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Descrizione fisica	1 online resource (XLII, 691 p. 686 illus., 511 illus. in color.)
Collana	International cryogenics monograph series
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Nota di contenuto	Units and Symbols -- 1 Introduction -- 2 Some Reminders about Cryogenics and Others -- 3 Heat Exchangers for Cryogenic use, Reminders -- 4 Basic Cycles for Helium Refrigeration and Liquefaction -- 5 Special Cycles for Helium Refrigeration and Liquefaction -- 6 Technology of the helium Refrigeration Components -- 7 Helium -- 8 Introduction to off-design Operation -- 9 Process control -- 10 Operating Modes of a Helium Refrigeration Plant -- 11 Operation and Maintenance of a Helium Plant -- 12 A Few Examples of Existing Plants -- 13 A Helium Plant Specification -- 14 Commissioning Tests -- 15 The Cryo Tool Box -- 16 Annex 1 Starting procedures for screw compressors -- 17 Annex 2 More on ORS -- 18 Annex 3 Heat exchangers operating in a horizontal position -- 19 Annex 4 Introduction to the Grafcet language for the description of an automation procedure -- 20 Terminology.
Sommario/riassunto	This book offers a practical introduction to helium refrigeration engineering, taking a logical and structured approach to the design, building, commissioning, operation and maintenance of refrigeration systems. It begins with a short refresher of cryogenic principles, and a review of the theory of heat exchangers, allowing the reader to understand the importance of the heat exchanger role in the various thermodynamic cycle structures. The cycles are considered from the simplest (Joule Thomson) to the most complicated ones for the very large refrigeration plants and, finally, those operating at temperatures

lower than 4.5 K. The focus then turns to the operation, ability and limitations of the main components, including room temperature cycle screw compressors, heat exchangers, cryogenic expansion turbines, cryogenic centrifugal compressors and circulators. The book also describes the basic principles of process control and studies the operating situations of helium plants, with emphasis on high level efficiency. A major issue is helium purity, and the book explains why helium is polluted, how to purify it and then how to check its purity, to ensure that all components are filled with pure helium prior to starting. Although the intention of the book is not to design thermodynamic cycles, it is of interest to a designer or operator of a cryogenic system to perform some simplified calculations to get an idea of how components or systems are behaving. Throughout the book, such calculations are generally performed using Microsoft® Excel and the Gaspak® or Hepak® software. .