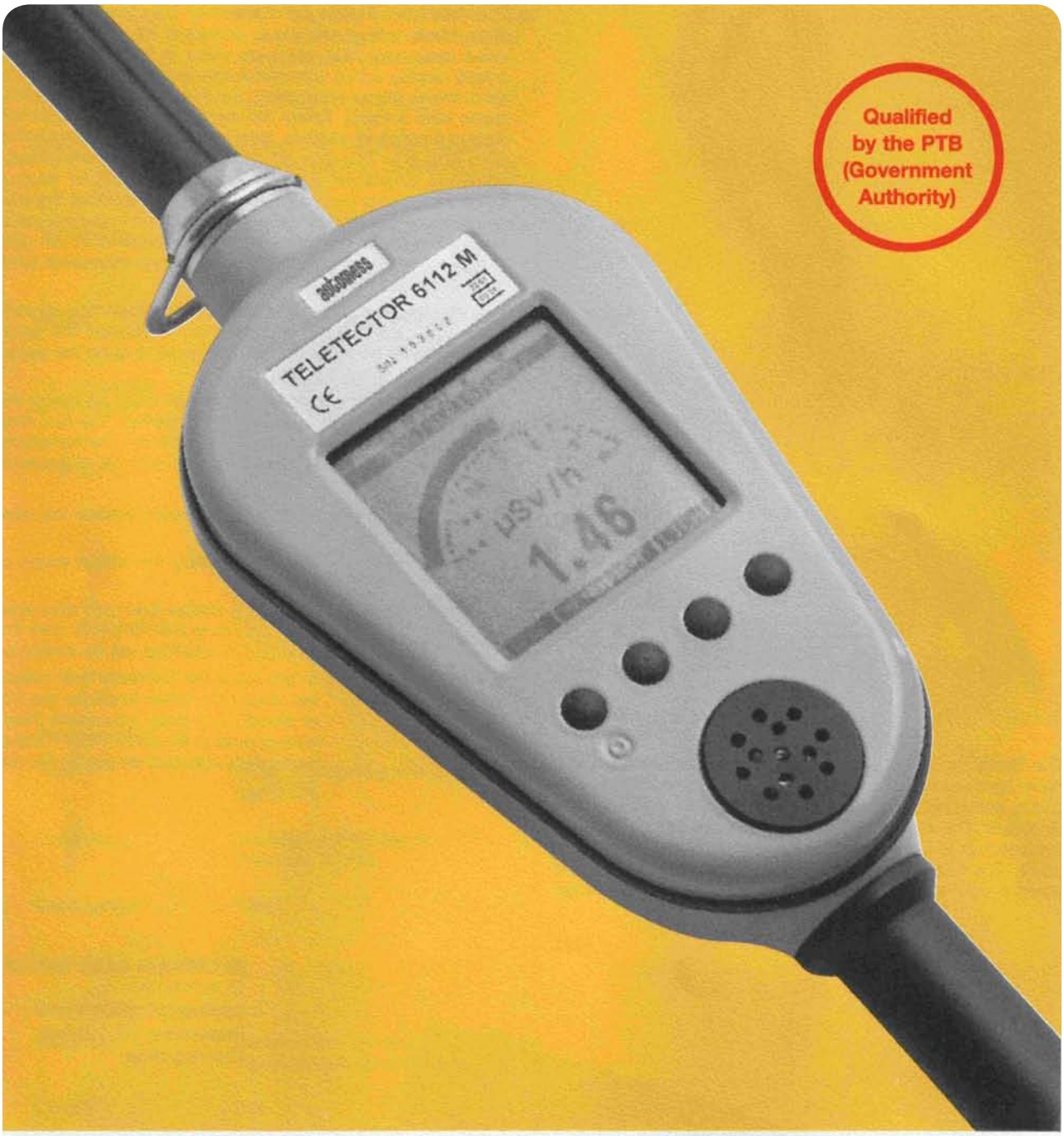
Automation und Messtechnik GmbH

automess



- Measuring quantity: Photon Dose Equivalent Rate H_x.
- Safety by distance: telescope extendible up to 4 m total length.
- Wide dose rate range from 0.1 µSv/h to 10 Sv/h, adjustable time constants.
- Simultaneous measurement of dose rate, dose, dose rate mean value, standard deviation of the mean value, dose rate maximum value.
- Freely programmable dose rate and dose alarm threshold.
- Automatic range switching.
- Illuminated fully graphic LCD for analog and digital display of the measured value.
- Storage of up to 450 measurements including location, dose rate, time,

TELETECTOR 6112M

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TELETECTOR 6112M

The Teletector 6112M is a portable battery operated dose rate meter to measure photon radiation (gamma and X-radiation), and to detect beta radiation. Two GM counter tubes serve as detectors. The stainless steel telescope can be continuously extended up to more than four metres; its tip carries the two tubes. The tubes are placed along the axis one behind the other; a groove marks the centre of each tube. The low range tube (end window tube ZP1400) can also detect beta radiation. Together with the high range tube (ZP 1300) the Teletector covers a dose rate range from 0.1 µSv/h to 10 Sv/h, where it automatically switches between the two tubes.

The Teletector 6112M simultaneously measures dose rate, dose, dose rate mean value, standard deviation of mean value, and dose rate maximum value. A fully graphic liquid crystal display (LCD) with switchable illumination (LED backlight) shows all the information. Four keys allow to select functions from a menu, where the display always describes the current function of all keys. Menu options are represented in plain language. The user may select one of the three preprogrammed languages (German, English, French) or even a fourth individually programmable language. Besides the current function the display always shows some important parameters in a status line: battery condition, detector in use (low or high range), date, time, and whether alarm thresholds have been exceeded.

The loudspeaker allows single pulse detection and sounds when some alarm is on. In case of contamination, the speaker may easily be replaced without having to open the instrument.

A non-volatile memory stores all settings when switching the Teletector off or when replacing the batteries. The real time clock keeps date and time with the help of a rechargeable back-up battery. A 16-bit microprocessor controls all the functions.

The Teletector 6112M has three operation modes the user can select:

- **66112M mode** This mode offers the widest scope of functions.
- **6150AD mode** This mode makes operation very similar to operating a 6150AD5/6. Only the 6150AD5/6 functions will be available.
- **Fire brigade mode** In this mode the Teletector only indicates dose rate, other functions are not available. The dose rate alarm threshold is fixed at 25 µSv/h. This mode is particularly intended for use by fire brigades.

ALUMINIUM CASE 6605.22
CONTENTS:
Teletector 6112M
Probe cover 6112 B-142
Carrying strap

TELETECTOR 6112M
with source holder 761.14 and check source 6706
for check measurements

FUNCTIONS

- **Dose rate**
  The dose rate is displayed simultaneously as an analog and digital display. The analog, arc-shaped bar graph is logarithmic and extends over 2 decades. The measuring range switching is automatically.

- **Dose**
  The dose is displayed digitally. If a dose alarm threshold was programmed, the current dose is additionally displayed as a bar graph relative to the alarm threshold. The time since when (date/time) and how long (hours / minutes / seconds) the dose has accumulated are also displayed. The dose can be deleted at any time.

- **Dose rate history**
  This function graphically represents dose rate history, where "history" means the progress of dose rate in the past. After having been switched on, the Teletector averages dose rate at one-minute intervals (independent of current dose rate indication) and stores these one-minute averages in a circular buffer. The circular buffer will overflow after 48 hours, then the most recent value will replace the oldest one. Therefore you may review dose rate history for up to the last 48 hours. Graphic dose rate indication always comprises two decades that are automatically scaled according to the highest dose rate in the currently visible time window.

- **Statistics**
  The possibility exists of evaluating the measured values statistically. In this case the mean value, the standard deviation of the mean value and the maximum value of dose rate are displayed. The start (date / time) and the duration of the measurement are also displayed. The statistic can be deleted any time.

- **Log**
  This function allows to view the logbook. The logbook may enable you to review exceptional events having occurred during previous uses of the instrument.

  When switching itself off, the Teletector stores the following data in his logbook:
  - starting time (date and time when switched on),
  - duration of use,
  - dose rate mean value for that use,
  - dose rate maximum value for that use,
  - dose accumulated during that use.

- **Recording measured values**
  The Teletector has a facility for saving up to 450 measured values. Here, the mean value, the standard deviation, the measurement start and the measuring duration are saved in a table. A brief description in plain text can be entered for each table location with the aid of a PC and a minimum measuring time can be defined. The table is continuously saved and can also be transferred to the PC again. Further processing of the collected data is possible with standard programs (Excel, Lotus-123). This means that there is almost no possibility of transfer errors of the type which used to occur when processing the measured values manually.

