ALMO

ALarm MOnitor – stationary dose rate monitoring system with external detectors

Use and function

The ALMO alarm monitors are used to control permanently the dose rate measurement level in the laboratory and in production facilities. The systems consist of a basic device with LCD display and electronics, combined with one or more probes and external alarm units.
Depending on the version, it is possible to connect 1, 3 or 6 detectors to the ALMO basic device.
The measurement value display of the multi-channel systems ALMO-3 and ALMO-6 is displayed individually for each channel.
The stand-alone ALMO-systems can be linked to a superior PC-system for central monitoring and documentation

Fields of application

- workplace and room monitoring, e.g. in hot cells and laboratories
- system monitoring, e.g. in isotope production
- ward and/or patient monitoring in nuclear medicine/radiotherapy, e.g. in radio iodine therapy or afterloading
- monitoring and selection in sorting boxes for radioactive waste
- exhaust air monitoring
- monitoring of test facilities in nondestructive material testing
- warehouse monitoring, e.g. collection sites for radioactive waste

MED

Nuklear-Medizintechnik Dresden GmbH

Performance features

- µ-controller-based measurement electronics
- digital measurement value information on large-area, illuminated LCD
- measurement value display of dose rate in n/µ/mSv/h with autoranging function
- externally connectable detectors (GM counter tube, NaI-detectors) with integrated high tension and electronics
- automatic detector identification, calibration data are read out by the measurement electronics, allowing simple replacement of the detector
- 2 freely definable alarm thresholds per probe
- easy-to-operate measurement system with user guidance
- ergonomically shaped housing, desktop or wall version
- cable exit of the wall version upward (to the ceiling) or downward (to the floor)
- various visual/acoustic alarm units can be connected
- serial data interface for measurement data transfer and storage on external PC-system
- software for continuous dose rate measurement, including data storage
- also available with integrated battery backup
- maximal cable length:
  - o GM detector: 100 m
    - o NaI-scintillation detector: 20 m

Versions and detectors

The ALMO-system is available in three versions:
- ALMO-1 one-channel system, 1 detector connectable
- ALMO-3 multi-channel system, up to 3 detectors connectable
- ALMO-6 multi-channel system, up to 6 detectors connectable

All ALMO-systems can be combined with the following detector types

Type	Energy range	Measurement range	Dimensions, weight
GM-detector 18545 C	40 keV - 1.3 MeV	150 nSv/h - 200 µSv/h	length 345 mm, Ø 25/40 mm, 380 g
GM-detector 18550 C	40 keV - 1.3 MeV	1 µSv/h - 20 mSv/h	length 10 mm, Ø 40 mm, 150 g
GM-detector 18509 C	55 keV - 1.3 MeV	10 µSv/h - 1 Sv/h	length 110 mm, Ø 40 mm, 150 g
GM-detector 18529 C	70 keV - 3 MeV	100 µSv/h - 10 Sv/h	length 110 mm, Ø 40 mm, 150 g
NaI-scintillation detector 25B38	25 keV - 1.3 MeV	40 nSv/h - 200 µSv/h	length 38 mm (active range), Ø 25 mm, 200 g

Special versions

Afterloading

The ALMO-1 system is used by different manufacturers of afterloading systems.
In this case, the main task of the alarm monitor is to indicate if the therapy source is opened or closed. For that purpose the ALMO-1 is mostly combined with GM-probe type 18550. Generally the version with integrated battery backup is used in order to keep the system running in case of a power breakdown. An external LED-lamp with 3 levels (red/yellow/green) and a horn element shows the operating status of the system visually and acoustically: green = closed source, yellow = error, red = open source, red + acoustic alarm = open source and open door.
Additionally to the LED-lamp, some manufacturers use a second LED-lamp or a matrix tableau with alarm signal for the area outside the therapy room (corridor or control room). These units are controlled in a similar way via the ALMO-system.
An electronic interlock - if existent - can also be operated via the ALMO-system. Such a function is often used as safety feature, particularly in hot cells.

ALMO build-in version

Especially for the manufacturers of hot cells and isotope production facilities, we have developed a build-in version for the alarm monitors ALMO-3 and ALMO-6. Instead of the standard housing for desktop or wall mounting, the ALMO is integrated in a metal die-cast case with mounting boreholes. The case is installed behind the hot cell cover or in the door of a switch cabinet. The front panel of the ALMO-system with display, operator keyboard and LEDs is embedded into the intended cut-outs of the covering or the door to form a flat surface with the outside.

