1. Record Nr. UNINA9910589999903321

Autore	Thurow Kerstin <1969->
Titolo	Devices and Systems for Laboratory Automation
Pubbl/distr/stampa	Newark : , : John Wiley & Sons, Incorporated, , 2022 ©2023
ISBN	3-527-82944-X 3-527-82942-3
Descrizione fisica	1 online resource (513 pages)
Altri autori (Persone)	JungingerSteffen
Soggetti	Electronic books.
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Nota di contenuto	Cover -- Title Page -- Copyright -- Contents -- Chapter 1 Introduction -- 1.1 A Short Definition of Laboratory Automation -- 1.2 Short History of Laboratory Automation -- 1.2.1 Early Developments in Laboratory Automation -- 1.2.2 Advances in the Automation of Clinical Laboratories -- 1.2.3 Developments in Pharmaceutical Research -- 1.3 Laboratory Applications and Requirements -- 1.3.1 Bioscreening and Pharmaceutical Testing -- 1.3.1.1 Enzymatic Assays -- 1.3.1.2 Cell Based Assays -- 1.3.1.3 ELISAs -- 1.3.1.4 DNA/RNA Extraction, Purification, and Quantification -- 1.3.1.5 PCR/RTPCR/qPCR -- 1.3.1.6 Gene Expression Analysis -- 1.3.1.7 NextGeneration Sequencing -- 1.3.1.8 Cell Culturing -- 1.3.1.9 Requirements -- 1.3.2 Clinical Applications -- 1.3.2.1 Determination of Classical Parameter -- 1.3.2.2 Determination of Vitamins -- 1.3.2.3 Determination of Drugs of Abuse -- 1.3.2.4 Requirements -- 1.3.3 Classical Analytical Applications -- 1.3.3.1 Food Analysis -- 1.3.3.2 Environmental Analysis -- 1.3.3.3 Requirements -- 1.4 The Goal of this Book -- References -- Chapter 2 Basic Concepts and Principles of Laboratory Automation -- 2.1 The LUO Concept in Laboratory Automation -- 2.1.1 Laboratory Unit Operation Concept -- 2.1.2 Classes of Laboratory Systems and Devices -- 2.1.3 General Automation Strategies in Laboratory Automation -- 2.2 Advantages and Limitations of Laboratory Automation -- 2.2.1 Advantages of Laboratory Automation

-- 2.2.2 Limitations of Laboratory Automation -- 2.2.3 Error Handling in Laboratory Automation -- 2.3 Economic Potential of Laboratory Automation -- 2.3.1 Market Dynamics -- 2.3.2 Market Shares by Region -- 2.3.3 Market Shares by Application -- 2.3.4 Market Shares by Users -- 2.3.5 Market Share by Vendors -- References -- Chapter 3 Formats in Laboratory Automation -- 3.1 Formats in Biological Applications.
3.1.1 Introduction -- 3.1.2 Characteristics of Microplates -- 3.1.3 Lids and Sealing Systems for Microtiter Plates -- 3.1.3.1 Lids -- 3.1.3.2 Foils and Films -- 3.1.3.3 Mats -- 3.1.3.4 RoboLid -- 3.1.3.5 Advantages and Disadvantages of Locking Systems -- 3.1.3.6 Application Areas of Locking Systems -- 3.1.4 Market Potential and Commercially Available Systems -- 3.1.4.1 Microtiter Plates Market -- 3.1.4.2 Market Lids and Sealing Systems -- 3.2 Formats in Clinical Applications -- 3.2.1 Collection of Blood Samples -- 3.2.2 Collection of Urine Samples -- 3.2.3 Collection of Further Examination Material -- 3.3 Formats in Classical Analytical Applications -- 3.4 Automated Handling of Labware -- 3.4.1 Automated Handling of MTP and Covers -- 3.4.1.1 Handling of Microtiter Plates and Lids -- 3.4.1.2 Automated Handling of Foils and Films -- 3.4.2 Automated Handling of Single Samples -- 3.4.2.1 Automated Transport -- 3.4.2.2 Automated Opening/Closing of Single Samples -- References -- Chapter 4 Liquid Handling in Laboratory Automation -- 4.1 Introduction -- 4.1.1 Definition and General Introduction -- 4.1.2 Short History of Liquid Handling -- 4.1.3 Use of Liquid Handling Systems -- 4.2 Liquid Handling Technologies -- 4.2.1 Pipetting Technologies -- 4.2.2 Aspiration Methods -- 4.3 Critical Liquid Handling Parameters and Error Sources in Liquid Handling -- 4.3.1 Important Liquid Handling Parameters -- 4.3.2 Physical Influencing Factors -- 4.3.3 Error Sources in Liquid Handling -- 4.3.4 Liquid Handling Performance Monitoring -- 4.4 Market Potential and Systems -- 4.4.1 Market Potential for Liquid Handling Systems -- 4.4.2 General Channel Configurations -- 4.4.3 Liquid Handling Systems with 1-8 Channels -- 4.4.4 Multichannel Systems -- 4.4.5 Liquid Handling Accessories -- References -- Chapter 5 Low-Volume Liquid Delivery -- 5.1 Introduction.
