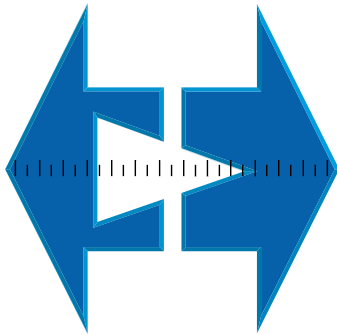




American National Standard for

Controlled-Volume Metering Pumps

for Nomenclature, Definitions,
Application, and Operation

ANSI/HI 7.1-7.5-2006



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Sponsor
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Approved August 4, 2006
American National Standards Institute, Inc.

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Foreword (Not part of Standard)

Purpose and aims of the Hydraulic Institute

The purpose and aims of the Institute are to promote the continued growth and well-being of pump users and pump manufacturers and further the interests of the public in such matters as are involved in manufacturing, engineering, distribution, safety, transportation, and other problems of the industry, and to this end, among other things:

- a) To develop and publish standards for pumps;
- b) To collect and disseminate information of value to its members and to the public;
- c) To appear for its members before governmental departments and agencies and other bodies in regard to matters affecting the industry;
- d) To increase the amount and to improve the quality of pump service to the public;
- e) To support educational and research activities;
- f) To promote the business interests of its members but not to engage in business of the kind ordinarily carried on for profit or to perform particular services for its members or individual persons as distinguished from activities to improve the business conditions and lawful interests of all of its members.

Purpose of Standards

- 1) Hydraulic Institute Standards are adopted in the public interest and are designed to help eliminate misunderstandings between the manufacturer, the purchaser and/or the user and to assist the purchaser in selecting and obtaining the proper product for a particular need.
- 2) Use of Hydraulic Institute Standards is completely voluntary. Existence of Hydraulic Institute Standards does not in any respect preclude a member from manufacturing or selling products not conforming to the Standards.

Definition of a Standard of the Hydraulic Institute

Quoting from Article XV, Standards, of the By-Laws of the Institute, Section B:

“An Institute Standard defines the product, material, process or procedure with reference to one or more of the following: nomenclature, composition, construction, dimensions, tolerances, safety, operating characteristics, performance, quality, rating, testing, and service for which designed.”

Comments from users

Comments from users of this Standard will be appreciated, to help the Hydraulic Institute prepare even more useful future editions. Questions arising from the content of this Standard may be directed to the Hydraulic Institute. It will direct all such questions to the appropriate technical committee for provision of a suitable answer.

If a dispute arises regarding contents of an Institute publication or an answer provided by the Institute to a question such as indicated above, the point in question shall be referred to the Executive Committee of the Hydraulic Institute, which then shall act as a Board of Appeals.

Revisions

The Standards of the Hydraulic Institute are subject to constant review, and revisions are undertaken whenever it is found necessary because of new developments and progress in the art. If no revisions are made for five years, the standards are reaffirmed using the ANSI canvass procedure.

Scope

This Standard is for controlled-volume metering pumps, which are reciprocating power pumps used to accurately displace a predetermined volume of liquid in a specified time period. It includes types and nomenclature; definitions; design and application; and installation, operation and maintenance. This standard does not apply to accessory items, such as piping, tubing, fittings, or instrumentation or pump drivers.

Units of Measurement

Metric units of measurement are predominantly used, and, where appropriate, US customary equivalents appear in brackets following the metric units. Charts, graphs, and sample calculations are shown in both metric and US units.

Consensus for this standard was achieved by use of the Canvass Method

The following organizations, recognized as having an interest in the standardization of controlled-volume metering pumps, were contacted prior to the approval of this standard. Inclusion in this list does not necessarily imply that the organization concurred with the submittal of the proposed standard to ANSI.

Alldos Inc.	Fluid Sealing Association
Brown and Caldwell	Indiana Michigan Power
City of Newport News Department of Public Utilities (Waterworks)	McFarland Pump Company LLC
Fluor Corp.	Moyno, Inc.
	Saudi Arabian Bechtel Company

Working Group Committee Members

Although this standard was processed and approved for submittal to ANSI by the Canvass Method, the committee met many times to facilitate the development of this standard. At the time it was developed, the committee had the following members:

Chairman – Daniel Shaw, McFarland Pump Company

Members:

Robert Bean	Milton Ray Company, USA
Irv Becker	Grundfos Pumps Corporation
D. Michael Dowse*	Neptune Chemical Pump Co, Inc.
Eric Hart*	SPX Process Equipment, Bran + Luebbe
Aaron Hinchliffe	Iwaki America Incorporated
Ken McQuesten	American Lewa, Inc.
Mike Mulcahy	Tuthill Pump Group
Manor Parikh	Siemens U.S. Filter/Wallace & Tienan

*Former Chairman

7 Controlled-volume metering pumps

7.0 General description of controlled-volume metering pumps

Controlled-volume metering pumps (also known as *metering pumps*, *proportioning pumps*, *chemical injection/feed pumps*, or *dosing pumps*) are reciprocating positive displacement pumps typically used for the injection of chemical additives, proportional blending of multiple components, or metered transfer of a single liquid. These types of pumps are used in applications requiring highly accurate, repeatable, and adjustable rate of flow.

The rate of flow of a controlled-volume pump is a function of the cross-sectional area of the plunger or piston, or displacement of the diaphragm; the stroke length; and the stroking speed. The pumping action is created by a reciprocating piston and controlled by suction and discharge check valves. The rate of flow is adjusted by changing the stroke length and/or the stroking speed.

Controlled-volume metering pumps are characterized by their ability to meet specific performance requirements concerning steady state accuracy, repeatability, and linearity.

7.1 Types and nomenclature

Because controlled-volume metering pumps are employed in a number of different environments and applications, several types have been developed with

different liquid ends and drive and control mechanisms. The basic elements of the pumps are the driver, the flow control, pumphead, and the gearbox. These are shown in Figure 7.1, which illustrates the general arrangement of these elements and how they are combined to form a controlled-volume metering pump. Detailed descriptions of these elements follow below.

7.1.1 Construction characteristics of controlled-volume metering pumps

NOTE: The following definitions and illustrations represent typical construction characteristics of controlled-volume metering pumps but do not necessarily represent recommended designs. Variations in design may exist without violating the intent of this standard.

Liquid end

- Plunger
- Piston
- Mechanical coupled disc diaphragm
- Hydraulic coupled disc diaphragm
- Hydraulic coupled tubular diaphragm
- Hydraulic coupled conical diaphragm

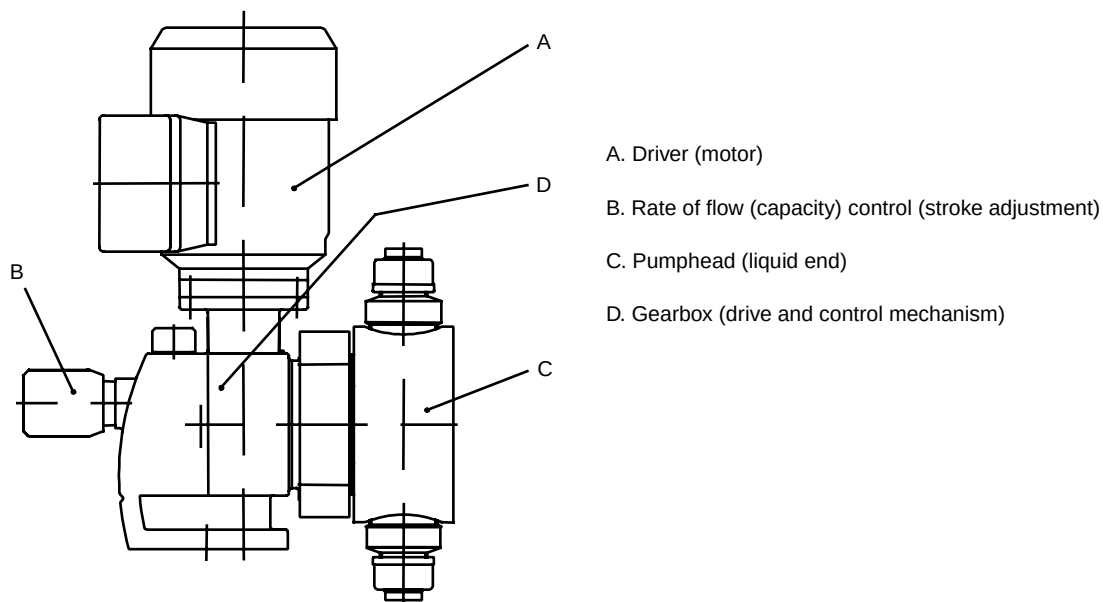


Figure 7.1 — Basic elements of a controlled-volume metering pump