invensys
Eurotherm

nanodac™

Recorder/Controller
Steriliser Application Block

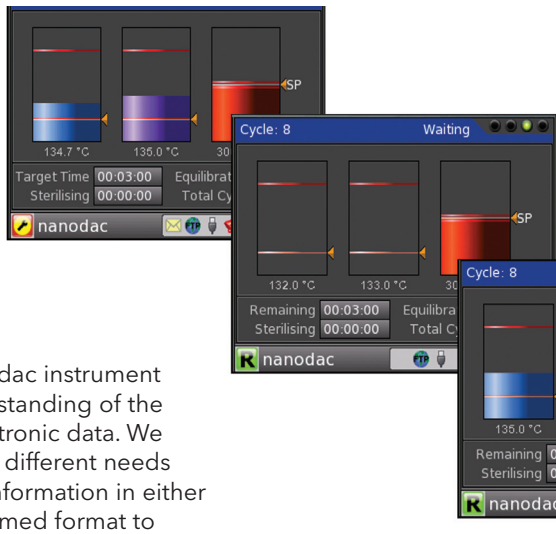
imagine making the impossible possible

imagine bigger better smaller, we did. We combined our extensive expertise in absolute data security and world class control to bring you the best in recording and control in a space-saving, small box with a superb full colour display and it is called the nanodac™ recorder/controller. Add to this, an absolute commitment to technological innovation, constant reinvestment in research and development, and a team of engineering oriented salesmen who understand your process requirements; we can and do imagine making the impossible possible for our customers.

nanodac Recorder/Controller Steriliser Application Block

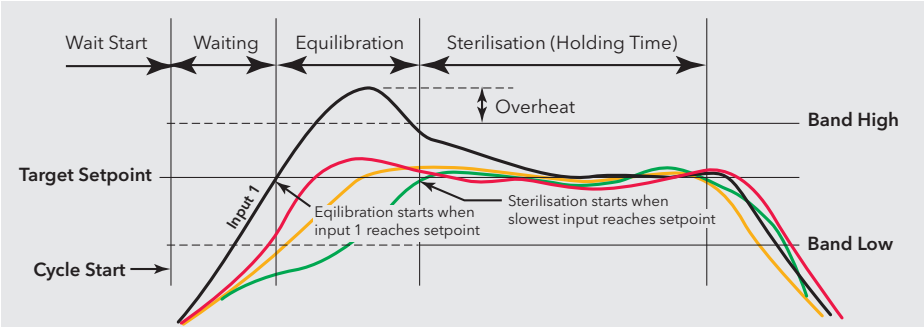
The nanodac recorder/controller offers the ultimate in graphical recording combined with PID control for a box of its size. The compact ¼ DIN panel mount unit offers four high accuracy universal inputs for data recording and PID control. This secure data recording device with accurate control is enhanced by a full colour, ¼ VGA, 320 x 240 pixel display to bring a crystal clear operator interface to even the smallest of machines.

In order to assist with the Decontamination process the Invensys Eurotherm R&D resource worked with a number of Steriliser manufacturers to develop a solution for the Independent Monitoring System (IMS). The resulting Sterilisation Application provides cycle based data logging and monitoring. In addition the intuitive display provides instantaneous information on the status of the Sterilisation cycle. The Steriliser Application supports up to four process variables, (Chamber Temperature, Chamber Pressure and Air Detector being the three primary variables) and is suitable for use with Porous Load, Dry Heat, Flash, and LTS Sterilisers or for those sterilisers requiring no more than four process variables.



Photograph courtesy of BMM Weston Ltd

The recording functionality within the nanodac instrument contains decades of knowledge and understanding of the requirements of capturing and storing electronic data. We understand that different applications have different needs and the nanodac recorder can store your information in either open CSV format or in a secure, check summed format to protect data integrity. Whichever format you choose for your process we have the tools to help you keep this data safe, get it to the place you need, and in the format you require.



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Display Information

Cycle
A five-digit counter to indicate the total number of cycles.

Remaining
The sterilising time remaining for the current cycle. The display field is replaced by 'Target Time' when the cycle is not running.

Target time
The intended sterilisation time.