5.2 ContactBased Dispenser Technologies -- 5.2.1 Pin Tools -- 5.2.2 Dispensers with Fixed Tips -- 5.2.3 Dispensers with Disposable Tips -- 5.2.4 Summary -- 5.3 Contactless Dispenser Technologies -- 5.3.1 Displacement Dispensers -- 5.3.1.1 Peristaltic Pumps -- 5.3.1.2 Ceramic Pumps -- 5.3.2 ValveBased Dispensers -- 5.3.2.1 Solenoid Valve Dispensers -- 5.3.2.2 Piezoelectric ValveBased Dispensers -- 5.3.3 Capillary Sipper -- 5.3.4 Acoustic Dispensers -- 5.3.5 Summary -- 5.4 Application Areas and Requirements for LowVolume Dispensing -- 5.4.1 Application Areas for LowVolume Dispensing -- 5.4.2 Requirements for LowVolume Dispensing -- 5.5 Overview of Low Volume Dispensers -- 5.5.1 Positive Displacement Systems -- 5.5.2 Piezoelectric Dispenser -- 5.5.3 Acoustic Dispensers -- 5.5.4 Additional Systems -- References -- Chapter 6 Solid Dispensing -- 6.1 Introduction -- 6.2 Factors Influencing the Dosing of Solids -- 6.2.1 Flow Behavior of Bulk Solids -- 6.2.2 Density of Solids -- 6.2.3 Fluidization of Bulk Materials -- 6.3 SolidDispensing Technologies -- 6.3.1 Volumetric Dosing Methods -- 6.3.2 Gravimetric Dosing Methods -- 6.3.3 Dosing Methods in Laboratory Automation -- 6.4 Solid Dispensing Systems -- References -- Chapter 7 Devices for Sample Preparation -- 7.1 Introduction -- 7.2 Automated Heating, Cooling, and Mixing -- 7.2.1 Introduction -- 7.2.2 Automated Heating and Cooling -- 7.2.3 Automated Thermocycler -- 7.2.4 Automated Mixing/Shaking -- 7.2.4.1 Introduction -- 7.2.4.2 Automated Shaking

-- 7.2.4.3 Automated Stirring -- 7.2.5 Combined Solutions for Mixing and Temperature Control -- 7.3 Automated Incubation -- 7.3.1 Introduction -- 7.3.2 Important Parameter -- 7.3.3 Incubation Systems in the Laboratory -- 7.3.4 Market Situation -- 7.4 Automated Centrifugation -- 7.4.1 Introduction -- 7.4.2 Requirements -- 7.4.3 Market Situation and Systems.
