enFlow* IV Fluid and Blood Warmer
The right temperature, in the right place, at the right time
A Case for Maintaining Normothermia

Keeping surgical patients at a normal body temperature is a daily struggle for medical personnel looking after patients with impaired thermoregulation. Among the millions of surgeries occurring annually in the world, it is estimated that 50-90% suffer from hypothermia. Hypothermia is defined as a core temperature below 36˚ Celsius. Small reduction in core temperature can have a significant negative impact on postoperative outcomes, affecting patient satisfaction and recovery. 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 the issue is the delivery of cold fluids. One study concluded that each liter of intravenous fluid infused into adult patients at ambient temperature, decreases the mean body temperature by approximately 0.25 °C. A further study in 2010 also concluded that infusion of warm fluid is effective in keeping patients nearly normothermic and preventing postanesthetic shivering.
Preoperative warming reduces the impact of heat redistribution caused by anesthesia, leading to a more stable core temperature throughout surgery and on entry into PACU.

Within the first 30 minutes of anesthesia core temperature may already have decreased by 1.50 °C leading to increased blood loss, reduced productivity and an increased risk of infection.

Hypothermic patients on average take 40 minutes longer to recover. Hypothermia can occur in up to 90% of all surgeries and now with millions of day procedures being carried out every year it is imperative that patients recover safely and quickly to maintain the demand on services.

Normothermic patients are less prone to postoperative cardiac events and leave PACU earlier than those suffering from hypothermia.

Hypothermia reduces resistance to surgical wound infections. Fluids or blood may continue to be delivered in the ICU where patients remain at risk from the effects of hypothermia.
When it comes to fluid warming, the enFlow IV blood and Fluid warmer can help you maintain normothermia with accuracy, mobility and speed. Its compact size and performance can also help you deliver higher quality care to more people, part of GE’s healthymagination commitment.

The enFlow IV Fluid and Blood Warmer

The Right Temperature
By consistently helping to maintain the right patient temperature, enFlow brings the opportunity for both clinical and economic benefits to your hospital. Maintaining normothermia can help lessen complications and speed up recovery time – all while reducing length of stay and hospital costs.14

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.

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

• Designed for the military
  Intuitive. Designed for use by soldiers in extreme conditions, enFlow is very simple to utilise. Simply prime, insert the cartridge, switch on, and the system is ready to 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 IV fluid warming system quickly and effectively on an annual basis, or per individual hospital protocol.

• Small mobile, disposable cartridge
  Transferable. The cartridge is a modest 4 cm x 11 cm and has a priming volume of 4 mL. It's designed to enable great 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, coupled with the ability to easily transfer between systems, means less waste and less cost.

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.

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. GE recommends a functional test every five years. Additionally, we have developed the enCheck test device to enable your engineers to check the alarm functionality of the enFlow system quickly and effectively on an annual basis, or per individual hospital protocol.

GE also offers technical support Monday - Friday to answer any technical questions.

enFlow Products

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.

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 °C ± 2 °C. The warmer is very lightweight and transportable, weighing only 9.5 ounces (275 g).

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 cartridges can stay in line and travel with the patient for up to 24 hours and require less than 4 mL priming volume. All cartridges are radiation-sterilized, non-pyrogenic, and made from materials that do not contain natural latex or DEHP. A box of 10 cartridges measures 3 in (7 cm) x 5.5 in (14 cm) x 4.5 in (11 cm).

Disposable sterile cartridges, PN 980202EU, box of 30
Patient-dedicated cartridges as above but with a 3in/7.5cm extension set (overall length 5 in or 12.5 cm) is also available for customers that require extra length at the end of the cartridge to allow for the placement of IV accessories.

Warmer holder, PN 980305, 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.

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.

Cord clip, PN 980309VS, box of 20
The cord clip allows care givers to affix the cord of the warmer to the patient’s bed sheet or clothing.

Insulated warmer strap, PN 980304VS30
Strap with integrated insulated pad allowing the user to attach the warmer to the customers limb when the cord clip is not adequate.
**enFlow IV Fluid/Blood Warmer System**

**Performance Detail**
- Disposable cartridge priming volume: 4 mL
- Temperature, Operating: -5 °C to 50 °C
- Temperature, Storage: -30 °C to 70 °C
- Relative Humidity, Operating and Storage: 10% to 90%
- Altitude, Operating and Storage: Up to 4,572 m (15,000 ft.)
- Air Pressure, Operating and Storage: 570 hPa, (17 in. Hg) to 1,060 hPa (31 in. Hg)
- Compliance with Standards:
  - Biocompatibility Disposable Cartridge: ISO 10993
  - Infusion Set Compatible Disposable Cartridge: ISO 8536-4
  - Over Temperature Set Point: 40 °C
  - Input Voltage: 28 VDC at a maximum of 300 Watts
  - Input Current: 5 A
  - Weight: Warmer: 279 g (9.8 oz), Controller: 1.8 kg (3.9 lb), Disposable Cartridge: 33 g (1.2 oz)

**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
- IEC61000-4-8 Level 2, 3 A/M

**Magnetic Field Immunity**
- 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

**References**

2. NICE (National Institute for Clinical Excellence) Inadvertent perioperative hypothermia: full guideline (April 2008).
15. Mahoney, Christine Brown, RN, PhD, MS & Odum, Jan RN, MS, COPAN, FAAN; Maintaining intraoperative normothermia: A metaanalysis of outcomes with costs. AANA Journal, April 1999, Vol. 67, No. 2, 155-164.
About GE Healthcare
GE Healthcare provides transformational medical technologies and services that are shaping a new age of patient care. Our broad expertise in medical imaging and information technologies, medical diagnostics, patient monitoring systems, drug discovery, biopharmaceutical manufacturing technologies, performance improvement and performance solutions services help our customers to deliver better care to more people around the world at a lower cost. In addition, we partner with healthcare leaders, striving to leverage the global policy change necessary to implement a successful shift to sustainable healthcare systems.

Our “healthymagination” vision for the future invites the world to join us on our journey as we continuously develop innovations focused on reducing costs, increasing access and improving quality and efficiency around the world. Headquartered in the United Kingdom, GE Healthcare is a $17 billion unit of General Electric Company (NYSE: GE). Worldwide, GE Healthcare employs more than 46,000 people committed to serving healthcare professionals and their patients in more than 100 countries. For more information about GE Healthcare, visit our website at www.gehealthcare.com/vitalsigns

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