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*Power Index Calculation Procedure—
Standard Rating Methodology for Power Drive Systems and Complete Drive Modules*

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Foreword

The objective of this standard is to define a rating system for power drive systems (PDS) consisting of a motor and an adjustable speed drive. The Power Index (PI) calculated using this document can be applied to integrated motor and control (IMAC) equipment, a paired PDS consisting of a complete drive module packaged and sold with a physically separate motor, or complete drive modules alone (rated with a default motor). The PI is intended to be used by utility companies and energy program administrators as part of a program to provide incentives for selection of drives that, when properly applied, should result in overall energy savings. The rating may also be used by an end user to understand the value of a PDS for their driven equipment. Proper sizing and application of drives is vital to achieving energy savings and proper performance, but is outside the scope of this document. The power use determined according to this document is not intended to predict the actual performance in the specific application. The rating does provide an objective and representative basis for comparing different PDS designs, and observing the benefits of adding a PDS to equipment compared to a constant speed motor.

This rating is intended to be used for variable torque equipment that serves either a constant load or a variable load. Applications with constant torque loads may be added in a later phase of this program.

The final PI rating is a number between 0-100 that represents the percent power savings over the baseline constant speed motor. As such, higher numbers represent higher energy savings. Rated equipment shall be rated with both a constant load (CL) PI and a variable load (VL) PI that describes the predicted savings in constant and variable load applications, respectively. Definitions and calculations for the different ratings are contained within.

This standard provides the method to calculate the metric, Power Index. For the procedures to determine input power, it references other documents.

Proposals for modification or improvement of this standard are welcome. They should be sent to the National Electrical Manufacturers Association, 1100 N 17th Street, Suite 900, Arlington, VA 22209, or sent via the NEMA website (<http://www.nema.org>).

This standard was developed jointly by IEC and the NEMA Industrial Automation Control Products and Systems and Motors and Generators Section. At the time of publication, these sections were composed of the following members:

Industrial Automation Control Products and Systems

ABB, Inc.—Cary, NC
Applied Information, Inc.—Suwanee, GA
Carlo Gavazzi, Inc.—Buffalo Grove, IL
Cummins, Inc.—Minneapolis, MN
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Delta Electronics (Americas) Ltd.—Research Triangle Park, NC
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Elinco Control Company, Ltd.—Willis, TX
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WEG Electric Corp—Duluth, GA
Worldwide Electric Corporation—Rochester, NY

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Eaton—Milwaukee, WI
Nidec Motor Corporation—St. Charles, MO
Rockwell Automation—Milwaukee, WI
SEW-Eurodrive, Incorporated—Lyman, SC
Schneider Electric—Lexington, KY
Siemens Industry, Inc.—Norcross, GA

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1 Scope

This standard establishes the calculation procedure and metric of **Power Index (PI)** for low voltage (600 V and less) power drive systems (PDS) and complete drive modules (CDM) from 1 to 500 HP.

The rated PDS consists of the combination of a CDM and a motor. The CDM is an electronic power converter connected between the single or polyphase AC supply and a polyphase motor. The motor is any motor that can be tested according to IEC 60034-2-3. It includes any controls as packaged by the manufacturer at the time of sale. The PDS *as rated* does not include connected driven equipment. It includes all components from incoming power to torque output from the motor shaft. See Figure 1.

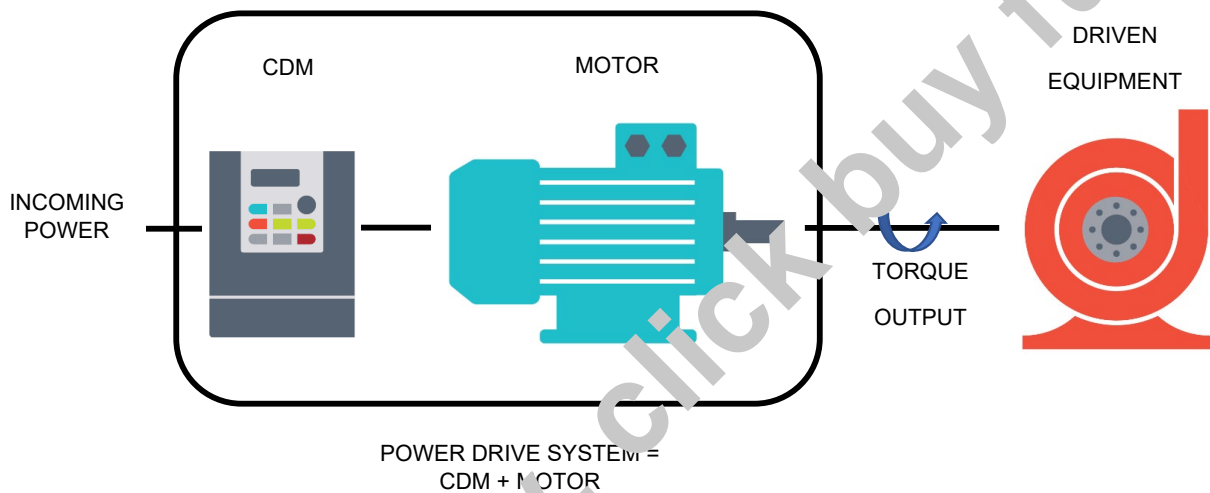


Figure 1. Power Drive System

The PI calculated using this document can be applied to any of the following cases:

- Case 1: A PDS consisting of an integrated motor and control (IMAC) where the controls are housed on the motor casing
- Case 2: A paired PDS consisting of a CDM packaged and sold with a physically separate motor
- Case 3: A CDM only (PI rating is calculated using a Default Motor).

Cases 1 and 2 are rated in the same manner. The only difference for Case 3 is that for a CDM-only, PI uses the losses from the Default Motor as given in Table 4.

The PDS, as rated, does not include any gears, belts, or other transmission of torque. This specifically excludes any magnetic, hydraulic, or other non-electronic drive. Servo motors are specifically excluded. For the purposes of this rating, the scope is limited to low voltage (under 600V) equipment and motors with a "Premium Efficiency" rating or above.