

Qualified
by the PTB
(Government
Authority)



- Measuring quantity: Ambient Dose Equivalent Rate $\dot{H}^*(10)$.
- Safety by distance: telescope extendible up to 4,17 m total length.
- Wide dose rate range from 0.01 $\mu\text{Sv/h}$ 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, duration and standard deviation of measurement.
- Serial transfer of current measurement and stored measurements to a PC. Easy processing of these data with standard Windows Software.

TELETECTOR[®] 6112M/H

Microprocessor controlled dose rate meter with telescope to measure gamma radiation and to detect beta radiation



TELETECTOR 6112M/H

The Teletector 6112M/H 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 0.01 $\mu\text{Sv/h}$ to 10 Sv/h, where it automatically switches between the two tubes.

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

- **6112M/H mode** This mode offers the widest scope of functions.
- **6150AD(H) mode** This mode makes operation very similar to operating a 6150AD5/6(H). Only the 6150AD5/6(H) 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 $\mu\text{Sv/h}$. This mode is particularly intended for use by fire brigades.



ALUMINIUM CASE 6605.22

CONTENTS:

Teletector 6112M/H

Probe cover 6112 B-142

Carrying strap



TELETECTOR 6112M/H
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 (Rx/D/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.

TECHNICAL DATA

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 ambient dose equivalent rate $\dot{H}^*(10)$
 Dose rate range analog:
 ZP1400: 0.1 $\mu\text{Sv/h}$ to 10 mSv/h
 ZP1300: 7 mSv/h to 10 Sv/h
 digital:
 0.01 $\mu\text{Sv/h}$ to 10 Sv/h

Instrumental background < 20 nSv/h (low range tube)

Linearity of dose rate measurement $\pm 8\%$ 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

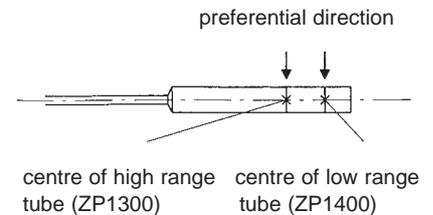
Thickness of beta window tube window: 2 - 3 mg/cm²
 protection foil in tube housing: 6 mg/cm²
 sensitive area: approx. 60 mm²

Energy dependence (protective cap applied or removed): nominal range 45 keV to 1.3 MeV (PTB)

Directional dependence (protective cap applied or removed): nominal range $\pm 45^\circ$ around preferential direction (PTB)

Directional and energy dependence for all energies and directions within their nominal ranges referred to Cs-137 at preferential direction (protective cap applied or removed) $\pm 40\%$ (PTB) (permitted: $\pm 40\%$)

Preferential direction radial on marking grooves on the tube housing



Display fully graphic LCD (128 x 128 pixels) transfective, 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 still 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: $\pm 6\%$, 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	Diameter at "HDL" position	86 mm		
Telescope	stainless steel	Diameter at "NDL" position	56 mm		
Protection class	IP 67 according to DIN 40050 if telescope completely pushed together and protection cap applied	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).			
Power supply	four C cells (LR14, AM2)	Material	grey plastic		
Battery life	approx. 100 hours with alkaline batteries (without illumination and speaker)	PTB approval	<table border="1"><tr><td>23.11</td></tr><tr><td>00.02</td></tr></table>	23.11	00.02
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Dimensions	total length 97 cm to 417 cm width 13 cm, maximum height approx. 9 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	<table border="1"><tr><td>23.51</td></tr><tr><td>03.02</td></tr></table>	23.51	03.02
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	This approval applies to the German version which uses the same hardware but has some software restrictions: the time constant cannot be selected, its range is fixed at 16s-2s.		

Probe cover 6112B-142

for extended telescope; transparent plastic foil, length 4 m.

Aluminium Case 6605.22

825 x 175 x 125 mm³ for storage of:
 1 each Teletector 6112M/H
 1 each Carrying Strap
 1 each Miniature Earphone 865.1.4
 1 each Probe Cover 6112B-142
 1 each C Cell 1.5 V

Optional Accessories

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

– SUBJECT TO TECHNICAL CHANGES WITHOUT NOTICE –

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

Energy dependence referred to $H^*(10)$, normalized to Cs-137:

