Comparison of IV Fluid Line Warmers
Advanced Anaesthesia Specialists
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We have received samples of IV Fluid warmers for testing.

Procedure:

IV fluid at room Temperature was delivered to the IV line fluid warmer via a standard IV fluid pump with its standard IV set & the IV fluid container elevated 0.5M above the IV pump. IV fluid temperature was measured at 2 locations on "the patient side" of the fluid warmer at a range of IV fluid flow rates.

a) 200mm downstream from the IV fluid warmer
b) 10 mm downstream (ie the "outlet") from the IV fluid

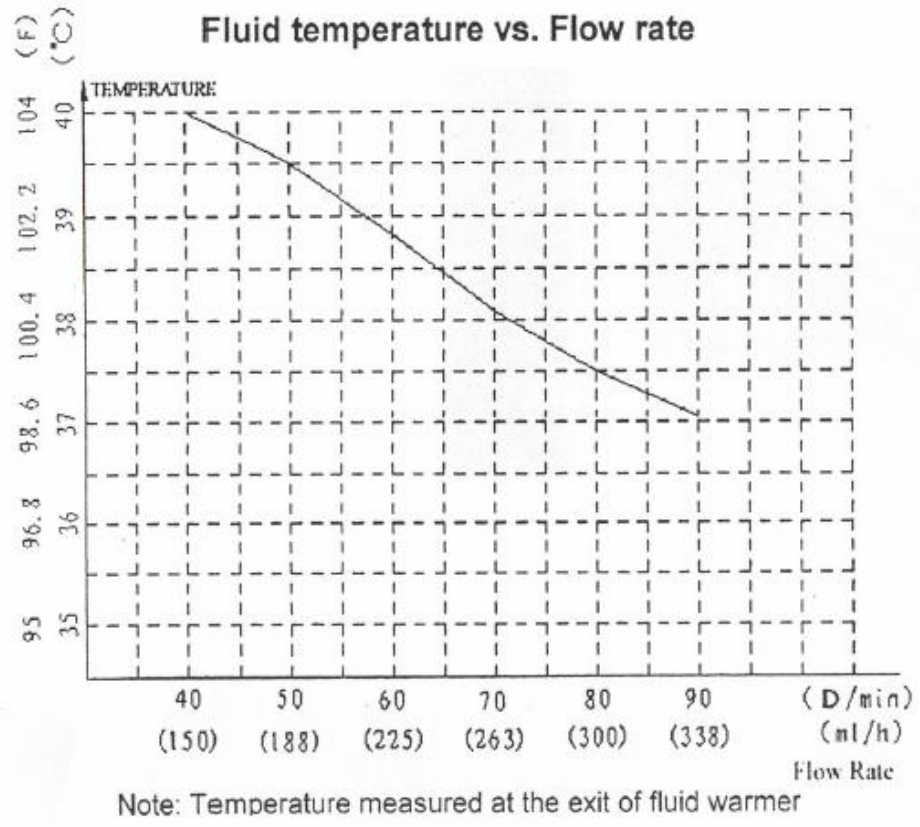
This data is presented in XL graphs after each manufacturer's published graphical performance information (supplied in the user instruction manual)

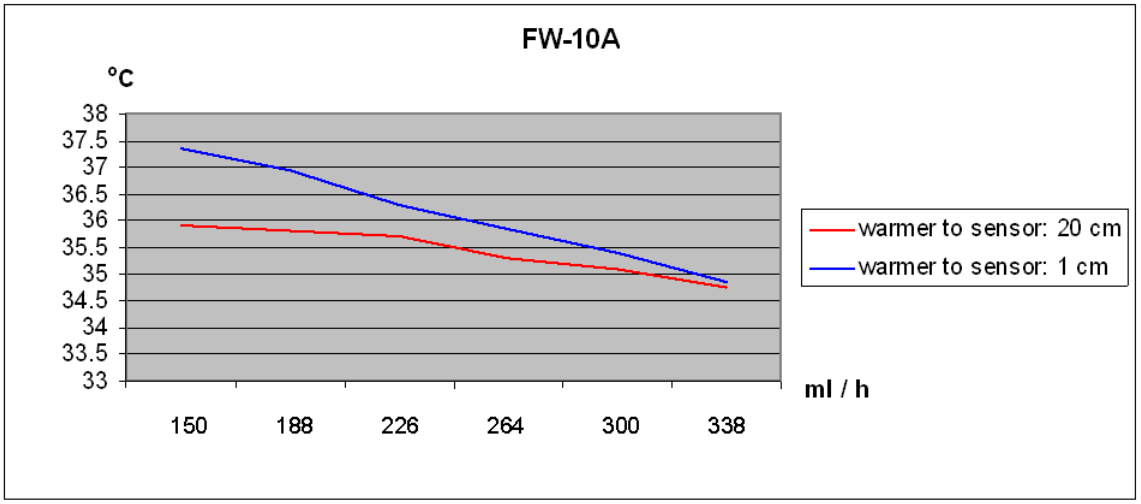
Variability between heaters in 1 model type:
The maximum heating temperature of the first warmer was in excess of acceptable limits, when compared to other manufacturers/brands (44 ^{o}C ~ 45 ^{o}C). A second unit was modified, and the maximum fluid temperature was below this limit (32.3 ^{o}C). However, at a practical distance from the warmer outlet, the IV Fluid temperature is below 30^{o}C at all flow rates (the highest fluid temperature is now only 7.1 ^{o}C above the initial fluid temperature at the lowest measured flow rate).

By comparison, the second brand of IV fluid warmer warms the fluid by just over 10 ^{o}C at 20cm distal from the warmer at the lowest tested rate of 150ml/h (higher than the first model).

