

# NT200

## Smear test instrument



**NUTRONIC** Gävle Sweden



## The number one instrument for contamination control

NT200 is the first choice for your alpha/beta counting needs. With an optimal combination of high performance and user-friendly operation the NT200 is a real timesaver. It makes fast and accurate measurements whether you place it out in the plant, in a central laboratory or in a vehicle.

### NT200 Main features

- Industrial strength alpha/beta counter with laboratory quality
- High detector efficiency and low background gives short measuring times
- Permanently filled proportional detector, no counting gas required
- Optimised for smear (wipe) samples/air samples with display in contamination units, activity or counts.
- Compact design using pass-through sample drawer with two holders
- Very bright and clear display
- Standalone design, no PC needed for operation or calibration
- Built-in printer
- Automatic detection of alpha in beta mode (auto-alpha)
- Automatic background compensation with separate background detector
- Very easy to decontaminate
- Easy to change mode between smear sample and air sample
- Measuring starts by pushing the sample drawer into measuring position.
- Measurement does not start unless the sample is fully in position.

The NT200 is a timesaving and easy-to-use alpha/beta counter optimised for smear samples and air samples. The compact design and the relatively low weight make the NT200 semi-portable allowing it to be easily placed near the sampling location. Increased background radiation is no problem because the NT200 has a 50 mm lead shield and an automatic background compensation system.

Short measuring times and an innovative sample holder make the workflow very efficient. A pass-through drawer acts as a combined sample holder and start button. Insert the first sample, push the slide through the instrument and the measuring starts immediately. Meanwhile the next sample can be placed at the other end of the slide. When the first sample is measured the result is displayed. Push the slide to the opposite position and the measuring of the second sample starts. Insert the next sample and push the slide (and so on) until the sample series is completed. Push a button on the front panel and the built-in printer prints the results, date and time. The computer in the NT200 optimises the measuring process and measuring times to as low as two seconds are possible depending on the required accuracy.



*Insert a sample, push the slide and the measuring starts.*

When the first sample is measured the result is displayed. Push the slide to the opposite position and the measuring of the second sample starts. Insert the next sample and push the slide (and so on) until the sample series is completed. Push a button on the front panel and the built-in printer prints the results, date and time. The computer in the NT200 optimises the measuring process and measuring times to as low as two seconds are possible depending on the required accuracy.



*The optional external keyboard can be used to document the smear samples, adding comments where needed.*

The combination of a proportional detector with alpha and beta separation, a lead shield, computer control and a built-in printer makes it possible for the NT200 to replace permanently installed instruments, usually located in central departments or laboratories. The NT200 can be placed next to the working area in the plant, allowing the operator to measure samples immediately without the delays involved in transportation to a permanently installed instrument. The NT200 saves time and improves the workflow for both routine measurements and measurements during time critical plant maintenance.

### Keyboard and memory card

The external keyboard and a removable MMC memory card makes the NT200 a complete system for documenting smear samples. The operator can make notes about the samples and store them together with the results. The data can be exported in Excel© format to any PC with a MMC card reader for further processing and storage. The memory card can store over 10000 samples along with comments.

## Detector

The NT200 uses a proportional detector that can separate alpha and beta radiation. It has low sensitivity for gamma (background) radiation. The detector is a permanently sealed type and needs no gas supply.

The instrument is equipped with two identical detectors. One measures the sample and the other one measures the background radiation. An anti-coincidence circuit between the detectors lowers the background.

## Measuring modes

The NT200 can be set to measure beta only, alpha and beta or beta with auto-alpha detection. This makes the instrument flexible and easy to adapt for different tasks.

In beta mode the measurement is performed on the beta plateau only. In alpha and beta mode the instrument will first measure on the beta plateau, then when the beta measurement is complete the detector bias voltage is lowered to the alpha plateau voltage and a new measurement is started. The alpha and beta results are presented separately on the display.

In auto-alpha mode the instrument will always start to measure in beta mode. During the beta measurement the instrument monitors for pulses with high amplitude that are suspected alpha pulses. After the beta measurement, if high-amplitude pulses were found, the NT200 will lower the detector bias voltage to the alpha plateau level and make an alpha measurement.

The supervisor can pre-set three sample areas that the user can choose from when a measurement is started.

## Air samples

The NT200 can also measure air samples (50 mm paper filters). The supervisor can pre-set three air volumes that the operator can choose from or the operator can set the volume. The result is displayed in Bq/m<sup>3</sup>.



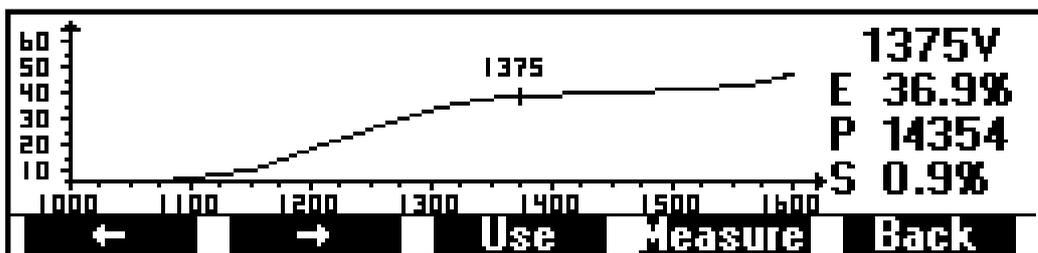
A measurement in auto-alpha mode with the NT200. In the right windows alpha activity has been registered. The display clearly indicates this and shows the alpha and beta results separately.



