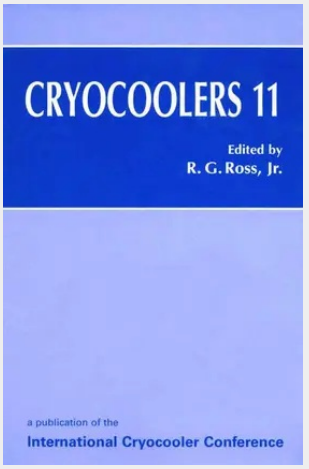
Ross

# Cryocoolers 11




Over the last two years we have witnessed a continuation in the breakthrough shift toward pulse tube cryocoolers for long-life, high-reliability cryocooler applications. One class of pulse tubes that has reached maturity is referred to as "Stirling type" because they are based on the linear Oxford Stirling-cooler type compressor; they generally provide cooling in the 30 to 100 K temperature range and operate at frequencies from 30 to 60 Hz. The other type of pulse tube cooler making great advances is the so-called "Gifford-McMahon type. " Pulse tube coolers of this type use a G-M type compressor and lower frequency operation to achieve temperatures in the 2 to 10 K temperature range. Nearly a third of this proceedings covers these new developments in the pulse tube arena. Complementing the work on low-temperature pulse tubes is substantial continued progress on rare earth regenerator materials and Gifford-McMahon coolers. These technologies continue to make great progress in opening up the 2 - 4 K market. Also in the commercial sector, continued interest is being shown in the development of long-life, low-cost cryocoolers for the emerging high temperature superconductor electronics market, particularly the cellular telephone base-station market. At higher temperature levels, closed-cycle J-T or throttle-cycle refrigerators are taking advantage of mixed refrigerant gases, spearheaded in the former USSR, to achieve low-cost cr- cooler systems in the 65 - 80 K temperature range.

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**213,99 €**
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*Lieferfrist: bis zu 10 Tage*

**Artikelnummer:** 9780306465673
**Medium:** Buch
**ISBN:** 978-0-306-46567-3
**Verlag:** Springer
**Erscheinungstermin:** 30.09.2001
**Sprache(n):** Englisch
**Auflage:** 2001
**Produktform:** Gebunden
**Gewicht:** 1555 g
**Seiten:** 825
**Format (B x H):** 170 x 257 mm



**Kundenservice Verlag Dr. Otto Schmidt KG**
Neumannstraße 10, 40235 Düsseldorf | kundenservice@otto-schmidt.de | 0221-93738-997 (Inland)