DETECTOR DATA

T20B and Piranha T20
Dose Probe

INDEPENDENT X-RAY
QUALITY ASSURANCE

Artnr 9630514-00

v2019.12B

GENERAL

The detectors **T20B Dose Probe** and **RTI T20 Dose Probe**, are all referred to as **T20** in the included documentation.

The **T20** is a type of dose detector compatible to previous detectors supplied by RTI like the R100B and the Piranha/RTI Dose Probe. It shall fulfil the relevant parts of the IEC 61674 standard for diagnostic dosemeters.
The **T20B** is optimized for the Barracuda line of electrometers with Lemo connector. The **RTI T20** is adapted for use with the Piranha/Cobia which uses a different connector.

It is optimised to contain as little material as possible, to avoid any influence on the feedback of an Image Intensifier. The long rod makes it easy to position even on the largest Image Intensifiers.

TECHNICAL DESCRIPTION

No corrections needed: The detector's main part is a PIN semiconductor photo diode. The diode detects the X-rays and produces a current proportional to the intensity of the X-rays. As the diode responds differently when exposed to X-rays with different spectral content, an energy filter is placed in front of the detector to compensate for this energy dependence. This makes the response energy independent even for very low dose rates. No corrections are applied, or needs to be applied.
EMI protected: To make the detector more immune to EMI (ElectroMagnetic Interference), as the triaxial cable is not 100 % shielded, ferrite core(s) is used. This is placed on the end of the cable close to the connector.
Connects to electrometer: The currents, and charge, produced by the photo diode can then be measured with an electrometer and converted to values of the air kerma or air kerma rate (or dose and dose rate).

