Knowing the critical requirements of polymer blending is the first step in understanding the numerous benefits of dynaBLEND® technology. Over the years, the spectrum of available polymers has widened. Today there are more difficult-to-blend polymers than ever before. Some polymer blending systems work well on simple-to-blend polymers, but fail to effectively activate many other polymers.

**As-supplied or Concentrated Polymer**—Polymer is a long chain molecule having positive (cationic), negative (anionic) or neutral (non-ionic) charge sites. In its as-supplied, concentrated form, the polymer is tightly coiled. In this state, the polymer is not susceptible to damage from high mixing energy.

**Effects of Insufficient Mixing Energy**—When insufficient mixing energy is applied, polymer gelling or agglomeration occurs, resulting in the charge sites not being fully exposed. Overdosing of polymer is required to achieve desired performance.

**Effects of Overexposure to Mixing Energy**—Overexposing polymer to mixing energy after initial activation will damage the fragile long chain molecule. Again, overdosing of polymer is required.

**Fully Activated Polymer**—Unwinding and elongating the coiled polymer molecule is necessary to expose the maximum number of charge sites to your process. The job of the polymer activation and blending system is to gently and thoroughly activate polymer. Fully elongated, undamaged polymer is the most active and effective form yet also the most fragile state. Continued exposure to mixing energy in this state will damage the fragile polymer.

the way to **Optimum** polymer performance

1. **“Infinite Shear in Zero Time.”** Apply ultra-high mixing energy at the point of initial polymer and water contact to prevent polymer gelling or agglomeration. At this time the polymer is coiled-up and not susceptible to damage.

2. **Create the right environment.** Polymer solution has proven to be the ideal environment for polymer activation, as opposed to raw water. Inject neat, concentrated polymer into polymer solution, not raw water.

3. **Prolonged turbulence.** Expose polymer to prolonged turbulence in order to complete the blending process gently and fully.

4. **Avoid damaging mixing energy** after the polymer is initially activated so as not to break the fragile molecular chain.
proven **Performance**

While some polymer systems can only work well on the simple-to-blend polymers, dynaBLEND® has a proven track record of effectively activating all types of polymer. dynaBLEND is the standard for manufacturers of ultra-high molecular weight and high solids type polymers.

proven **Reliability**

dynaBLEND is designed for reliability. The non-mechanical dynaBLEND mixing chamber design inherently delivers an unequalled degree of reliability over many mechanical technologies. But we don’t stop there. The polymer injection check valve is a potential maintenance issue in any polymer system. Fluid Dynamics designed the PCV valve, a large port check valve with spring-loaded stainless steel ball and Teflon® body. The PCV valve easily disassembles for inspection or cleaning simply by pulling a two-prong stainless steel pin.

proven **Quality**

*Highest Quality = Lowest Life Cycle Cost!* dynaBLEND is the benchmark for quality in our industry. Why? Because of the value of longevity. dynaBLEND quality is achieved by building a more rugged system with higher quality components and tight quality control using highly skilled people.

*With quality comes confidence.* dynaBLEND is backed by the longest warranty in our industry—two (2) year system warranty and lifetime mixing chamber warranty.

Consider your investment—whether it be a centrifuge, belt filter press, clarifier, filter, paper machine, or whatever your process requires, your investment is substantial. Doesn’t it make sense to protect this investment?

A polymer blending and activation system can dramatically affect the performance and reliability of this process.

**You Should Expect:**

➤ Proven Performance  
➤ Proven Reliability  
➤ Proven Quality

**What does all this mean?**

A system that will deliver the lowest life-cycle cost.

**dynaBLEND®**

the proven solution

**here’s real Confidence**

➤ Two Year System Warranty  
➤ Lifetime Mixing Chamber Warranty  
➤ Total Satisfaction Guarantee

* See Fluid Dynamics warranty for further details.
simply the **Best** polymer system available!

dynaBLEND® L Series systems are designed to easily accept a wide range of flexible features and options. All dynaBLENDs utilize only the finest components, are built on all stainless steel frames and are designed to stand the test of time in extreme conditions and harsh environments.

