NT170

Large area smear sample instrument

NUTRONIC Gävle Sweden

NT 170 Large area smear sample instrument

The NT170 is the first choice for large area contamination control. It counts both alpha and beta on large sample cloths with a maximum size of 175 x 175 mm. It provides an optimal combination of high performance and user-friendly operation It makes fast and accurate measurements whether you place it out in the plant, in a central laboratory or in a vehicle.

NT170 Main features

- Industrial strength alpha/beta counting with laboratory quality
- High detector efficiency and low background gamma sensitivity gives short measuring times
- Permanently filled proportional detector, no counting gas required
- Optimised for smear (wipe) samples with display in contamination units, activity or counts.
- Holds smear cloths up to 175 x 175 mm
- Permanently sealed proportional detector
- High beta efficiency
- Detector active surface 163 x 163 mm
- Lead shield
- Semi-portable with two sturdy handles for easy carrying
- Easy to clean and maintain
- Optional built in printer
- Optional keyboard/memory card

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

The NT170 opens easily for cleaning.

Application

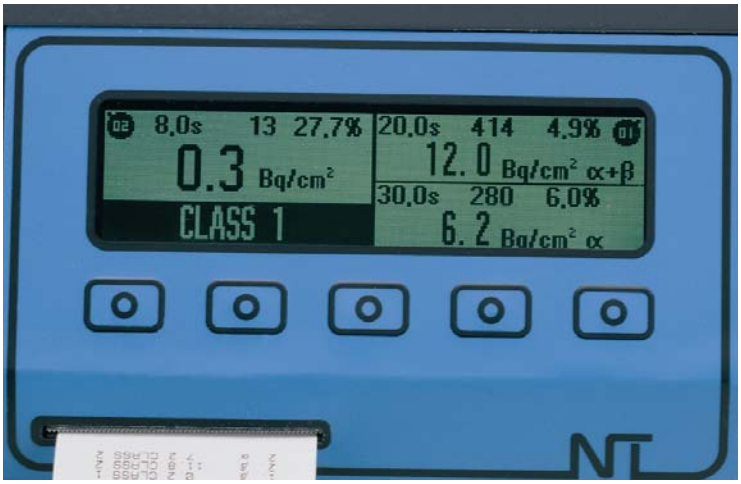
Today's increasing need for contamination control means that new sampling techniques must be employed. By using a large cloth for indirect evaluation of surface contamination a bigger surface can be sampled without saturating the cloth. The NT 170 is designed to hold cloths as large as 175 x 175 mm and this satisfies the most demanding needs for large area sampling.

The NT170 measures smear wipes fast and reliably even in environments with increased background.

Detector

The NT 170 uses a permanently sealed proportional detector. The proportional detector has low background (gamma) sensitivity and high beta efficiency compared to a scintillation detector. It needs no consumables and gives long and reliable operation.

Operation
The NT170 is fast and easy to operate. Insert the sample, close the sample holder and the measuring will start. The result is displayed in directly in contamination units (Bq/cm^2). The result can also be printed on the NT170 built in printer (option).



Measuring results are displayed in the NT170 display

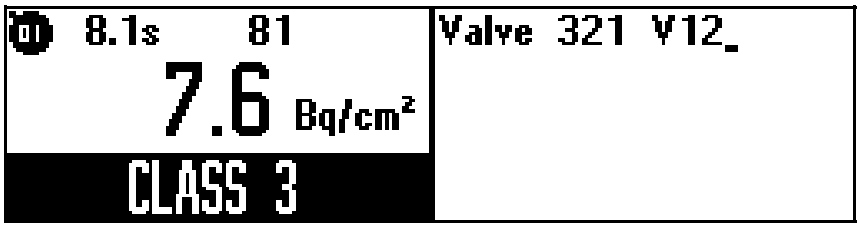
Measuring modes
The NT170 can be set to measure beta only, alpha and beta or beta with auto-alpha detection. This makes the instrument flexible and easy to adapt for different tasks.

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 NT170 will lower the detector bias voltage to the alpha plateau level and make an alpha measurement.

Calibration and maintenance
Calibration is computer assisted and it is easy to set all parameters. Easy maintenance is built into the product from start. The unit easily disassembles for decontamination and service.

Keyboard and memory card
If the NT170 is equipped with the keyboard/memory card option the NT170 becomes 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.



The user can type comments for each sample if the keyboard option is connected to the NT170.

Technial data NT170

Type of instrument
Smear test instrument for large area smear wipes.

Sample holder

Material:	Stainless steel
Maximum sample size	175 x 175 mm

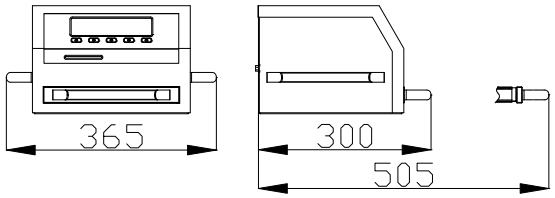
Lead shield

Geometry:	4π
Thickness:	20 mm

Size and weight

Width:	365 mm
Depth:	300 mm
Height:	190 mm
Weight	41 kg

Front view *Side view*



Working area with sample holder in open position:

Width:	365 mm
Depth:	505 mm

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

Power supply

Input voltage:	90-264 VAC
Input frequency:	47Hz to 440Hz
Max input current:	120VAC 1.4A RMS 230VAC 0.7A RMS
Power consumption:	9W normal operation ~20W peak while printing

Background compensation
The stored background count rate is subtracted from the sample count rate and the net count rate is used to compute the measuring value.

Detector
Permanently sealed proportional detector.

Gas filling:	Argon, CO_2
Active window size:	163 x 163 mm
Window material:	Mylar, Aluminium
Window density:	3,0 mg/cm²

Typical efficiency

Beta emitters	Eff. [%]	$E_{\beta max}$ [keV]
Sr-90/Y-90	50	546/2260
Cl-36	45	710
Co-60	38	318
Tc-99	25	294
C-14	14	154

Alpha emitters		E [keV]
Am-241	17	5638
Pu-239	10	5245

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	38%
Efficiency alpha	21,0%
Background alpha	0,030 cps
Background beta	0,05 1,0 [µGy/h] 7 14 [CPS]
Sigma, number of	1,65 (confidence level 90%)
Source efficiency	25%
Smear area	2000 cm²
Removal factor	10%

Background 0,05 µGy/h

Time [s]	MDA beta [Bq/cm²]	MDA alpha [Bq/cm²]
5	0,40	0,17
13	0,15	0,04

Background 1,0 µGy/h

Time [s]	MDA beta [Bq/cm²]	MDA alpha [Bq/cm²]
15	0,40	0,035

Applicable standards
The NT170 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. **Code du Travail Article R234-6** (France, Fair Labour Standards Act, weight less than 25 kg)

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