
**Vacuum gauges — Definitions and
specifications for quadrupole mass
spectrometers**

*Manomètres à vide — Définitions et spécifications des spectromètres
de masse quadripolaires*



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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

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The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

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Introduction

Quadrupole mass spectrometers (QMSs) are nowadays used not only for leak detection and residual gas analysis in vacuum but also as instruments to provide quantitative analysis in processes and control processes such as physical and chemical vapor deposition, and etch processes.

Total pressure, composition of the gas mixture, QMS settings, environment conditions, etc., have a significant influence on the measured signal, its uncertainty and interpretation. For this reason, it is not possible to calibrate QMS for all its possible applications. Instead, it has either to be calibrated for the particular conditions of use or for a standardized condition.

There is also some need for standardization in order to enable QMS users to compare devices of different manufacturers and to use the QMS properly.

In continuation of efforts of TC 112 during the 1990s, this International Standard takes a first step towards establishment of a standardized calibration procedure for QMS by defining the terms and parameters.

Vacuum gauges — Definitions and specifications for quadrupole mass spectrometers

1 Scope

This International Standard defines terms relevant to quadrupole mass spectrometers (QMSs) and specifies the parameters required for specification by QMS manufacturers necessary for proper calibration and for maintaining the quality of partial pressure measurement.

This International Standard applies to QMSs with an ion source of the electron impact ionization type. Such QMSs are designed for the measurement of atomic mass-to-charge ratios m/z typically <300 . QMSs with other ion sources, such as those of the chemical ionization, photoionization, and field ionization types, as well as the measurements of m/z above 300, which are mainly used to specify organic materials, lie outside the scope of this International Standard.

2 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

2.1 Definitions of components

2.1.1

quadrupole mass spectrometer **QMS**

mass spectrometer in which ions are injected axially into a quadrupole lens consisting of a system of four electrodes, usually rods, to which radio frequency and d.c. electric fields in a critical ratio are applied, so that only ions with a certain mass/charge ratio emerge

[SOURCE: ISO 3529-3:1981,^[2] 3.5.2.2]

Note 1 to entry Such a QMS consists of a sensor head and electronic unit.

2.1.2

sensor head **analyser tube** **sensor** **sensor unit** **sensing head** **gauge head**

equipment consisting of an ion source, quadrupole mass filter, and ion detector in one enclosure

2.1.3

ion source

part of the QMS in which ions of gas molecules and atoms are produced

Note 1 to entry For the production of positive ions, the ion source generally uses an electron impact ionization process.

2.1.3.1

open ion source

ion source with a high conductance to the surrounding vacuum environment, often designed as an open grid structure

Note 1 to entry All of the operational components of this ionization hardware are exposed to the same vacuum region.