### dynaBLEND Construction Features

- **A** All Piping Components Rigidly Mounted to Skid
- **B** Gusseted Uprights for Rigidity
- **C** NEMA 4X Control Panel
  
  *Fluid Dynamics is a UL Certified Panel Shop*
- **D** Control Panel at Operator Eye-Level
- **E** Open Frame Design for Ease of Accessibility
  
  *Constructed of 304 SS*
- **F** Sealtite for All Power Wiring

### Basic dynaBLEND and Options

1. Metering Pump
2. Calibration Column (optional)
3. Polymer Flow Measurement (optional)
4. Proprietary Design Polymer Check Valve
5. Differential Pressure Switch (optional)
6. Solenoid Valve
7. Water Flow Measurement
8. Liquid Filled SS Pressure Gauges
9. Variable Orifice Water Control Valve
10. dynaBLEND Mixing Chamber
11. Pressure Relief Valve

### Optional Booster Pump Module

12. Booster Pump
13. Pressure Reducing Valve

### Optional Post Dilution Module

14. Solenoid Valve
15. Water Flow Measurement
16. Static Mixer

*1 Can be Diaphragm or Progressing Cavity*

*2 Can be Rotometer, Turbine Flow Meter or Magnetic Flow Meter*
inside the dynaBLEND® system

In twenty years of independent side-by-side trials, the dynaBLEND system has proven itself superior to alternative blending methods. Success is due to its patented, non-mechanical HydroAction Technology—a technology that produces in excess of six times the mixing energy per unit volume than a comparable-sized mechanical mixer.

dynaBLEND induces high mixing energy without the use of mechanical impellers to ensure a blending process free from polymer damage, while preventing polymer gelling.

Preventing polymer gelling or damage maximizes your polymer investment by reducing your polymer use. Thousands of installations worldwide validate dynaBLEND’s track record for superior performance and reliability.

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the three stages of hydroAction

STAGE 1

initial Ultra-High energy

A pressure drop occurring across the specially designed variable orifice water control valve produces a high velocity water jet. This water jet, traveling at approximately 70 ft. per second, is aimed directly at, and impinges on the polymer as it enters the mixing chamber. At this point, the only point where high energy exists in the mixing chamber, the polymer is coiled-up and not susceptible to damage.

STAGE 2

Recirculation

In dynaBLEND’s concentric mixing chambers, newly blended polymer recirculates multiple times for additional exposure to non-damaging turbulence, completing the blending process. This recirculation ensures that polymer solution is present directly after the point of neat, concentrated polymer injection, for an ideal activation and blending environment.

STAGE 3

diminishing Mixing Energy

Mixing energy naturally diminishes in dynaBLEND’s concentric chambers. The flow path through the system’s concentric chambers further ensures optimum polymer performance by preventing polymer from short-circuiting the three stage process.
The L4-D / L6-D Series dynaBLEND® is a full featured liquid polymer blending system. These are the smallest dynaBLEND units and the use of a diaphragm pump makes them the most economical polymer blending system offered by Fluid Dynamics.

**WATER SUPPLY PRESSURE**
Water supply must be able to provide the maximum flow rate at 35-50 psi (240-345 kPa) greater than the pressure at point of use.

**OPERATING PRESSURE**
100 psi maximum (689 kPa)

**DIMENSIONS**
24" D x 24" W x 68" H
(61cm x 61cm x 173cm)

**WEIGHT**
Series L4-D: 175 lbs. (80 kg)
Series L6-D: 220 lbs. (100 kg)

**POWER REQUIREMENTS**
Single phase 115 VAC standard

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**SERIES**
**DILUTION WATER**
L4-300- 30- 300 GPH (113-1136 LPH)
L4-600- 60- 600 GPH (227-2271 LPH)
L4-1200- 120-1200 GPH (454-4543 LPH)
L6-1800- 180-1800 GPH (681-6814 LPH)
L6-2400- 240-2400 GPH (909-9085 LPH)
L6-3000- 300-3000 GPH (1136-11356 LPH)

**PUMP**
**POLYMER RANGE**
0.4D 0.02-0.4 GPH (0.08-1.5 LPH)
1.0D 0.05-1.0 GPH (0.19-3.8 LPH)
2.5D 0.1-2.5 GPH (0.38-9.4 LPH)
4.5D 0.2-4.5 GPH (0.75-17.0 LPH)
8.0D 0.4-8.0 GPH (1.5-30.0 LPH)

Dual pump configurations available.

