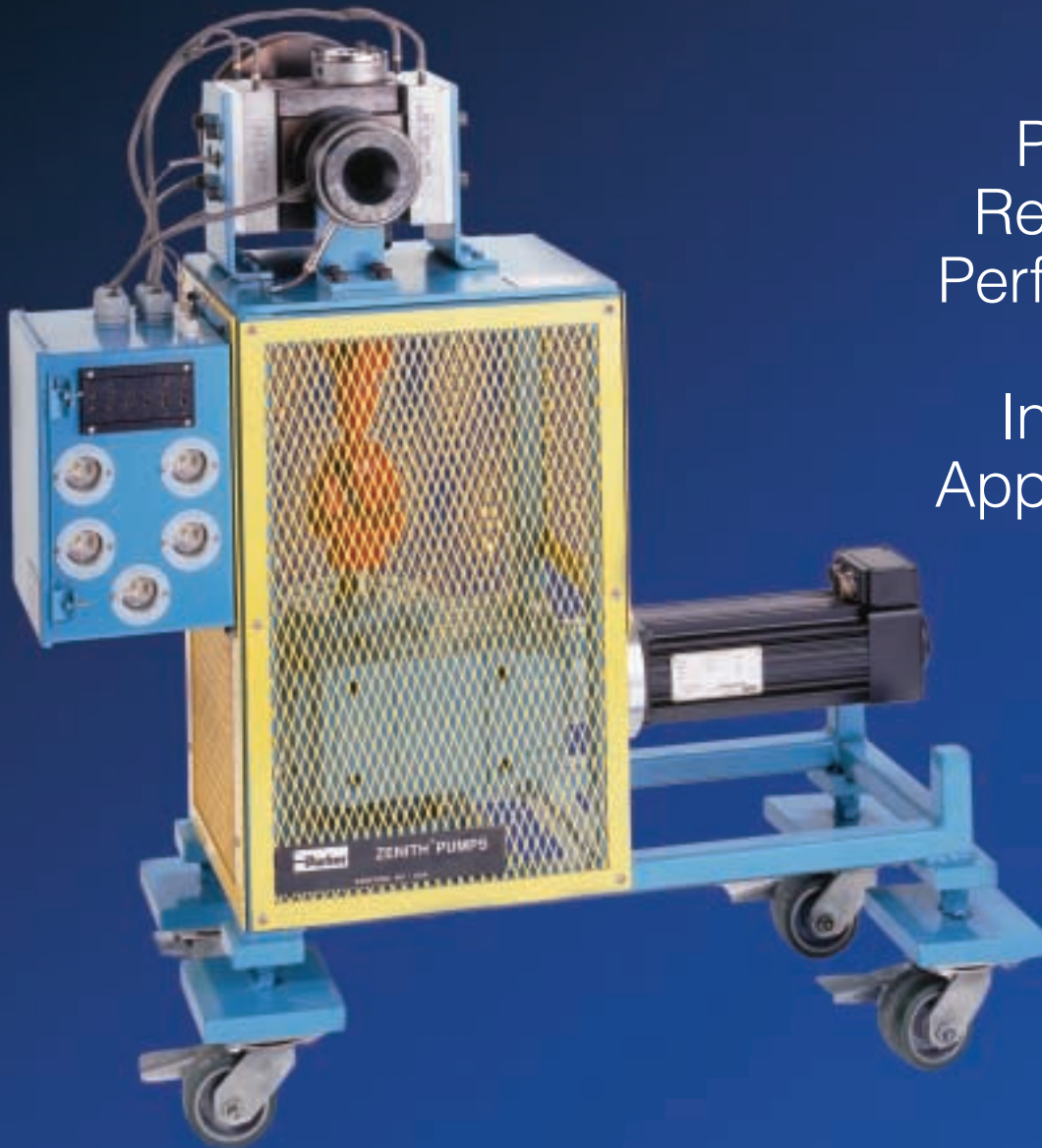


Zenith[®] Pumps

PEP-II Series Gear Pumps



Precise,
Pulseless,
Repeatable
Performance

In Polymer
Applications.

Zenith® Pumps

In 1926, Zenith Pumps developed the first precision metering gear pump for the extrusion of acetate rayon. This basic design became the foundation for the entire synthetic fiber industry.

