



# AF Series Additive Feeders

Part Number: 882.00152.00  
Bulletin Number: BF2-605  
Effective: 2/23/06

Write Down Your Serial Numbers Here For Future Reference:

_____	_____
_____	_____
_____	_____

We are committed to a continuing program of product improvement.  
Specifications, appearance, and dimensions described in this manual are subject to change without notice.

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# Shipping Information

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## ***Unpacking and Inspection***

You should inspect your additive feeder for possible shipping damage.

Thoroughly check the equipment for any damage that might have occurred in transit, such as broken or loose wiring and components, loose hardware and mounting screws, etc.

## ***In the Event of Shipping Damage***

According to the contract terms and conditions of the Carrier, the responsibility of the Shipper ends at the time and place of shipment.

Notify the transportation company's local agent if you discover damage.

Hold the damaged goods and packing material for the examining agent's inspection. **Do not return any goods before the transportation company's inspection and authorization.**

File a claim with the transportation company. Substantiate the claim by referring to the agent's report. A certified copy of our invoice is available upon request. The original Bill of Lading is attached to our original invoice. If the shipment was prepaid, write us for a receipted transportation bill.

Advise customer service regarding your wish for assistance and to obtain an RMA (return material authorization) number.

## ***If the Shipment is Not Complete***

Check the packing list as back-ordered items are noted on it. You should have:

- Additive Feeder
- Bill of lading
- Packing list
- Operating and Installation packet
- Electrical schematic and panel layout drawings
- Component instruction manuals

Re-inspect the container and packing material to see if you missed any smaller items during unpacking.

## ***If the Shipment is Not Correct***

If the shipment is not what you ordered, **contact the service department immediately**. For shipments in the United States and Canada, call **1 (800) 423-3183**; for all other countries, call our international desk at **(630) 595-1060**. Have the order number and item number available. *Hold the items until you receive shipping instructions.*

## ***Returns***

Do not return any damaged or incorrect items until you receive shipping instructions from the shipping department.

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# Chapter 1: Safety

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## 1-1 How to Use This Manual

Use this manual as a guide and reference for installing, operating, and maintaining your additive feeder. The purpose is to assist you in applying efficient, proven techniques that enhance equipment productivity.

This manual covers only light corrective maintenance. No other maintenance should be undertaken without first contacting a service engineer.

The Functional Description section outlines models covered, standard features, and safety features. Additional sections within the manual provide instructions for installation, pre-operational procedures, operation, preventive maintenance, and corrective maintenance.

The Installation chapter includes required data for receiving, unpacking, inspecting, and setup of the additive feeder. We can also provide the assistance of a factory-trained technician to help train your operator(s) for a nominal charge. This section includes instructions, checks, and adjustments that should be followed before commencing with operation of the additive feeder. These instructions are intended to supplement standard shop procedures performed at shift, daily, and weekly intervals.

The Operation chapter includes a description of electrical and mechanical controls, in addition to information for operating the additive feeder safely and efficiently.

The Maintenance chapter is intended to serve as a source of detailed assembly and disassembly instructions for those areas of the equipment requiring service. Preventive maintenance sections are included to ensure that your additive feeder provides excellent, long service.

The Troubleshooting chapter serves as a guide for identification of most common problems. Potential problems are listed, along with possible causes and related solutions.

The Appendix contains technical specifications, drawings, schematics, parts lists, and available options. A spare parts list with part numbers specific to your machine is provided with your shipping paperwork package. Refer to this section for a listing of spare parts for purchase. Have your serial number and model number ready when ordering.

### **Safety Symbols Used in this Manual**

The following safety alert symbols are used to alert you to potential personal injury hazards. Obey all safety messages that follow these symbols to avoid possible injury or death.

**DANGER!** *DANGER indicates an imminently hazardous situation that, if not avoided, will result in death or serious injury.*

**WARNING!** *WARNING indicates a potentially hazardous situation or practice that, if not avoided, could result in death or serious injury.*

**Caution!** *CAUTION indicates a potentially hazardous situation or practice that, if not avoided, may result in minor or moderate injury or in property damage.*

## 1-2 Warnings and Precautions

Our equipment is designed to provide safe and reliable operation when installed and operated within design specifications, following national and local safety codes. This may include, but is not limited to OSHA, NEC, CSA, SPI, and any other local, national and international regulations.

To avoid possible personal injury or equipment damage when installing, operating, or maintaining this equipment, use good judgment and follow these safe practices:

- ☑ **Read and follow these operation and installation instructions when installing, operating, and maintaining this equipment. If these instructions become damaged or unreadable, additional copies are available from the manufacturer.**
- ☑ Follow all **SAFETY CODES**.
- ☑ Wear **SAFETY GLASSES** and **WORK GLOVES**.
- ☑ Work only with approved tools and devices.
- ☑ Disconnect and/or lock out power before servicing or maintaining the equipment.
- ☑ Use care when **LOADING, UNLOADING, RIGGING, or MOVING** this equipment.
- ☑ Operate this equipment within design specifications.
- ☑ **DO NOT** use the additive feeder in an explosive atmosphere.
- ☑ **DO NOT** use additive feeder outdoors or in wet environments. Moisture will damage the motor and can create an electric shock hazard.
- ☑ **OPEN, TAG, and LOCK ALL DISCONNECTS** before working on equipment. You should remove the fuses and carry them with you.
- ☑ Make sure the equipment and components are properly **GROUND**ED before you switch on power.
- ☑ Use **EXTREME CAUTION** when working with additive feeder. **NEVER** put hands or tools in or near the auger assembly when power is connected.
- ☑ When welding or brazing in or around this equipment, make sure **VENTILATION** is **ADEQUATE**. **PROTECT** adjacent materials from flame or sparks by shielding with sheet metal. An approved **FIRE EXTINGUISHER** should be close at hand and ready for use if needed.
- ☑ Do not restore power until you remove all tools, test equipment, etc., and the equipment and related components are fully reassembled.
- ☑ Only **PROPERLY TRAINED** personnel familiar with the information in this manual should work on this equipment.