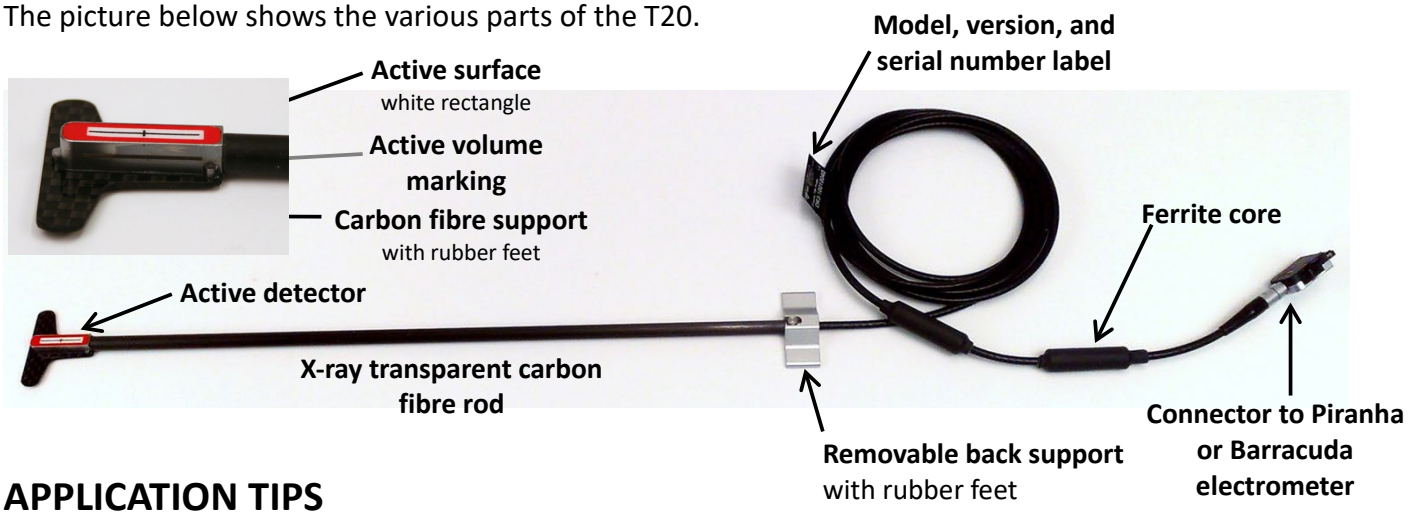
SPECIFICATIONS, TYPE T20

Typical energy dependence	+1,6 to -0,4 % (radiation quality R1) +1,9 to -1,5 % (radiation quality RQR)
Air kerma (Dose) Air kerma rate (Dose rate)	700 pGy – 10 kGy (80 nR – 11 MR) (with Barracuda or Piranha) 27 nGy/s – 500 mGy/s (3 µR/s – 57 R/s)
Inaccuracy	< 3 % between 50 – 150 kV
Typical sensitivity	8 µC/Gy (factor=125 kGy/C) (radiation quality R1)
Cable length	200 cm
Minimum cable bend radius	30 mm (Ø60 mm)
Sensitive volume	This is marked by a rectangle on the red label and by a line on the side of the metallic case.
Dimensions (without cable)	35 × 320 × 6,0 mm (metal 23,5 × 5,6 mm)
Weight	Approx. 75 g
Operating temp. and humidity	-10 °C to +50 °C at <85 % relative humidity
Temperate and air pressure	Insensitive, no TP correction is necessary
Back scatter / Angular dependence	Insensitive to backscatter, will measure the same independent of what is behind the T20. Very close to ideal Cosine (flat sensor). See the graphs on page 4.

Above specifications are valid for + 18 °C to + 23 °C at <80 % relative humidity. All specifications can be altered without notice.

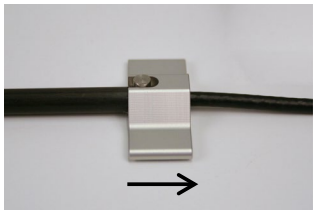
OVERVIEW

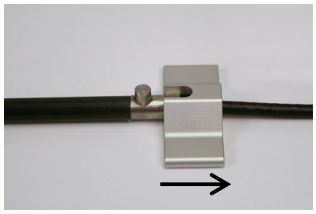
The picture below shows the various parts of the T20.

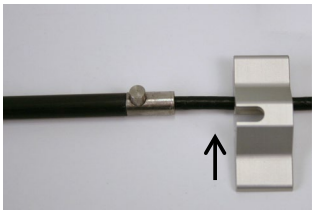


APPLICATION TIPS

The back stabilising device may be removed, as shown below, for instance when measuring in narrow places. To fit it back do the opposite.


1. Pull support backwards


2. Continue pulling


3. Lift the support up over the cable

For use of the probe with the Barracuda and the Piranha, see respective product manual. The T20 is designed for measurements in free air. For measurements behind phantoms, we suggest using the R100B or the Piranha Dose Probe. Below you can see some application photos of the T20. In the X-ray image, note the relative transparency of the rod, the black rectangular part is the metallic active detector.


T20 is taped to an Image Intensifier

X-ray image of the T20

ENERGY CORRECTION GRAPHS

On the next page, typical correction tables and graphs for the T20 are shown, as well as graphs of the angular sensitivity.

T20 Typical Energy Correction R1

kV	Cq
50	1,016
55	1,010
60	1,006
65	1,002
70	1,000
75	0,998
80	0,997
85	0,996
90	0,996
95	0,996
100	0,996
105	0,997
110	0,997
115	0,998
120	0,999
125	1,001
130	1,002
135	1,004
140	1,006
145	1,008
150	1,011

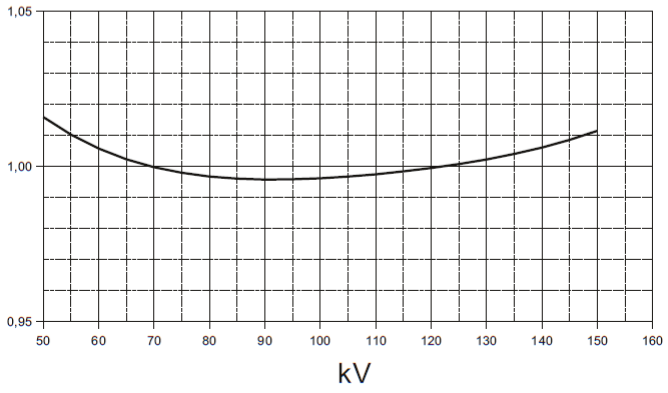
Application: Skin Dose, Radiographic
kV range: 50-150 kV
Anode: Tungsten
Filtration: 3,0 mm Al
Reference point: 70 kV

Example:
Measured or set kVp = 130 kV
Measured dose = 0,50 mGy
Correction factor Cq = 1,002 for 130 kV
Corrected dose = 1,002 x 0,50 = 0,501 mGy

Inaccuracy:
The inaccuracy of the typical correction factor is less than ±4 %.

Note:
Check your manual to verify when you have to do the correction manually.