**FUNCTIONAL EXAMPLE:**
L4-600-2.5D fits applications with 60-600 GPH dilution water and 0.1-2.5 GPH polymer

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*Stated polymer pump range may not be achieved at all viscosities.*
The L4-P / L6-P Series dynaBLEND® offers the same flow rates and features of the L4-D / L6-D Series with an upgrade to a progressing cavity pump. The progressing cavity pump provides increased life cycle.

### WATER SUPPLY PRESSURE
Water supply must be able to provide the maximum flow rate at 35-50 psi (240-345 kPa) greater than the pressure at point of use.

### OPERATING PRESSURE
100 psi maximum (689 kPa)

### DIMENSIONS
24” D x 24” W x 68” H
(61 cm x 61 cm x 173 cm)

### WEIGHT
Series L4-P: 250 lbs. (114 kg)
Series L6-P: 275 lbs. (125 kg)

### POWER REQUIREMENTS
Single phase 115 VAC standard

### DILUTION WATER
- **L4-300-**: 30-300 GPH (113-1136 LPH)
- **L4-600-**: 60-600 GPH (227-2271 LPH)
- **L4-1200-**: 120-1200 GPH (454-4543 LPH)
- **L6-1800-**: 180-1800 GPH (681-6814 LPH)
- **L6-2400-**: 240-2400 GPH (909-9085 LPH)
- **L6-3000-**: 300-3000 GPH (1136-11356 LPH)

### PUMP POLYMER RANGE
- **1.2P**: 0.12-1.2 GPH (0.45-4.5 LPH)
- **3.0P**: 0.3-3.0 GPH (1.13-11.3 LPH)
- **6.0P**: 0.6-6.0 GPH (2.27-22.7 LPH)
- **15P**: 1.5-15.0 GPH (5.68-56.8 LPH)
- **20P**: 2.0-20.0 GPH (7.57-75.7 LPH)

Dual pump configurations available.

**dynaBLEND® MODEL EXAMPLE:**
L6-1800-6.0P fits applications with 180-1800 GPH dilution water and 0.6-6.0 GPH polymer
The L8-P / L12-P Series dynaBLEND® include all features available throughout the line but in larger capacities.

L8-P / L12-P dynaBLENDs are designed to provide the highest standard water and polymer flow rates available on the market.

### SERIES DILUTION WATER

**L8-6000-**
- 600-6000 GPH (2270-22700 LPH)

**L8-9000-**
- 900-9000 GPH (3400-34000 LPH)

**L12-12000-**
- 1200-12000 GPH (4540-45400 LPH)

**L12-21000-**
- 2100-21000 GPH (7950-79500 LPH)

### DUAL PUMP POLYMER RANGE

<table>
<thead>
<tr>
<th>PUMP</th>
<th>POLYMER RANGE</th>
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<tbody>
<tr>
<td>15P</td>
<td>1.5-15 GPH</td>
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<tr>
<td>20P</td>
<td>2.0-20 GPH</td>
</tr>
<tr>
<td>25P</td>
<td>2.5-25 GPH</td>
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<tr>
<td>75P</td>
<td>7.5-75 GPH</td>
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<tr>
<td>110P</td>
<td>11-110 GPH</td>
</tr>
<tr>
<td>300P</td>
<td>30-300 GPH</td>
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</tbody>
</table>

Dual pump configurations available.

**dynaBLEND® MODEL EXAMPLE:**
L8-6000-75P fits applications with 600-6000 GPH dilution water and 3.75-75 GPH polymer

### WATER SUPPLY PRESSURE

Water supply must be able to provide the maximum flow rate at 35-50 psi (240-345 kPa) greater than the pressure at point of use.

### OPERATING PRESSURE

100 psi maximum (689 kPa)

### DIMENSIONS

36" D x 43" W x 68" H
(92cm x 109cm x 173cm)

### WEIGHT

- Series L8-P: 525 lbs. (238 kg)
- Series L12-P: 600 lbs. (273 kg)

### POWER REQUIREMENTS

Single phase 115 VAC standard
### Control and Instrument Options

#### Control Panel Options
Some of the available features include or allow the selection of accessories or options. These options are described below.

**PUMP CONTROL**

**Diaphragm Pumps** can be furnished with manual or automatic speed control. Automatic control models accept a 4-20 mADC pacing signal which varies the speed of the pump. Pacing feature is available on all control levels except Control Level 1.