We have long recognized the importance of safety and have designed and manufactured our equipment with operator safety as a prime consideration. We expect you, as a user, to abide by the foregoing recommendations in order to make operator safety a reality.

## 1-3 Responsibility

These machines are constructed for maximum operator safety when used under standard operating conditions and when recommended instructions are followed in the maintenance and operation of the machine.

All personnel engaged in the use of the machine should become familiar with its operation as described in this manual.

Proper operation of the machine promotes safety for the operator and all workers in its vicinity.

Each individual must take responsibility for observing the prescribed safety rules as outlined. All warning and danger signs must be observed and obeyed. All actual or potential danger areas must be reported to your immediate supervisor.

### ***General Responsibility***

No matter who you are, safety is important. Owners, operators and maintenance personnel must realize that every day, safety is a vital part of their jobs.

If your main concern is loss of productivity, remember that production is always affected in a negative way following an accident. The following are some of the ways that accidents can affect your production:

- Loss of a skilled operator (temporarily or permanently)
- Breakdown of shop morale
- Costly damage to equipment
- Downtime

An effective safety program is responsible and economically sound.

Organize a safety committee or group, and hold regular meetings. Promote this group from the management level. Through this group, the safety program can be continually reviewed, maintained, and improved. Keep minutes or a record of the meetings.

Hold daily equipment inspections in addition to regular maintenance checks. You will keep your equipment safe for production and exhibit your commitment to safety.

Please read and use this manual as a guide to equipment safety. This manual contains safety warnings throughout, specific to each function and point of operation.

## ***Operator Responsibility***

The operator's responsibility does not end with efficient production. The operator usually has the most daily contact with the equipment and intimately knows its capabilities and limitations.

Plant and personnel safety is sometimes forgotten in the desire to meet incentive rates, or through a casual attitude toward machinery formed over a period of months or years. Your employer probably has established a set of safety rules in your workplace. Those rules, this manual, or any other safety information will not keep you from being injured while operating your equipment.

Learn and always use safe operation procedures. Cooperate with co-workers to promote safe practices. Immediately report any potentially dangerous situation to your supervisor or appropriate person.

### **REMEMBER:**

- **NEVER** place your hands or any part of your body in any dangerous location.
- **NEVER** operate, service, or adjust the feeder without appropriate training and first reading and understanding this manual.
- **NEVER** try to pull material out of the feeder with your hands while it is running!
- Before you start the feeder check the following:
  - Remove all tools from the feeder;
  - Be sure no objects (tools, nuts, bolts, clamps, bars) are laying in the hopper area;
- If your feeder has been inoperative or unattended, check all settings before starting the unit.
- At the beginning of your shift and after breaks, verify that the controls and other auxiliary equipment are functioning properly.
- Keep all safety guards in place and in good repair. **NEVER** attempt to bypass, modify, or remove safety guards. Such alteration is not only unsafe, but will void the warranty on your equipment.
- When changing control settings to perform a different mode of operation, be sure selector switches are correctly positioned. Locking selector switches should only be adjusted by authorized personnel and the keys removed after setting.
- Report the following occurrences **IMMEDIATELY**:
  - unsafe operation or condition
  - unusual feeder action
  - leakage
  - improper maintenance
  - **NEVER** stand or sit where you could slip or stumble into the feeder while working on it.
- **DO NOT** wear loose clothing or jewelry, which can be caught while working on a feeder. In addition, cover or tie back long hair.

- Clean the feeder and surrounding area **DAILY**, and inspect the machine for loose, missing or broken parts.
- Shut off power to the feeder when it is not in use. Turn the switch to the **OFF** position, or unplug it from the power source.

### ***Additive Feeder Safety Tags***



**Read Operation and Installation Manual**



**Shear Hazard Rotating Auger**



**High Voltage Inside Enclosure**



**Earth Ground**



**Lifting Point**



**Protected Earth Ground**

### ***Maintenance Responsibility***

Proper maintenance is essential to safety. If you are a maintenance worker, you must make safety a priority to effectively repair and maintain equipment.

Before removing, adjusting, or replacing parts on a machine, remember to turn off all electric supplies and all accessory equipment at the machine, and disconnect and lockout electrical power. Attach warning tags to the disconnect switch.

When you need to perform maintenance or repair work on equipment above floor level, use a solid platform or a hydraulic elevator. If there is a permanently installed catwalk on your equipment, use it. The work platform should have secure footing and a place for tools and parts. **DO NOT** climb on equipment, machines, or work from ladders.

If you need to repair a large component, use appropriate handling equipment. Before you use handling equipment (portable “A” frames, electric boom trucks, fork trucks, overhead cranes) be sure the load does not exceed the capacity of the handling equipment or cause it to become unstable.

Carefully test the condition of lifting cables, chains, ropes, slings, and hooks before using them to lift a load.

Be sure that all non-current carrying parts are correctly connected to earth ground with an electrical conductor that complies with current codes. Install in accordance with national and local codes.

When you have completed the repair or maintenance procedure, check your work and remove your tools, rigging, and handling equipment.

Do not restore power to the equipment until all persons are clear of the area. **DO NOT** start and run the machine until you are sure all parts are functioning correctly.

**BEFORE** you turn the machine over to the operator for production, verify all equipment enclosure panels, guards and safety devices are in place and functioning properly.

### ***Reporting a Safety Defect***

If you believe that your equipment has a defect that could cause injury, you should immediately discontinue its use and inform the manufacturer.

The principle factors that can result in injury are failure to follow proper operating procedures (i.e. lockout/tagout), or failure to maintain a clean and safe working environment.