This solution has essential advantages particularly with regard to the permanently increasing clean room conditions, because the contamination risks and the extensive cleaning process for housing parts and cabling are omitted.
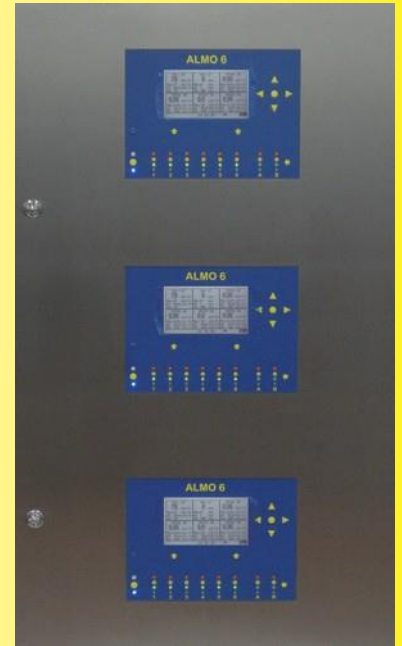
Technical data

ALMO-1

Electronics:	µ-controller-based measuring electronics with 1 measuring channel (1 detector connectable)
Display:	LCD with LED illumination during continuous use
Keyboard:	foil keyboard
Housing:	200 x 150 x 75 mm (L x W x H), available as wall or desktop housing
Weight:	approx. 700 g
Power supply:	100-240 V ~, 47-63 Hz
Power consumption:	15 W
Alarm:	optical and acoustic, optionally external alarm units, quit function
Temperature range:	0° C till +50° C, 0 – 95 % relative humidity (no condensation)
Interfaces:	3 relay outputs (24 V, 500 mA or potential-free, max. 24 V, 1 A) e.g. for lamp with 3 levels, siren, interlock
	RS 232 / 422 / 485 or USB-interface (selectable via menu
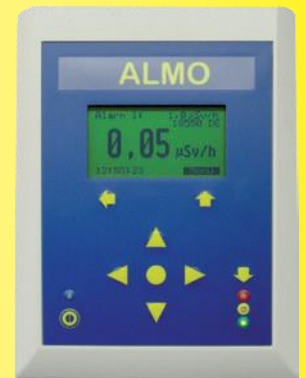
ALMO-3

Like ALMO-1, but with the following differences:

Electronics:	µ-controller-based measuring electronics with 3 measuring channels (up to 3 detectors connectable)
Housing:	280 x 300 x 120 mm (L x W x H) available as wall or desktop housing
Weight:	approx. 2.2 kg
Power consumption:	60 W
Interfaces:	3 relay outputs per channel (24 V, 500 mA or potential-free, max. 24 V, 1 A) e.g. for lamp with 3 levels, siren, interlock
	2 serial interfaces (selectable via menu):
	A: selectable RS 232 / 422 / 485 or USB
	B: selectable RS 232 / 422 / 485

ALMO-6

WLike ALMO-3, but with the following differences:

Electronics:	µ-controller-based measuring electronics with 6 measuring channels (up to 6 detectors connectable)

Options and accessories

External alarm units

Alarm units, e.g. the LED-lamp with 3 levels, can be connected to all ALMO-systems to visualize an optical alarm. The LED-lamps are available in different versions (1/2/3 levels, with or without acoustics, flashlight). They can be ordered for wall mounting as well as for desktop or build-up installation.

Additional external display

Depending on the local circumstances it may be necessary to display the measuring value of one or more detectors at the measurement or monitoring place, apart from the central measurement display of the ALMO. The external measurement display offers a high comfort with task-specific parameter setting.

Software

All measurement data can be displayed graphically by the software for measurement and data storage. Therefore the dose rate measurement values can be displayed in a curve, as a function of time.

During the actual monitoring process, the lamp symbols (green/yellow/red) can be shown for a quick interpretation of the measurement values.
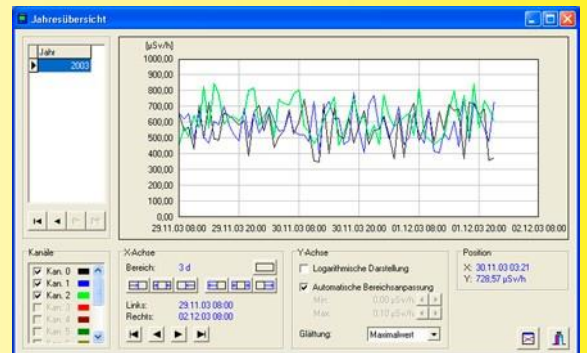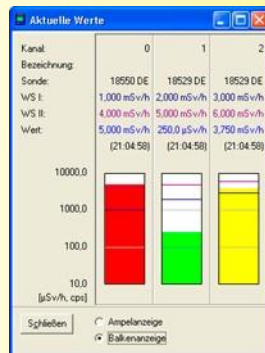
Examples of use

PET Research Center Rossendorf
(ALMO wall version, cable exit downward)

University of Manchester, UK, Wolfson Molecular Imaging Center
(ALMO wall version, cable exit upward)