The NT200 can also measure air samples.

## Calibration

Calibration is simplified by an automated procedure. The plateau scan is presented in a chart on the display and is printed on the printer.



Example on beta plateau from a Co-60 source. The arrow keys are used to step up and down in the plateau to select a suitable detector bias voltage.

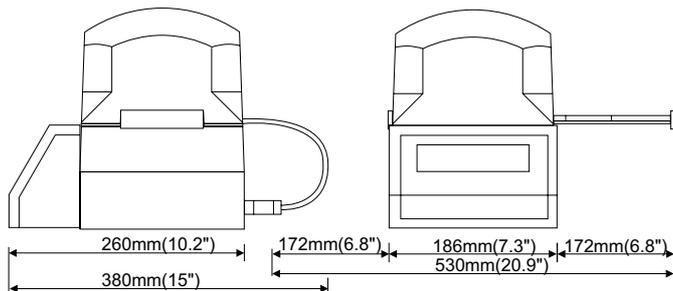
## Specifications

### Size

Width 186 mm (7.3"), depth 260 mm (10.2"), height 240 mm (9.4").  
Working area including sample drawer and cables:  
depth 380 mm (15"), width 530 mm (20.9").  
Lead shield thickness approx. 50 mm (2").

### Weight

Total weight 47 kg (104 lb). Each part weights less than 25kg (55 lb).



### Detector

Permanently sealed proportional detector.  
Gas filling: Argon, CO<sub>2</sub>  
Window density: 2,0 mg/cm<sup>2</sup>  
Active window diameter: 44 mm (1.7")

### Typical instrument efficiency

Measuring geometry 2π according to ISO 7503-1.

Nuclide	Eff. [%]
Sr-90/Y-90	49
Co-60	37
Am-241	34

### Background count rate

CPS	μGy/h
0,25	0,1
0,4	1
0,8	10
0,010	1,0 (alpha mode)

### Background compensation

The NT200 has dynamic and static background compensation modes.  
Dynamic: Background is counted during the sample counting with the background detector. Suitable in areas with varying background.  
Static: Background is counted before sample counting. Suitable for areas with stable background. The NT200 also has an anti-coincidence circuit to reduce the background.

### Measuring modes

Beta with auto-alpha, beta only, alpha only, alpha and beta.  
Max display value: 9999 Bq/cm<sup>2</sup>, 99999 kBq/m<sup>2</sup>.

### Display units

Bq/cm<sup>2</sup>, kBq/m<sup>2</sup>, kDPM/dm<sup>2</sup>, Bq, DPM, μCi, nCi, CPS, CPM, Bq/m<sup>3</sup>, counts.

### Sample holder

Cup size 52x5 mm (2"x0.2") or direct insertion of smears under a clip ("mouse trap") depending on sample holder model. Custom holders can be made up to 62 mm (2.4").

### Power supply standard model

Input voltage: 90-264 VAC, max 20W peak while printing.  
Normal operation: 9W

### Power supply NT200DC

Input voltage: 10-36 VDC. Current consumption at 12V: 0,6 A normal operation, 2 A peak while printing.

### Flash memory card

Type: MultiMediaCard (MMC, 16 Mbyte minimum), storage of >10 000 samples.

### Display

LCD, resolution 256x64 dots. Black text on white background.

### Printer

Type: Thermal line dot system  
Paper width: 58 mm (2.3")

### Software

The NT200 incorporates user-friendly software with menus for all settings. Easy upgrade by inserting a memory card in the NT200. A menu password and a switch that can be sealed protect all settings.

### Languages

The software can be set to English, French, German, Swedish or Finnish.

### Minimum detectable activity (MDA)

The formula is based on ISO/FDIS 11929-1 and ISO 7503-1.

Typical example for Co-60/Am-241:

Efficiency beta	37%
Efficiency alpha	34%
Background alpha	0,005 CPS
Background beta	0,25 CPS (0,50 μGy/h)
Sigma, number of	1,65 (confidence level 90%)
Source efficiency	25%
Smear area	300 cm <sup>2</sup>
Removal factor	10%

Time [s]	MDA beta [Bq/cm <sup>2</sup> ]	MDA alpha [Bq/cm <sup>2</sup> ]
10	0,47	0,25
20	0,29	0,14
30	0,22	0,09
100	0,11	0,03

### Applicable standards

The NT200 adhere to the following international standards:

**IEC 325** Alpha, beta and alpha-beta contamination meters and monitors. **ISO 7503-1** Evaluation of surface contamination. **ISO 8769** Reference sources for the calibration of surface contamination monitors. **ISO/FDIS 11929-1** Determination of the detection limit threshold for ionising radiation measurements

### Environmental

Operating temperature: 0-40°C (32-104°F).  
Operating humidity: 0-90% relative, non-condensing.

### DC option

Same as base model except: Powered from 10-36VDC. External mains adapter 100-240VAC-12VDC included. Cable with battery clips included.

### Keyboard/memory card option

External keyboard with MultimediaCard (MMC) memory card slot, 1 MMC memory card and software that allows the user make comments for each sample. The measuring series is stored as an Excel© file with the date, the time, the measuring value and the user comment for each sample.

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