# Chapter 2: Functional Description

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## 2-1 Models Covered in This Manual

This manual provides operation, installation, and maintenance instructions for 1 and 2 component additive feeders. Model numbers are listed on the serial tag. Make sure you know the model and serial number of your equipment before contacting the manufacturer for parts or service.

Our additive feeders are designed to precisely feed up to two components before being used in the injection molding, blow molding or extrusion processes. Additive Feeders are configured to meet the specific requirements stated by the Customer at the time of purchase.

## 2-2 General Description

Our additive feeder is a highly accurate unit designed to feed one or two additives into a stream of virgin plastic pellets prior to injection molding, blow molding, or extrusion. Such additives may include color, regrind, or other free-flowing pelletized or granular materials. The additive feeder may also be appropriate for other applications. Consult the manufacturer for additional information.

## 2-3 Standard Features

### *Mechanical Features*

#### **Transport Tube**

- Stainless steel augers available in 1/2", 3/4", 1", 1-1/4" and 1-1/2" sizes
- Augers/insert assemblies are interchangeable without tools
- UHMW polyethylene auger insert is durable and easily cleaned
- Calibration hatch opens without tools
- Cleanout hatch below the flood zone opens without tools and allows the supply hopper to dump completely.
- Lightweight aluminum casting

#### **Main Throat**

- Low profile design adds only 6 inches to supply system headroom requirements
- Accommodates one or two additive feeders
- Sturdy steel construction with sight glasses to visually confirm proper operation

#### **Supply Hopper**

- 1 or 2 cubic-foot capacity
- Design based on dynamic/static material flow characteristics
- Angled hopper geometry allows use with 60° machine supply hoppers
- Easy, fast, and complete cleanout
- Sight glasses give visual level indication
- Manual fill cover standard

### **Motor Assembly**

- Quick release swing-away motor mount speeds auger/motor changes and cleanout
- Permanently lubricated
- Replaceable motor brushes

### **Electrical Features**

#### **Motor Assembly**

- Continuous service fractional horsepower DC motor.
- Hall Effect sensor transmits RPM to microprocessor control
- 115/1/60 supply voltage

#### **Controller Features**

- Closed-loop control constantly monitors feedback from the auger motor RPM sensor for high accuracy and repeatability. Feed rates remain stable during main power supply voltage fluctuations.
- Remote control mounting capability permits mounting the control panel up to 9 feet from the feeder.
- Field-programmable display permits viewing in rpm, pounds per hour, kilos per hour, etc., as well as high/low limits.
- Automatic and manual/calibration operation modes.

## **2-4 Options**

### **Special Voltage**

- 230/1/60 VAC

### **Timer/Counter Control**

- Designed for use with cycled processes like injection molding
- Cycle timer can be set to limit the additive feeder cycle to avoid feeding straight color if a resin supply problem occurs in conjunction with a processing machine control relay failure.
- Batch counter provides inventory management information
- Calibration feature allows precise, repeatable sampling during setup

### **Timer/Elapsed Timer Control**

- Designed for use with continuous processes like extrusion
- Elapsed timer provides inventory management information
- Calibration feature allows precise, repeatable sampling during setup

### **Extruder Following Feature**

- This feature allows the additive feeder to automatically increase or decrease the material feed rate as the extruder screw speed changes.

### **Quick Change Supply Hopper**

- 0.3 cubic foot capacity hopper with slide gate allows for rapid change of additives

### **Supply Hopper Covers**

- Hopper mounting cutout for vacuum receivers
- Hopper loader mounting cutout for hopper loaders
- Blank cover available for custom cutout

### **Additional Auger Assemblies**

- Switch augers for changing process throughputs

### **Mounting Adapters**

- Special main throat and flanges can eliminate transitions and accommodate different machine hoppers

## **2-5 Accessories**

### **Low Level Alarm**

- Audible/visual alert to allow supply hopper level to avoid feeding straight resin into the processing machine
- Remote mount
- Advisory or process interrupt capability
- Alarm silence/acknowledge button

### **Drawer Magnet**

- Removes tramp metal from the process stream

## **2-6 Safety Devices and Interlocks**

This section includes information on safety devices and procedures that are inherent to the additive feeder. This manual is not intended to supersede or alter safety standards established by the user of this equipment. Instead, the material contained in this section is recommended to supplement these procedures in order to provide a safer working environment.

At the completion of this section, the operator and maintenance personnel will be able to do the following:

- Identify and locate specific safety devices.
- Understand the proper use of the safety devices provided.
- Describe the function of the safety device.

### **Safety Circuit Standards**

Safety circuits used in industrial systems protect the operator and maintenance personnel from dangerous energy. They also provide a means of locking out or isolating the energy for servicing equipment.

Various agencies have contributed to the establishment of safety standards that apply to the design and manufacture of automated equipment. The Occupational Safety and Health Administration (OSHA) and the Joint Industrial Council (JIC) are just a few of the organizations that have joined with the plastics industry to develop safety standards.

Every effort has been made to incorporate these standards into the design of the additive feeder; however, it is the responsibility of the personnel operating and maintaining the equipment to familiarize themselves with the safety procedures and the proper use of any safety devices.

### **Fail Safe Operation**

If a safety device or circuit should fail, the design must be such that the failure causes a "Safe" condition. As an example, a safety switch must be a normally open switch. The switch must be held closed with the device it is to protect. If the switch fails, it will go to the open condition, tripping out the safety circuit.

**At no time should the safety device fail and allow the operation to continue.** For example, if a safety switch is guarding a motor, and the safety switch fails, the motor should not be able to run.

### **Safety Device Lock-Outs**

Some safety devices disconnect electrical energy from a circuit. The safety devices that are used on these additive feeders are primarily concerned with electrical power disconnection and the disabling of moving parts that may need to be accessed during the normal operation of the machine.

Some of the safety devices utilize a manual activator. This is the method of initiating the safety lock out. This may be in the form of a plug, lever or a handle. Within this lockable handle, there may be a location for a padlock. Personnel servicing the equipment should place a padlock in the lockout handle.

