system

The enFlow® system from CareFusion delivers the right temperature in the right place at the right time.

The right temperature

By consistently helping to maintain the right patient body temperature, enFlow can help bring the opportunity for both clinical and economic benefits to your hospital. Maintaining normothermia can help lessen complications and speed up recovery time—all while helping to reduce length of patient stays and hospital costs.^{1,2}

The right place

True system mobility and a small transferable cartridge allow enFlow to help maintain normothermia in the right place—throughout all care areas. It can be used before, during and after procedures, in any orientation. And, because its cartridge is easily transported from room to room, enFlow maintains your workflow while saving steps. enFlow maintains your workflow while enabling continuous patient warming.

The right time

The enFlow system enables warmed infusate delivery at the right time across all clinical areas, right away—in less than 18 seconds. Its low priming volume reduces the time needed to reach the temperature set point, thus allowing the warming process to start quickly. Additionally, its close proximity to the patient reduces heat loss across the IV line.



Maintaining normothermia is a necessity

Keeping surgical patients at a normal body temperature is a daily struggle for healthcare providers caring for patients with impaired thermoregulation. Among the millions of surgeries performed annually around the world, it is estimated that 50-90% of those patients suffer from hypothermia.³ Hypothermia is defined as a core temperature below 36° Celsius.⁴ A small reduction in core temperature can have a significant negative impact on postoperative outcomes, affecting patient satisfaction and recovery.⁵ This, in combination with the extra financial burden, is the reason more and more

hospitals are taking actions to address the impact of accidental hypothermia in the clinical and pre-hospital environment.

One of the contributing factors to accidental hypothermia is the intravenous (IV) delivery of cold fluids. One study concluded that each liter of IV fluid infused into adult patients at ambient temperature decreases the mean body temperature by approximately 0.25 °C.² A further analysis in 2010 also concluded that infusion of warm fluid is effective in keeping patients nearly normothermic and prevents postanesthetic shivering.^{6,7}

enFlow features and benefits

Designed for the military

Intuitive. Designed for use by soldiers in extreme conditions, enFlow is very simple to operate. Simply prime, insert the cartridge, switch on, and the system is ready for use.

Warms close to the patient

Closer means warmer. The lightweight warmer (9.5 oz) can be placed close to the patient—allowing less opportunity for fluid-cooling in the IV line.

Reaches temperature in seconds

Time is precious. The known thermal efficiency of our warmer material and the design of the disposable cartridge allow the IV fluid to reach temperature in seconds, thus minimizing prep and waiting time. Simply turn on and fluids will be warmed in seconds.

Small, mobile, disposable cartridge

Transferable. The cartridge is only 4 cm x 11 cm and has a priming volume of 4 mL. It's designed to enable great thermocoupling with the ability to transfer the cartridge from warmer to warmer. This allows you to deliver fluid warming to your patient across care areas that have the enFlow device without having to transport the actual warming system.

Less waste

Compact design. A very small disposable cartridge, coupled with the ability to easily transfer between systems, means less waste.

Application

enFlow is simple to use and requires very little application training. Its set up is quick, application is easy and warming time to reach a target temperature of 40 °C occurs in seconds. By using enFlow you will be warming fluid close to the patient with little loss of temperature as it travels to the patient through the short extension of 3.5 in/7 cm (*approximately 1°C for every meter*).

Unlike the majority of IV fluid warmers, the enFlow disposable cartridge is designed to move easily with the patient, enabling you to warm fluids in all care areas should the need arise, using only one disposable cartridge.

Maintenance

enFlow is designed to be low maintenance. The enFlow IV Fluid/Blood Warming System components have been designed to be durable, long-lasting and water resistant. The system uses current Surface Mount Technology (SMT) and materials. CareFusion recommends a functional test every five years. Additionally, we have developed the enCheck test device to enable your biomedical engineers to check the alarm functionality of the enFlow system quickly and effectively on an annual basis, or per the protocol of individual hospitals.



enFlow mobility:

Combating the negative effect of hypothermia throughout the care continuum



1. Pre-Op

Preoperative warming reduces the impact of heat redistribution caused by anesthesia, leading to a more stable core temperature when your patient reaches postanesthesia care unit (PACU).⁸

2. Emergency room (ER)

Each liter of intravenous fluid infused into adult patients at an ambient temperature decreases the mean body temperature by approximately 0.25 °C.²

Trauma patients often arrive in a hypothermic state and continue to lose body heat during examination by healthcare providers. Warming blood and IV fluids will help maintain normothermia, which can reduce the risks associated with a core temperature below 36 °C.⁹

3. Hallway

Within the first 30 minutes of receiving anesthesia, a patient's core temperature may already have decreased by 1.5 °C¹, leading to increased blood loss and an increased risk of infection.



4. Day surgery

Hypothermic patients, on average, take 40 minutes longer to recover.⁵

Hypothermia can occur in up to 90% of all surgeries.³ Now, with millions of day surgeries being performed every year, it is imperative that patients recover safely and quickly to streamline the demand on surgical services.

5. PACU

Normothermic patients are less prone to postoperative cardiac events and leave the PACU earlier than those suffering from hypothermia.^{10,11}

6. ICU

Hypothermia reduces resistance to surgical wound infections.^{2,12,13}

Fluids or blood may continue to be delivered in the ICU where patients remain at risk from the effects of hypothermia.



enFlow controller, PN 980121EU

The controller unit serves as the power supply for the warmer unit. It is designed to mount on an IV pole or sit on a table top. The front panel includes a temperature display and keypad. Regardless of the unit's orientation, the temperature readout is always displayed in a "right side up" view.