**Progressing Cavity Pumps** are offered in manual or automatic models. Automatic models accept a 4-20 mADC pacing signal, which varies the speed of the pump. Tachometer feedback is an option available on PC pumps. Pump speed is interpolated as an indication of polymer flow where budgetary constraints do not allow more sophisticated polymer flow measurement. Pacing feature is available on all control levels except Control Level 1.

**WATER MEASUREMENT**

**Differential Pressure Switch**—A non-quantitative device used to sense the loss of water flow. Alarm and system shutdown is provided on loss of water flow. This feature is standard on Control Level 3 and optional on Control Levels 4, 5 and 6.

**Rotometer**—A quantitative device which allows water flow rate to be observed locally. Standard on all units unless a higher level control is selected.

**Turbine Flow Meter**—A quantitative device which measures water flow and provides a signal to indicate the water flow rate. This signal is used to display the flow rate and/or as a part of the ratio control feature. This feature is standard for Control Levels 4, 5 and 6 and is optional on Control Level 3.

**Magnetic Flow Meter**—An alternative to the Turbine Flow Meter available to meet customer preferences. This feature is optional and available only on Control Levels 4, 5 and 6.

**AUTO FLUSH**
Automatically initiated flush cycle. Cycle time is adjustable. Standard on Control Levels 4, 5 and 6; optional on Control Level 3.

**DRI POLYMER PREPARATION UNITS**
Available from Fluid Dynamics Inc.—request the dynaJET® brochure.

### POLYMER MEASUREMENT

**Calibration Column**—A pump draw down cylinder is standard on all systems utilizing a progressing cavity pump and optional for all systems utilizing a diaphragm pump.

**Thermal Flow Sensor**—A non-quantitative device used to sense loss of polymer flow. Alarm and shutdown is provided when loss of polymer flow is sensed. This feature is optional on Control Levels 3, 4 and 5 and standard on Control Level 6.

**Mass Flow Meter**—A quantitative device which is a highly sensitive instrument used to measure the flow of non-conductive and viscous liquids such as polymer, accurately, even at very low flows. The device provides a signal proportional to flow which may be used to display polymer flow rate and/or as the basis of the dynaBLEND ratio control feature with the highest accuracy. This option is available only on Control Levels 4, 5 and 6. When this option is selected, the thermal flow sensor is not required.
Fluid Dynamics Inc. offers dynaBLEND® Liquid Polymer Blending Systems with a variety of pre-engineered control configurations, including local, remote, microprocessor and PLC. All control enclosures are rated NEMA 4X. Standard power is 115 VAC. UL Certification is optional.

All units include manual polymer pump rate control. Control Levels 2 and higher are designed to accept a pacing signal for remote speed adjustment of the polymer feed pump. All progressing cavity pumps are provided with a variable speed drive with local rate indication. Diaphragm pumps feature both adjustable stroke length (manual only) and adjustable stroke speed control.

Control Levels 3, 4 and 5 are available with an optional alarm indicating loss of polymer flow, derived from a thermal flow sensor. This option is not available with pumps operating below 0.2 gph. This feature is included on Control Level 6.

Control Levels 1 through 3 are discrete control systems using relay logic and isolated contact I/O.

**Level 1**
- LOCAL-OFF-REMOTE Selector Switch
- RUN Indicating Light
- Manual Pump Flow Rate Adjustment
- Alarms: None
- Inputs: Remote ON-OFF (Discrete)
- Outputs: Running (Discrete)
  Remote Mode (Discrete)

**Level 2**
Level 2 is identical to Level 1 except with one added input:
- Inputs: Pacing of Metering Pump (4-20 mADC)

*Note: The ability to pace the metering pump is based on pump/drive selection.*

**Level 3**
- LOCAL-OFF-REMOTE Selector Switch
- RUN Indicating Light
- Manual Pump Flow Rate Adjustment
- Alarms: Low Water Differential Pressure
- Inputs: Remote ON-OFF (Discrete)
  Pacing of Metering Pump (4-20 mADC)
- Outputs: Running (Discrete)
  Remote Mode (Discrete)
  Low Water Diff. Press. Alarm (Discrete)

*Option — AUTO FLUSH can be added to Level 3 controls.*

Control Level 4 includes a Microprocessor based ratio control device capable of maintaining a precise solution concentration while following the manually adjusted dilution water flow rate.