In addition to the safety devices listed above, these additive feeders are equipped with a line cord plug. This allows the operator or maintenance personnel to unplug the additive feeder from its power source and tag it out. The plug can then be tagged with any number of approved electrical lockout tags available at most electrical supply stores.

**WARNING!** *Always disconnect and lockout all electrical power and pneumatic (i.e. compressed air) sources prior to servicing or cleaning the additive feeder. Failure to do so may result in serious injury. No one but the person who installed the lockout may remove it.*



# Chapter 3: Installation

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## 3-1 Uncrating the Equipment

Additive feeders are shipped mounted on a skid, and enclosed in a cardboard box.

1. Pry the crating away from the skid.

**Note:** *Remove the nails holding the box to the skid and lift the box off carefully; avoiding staples in the 1' x 4' wood supports. Cut the steel banding.*

2. Use a pry bar to remove the blocks securing the unit to the skid.
3. Lift unit from sides. Use a pry bar if necessary to carefully remove the skid from the unit.

## 3-2 Rigging and Placing the Additive Feeder

**Note:** *Disassemble the material transport assembly from the main throat to ease marking, drilling and installation of the additive feeder. If the machine throat is smaller than the additive feeder throat, adapters are available.*

1. Remove hopper from your processing machine.
2. Drill holes in both flanges of the additive feeder main throat to exactly match the bolt hole pattern on your processing machine throat. Select a position for easy operator access.
3. Bolt the main throat to the machine, and the machine hopper to the main throat with the appropriate bolts, nuts and lockwashers.
4. Mount the control in a position with convenient operator access near the additive feeder. Avoid locations with excessive dust, vibration and moisture.

### Supply System Installation

If the additive feeder is to be used with an automatic loading system, install the hopper loader, vacuum hopper, etc., in the supply hopper cover. Follow the instructions provided with the loading system.

### **3-3 Electrical Connections**

When making electrical connections to your additive feeder, ensure that you take into consideration and make arrangements for the following:

- A qualified electrician should make all electrical connections.
- Fulfill all national, state, and local safety and electrical code requirements.
- The serial tag lists voltage, phase, and amp draw information
- Line voltage must be within plus or minus ten percent ( $\pm 10\%$ ) of the voltage listed on the serial tag, or damage may occur.
- Install a fused disconnect with a lockout feature in the power main leading to the additive feeder if the unit will be wired directly to a power main.
- Make sure all electrical connections are tight.

#### **Main Power Connection**

The control is shipped pre-wired and attached to the additive feeder. Standard controls are supplied with a power cord with the plug wired to the control unit, ready to plug into an appropriately grounded three-prong receptacle.

#### **Control Relay Connection**

To interlock the additive feeder operation to an injection molding machine, extruder, etc., remove jumper (J1) from the terminal block in the control enclosure and wire in the control relay signal from the processing machine. For injection applications the additive feeder will automatically operate at the specified rate while the screw is turning. (see 4-3, Injection Mode Application), for extrusion processes the additive feeder will run proportional to the speed of the extruder. (See 4-4, Extrusion Mode Application)

**Please refer to the schematics enclosed in the information packet for the latest electrical drawings.**

### 3-4 Setup Procedures

This section provides the procedures necessary for configuring your additive feeder.

Configuration of your additive feeder includes determining the desired feed rate and calibrating the additive feeder. We recommend that you carry out these procedures in the order given here.

**Note:** *Before carrying out these procedures, install all equipment as described in this section.*

#### **Determining the Desired Feed Rate**

The additive feed rate is the desired amount of additive to be introduced into the process stream per hour. To determine the feed rate, follow the procedure in this section. If the desired feed rate is known, go to the calibration procedure in the next section. The charts in figures 1 and 2 on the following page provide conversion and rate charts to assist you in your calculations.

#### **For Cyclical Processing (Injection Molding, etc.)**

To set up an additive feeder for cyclical processing, you need to know shot size, recovery time, and the letdown ratio.

##### **Cyclical Processing Equation:**

$$\frac{\text{Shot Size (oz)}}{\text{Recovery time (sec)}} \times \text{Letdown (ratio or \%)} \times 225 = \text{Feed Rate (lbs./hr.)}$$

##### **Example:**

Shot size = 8 ounces

Recovery time = 5 seconds

Letdown ratio = 20:1

8 oz./5 sec. X 1/20 = 0.08 = Desired feed rate

To convert to lbs./hr.: 0.08 oz/sec x 225 = 18 lbs./hr.

#### **For Continuous Processing (Extrusion, etc.)**

To set up an additive feeder for continuous processing, you need to know the total process throughput and the desired additive percentage or letdown ratio.

##### **Continuous Processing Equation:**

$$\text{Total throughput (lbs./hr.)} \times \text{percentage of additive} = \text{Feed rate}$$