- **Dose rate alarm threshold**
  A dose rate alarm threshold is freely programmable. If the alarm threshold is exceeded, an intermittent alarm tone sounds and the display is automatically switched over to the dose rate display (except in the case of the "Record" function). The alarm tone can be quitted by pressing a key.

- **Dose alarm threshold**
  A dose alarm threshold is freely programmable. If the alarm threshold is exceeded, an intermittent alarm tone sounds and the display is automatically switched over to the dose display (except in the case of the "Record" function). The alarm tone can be quitted by pressing a button.

- **Check detectors**
  With the aid of a menu point it is possible to check the function of both detectors by using a test source.

- **Time constant**
  This function selects the time constant. The time constant always floats with dose rate. You may select the time constant to float within one of these three ranges: 16s to 2s, 8s to 2s, or 4s to 2s. The smaller the time constant, the faster the Teletector responds to changes in dose rate. Note, however, that faster response means greater standard deviation (stronger fluctuations) of dose rate indication.

  The time constant is larger at low dose rates and becomes smaller as dose rate increases. Time constant and standard deviation are linked to each other and depend on dose rate.

  If you require measurements with even lower standard deviation (better statistical accuracy), use dose rate mean value.

- **Serial Interface**
  The serial interface is bi-directional (RxD/TxD). The Teletector outputs dose rate through this interface at one-second intervals, which is the same cycle as for calculating dose rate. The output format is binary. To connect the Teletector to a PC, the connecting cable type 865.1.3 is available as an optional accessory.

  With suitable software you may also load your customised places or read their recordings through this interface.

- **Earphone Output**
  The earphone type 865.1.4 (optional accessory) also plugs into this connector. Acoustic signals transmitted to the earphone are the same as for the built-in speaker. However, the earphone is always on, even if the speaker was switched off by the speaker key.

- **Settings**
  The following things can be set:
  - Date and time.
  - Language: German / English / French / others freely programmable,
  - Lighting: On/Off, with key 10 s on, always on.
  - Tone generator: Single pulse indication On/Off.

- **Units**
  This function selects the unit to one of the following:
  - Sievert (photon dose equivalent H_x, not ambient dose equivalent H*(10),
  - Roentgen,
  - Gray.

  Changing the unit only affects display. Internally the Teletector always uses Sievert (H_x). This also applies for recorded values and all values that can be transmitted through the serial interface. The Teletector converts between these units according to the relation

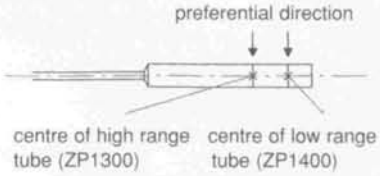
  114 Roentgen = 1.14 Sievert = 1 Gray

  independent of photon energy.

TECHNICAL DATA

Teletector 6112M

Detectors:	
a) low range tube (LR)	beta gamma end window tube ZP1400, energy compensated, effective length 40 mm, sensitivity at Cs-137 approx. 5800 pulses per µSv
b) high range tube (HR)	gamma tube ZP1300, energy compensated, effective length 8 mm, sensitivity at Cs-137 approx. 100 pulses per µSv
Switching detectors	automatically with hysteresis: switches up to HR when dose rate goes above 10 mSv/h, switches back to LR when dose rate goes below 7 mSv/h; manual selection of detector for radiological check
Measuring quantity	photon dose equivalent rate H_x
Dose rate range	analog: ZP1400: 0.1 µSv/h to 10 mSv/h ZP1300: 7 mSv/h to 10 Sv/h digital: 0.01 µSv/h to 10 Sv/h
Instrumental background	< 20 nSv/h (low range tube)
Linearity of dose rate measurement	±8% within nominal energy range, PTB approved (calibration with Cs-137)
Dose range	10 nSv to 10 Sv (beyond 10 Sv up to 100 Sv flashing)
Alarm thresholds	adjustable threshold for both dose and dose rate
Detection of beta radiation	with end window tube ZP1400 through window in the face of the tube housing. Protection cap must be removed. Protection cap rejection factor for Sr-90/Y-90: approx. 100
Thickness of beta window	tube window: 2 - 3 mg/cm² protection foil in tube housing: 6 mg/cm² sensitive area: approx. 60 mm²
Energy dependence	nominal range: 65 keV to 1.3 MeV change of response referred to Cs-137: ± 30 %, PTB approved
Directional dependence	16% within nominal range of ±45° referred to the preferential direction, PTB approved
Preferential direction	radial on marking grooves on the tube housing