- Microprocessor Control with Touchpad Input
- Ratio Control of Polymer to Dilution Water *
- LOCAL-OFF-REMOTE Selector Switch
- Running Indication
- Pump Rate Indication
- Water Rate Indication
- Solution Concentration Indication
- Auto Flush
- Alarm: Low Water Flow
- Inputs: Remote On-Off (Discrete)
  Pacing of Metering Pump (4-20 mADC)
- Outputs: Running (Discrete)
  Auto Flush Mode (Discrete)
  Low Water Flow Alarm (Discrete)
  Polymer Pump Rate (4-20 mADC)

*When the selector switch is in “LOCAL” the polymer feed follows the water flow to maintain a fixed concentration. A typical application is to fill a tank with a polymer solution, which is then delivered to multiple points of use.

When the selector switch is in “REMOTE” the polymer pump follows a remote control (demand) signal. Dilution water is manually adjusted. A typical application for is direct injection of diluted polymer solution to a single feed point.
Control Level 5 includes a Microprocessor based ratio control package to maintain a precise polymer solution concentration. The device is configurable, through a local touchpad, to allow either water or polymer to follow a 4-20 mADC pacing signal. The non-paced flow is controlled automatically to maintain the desired solution concentration. Polymer solution concentration may be adjusted locally or by a second remote 4-20 mADC signal. When operating in a fully automatic mode, water flow is controlled automatically through the use of an integral linear actuated variable orifice (LAVO).

- Microprocessor Control with Touchpad Input
- Ratio Control of Polymer Solution Concentration
  - Local Input Through Touchpad
  - In Response to a Remote Signal
- LOCAL-OFF-REMOTE Selector Switch
- Running Indication
- Pump Rate Indication
- Water Rate Indication
- Solution Concentration Indication
- Auto Flush
- Alarms: Low Water Flow
  Solution Concentration FAULT
- Inputs: Pacing Signal (4-20 mADC)
  Solution Concentration (4-20 mADC)
  Remote On-Off (Discrete)
- Outputs: Running (Discrete)
  Remote Mode (Discrete)
  Auto Flush Mode (Discrete)
  Common Alarm (Discrete)
  Polymer Pump Rate (4-20 mADC)

Control Level 6 incorporates a PLC with a touch screen interface to maintain precise control of polymer solution concentration and flow rate. The system is configurable, through the integral touch screen to select either water or polymer to follow a 4-20 mADC pacing signal. The non-paced flow is controlled automatically to maintain the desired solution concentration. Polymer solution concentration may be adjusted locally or by a second remote 4-20 mADC signal. When operating in a fully automatic mode, water flow is controlled automatically through the use of an integral linear actuated variable orifice (LAVO).

- PLC Control with Touch Screen Interface
- Ratio Control of Polymer Solution Concentration
  - Local Input Through Touch Screen
  - In Response to a Remote Signal
- LOCAL-OFF-REMOTE Selection (Touch Screen)
- Running Indication
- Pump Rate Indication
- Water Rate Indication
- Solution Concentration Indication
- Auto Flush
- Alarms: Low Water Flow (Adjustable Set Point)
  No Polymer Flow (Thermal Flow Sensor)
  Solution Concentration FAULT
- Inputs: Pacing Signal (4-20 mADC)
  Solution Concentration (4-20 mADC)
  Remote On-Off (Discrete)
- Outputs: Running (Discrete)
  Remote Mode (Discrete)
  Auto Flush Mode (Discrete)
  Common Alarm (Discrete)
  Solution Flow Rate (4-20 mADC)
  Polymer Pump Rate (4-20 mADC)
  Dilution Water Flow Rate (4-20 mADC)

1 The primary 4-20 mADC pacing signal can drive either water or polymer flow rate as master. A second 4-20 mADC signal is used to adjust the solution concentration.

2 A solution concentration FAULT is an indication of insufficient dilution water to satisfy concentration requirement.

3 This input is separate from the pacing signal.
Fluid Dynamics Products:

dynaBLEND®
Liquid Polymer Blending System

dynaBLEND®
Dry Polymer Preparation System

dynaJET®
Dry Polymer Preperation System

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The information contained herein relative to data, dimensions and recommendations as to size, power and assembly are for purpose of estimation only. These values should not be assumed to be universally applicable to specific design problems. Particular designs, installations and plants may call for specific requirements. Consult Fluid Dynamics for exact recommendations or specific needs. Patent #4701055.
Other patents may apply.

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