##### **Example:**

Total throughput = 100 pounds per hour

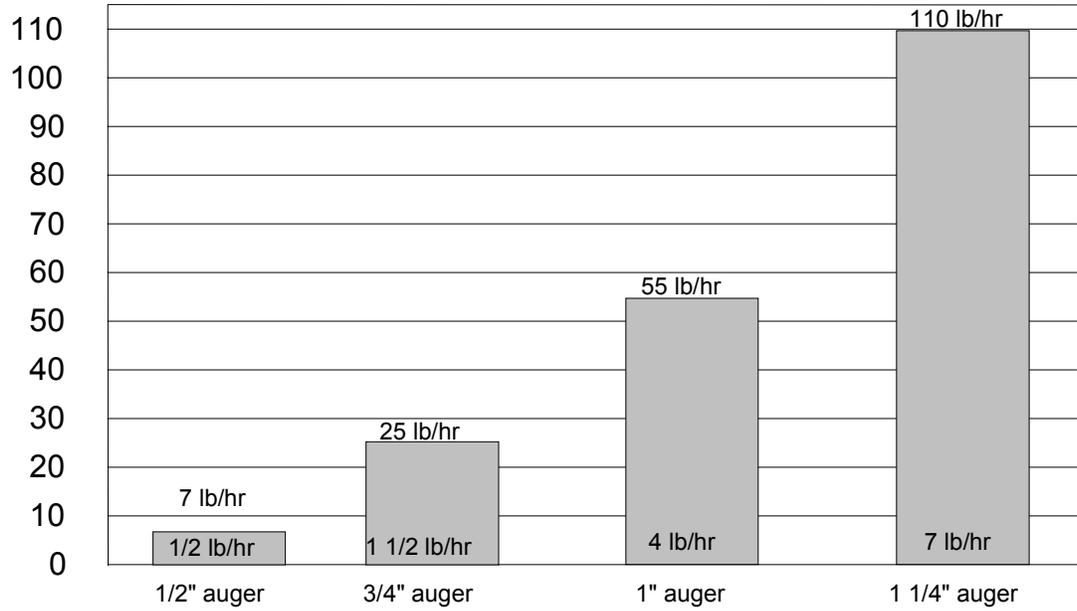
Percentage of additive = 2%

100 lbs./hr. x 0.02 = 2 lbs./hr. feed rate

**Figure 1: Conversion Chart**

Multiply	By	To obtain
Ounces per Second	225	Pounds per Hour
Grams	0.035	Ounces
Ounces	0.0625	Pounds
Seconds	0.00028	Hours

**Figure 2: Rate Chart**



## **Calibration Procedure**

This procedure allows the operator to precisely adjust additive feed rates.

**Caution!** *Never put hands or tools in or near the auger assembly when power is connected.*

*Do not wear gloves or loose clothing during calibration. The auger is exposed when the calibration or cleanout hatches are open.*

### **Equipment Needed:**

- Scale
- Sample container
- Timer- stopwatch, watch/clock w/second hand

### **Procedure**

1. Close cleanout and calibration hatches.
2. Fill the additive supply hopper.
3. Weigh the empty sample container.
4. Swing open the calibration hatch near the main throat.
5. Set the controller to a desired RPM.
6. Place the sample container below the calibration hatch.
7. Hold the three-position motor switch in the Manual position for about a minute. This lets the new setpoint stabilize and fills the auger flights with material. Discard the first sample.
8. Position the empty scale container below the calibration hatch and hold the three-position motor switch in the Manual position for exactly one minute.

**Note:** *If your additive feeder is equipped with the timer option, set the timer to one minute and put the three-position switch in the Manual position. Operation will automatically stop after one minute.*

9. Weigh the sample container. Subtract the weight of the container and multiply by 60 to determine the pounds per hour feed rate.
10. Adjust the auger rpm and repeat the calibration process until the desired feed rate is achieved.

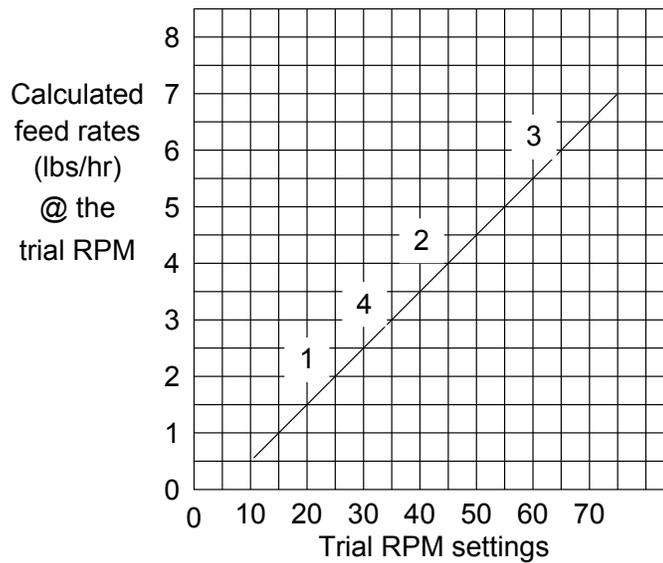
**Note:** *To speed the calibration procedure, reduce trial and error auger rpm settings and zero in on the desired feed rate. Chart the calculated feed rates from a few rpm settings on graph paper. Draw a straight line between the coordinates to establish a customized feed rate curve for the actual operating conditions. A sample graph is provided on the next page; graph paper is included in the back of this manual for use with your feeding processes.*

**Examples:**

This example shows how to extrapolate a desired feed rate of 3 lbs./hr., based on the feed rates of 3 trial rpm settings.

Observed Feed Rates
Sample 1 = 2 pounds per hour @ 20 rpm
Sample 2 = 4 pounds per hour @ 40 rpm
Sample 3 = 6 pounds per hour @ 60 rpm

In this example, a feed rate of 3 lbs./hr. would be about 30 rpm.



## 3-5 Initial Start-up

### *Pre-Startup Checks*

- Are all the electrical connections correct, secure and to code?
- Is the auger insert locked in place?
- Are the motor and auger properly coupled and the motor mount locked in place?
- Are the cleanout and calibration hatches shut and secured?
- Are all tools, hardware, etc., cleared from the feeder?
- Is the processing machine ready for operation?
- Is the control relay connection to the processing machine properly installed?
- Is there an adequate supply of additive in the supply hopper?
- Is the supply system (if installed) ready for operation?

### *Starting Up the Additive Feeder*

1. Turn the power switch **ON**.
2. Set the desired feed rate on the RPM display using the up or down arrows.
3. Flip the motor switch to **AUTO**.

If the additive feeder is installed correctly, it should begin operation at the desired RPM when the processing machine screw is in operation.

