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Titolo	Real-time Monitoring and Operational Control of Drinking-Water Systems / / edited by Vicenç Puig, Carlos Ocampo-Martínez, Ramon Pérez, Gabriela Cembrano, Joseba Quevedo, Teresa Escobet
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Descrizione fisica	1 online resource (XXVI, 428 p. 169 illus., 121 illus. in color.)
Collana	Advances in Industrial Control, , 1430-9491
Disciplina	333.91
Soggetti	Automatic control Water-supply Computer simulation Control and Systems Theory Water Industry/Water Technologies Simulation and Modeling
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Formato	Materiale a stampa
Livello bibliografico	Monografia
Nota di bibliografia	Includes bibliographical references at the end of each chapters and index.
Nota di contenuto	Introduction -- Real-Time Monitoring and Operational Control of Water Systems -- Part I: Modelling -- Modelling of Drinking Water Networks -- Parameter Estimation -- Nodal Demand Calibration -- Short-Term Demand Forecasting -- Part II: Monitoring -- Leak Monitoring -- Quality Monitoring -- Sensor Placement for Monitoring -- Data Validation and Reconstruction.- Fault Diagnosis -- Part III: Operational Control -- Model Predictive Control of Transport Networks -- Model Predictive Control of Distribution Networks -- Stochastic Model Predictive Control -- Fault-Tolerance and Health-Aware Strategies -- Partitioning the Network into Subsystems -- Decentralized Model Predictive Control -- Part IV: Future Trends -- Data-Driven Evolutionary Game-Based Control -- Coordination between Regional and Metropolitan Networks -- Big Data Analytics and Knowledge Discovery.
Sommario/riassunto	This book presents a set of approaches for the real-time monitoring and control of drinking-water networks based on advanced information

and communication technologies. It shows the reader how to achieve significant improvements in efficiency in terms of water use, energy consumption, water loss minimization, and water quality guarantees. The methods and approaches presented are illustrated and have been applied using real-life pilot demonstrations based on the drinking-water network in Barcelona, Spain. The proposed approaches and tools cover: • decision-making support for real-time optimal control of water transport networks, explaining how stochastic model predictive control algorithms that take explicit account of uncertainties associated with energy prices and real demand allow the main flow and pressure actuators—pumping stations and pressure regulation valves—and intermediate storage tanks to be operated to meet demand using the most susta inable types of source and with minimum electricity costs; • decision-making support for monitoring water balance and distribution network quality in real time, implementing fault detection and diagnosis techniques and using information from hundreds of flow, pressure, and water-quality sensors together with hydraulic and quality-parameter-evolution models to detect and locate leaks in the network, possible breaches in water quality, and failures in sensors and/or actuators; • consumer-demand prediction, based on smart metering techniques, producing detailed analyses and forecasts of consumption patterns, providing a customer communications service, and suggesting economic measures intended to promote more efficient use of water at the household level. Researchers and engineers working with drinking-water networks will find this a vital support in overcoming the problems associated with increased population, environmental sensitivities and regulation, aging infrastructures, energy requirements, and limited water sources. Advances in Industrial Control aims to report and encourage the transfer of technology in control engineering. The rapid development of control technology has an impact on all areas of the control discipline. The series offers an opportunity for researchers to present an extended exposition of new work in all aspects of industrial control.