During the '40s and '50s, Zenith Pumps developed the original PEP (Polymer Extrusion Pump) design for the extrusion of film, sheet and profile, which consisted primarily of polyester and nylon polymers.

Since then, Zenith has provided pumps for virtually every polymer utilized in the plastics industry. This diverse experience has resulted in the development of many design features and modifications for the PEP-II pumps.

The PEP-II's unique positive displacement design provides consistent, accurate polymer delivery under varying extruder output conditions of pressure, temperature and viscosity. With the PEP-II providing the pressure between the extruder and the die, extruder parameters can be configured to provide a homogeneous melt at increased throughputs and tighter gauge tolerances.

Today, the Zenith PEP-II pump has become the pump of choice for a wide range of polymer applications in the plastics industry. Zenith can be found wherever *precise, pulseless, repeatable metering* of fluids is required.

Benefits

For years, polymer processors have utilized gear-pump-assisted extrusion to solve critical issues in the diverse plastics industry.

The Zenith gear pump optimizes the extrusion process by allowing the screw to melt and homogenize the polymer. As the pump generates the needed pressure, it relieves the extruder of work; therefore, reducing heat from the shear, lowering the torque required, and eliminating surging. All this optimizes the performance of the extruder and offers the following benefits:

- **Improved Dimensional Stability—**

Effectively isolates the die from upstream fluctuations.

- **Controlled Melt Quality—**Regulates the extruder back pressure while it reduces residence time, stabilizes the plasticating action, and lowers melt temperature.

- **Increased Production—**Provides very high efficiency regardless of its pressure building requirement.

- **Reduced Raw Material Usage—**Provides a narrower finished product gauge variation.

- **Eliminates Surging and Screw Beat—**Effectively handles problems caused by melt density or extruder parameters.

- **Increased Extruder Flexibility—**Allows varying process conditions such as higher regrind levels, temperatures, pressures, etc.

- **Crowned Root Gear Design—**Reduces shear internal to the pump, lowering the temperature and increasing the production rate per power required.

- **Streamlined Operation and Startup—**Closed-loop controls provide easy operator interface.

- **Extended Extruder Life—**Reduces work required by the extruder such as pressure and torque.

- **Lower Operational Costs—**Provides a more efficient method of conveying, eliminating material giveaway, and increasing production per pound of extrudate, etc.

Applications

PEP-II Series pumps are ideal for such processes as:

Film
Sheet
Profile

Coextrusion
Wire and Cable
Nonwoven

Tubing
Coating
Fiber Boosting

Nonwoven Fibers
Pelletizing

Examples of materials processed include:

Acrylic
Cellulosics
Polysulfone
Polyester
Hot Melt
Adhesive

Fluoropolymers
LLDPE
HDPE
PC
PE
PS

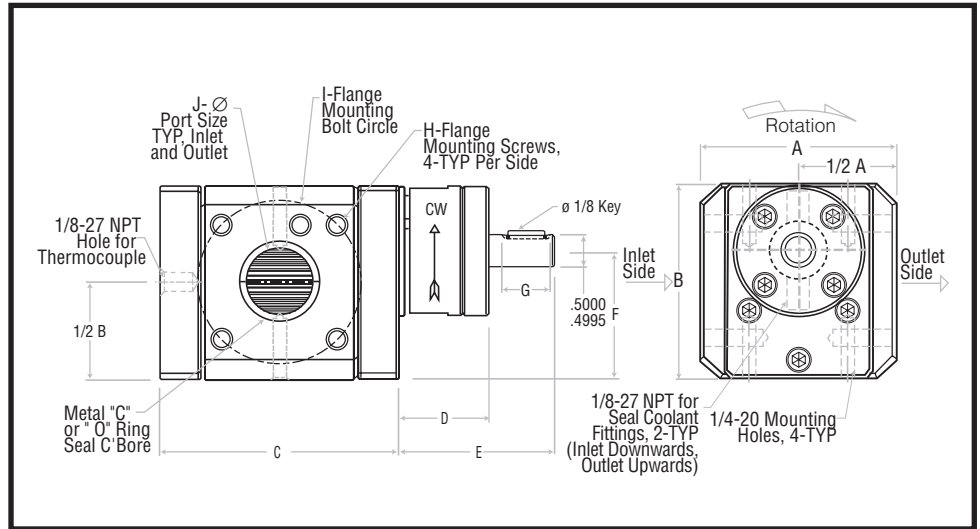
PB
PUR
PP
PA
PET
PEEK

PVC
PVA
SAN
HIPS
PMMA
PVB

PIB
ABS
SMA
TPEs
Many others

PEP-II Pump 0.16-3 cc/rev

Dimensional Diagram

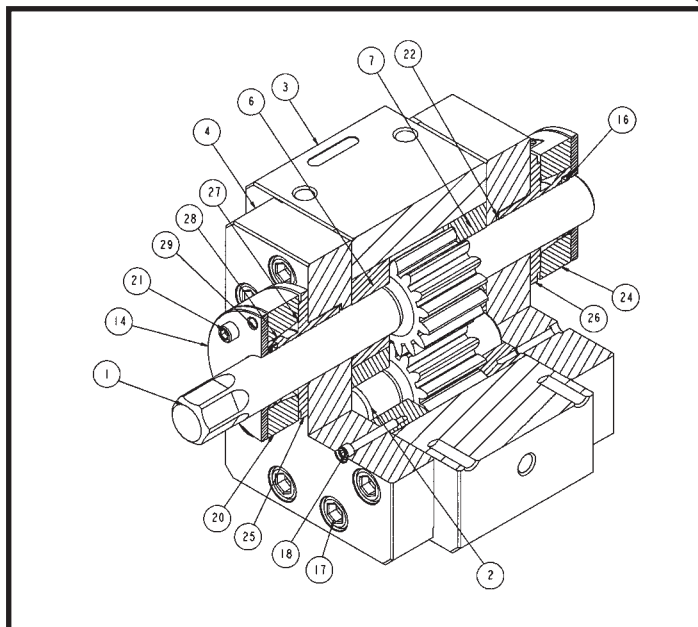


Dimensional Data Chart

PUMP CAPACITY	A	B	C	D	PUMP DIMENSIONS			H	I	J	MAX TORQUE	APPROX WEIGHT
CC/REV					E	F	G				LBS	LBS
0.16	3.000	3.000	2.860	1.400	2.400	1.960	0.750	1/4	1.500	0.125	80	9
0.3	3.000	3.000	2.860	1.400	2.400	1.960	0.750	1/4	1.500	0.125	80	9
0.6	3.000	3.000	2.860	1.400	2.400	1.960	0.750	1/4	1.500	0.250	195	9
1.2	3.000	3.000	3.650	1.400	2.400	1.960	0.750	5/16	2.500	0.750	410	9
1.8	3.000	3.000	3.650	1.400	2.400	1.960	0.750	5/16	2.500	0.750	410	9
3.0	3.000	3.000	3.650	1.400	2.400	1.960	0.750	5/16	2.500	1.000	600	9

PUMP DIMENSIONS ARE IN INCHES

Materials Of Construction Diagram And Chart



ITEM	QTY	PART	MATERIAL
1	1	FRONT PLATE	TOOL STEEL
2	1	CENTER PLATE	TOOL STEEL
3	1	REAR PLATE	TOOL STEEL
4	1	DRIVE SHAFT	TOOL STEEL
5	1	ARBOR	TOOL STEEL
6	2	METERING GEAR	TOOL STEEL
8	2	KEY, GEAR	
9	2	BEARING	TOOL STEEL
10	2	BEARING	TOOL STEEL
11	1	RHEOSEAL	STAINLESS
13	1	SEAL PLATE	STAINLESS
14	1	LIP SEAL	FILLED PTFE
15	6	SOCKET HEAD BOLT	ALLOY
16	4	SOCKET HEAD BOLT	ALLOY
17	4	SOCKET HEAD BOLT	ALLOY
18	2	METAL C-RING	
19	2	KEY, D-BEARING	
20	1	KEY, EXTERNAL	