### *Shutting Down the Additive Feeder*

1. Flip the motor switch to the **OFF** (center) position.
2. Turn the power **OFF**.

For long term shutdown, disconnect power and clean the additive feeder.

# Chapter 4: Operation

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## 4-1 Start-up

1. Turn the power switch **ON**.
2. Set the desired feed rate on the RPM display using the up or down arrows.
3. Flip the motor switch to **AUTO**.

If the additive feeder is installed correctly, it should begin operation at the desired RPM when the processing machine screw is in operation.

## 4-2 Controller Description and Operation

### *Identifying Control Panel Indicator Lights and Switches on the Controller Switches*

**Power Switch.** This switch turns the control **ON** and **OFF**.

**Motor Switch.** This switch has three (3) positions:

- **OFF** stops the auger motor.
- **AUTO** starts normal automatic operation.
- **MANUAL** operates the auger at the set point as long as the switch is held in this position. Use this feature when calibrating the feeder or during cleanout.

### *Indicator Lights*

**Motor Light.** This indicator lights when the auger motor is turning.

**Auger Speed.** This LED displays the auger speed setpoint.

### *Timer/Counter Control Operation (Injection Molding Applications)*

The Timer/Counter control is designed for use with cyclical processes like injection molding and features a timer and counter module. It also acts as a cycle override safety timer.

#### **Timer Module**

This feature of the controller assists in calibration of the additive feeder (See Page 19 for specific calibration instructions).

#### **Procedure**

1. Set the timer to the desired calibration period, using the round timer keys (See the timer information sheet for additional information).
2. Start the additive feeder by flipping the **MOTOR** switch to the **MANUAL** position.
3. When the timer times out, the feeder automatically stops.

#### **Used as a Cycle Override Safety Timer**

This component of the controller allows the operator to override the molding machine shot cycle when the additive feeder motor is running in **AUTO** mode.

## Procedure

1. Time the duration of feeder operation during a typical Injection molding machine shot cycle.
2. Set the timer to a slightly longer value.
3. Start the additive feeder by flipping the motor switch to the **AUTO** position.
4. If the timer times out because of a process flow problem, the feeder will automatically stop.
5. Reset the power switch.

## Counter Module

The counter module may be used as an inventory management aid and can also confirm the total cycles between reset independent of the IMM's control. Every IMM cycle will increment the display value. The counter module has battery-backed memory and will not lose count if the electrical power is interrupted.

- Press the **RESET** button to reset the counter.

**Note:** *Remove the jumper on the back of the module to lock out the reset button. Replace the jumper to restore reset button operation. Disconnect the power before moving the jumper.*

## Timer/Elapsed Timer Control (Extrusion & Blow Molding Applications)

The Timer/Elapsed Timer control is designed for use with continuous processes like extrusion and blow molding and features a timer and elapsed time module.

### Timer Module

This feature of the controller assists in calibration of the additive feeder (See Page 19 for specific calibration instructions).

1. Set the timer to the desired calibration period, using the round timer keys (see the timer information sheet for additional information).
2. Start the additive feeder by flipping the motor switch to the **MANUAL** position.
3. When the timer times out, the feeder will automatically stop.

### Elapsed Time Module

The elapsed time module may be used as an inventory management aid for continuous processing operations.

The timer module measures the time the additive feeder control receives the monitored control relay signal from the extruder/blow molder machine. The timer module has a battery-backed memory and will not lose the elapsed time of operation if the electrical power is interrupted.

- Press the **RESET** button to reset the counter.

**Note:** *Remove the jumper on the back of the module to lock out the reset button. Replace the jumper to restore reset button operation. Disconnect power before moving the jumper.*

## 4-3 Injection Molding Applications

Discussed in this portion of the manual are the finer points of the additive feeder operation, programming the control, and installation notes and examples. If you are unfamiliar with this product or have never performed this type of installation, please read this section of the manual fully before installing the equipment.

### **Steps that must be completed before the additive feeder will perform properly:**

- The proper control signal from the injection process
- Accurate programming of the control

### **Injection Molding**

Injection Molding cycles require that the additive feeder supply a constant feed rate during recovery and no material during the shot. Once a desired feed rate has been identified (See 3-4, Determining the Desired Feed Rate) and a calibration has been performed (See 3-4, Calibration Procedure), then the correct RPM can be set for that process. Finally the additive feeder needs to be told when to start and stop feeding material using a control connection.

### **Control Relay Connection**

To interlock the additive feeder operation to an injection molding machine, remove jumper (J1) from the terminal block in the control enclosure and wire in the control relay signal from the processing machine. For injection applications the additive feeder will automatically operate at the specified rate while the screw is turning.(see 4-3, Injection Mode Application)

### **Field Control Programming**

Although the drive's user interface is very versatile, it is also simple to setup and operate. With just a few button presses, it allows the user to configure a number of adjustable parameters. The LED display has three basic operating modes: Running Mode, Parameter-Selection Mode, and Value Mode. Each of the three modes have specific visual indicators that allow the user to immediately determine the current state or mode of the user interface.

**Note:** *Parameter-Selection Mode and Value Mode can only be entered if the Program Enable jumper is in the "On" position.*

Running Mode is the default display of the unit when power is applied. The drive will spend the majority of its time in this mode. In Running Mode, the display shows the target value in the appropriate user defined format of rate, time, or percentage. The control will continuously attempt to drive the motor at the requested target rate. In this display mode, the Up and Down buttons increase or decrease the displayed target value until either the display minimum or display maximum limit is reached. Depending on the alarm configuration, these buttons may also serve as an alarm-silence or alarm-reset button.

Parameter-Selection Mode can be entered by simply pressing and holding the Enter button down for three seconds. Once in Parameter-Selection Mode, the far left of the display will be a "P." The right side of the display will indicate the currently selected parameter number for editing purposes. Pressing the Up or Down button will increase or decrease the selected

parameter number on the display. Although the parameter numbers are in numerical order, some numbers are skipped. These numbers represent reserved parameters that are not yet implemented and are not displayed. Once the desired parameter number is displayed, a press of the Enter button will change the display to the Value Mode.