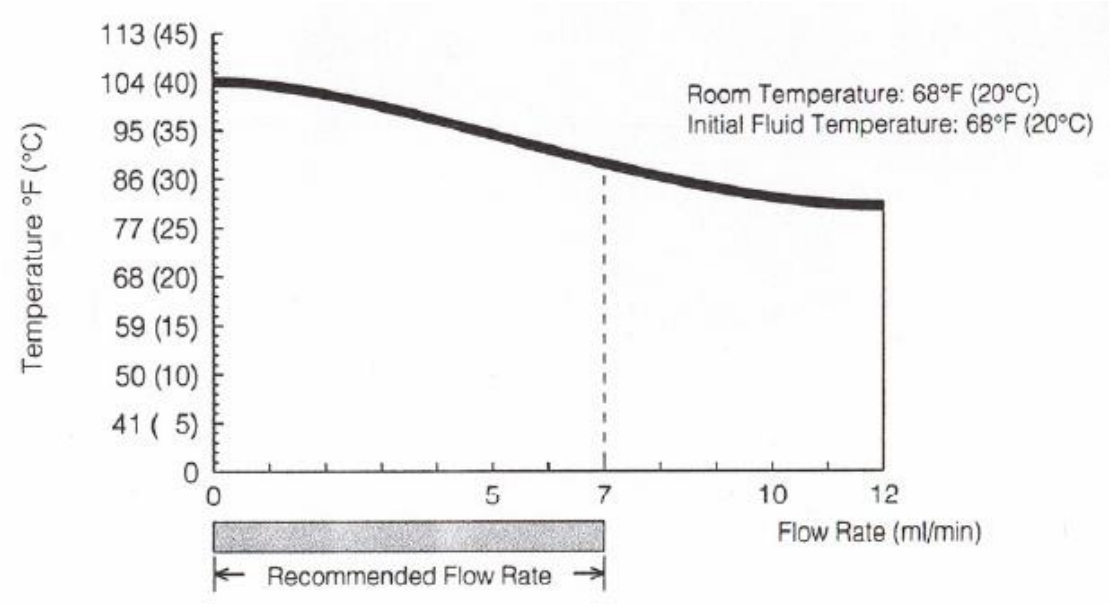
Safety also appears to be a deciding factor between these models, with respect to over-temperature cut-out. The first model is not specified as having a thermal cut-out in over-temperature conditions; testing also indicates this to be the case. The second model on the other hand, has good operational indicators, an LCD display indicating plate temperature, and an over-temperature cut-out that can actually be tested by applying a heat gun to the warming surface to elicit the warning alarm. (PH)

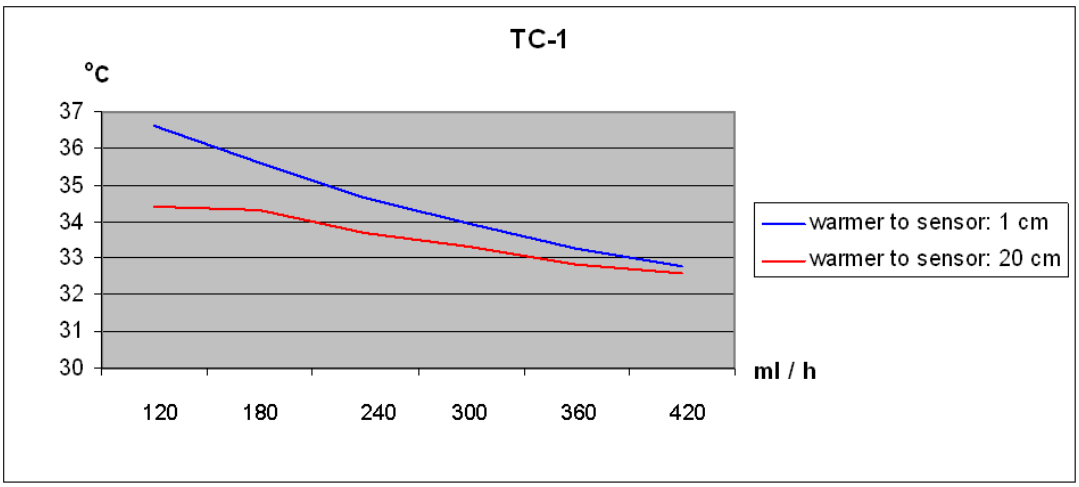
Testing Details and Results:
Angel FW-10A (GX)
Room temperature: 29.4 °C
Initial water temperature: 25.8 °C
Pump: Lifecare 5000
Temperature sensor: Cardell 9500 temperature sensor
IV set: IV set for Lifecare 5000
Warmer: Angel FW-10A





Tempcare TC-1 (GX)
Room temperature: 28.6 °C
Initial water temperature: 25.6 °C
Pump: Lifecare 5000
Temperature sensor: Cardell 9500 temperature sensor
IV set: IV set for Versaflo 1000
Warmer: Tempcare TC-1





Flyaford: SN 19861208396 (GX)
Room temperature: 26.3 °C
Initial water temperature: 24.4 °C
Pump: Lifecare 5000
Temperature sensor: Cardell 9500 temperature sensor
IV set: IV set for Versaflo 1000
Warmer: Shenzhen Flyaford IV Fluid warmer

Product Capabilities (in the manual)
When velocity is 2 ml/min—10 ml/min, Infusion temperature is 26℃ - 35℃。

Flyaford	Sn 19861208396		
	flow rate (ml/h)	1 cm	20 cm
	120	50.8	44.2
	240	43.4	42.5
	360	40.7	39.9
	480	38.1	37.6
	600	36.5	35.5