Display	fully graphic LCD (128 x 128 pixels) transflective, LED back-light
Range selection	automatically
Dose rate warning	acoustically and visually
Overload	dose rates above the full range (10 Sv/h) are indicated as over-range up to dose rates of 100 Sv/h; after overload the Teletector is functioning (PTB approved)
Detection of single pulses	acoustically, speaker may be replaced for decontamination
Speaker loudness level	> 90 dBa in a 30 cm distance
Climatic conditions	temperature range: -20 °C to +60 °C humidity: nominal range up to 95% (at -20 °C to +60 °C) change of response: ±6%, PTB approved
Storage temperature	-40° C to +85 °C
Atmospheric pressure	nominal range: 60 to 130 kPa (600 to 1300 mbar)
Geotropism (change of response as a result of gravitational effects)	none

Teletector housing	aluminium die-cast
Telescope	stainless steel
Protection class	IP 67 according to DIN 40050 if telescope completely pushed together and protection cap applied
Power supply	four C cells (LR14, AM2)
Battery life	approx. 100 hours with alkaline batteries (without illumination and speaker)
Dimensions	total length 97 cm to 417 cm width 13 cm, maximum height approx. 8 cm
Weight	2.7 kg (without batteries) 3.0 kg (including batteries)
CE compatible according to	EN 50 082-2:1995, EN 55 011:1998, ENV 50 140:1993, EN 61 000-4-2:1995
PTB approval	23.01 00.01 This approval applies to the German version which uses the same hardware but has some software restrictions: the unit (Sv, R, Gy) cannot be selected, it is fixed at Sv; the time constant cannot be selected, its range is fixed at 16s-2s.

Earphone 865.1.4

Type	dynamic earphone with earclip, 500 ohms
Dimensions	diameter without earclip 21 mm, thickness 12 mm
Cable length	1.5 m

Connecting Cable 865.1.3

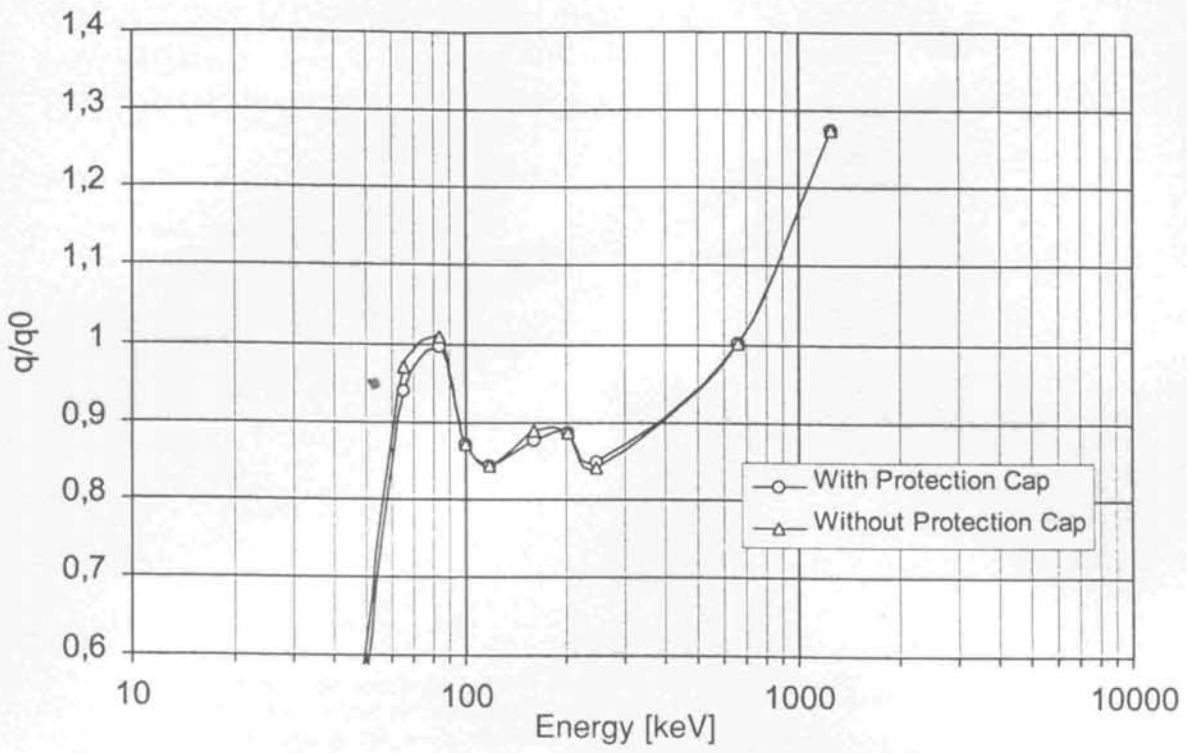
Application	connects the Teletector 6112M to the serial interface of a PC
Length	3 m
Connector at PC end	female 9 pin D-sub that plugs into a PC's standard COM port
Connector at Teletector end	5 pin waterproof connector that plugs Teletector end into the Teletector's serial interface