**Note:** *When in Parameter-Selection Mode, pressing the Enter button with parameter 0 selected will cause the unit to return to Running Mode.*

Value Mode is used to modify the value of the selected parameter. When in Value Mode, the two dots which form the colon, between digits two and three, will alternately flash (one, then the other) to inform the user that a parameter's value is being edited. Pressing the Up or Down button increases or decreases the selected parameter's value. See the default value tables (below) for the list of preprogrammed values. Value changes take effect immediately. Once the desired value is showing in the display window, pressing the Enter button again will return to Parameter Selection Mode. The new value is not saved in permanent memory until the Enter button is pressed. Removing power from the unit while in Value Mode may result in the specified new value being lost.

### **Resetting the Unit to Un-Programmed State**

The factory-default settings can be easily restored using either of two methods. Both methods require the Program Enable jumper to be in the "On" position. The first is to apply power to the unit with both the Enter and Down buttons pressed for 3 seconds. The second is to change the value of parameter 95 to 5.

### **JP1 (Program Enable Jumper)**

The JP1 jumper is located under the dust cover on the back end of the upper board. When the jumper is set to the "Off" position, all programming features are locked out to the front panel user. When the jumper is in the "On" position, the programming parameters are open to change. JP1 is shipped in the "Off" position.

### **Programming Step by Step Guide**

1. Remove the power source from the controller. Following the procedures in your facility, lockout or tagout the power source.
2. Remove the cover from the control enclosure
3. At the connection end of the drive lift the black plastic dust cover up slightly then slide it out of the back of the drive.
4. Locate the jumper labeled "JP1."
5. Move the JP1 jumper from the "OFF" position to the "ON" position.
6. Slide the black plastic cover back into position.
7. Install the enclosure cover.

8. Remove any lockout/tagout devices in use as per procedures in place at your facility, then connect the controller to the power source and power the unit up.
9. Press the Enter button until parameter selection mode is entered. When the drive is in Parameter-Selection Mode, the far left of the display will be a “P.”
10. Use the Up and Down arrow buttons to navigate to the desired parameter.
11. When the parameter number to be changed is displayed press the Enter button to enter Value Mode. When in Value Mode, the two dots which form the colon between digits two and three will alternately flash.
12. Use the Up and Down arrow buttons to change the parameter’s displayed value.
13. Press the Enter button to return to Parameter-Selection Mode.
14. Use the Up and Down Arrow buttons to go to the next parameter to be modified. Repeat as required for any remaining parameters.
15. When all program modifications are completed, use the Up and Down Arrow buttons to go to parameter “0” then press the Enter button to return to run mode.
16. Remove the power source from the controller. Following the procedures in your facility, lockout or tagout the power source.
17. Remove the dust cover from the control enclosure.
18. At the connection end of the drive lift the black plastic cover up slightly then slide it out of the back of the drive.
19. Locate the jumper labeled “JP1”.
20. Move the JP1 jumper from the “ON” position to the “OFF” position.
21. Slide the black plastic cover back into position.
22. Install the enclosure cover.
23. Remove any lockout/tagout devices in use as per procedures in place at your facility, then connect the controller to the power source and power the unit up.

The drive is now ready to be used.

**The required programming values for Injection Mold Applications are located on drawing number A0541236, one of three drawings that are included with the additive feeder. If you do not have these drawings contact service to have them forwarded to you.**

## ***Injection Mode Application Notes***

The additive feeder controller has the ability to display feed rates in units other than the factory set auger RPM display. With proper programming, the feeder can display pounds/hour, grams/minute, etc.

Programming for units other than auger RPM REQUIRES that the system be calibrated to determine exactly how much material is delivered at specific RPMs. Please refer to the Calibration Procedure section for additional details.

Please note that custom programming for units other RPM will only provide meaningful results when the auger and sleeve size does not change, and when the materials to be fed have similar physical characteristics.

**Example 1:** The unit is programmed by the end user to display feed rates in pounds/hour with a  $\frac{3}{4}$ " auger and sleeve. Someone else replaces this auger and sleeve with a 1" diameter unit and does not calibrate and reprogram the controller. The displayed values are no longer valid.

**Example 2:** The unit is programmed by the end user to display feed rates in pounds/hour of a pelletized colorant material. The pellets are of a uniform size and shape, freely flow, and contain no extraneous materials. At some point the additive feeder is used to introduce regrind material instead of the previous colorant pellets and does not calibrate and reprogram the controller. The displayed values are no longer valid.

When the controller is to be programmed to display in units other than auger RPM, parameters P20, P21, and P30 will need to be modified.

The value in parameter P20 must be programmed to the lowest desired delivery rate. The value in parameter P21 must be programmed to the highest desired delivery rate, and the value in parameter P30 must be programmed to a value that matches what the auger delivers when it is operating at full speed (71 RPM).

**Example 1:** An end user wants the additive feeder to display how many ounces per second are delivered rather than what speed the auger is to turn at. When the end user calibrated the unit they determined that at 10 RPM the unit delivered 1 ounce per second, and at 71 RPM the unit delivered 7.1 ounces per second. The end user wants to be able to set the control to deliver between 2 and 5 ounces per second. The value in parameter P20 gets programmed to "20" which will allow a minimum setpoint of 2.0. The value in parameter P21 gets programmed to "50" which will allow a maximum setpoint of 5.0. The value in parameter P31 gets programmed to "71" which is how much material is delivered when the unit is rotating at full speed (71 RPM).

## 4-4 Extrusion Applications

Discussed in this portion of the manual are the finer points of the additive feeder operation, programming the control, and installation notes and examples. If you are unfamiliar with this product or have never performed this type of installation, please read this section of the manual fully before installing the equipment.

