

# Radcal



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## Model 90M10/90M10-AG

### Non-invasive mAs Sensor for the Accu-series

#### DESCRIPTION:

The mAs sensor connects to the connector labeled **mAs** of the Accu-series instruments with the supplied cable. The mAs sensor couples to the x-ray generator by clamping to the x-ray anode HV cable. The 90M10 will clamp cables up to 23mm in diameter. The sensor measures the current flowing through the cable and these values

are digitized with 20 bits of resolution (2A full-scale) and transferred to the Accu-series processor. The values are corrected for zero level, and then their absolute values recorded as a waveform with the same 76.8  $\mu$ s resolution as the kV waveform. The value of mAs is computed by summing mA values during the part of the kV waveform (requires kV sensor in beam) defined by the same thresholds that are applied to determine its width, generally 75% of kVp. Average mA is mAs divided by this width.

To measure Anode current, clamp the 90M10 on the anode cable with the arrow on the clamp pointing towards the X-ray tube. For best results, do not move clamp before and during a measurement.

#### FEATURES:

- Automatic power control extends battery lifetime.
- Automatic zero.
- Measurement synchronized to kV waveform.
- Maximum 9999 mAs and 0.7mA(RMS noise) to 2A dynamic range with no range switching.
- Measures absolute value of mA.
- mA-waveform available to an external PC using the Accu-Gold software or a spreadsheet with optional XLPRO add-on software).

#### SPECIFICATIONS:

- Range: 0-1900 mA or 0-9999 mAs (2-2000 mA when used with 9095 )
- mA accuracy:  $\pm 4\%$  of reading (Limited by 0.6mA RMS noise below 15mA).
- mAs accuracy (1-s pulse):  $\pm 4\%$  of reading (Limited by 0.6mAs RMS noise below 15mA).
- Reverse Battery protection
- Bandwidth: 2.3 kHz, -3 dB.
- ON/OFF (Green light) controlled from the Accu-series control unit (ON only when a kV function is active.)
- Batteries: 2 x IEC-LR6 (1.5V AA Alkaline) Lifetime: Approximately 35 operating hours. (Replace batteries when green light doesn't come on.)

The model 90M10 conforms to the following product specification:  
EMC:EN 61326-1

Caution: In the presence of strong electromagnetic fields, performance may degrade up to 1 Amp.

#### USED WITH:

Models Accu-Gold, Rapid-Gold, Accu-Gold+, Rapid-Gold+, Accu-Pro, Accu-kV, 9095\*

\*May be used with a 9095 but unsuitable with GE AMX4, AMX4+ and AMX700 portables.

## Use of the Radcal 90M10 Non-invasive clamp-on mAs sensor

The 90M10 clamp-on mAs sensor uses Hall effect technology to measure the magnetic field produced by current flowing through the opening. The output of the sensor is calibrated to read current.

The sensor responds to the net current passing through the opening. This means that current flowing in the cable shield can add or subtract from the tube current. To a lesser extent, nearby electrical circuits can also affect the measurement, as can motion of the cable within the clamp opening.

The instrument program compensates for the effect of these extraneous signals by continuously measuring the sensor output and computing a zero correction. When a measurement begins the most-recent zero measurement is stored and used to correct the reported value. This correction is limited to 50 mA; if the zero is larger than this value a measurement error occurs.

Extraneous signals are generally not a problem for tube currents above about 100mA.

For measurements where errors in the 5 mA range are significant, Radcal recommends the following:

1. Position the sensor on the anode cable so the cable doesn't move relative to the sensor.
2. Locate the sensor away from magnetic noise sources, particularly those that might change during the exposure because the zero correction is measured several seconds before the exposure. The tube rotor in particular could be a problem.

REF: 90M10 and 90m10-AG are identical except for the interconnect cable required.