Status

Wait start:	The initial state at power up. This status remains until the first cycle is initiated.
Waiting:	Waiting for input 1 to reach its target setpoint. The cycle then enters Equilibration.
Equilibration:	Currently in the equilibration period, during which the cycle waits until all inputs have reached sterlisation conditions.
Sterilising:	Currently in the decontamination phase
Passed:	The cycle has completed successfully
Failed:	The cycle has failed either through one or more inputs becoming invalid, or because the 'Start' signal was removed.
Test cycle:	A test cycle is in progress

Input values
Temperatures are required in °C; pressure inputs in mBar. If necessary, maths channels and user values can be used to convert from other units.

Total Cycle
The elapsed time since the initiation of the current cycle. This time increments from the time the cycle is triggered until the time the trigger is removed.

Equilibration
The 'Holding Time' is preceded by a period during which the load has not yet fully attained temperature due to its thermal inertia. 'Equilibration time' is defined as the time between the attainment of sterilisation temperature in the chamber, and the attainment of that temperature in all parts of the load.

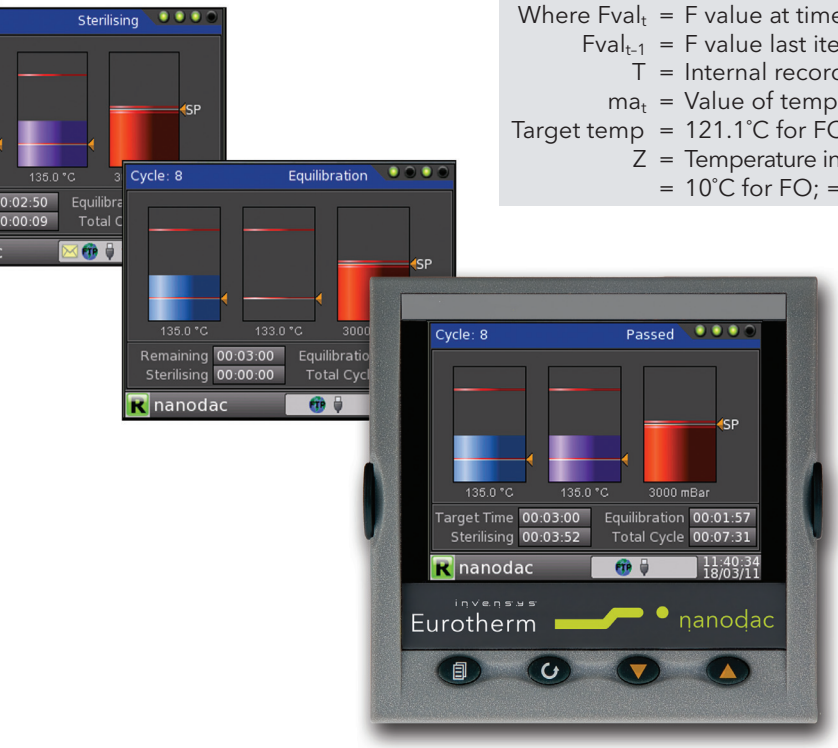
F0 (Lethality)

F0 is a means of calculating the 'equivalent time at sterilising temperature' for temperatures below, at, and above sterilising temperature, using the equation below.

FVALUE To calculate the equivalent time at sterilising temperature (for temperatures below, at and above sterilising temperature) both in dry (FH) and steam (FO) sterilising environments, we use the following equation:

$$Fval_t = Fvalt_{1-T} + T \times 10^{\frac{ma_t - \text{Target temp}}{Z}}$$

Where $Fval_t$ = F value at time t (minutes)
$Fval_{t-1}$ = F value last iteration
T = Internal recorder iteration interval (minutes)
ma_t = Value of temperature measuring channel
Target temp = 121.1°C for FO; 170°C for FH
Z = Temperature interval representing a factor-of-10 reduction in killing efficiency
= 10°C for FO; = 20°C for FH



Where:
Sterilisation time Depends on the application, typically 1 minute at Ts = 121°C.
Temp The value of the temperature measuring input.
Ts Desired sterilising temperature.
Z Temperature interval representing a factor of ten reduction in killing efficiency. Z = 10 for steam sterilising (F0); Z = 20 for dry heat sterilising (FH); Z = 10 for thermal disinfection (A0).

To ensure that steriliser loads that contain materials with different thermal inertias are thoroughly sterilised, a number of sensors are located within the load. The 'F' value should be calculated using the sensor closest to that part of the load which has the highest thermal inertia. For maximum accuracy, the temperature sensor should be calibrated and the input adjust function used to compensate for any inaccuracy found.

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