Typical Correction Graph



T20 Typical Energy Correction R3 (RQR)

kV	Cq
50	1,019
55	1,013
60	1,008
65	1,004
70	1,000
75	0,996
80	0,993
85	0,991
90	0,988
95	0,987
100	0,986
105	0,985
110	0,985
115	0,986
120	0,987
125	0,988
130	0,990
135	0,992
140	0,995
145	0,999
150	1,002

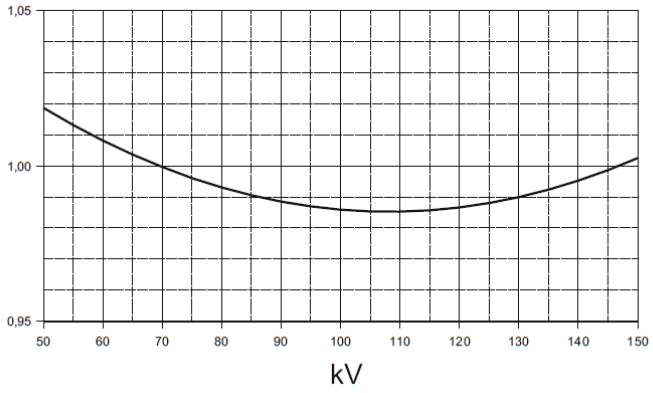
Application: Skin Dose, Radiographic
kV range: 50-150 kV
Anode: Tungsten
Inherent filtration: 2,5 mm Al
Reference point: 70 kV (HVL=2,58 mm Al)
IEC 61267 name: RQR

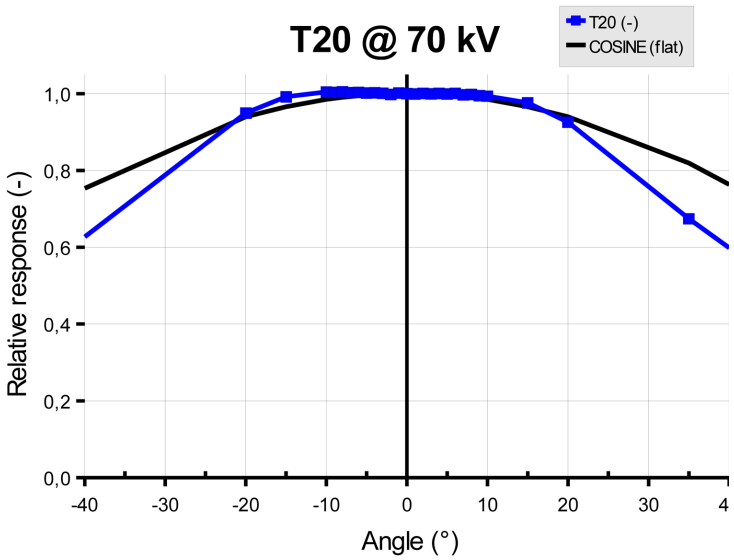
Example:
Measured or set kVp = 130 kV
Measured dose = 0,50 mGy
Correction factor Cq = 0,991 for 130 kV
Corrected dose = 0,991 x 0,50 = 0,496 mGy

Inaccuracy:
The inaccuracy of the typical correction factor is less than ±4 %.

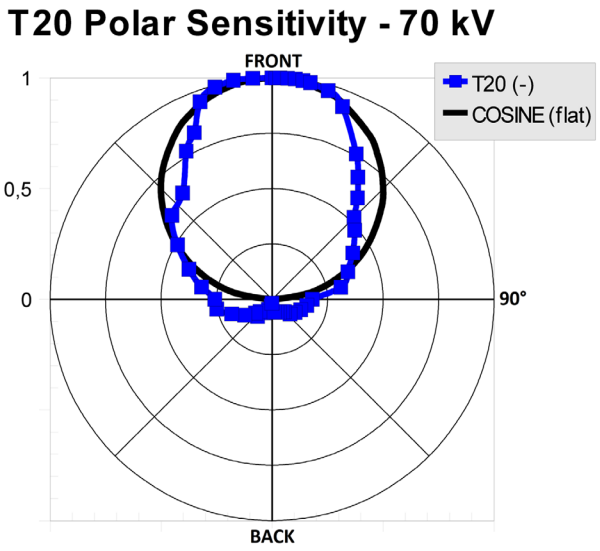
Note:
Check your manual to verify when you have to do the correction manually.

Typical Correction Graph





Angular (rotational) sensitivity for the T20. The black curve is the ideal flat response.



Polar plot of the same graph with the T20 located in the centre. The black curve is the ideal flat response.