Source Holder 761.14

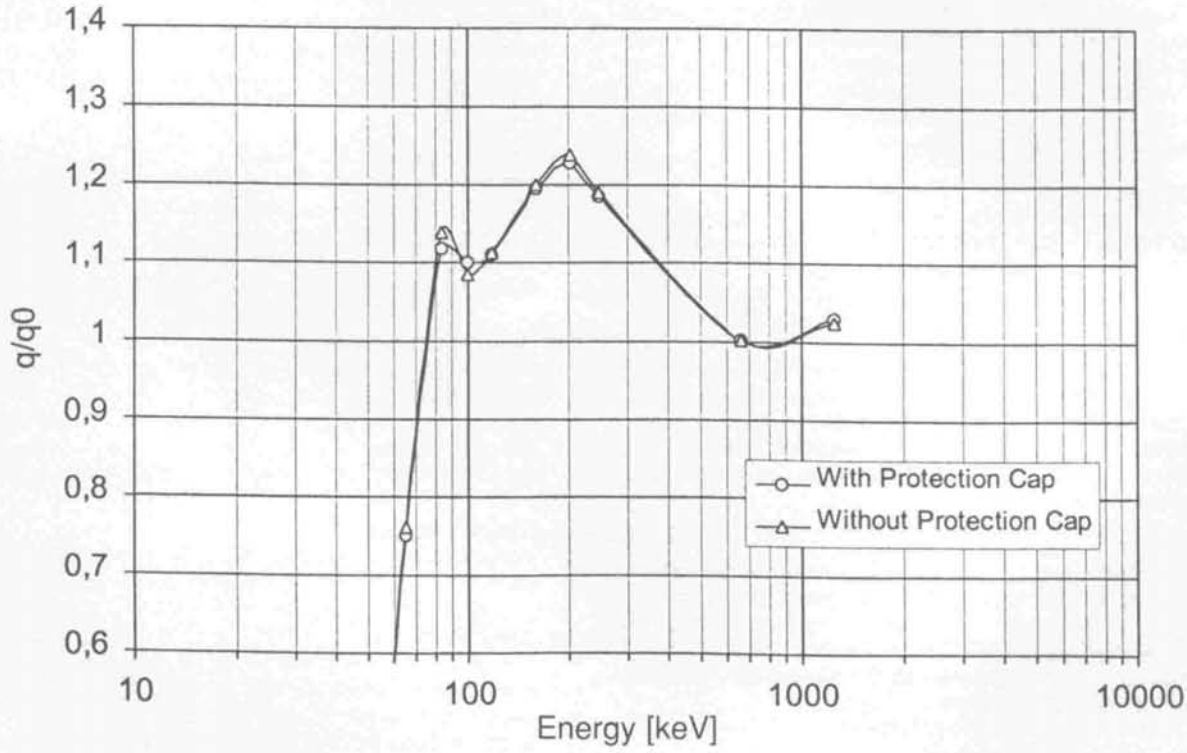
Application	holder to mount check source 6706 onto the tube housing
Length	88 mm
Diameter at "HDL" position	86 mm
Diameter at "NDL" position	56 mm The diameters are large enough to compensate deviations from the Teletector's rotational symmetry. Check readings will only vary slightly when turning the holder around the axis. Including any rotational position around the axis, check readings can be reproduced with a standard deviation not exceeding 4% (including the 1 % statistical uncertainty for a pulse count of 10000).
Material	grey plastic
PTB approval	23.11 00.02

– SUBJECT TO TECHNICAL CHANGES WITHOUT NOTICE –

Energy dependence referred to H_x, normalised to Cs-137, low range detector:



Energy dependence referred to H_x, normalised to Cs-137, high range detector:



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