Pump Capacity

Capacity CC/REV	Flow Rate LBS/HR	Extruder Size, IN	Typical Drive HP	Capacity CC/REV	Flow Rate LBS/HR	Extruder Size, IN	Typical Drive HP
0.16	0.2-1.25	.25	0.5	10	113-80	1.0, 1.25, 1.5	2
0.3	.04-2.5	.25, .5	0.5	20	26-160	1.25, 1.5, 2.0	3
0.6	.8-5	.5	0.5	40	53-450	1.5, 2.0, 2.5	5
1.2	1.5-9.0	.5	0.5	100	250-1200	2.5, 3.5	10
1.8	2.4-14	.5	0.5	175	450-2100	3.5, 4.5	15
3	4-24	.75, 1.0	0.5	300	300-3600	4.5, 6.0	20
5	6-40	1.0	1	750	2000-7000	8.0	30

NOTE: These are typical sizes only; others are available. Actual pump and drive size will vary with viscosity, pressure and other factors. Contact Zenith for further assistance.

Specifications

- Capacities:** From less than 1 to more than 7,000 lbs/hr standard.
- Operating Speed:** See below: Depending upon process parameters.
- Pressures:** Body to 10,000 psi (690 BAR); differentials from 4,000 psi (276 BAR).
- Temperature:** To 950°F (510°C).

Technical Data

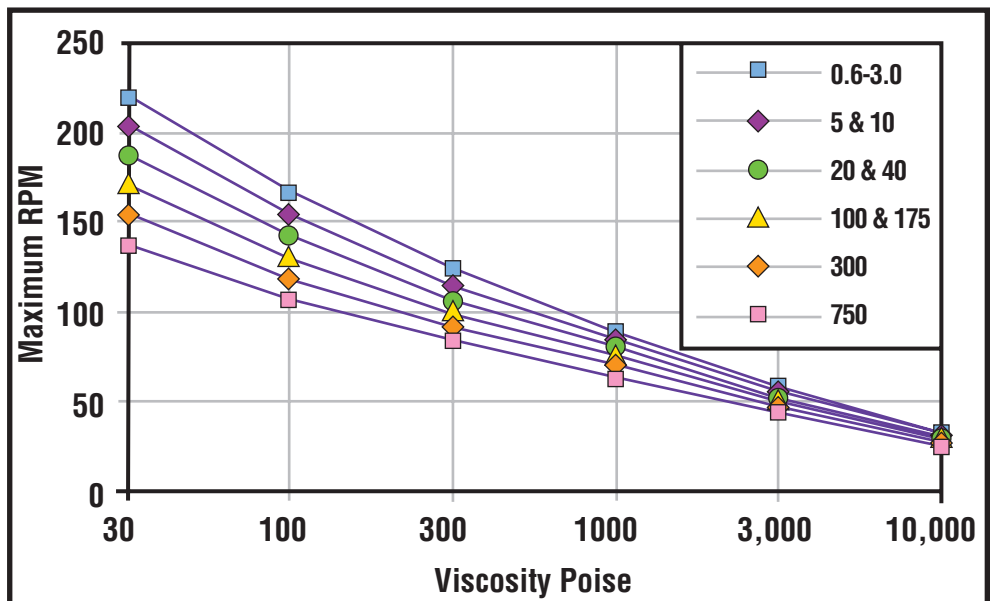
Required Torque: (IN-LB)

