

# Pille

## Portable Thermoluminescent Space Dosimeter System



### Application

#### Space dosimetry monitoring during manned space missions

- ✓ A unique, proven space dosimetry instrument for manned space missions
- ✓ To measure the absorbed dose at different locations in the space station (dosimetry mapping)
- ✓ To study radiation shielding effects of the surrounding environment
- ✓ Utilized for routine and extravehicular activity (EVA) individual dosimetry of astronauts

### Key Features

- ✓ Space dosimetry instrument for manned space missions to determine the absorbed dose from space radiation
- ✓ Thermoluminescent detector system (TLD)
- ✓ Unlimited number of passive detectors with memory chip inside containing the identification code and the individual calibration parameters of the dosimeter

- ✓ Easy-to-use, compact, lightweight microprocessor controlled on-board Reader Unit for providing the preliminary evaluation of the dose absorbed by the dosimeters
- ✓ The Reader Unit provides
  - ✓ User interface for astronauts (via numerical display and keyboard)
  - ✓ Automatic identification of the detectors
  - ✓ The measured dose and a series of parameters are displayed and stored on a removable memory card
  - ✓ A dosimeter inserted in the reader permanently is dedicated for automatic cyclic measurements
- ✓ RS-232 interface to connect to a PC for using a dedicated PC software ("Pille Controller") for downloading, listing and displaying the results of the measurements and setting the parameters of the Reader and the dosimeters
- ✓ CAN interface to connect to the data acquisition system of the space station
- ✓ Operated on-board space stations Salyut-6,-7, Mir, and the ISS

## General Specification

	Reader	Detector
Power	0.1 / 1 / 7 W (standby/ready/readout)	-
Mass	~ 1.4 kg	70 g (with carrying case)
Dimensions (H, W, D)	70 mm, 190 mm, 120 mm	∅ 20 mm * 60 mm
Input voltage range	17.0 V...34 V	-
Operational temperature range	-20°C...+40°C	-40°C...+50°C
Non-operational temperature range		-40°C...+85°C
Operational pressure range	1.2·10 <sup>5</sup> Pa...7·10 <sup>-4</sup> Pa	2·10 <sup>5</sup> Pa...10 <sup>-4</sup> Pa
Data rate	512 byte / readout	

## Environmental Specification

Temperature environment	-40°C...+85°C
Low frequency longitudinal and lateral vibration environment	20...100 Hz, 16.0 g
High frequency random environment for 3-axis	5...2000 Hz, 17.0 g <sub>RMS</sub>
Shock pulse	100 g, 0.25 ms
Depressurisation rate	5.0 kPa/s

## Measurement Capabilities

Dosimeters	
Type	bulb
Material	CaSO <sub>4</sub> :Dy
Reader	
Measuring range (s<10%)	3 μGy...10 Gy
TLD Efficiency (e=1±10%)	LET <sub>∞H2O</sub> < 10 keV/μm
Read-out precision	3 digits + exp.
Accuracy (above 10 μGy)	δ < 5%
Measuring modes	manual / automatic read-out
Display	8-digit alphanumeric LED
Displayed information	dose in μGy (air kerma); date and time of measurement; identification codes; mean dose rate; error codes
Storage of information	PCMCIA memory card (> 4000 data sets)

## Flight Heritage

Mission name	Hosting platform	Orbit details	Duration	Remarks
Pille	Salyut-6 SS	LEO 200-300 km	1.5 years	16 dosimeters and one Reader
Pille	Salyut-7 SS	LEO 300-400 km	3 years	16 dosimeters and one Reader
Pille'S	STS 41G / Challenger-6	LEO 300-400 km	8 days	8 dosimeters and one Reader
Pille	Mir SS	LEO 300-400 km	4 years	16 dosimeters and one Reader
Pille'95	Mir SS (EuroMir-95)	LEO 300-400 km	5 months	6 dosimeters and one Reader
Pille'96	Mir SS (NASAMir4)	LEO 300-400 km	5 months	8 dosimeters and one Reader
Pille-ISS	ISS - Destiny (U.S. Lab)	LEO 330-420 km	3 month / 10 years	50 dosimeters and one Reader
Pille-MKS	ISS - Zvezda (Rus. Lab)	LEO 330-420 km	15 years	12-17 dosimeters and one Reader

## Contact us

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