7.5 Automated Filtration -- 7.6 Automated Solid Phase Extraction -- 7.6.1 Introduction and Requirements -- 7.6.2 Semiautomated Systems -- 7.6.3 Requirements for Automated SPE Systems -- 7.6.4 Automated Single Sample Processing Systems -- 7.6.5 Automated Parallel Processing Systems with Limited Parallelity -- 7.6.6 High Parallel Systems -- 7.6.7 Labware for Automated Solid Phase Extraction -- 7.7 Automated Sonication -- 7.7.1 Basics and Applications of Ultrasonic Systems -- 7.7.2 Market Situation and Systems -- 7.8 Automated Evaporation -- 7.8.1 Introduction -- 7.8.2 Evaporation Technologies and Application Areas -- 7.8.3 Market Situation -- References -- Chapter 8 Robots in Laboratory Automation -- 8.1 Robots - A Definition -- 8.1.1 Historical Development of Laboratory Robotics -- 8.1.2 Basics and Definitions in Robotics -- 8.1.3 Robotic Configurations -- 8.1.4 Robot Programming -- 8.1.5 Advantages and Disadvantages of Laboratory Robots -- 8.2 Stationary Robots in Laboratory Automation -- 8.2.1 Industrial and Collaborative Robots -- 8.2.2 Market Potential -- 8.2.3 Available Stationary Robot Systems -- 8.3 Mobile Robots -- 8.3.1 Differentiation Between Stationary and Mobile Robots -- 8.3.2 Application Scenarios for Mobile Robots -- 8.3.3 Sensor Systems in Mobile Robotics -- 8.3.4 Market Situation and Available Systems -- 8.4 Gripper Systems -- 8.4.1 Mechanical Gripper -- 8.4.2 Pneumatic Gripper -- 8.4.3 Magnetic Gripper -- 8.4.4 Adaptive Gripper -- 8.4.5 Sensors and Safety Systems in Gripper Systems -- 8.5 Safety Aspects in Laboratory Automation -- References -- Chapter 9 Analytical Measurement Systems -- 9.1 AbsorptionBased Methods -- 9.1.1 Introduction -- 9.1.2 Physical Background -- 9.1.3 Application Areas of Absorption Spectroscopy -- 9.2 Fluorescence Based Methods -- 9.2.1 Introduction -- 9.2.2 Physical Background.
9.2.3 Application Areas of Fluorescence Spectroscopy -- 9.3 Market Situation and Available Reader Systems -- 9.4 Mass Spectrometric Methods -- 9.4.1 Introduction -- 9.4.2 Physical Background -- 9.4.2.1 Ionization -- 9.4.2.2 Mass Separation Technologies -- 9.4.2.3 Detection Technologies -- 9.4.3 Application Areas of Mass Spectrometric Methods -- 9.4.4 Market Situation and Mass Spectrometry Systems -- References -- Chapter 10 Sample Identification in Laboratory Automation -- 10.1 Introduction -- 10.2 Barcode Technology -- 10.2.1 Barcode Types -- 10.2.2 Barcode Reader Technology -- 10.2.3 Barcodes in Laboratory Automation -- 10.2.4 Market Situation for Barcode Readers -- 10.3 RFID Technology -- 10.3.1 RFID Methods -- 10.3.2 Application Areas and Design of RFID Systems -- 10.3.3 Advantages and Disadvantages of RFID Systems -- 10.3.4 Market Situation -- References -- Chapter 11 Interfaces in Laboratory Automation -- 11.1 Introduction -- 11.2 Analog Interfaces -- 11.3 Digital Interfaces -- 11.3.1 Parallel Interfaces -- 11.3.2 Serial Interfaces -- 11.3.3 Network Interfaces -- 11.4 Standardization in Laboratory Automation -- 11.4.1 Introduction -- 11.4.2 SiLA 2 Standard -- 11.4.3 Advantages of SiLA 2 -- 11.4.4 Disadvantages of SiLA -- 11.4.5 Actual Examples for SiLA Integrations -- References -- Chapter 12 Laboratory Automation Software -- 12.1 Introduction -- 12.2 System Control Software/Process Control Systems -- 12.2.1 Introduction -- 12.2.2 Cellario -- 12.2.3 Green Button Go -- 12.2.4 Momentum -- 12.2.5 OneLab -- 12.2.6 Overlord -- 12.2.7 SAMI EX --

12.2.8 VWorks -- 12.2.9 Hierarchical Workflow Management System (HWMS) -- 12.2.10 Summary -- 12.3 Laboratory Information Management Systems -- 12.3.1 Introduction -- 12.3.2 Core Functionalities of LIMS -- 12.3.3 LIMS Architectures -- 12.3.4 Factors Influencing the Selection of a LIMS -- 12.3.5 LIMS Vendors. 12.4 Electronic Laboratory Notebooks.