Warmer holder, PN 980305VS, box of 20

The warmer holder affixes to the side of the controller to allow clinicians a place to hang the warmer when it is not in use. This provides effective transportability and minimizes the likelihood the warmer will be dropped and potentially damaged.



enFlow warmer, PN 980105VS

The warmer is designed to work in conjunction with the disposable cartridge to warm IV fluids. The innovative design of the enFlow warmer allows it to be placed within inches of the IV site. This proximity reduces the potential for fluid cooling within the IV line. The unit uses dry-heat technology to attain a temperature of $40\text{ }^{\circ}\text{C} \pm 2\text{ }^{\circ}\text{C}$. The warmer is very lightweight and transportable, weighing only 9.5 oz (275 g).



enCheck testing tool, PN 980400

The enCheck tester was developed to quickly and reliably trigger the over-temperature alarm condition on the enFlow warmer. Within seconds, the enCheck unit will heat the warmer to an over-temperature scenario, causing the alarm to sound. enCheck is also designed to verify the warmer operation at the installation site. Unlike other fluid warming products that often require monthly maintenance and testing, enCheck allows hospitals to confidently use the product for testing required once every 5 years, or as mandated by accrediting bodies.



enFlow disposable cartridge, PN 980200EU, box of 30

The sterilized, disposable cartridge can be connected to any standard luer IV set. The warmer is designed so that the cartridge cannot be inserted incorrectly. The cartridge may stay inline and travel with the patient for up to 24 hours and requires less than 4 mL of priming volume. All cartridges are radiation-sterilized, non-pyrogenic, and made from materials that do not contain natural latex or di-(2-ethylhexyl) phthalate (DEHP). A box of 10 cartridges measures 3" (7 cm) x 5.5" (14 cm) x 4.5 in (11 cm).



Cord clip, PN 980309VS-20, box of 20

The cord clip allows caregivers to affix the cord of the warmer to the patient's bed sheet or clothing.



Cartridge with 3 inch extension set, PN 980202EU, box of 30

Patient-dedicated cartridges with a 3"/7.5 cm extension set (overall length is 5"/12.5 cm) are also available for customers that require extra length at the end of the cartridge to allow for the placement of IV accessories.



Insulated warmer strap, PN 980304VS30

The insulated warmer strap with an integrated insulated pad allows the user to attach the warmer to the patient's limb when the cord clip is not adequate.

enFlow IV fluid/blood warmer system

Warmer	13 cm x 6 cm x 3 cm (5.0" x 2.5" x 1.2")
Controller	23 cm x 15 cm x 9 cm (9.0" x 6.0" x 3.8")
Disposable cartridge	11 cm x 4 cm x 1 cm (4.5" x 1.5" x 0.4")
Weight	Warmer: (w/o disposable): 279 g (9.8 oz) Controller: 1.8 kg (3.9 lb) Disposable cartridge: 33 g (1.2 oz)

Performance Detail

Disposable cartridge priming volume	4 mL
Disposable cartridge sterility	Gamma sterilized
Fluid temperature output	40 °C ± 2 °C
Flow rate range	KVO to 200 mL/min
Input voltage	Warmer: 28 VDC at a maximum of 300 watts Controller: 110-120 or 220-240 VAC 47 – 63 Hz
Temperature set point	40 °C
Input current	5 A

Environmental/Physical requirements

Operating temperature	-5 °C to 50 °C
Storage temperature	-30 °C to 70 °C
Operating and storage relative humidity	Warmer: 10% to 90% Controller: 10% to 90% Disposable cartridge: 10% to 90%
Operating and storage altitude	Up to 4,572 m (15,000 ft)
Operating and storage air pressure	570 hPa, (17 inHg) to 1,060 hPa (31 inHg)

Compliance with standards

Biocompatibility disposable cartridge:	ISO 10993
Infusion set compatible disposable cartridge:	ISO 8536-4
Over temperature set point	ASTM F-2172-02
Alarms	IEC60601-1-8
Water resistance	Warmer: IEC 529 IP67 30 minutes immersion at a depth of 91.4 cm (36 in) Controller: IEC 529 IP21 dripping water Disposable cartridge: IEC 529 IP68 continuous immersion
Penetration	Warmer: IEC 529 IP67 dust tight Controller: IEC 529 IP21 ≥ 12.5 diameter against ingress of solid foreign bodies Disposable cartridge: IEC 529 IP68 dust tight
Electrical safety	UL 60601-1:2005 R6.03, CAN/CSA-C22.2 No. 60601.1:2008, IEC 60601-1-6:2010, AAMI ES60601-1:2005, IEC 60601-1-4:2000 (Canada)
Shock/Drop abuse tolerance	MIL-STD-810F
Vibration	MIL-STD-810F
Electromagnetic emissions	CISPR11 group 1 class A
Electromagnetic immunity	IEC61000-4-3 level 3, 10 V/M
Magnetic field immunity	IEC61000-4-8level 2, 3 A/M
Electrostatic discharge	IEC61000-4-2 level 4, 8 kV contact, 15 kV air

Safety classifications

Type of protection against electrical shock	Class I or internally powered
Degree of protection against electric shock	Type BF, defibrillation-proof
Mode of operation	Continuous

For more information or to order an enFlow IV fluid and blood warmer system,
please call **800.932.0760**, option 2.

References

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