$$\text{Torque} = K_1 \Delta P + (K_2 N \mu)$$

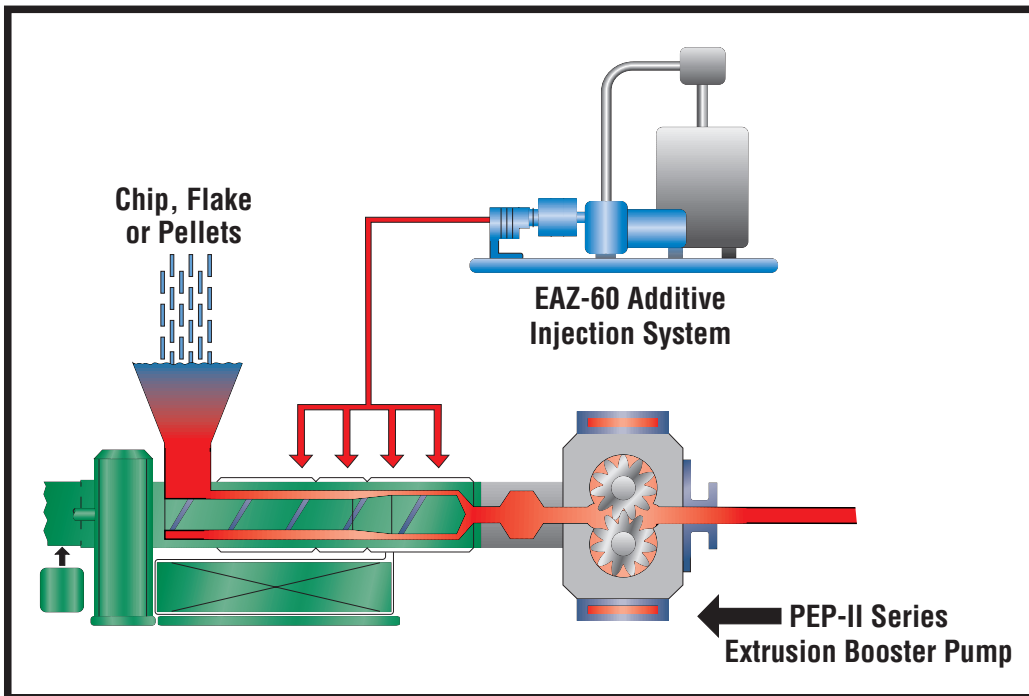
- K_1 = Constant from chart
- N = Rev. per minute
- ΔP = Differential pressure in bar
- K_2 = Constant from chart
- μ = Viscosity in Poise at application's maximum shear rate (refer to Technical Bulletin PEPTB)

Capacity cc/rev	K1	K2	Max. Torque IN-LB
0.16	0.0016	0.00332	80
0.3	0.0029	0.00332	80
0.6	0.0058	0.00355	195
1.2	0.0117	0.00459	410
1.8	0.0175	0.00507	410
3.0	0.0291	0.00597	600
5.0	0.0484	0.00342	1,225
10.0	0.0971	0.00706	2,085
20.0	0.1942	0.01172	3,250
40.0	0.3883	0.01919	6,750
100.0	0.9708	0.04328	12,100
175.0	1.6990	0.08113	22,400
300.0	2.9126	0.15357	50,600
750.0	7.2816	0.37911	116,600

Maximum Pump Speed



Zenith Pumps And The Extrusion Process



Zenith Pumps can handle all your extrusion pumping applications including additive injection for on-line compounding of tackifiers, colorants, stabilizers, etc.

Complete Systems Capability

Zenith Pumps offers typical drive and control packages, as well as custom systems designed to meet your particular process specifications. Our extensive experience and full engineering capabilities ensure you the best possible solution to your precision extrusion application.

Zenith's typical extrusion control package provides the basic controls for a PEP-II pump system. The drive consists of a motor and reducer mounted on a common base plate, with speed controlled by a Zenith ZeTROL digital speed controller. A pressure

control system regulates the extruder speed and maintains a constant pressure to the pump inlet. A temperature controller regulates the pump's electric heaters. Other features available include:

- Discharge pressure indicator
- Pump inlet/discharge flanges
- Pump fluid or steam heat plates
- Bronze heat plates for extreme service
- System mounting carts
- Start-up assistance



QSR-065 1994
QSR-095 1994



WARNING

FAILURE, IMPROPER SELECTION OR IMPROPER USE OF THE PRODUCTS AND/OR SYSTEMS DESCRIBED HERE-IN OR RELATED ITEMS CAN CAUSE DEATH, PERSONAL INJURY AND PROPERTY DAMAGE.

This document and other information from Parker Hannifin Corporation, its subsidiaries and authorized distributors provide product and/or system options for further investigation by users having technical expertise. It is important that you analyze all aspects of your application and review the information concerning the

product or system in the current product catalog. Due to the variety of operating conditions and applications for these products or systems, the user, through its own analysis and testing, is solely responsible for making the final selection of the products and systems and assuring that all performance, safety and warning requirements of the application are met.

The products described herein, including without limitation, product features, specifications, designs, availability and pricing, are subject to change by Parker Hannifin Corporation and its subsidiaries at any time without notice.

Parker Hannifin Corporation

Zenith® Pumps Division
5910 Elwin Buchanan Drive
Sanford, NC 27330-9551
Phone: 919-774-7667 • Fax: 919-774-5952
zenithpumps@parker.com • www.zenithpumps.com



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