### ***Steps that must be completed before the additive feeder will perform properly:***

- The proper control signal from the extrusion process
- Accurate programming of the control

### ***Extruder Tracking Control***

The extruder tracking control option allows the additive feeder's auger (follower) to turn in a precise ratio to the speed of your extruder screw (master). The speed control on the feeder can be set for any feed ratio from 10% to 200%.

The extruder tracking control detects the speed of the extruder screw and causes the feeder screw to rotate at the desired RPM. In effect, the extruder tracking control acts as an automatic speed control.

The extruder tracking control requires a **5 VDC TTL NPN RPM** signal from the extruder. Use an existing RPM signal from the extruder; consult with the extruder's manufacturer for the signal type and frequency.

You will need to know:

1. The signal voltage
2. The number of pulses per extruder screw revolution

A wide variety of sensors can be supplied by the manufacturer to suit your needs if the extruder control circuit does not provide a suitable signal.

These sensors include:

- Inductive proximity sensors to sense gear teeth.
- Magnetic pickups to sense affixed magnets.
- Optic sensors to sense affixed reflective tape. (Included with extrusion tracking control)

Consult your sales representative for additional information.

### ***Control Relay Connection***

To interlock the additive feeder operation to an extruder, remove jumper (J1) from the terminal block in the control enclosure and wire in the control relay signal from the processing machine. Connecting the additive feeder to the control relay simply ensures that when the extrusion process stops so does the additive feeder. (Without this control connection, the auger may continue feeding material for a short time).

### **Extruder Tracking Installation and Setup**

The additive feeder control is supplied with standard factory defaults. Control programming is required to suit the requirements of your process (See page 24, Field Control Programming).

Connect the TTL signal acquired from the extruder control or from a sensor you have installed to the terminal strip as shown in the electrical schematics provided with your unit's installation packet.

1. Install the feeder as described in Chapter 3.
2. Calibrate the feeder as described on Page 18. Determine the feed rates at different rpms. We recommend that you plot the feed rates on graph paper.
3. Calculate a new display constant taking the extruder screw signal into account.

$$\text{Constant} = 1000 \times \frac{\text{\# of Pulses per Revolution of Extruder Screw } \textcircled{1}}{\text{\# of Pulses per Revolution of the Feeder Screw } \textcircled{2}}$$

*① If not counted directly from screw, multiply by a "fudge factor" to get the pulses per extruder screw rpm.*

*② Factory set at 843 (PPR x 28.1 gear ratio).*

Program the control to the new constant, as described in the next section "Field Control Programming."

Determine the desired additive feeder setpoint (% of extruder (master) screw RPM). To determine this, you must know:

- Total extruder feedrate (lbs./hr.).
- The RPM of the extruder screw at that feedrate.
- The letdown ratio of the additive (% or :).
- The additive feedrate required at that letdown ratio (total feedrate X letdown ratio).
- The additive feedrate RPM needed to achieve this feedrate (as determined by the calibration procedure).

#### **Extruder Tracking Equation:**

$$\text{Set Point} = (\text{rpm of feeder} / \text{rpm of extruder}) \times 100$$

#### **Example:**

Total extruder feedrate = 500 pounds per hour

Extruder screw rpm for 500 lbs/hr = 50 rpm

Additive letdown percentage = 7%

Additive feedrate = 500 X 0.07 = 35 lbs./hr.

Feeder auger rpm needed for 35 lbs./hr. = 44 rpm (as the calibration procedure has shown)

Assuming this, set point = 44 rpm/50 rpm x 100 = 88 or 88% of the extruder screw speed.

## **Field Control Programming**

Although the drive's user interface is very versatile, it is also simple to setup and operate. With just a few button presses, it allows the user to configure a number of adjustable parameters. The LED display has three basic operating modes: Running Mode, Parameter-Selection Mode, and Value Mode. Each of the three modes have specific visual indicators that allow the user to immediately determine the current state or mode of the user interface.

**Note:** *Parameter-Selection Mode and Value Mode can only be entered if the Program Enable jumper is in the "On" position.*

### **Running Mode**

Running Mode is the default display of the unit when power is applied. The drive will spend the majority of its time in this mode. In Running Mode, the display shows the target value in the appropriate user defined format of rate, time, or percentage. The control will continuously attempt to drive the motor at the requested target rate. In this display mode, the Up and Down buttons increase or decrease the displayed target value until either the display minimum or display maximum limit is reached. Depending on the alarm configuration, these buttons may also serve as an alarm-silence or alarm-reset button.

### **Parameter-Selection Mode**

Parameter-Selection Mode can be entered by simply pressing and holding the Enter button down for three seconds. Once in Parameter-Selection Mode, the far left of the display will be a "P." The right side of the display will indicate the currently selected parameter number for editing purposes. Pressing the Up or Down button will increase or decrease the selected parameter number on the display. Although the parameter numbers are in numerical order, some numbers are skipped. These numbers represent reserved parameters that are not yet implemented and are not displayed. Once the desired parameter number is displayed, pressing the Enter button to change the display to the Value Mode.

**Note:** *When in Parameter-Selection Mode, pressing the Enter button with parameter 0 selected will cause the unit to return to Running Mode.*

### **Value Mode**

Value Mode is used to modify the value of the selected parameter. When in Value Mode, the two dots which form the colon, between digits two and three, will alternately flash (one, then the other) to inform the user that a parameter's value is being edited. Pressing the Up or Down button increases or decreases the selected parameter's value. See the default value tables (below) for the list of preprogrammed values. Value changes take effect immediately. Once the desired value is showing in the display window, pressing the Enter button again will return to Parameter Selection Mode. The new value is not saved in permanent memory until the Enter button is pressed. Removing power from the unit while in Value Mode may result in the specified new value being lost.

### ***Resetting the Unit to Un-Programmed State***

The factory-default settings can be easily restored using either of two methods. Both methods require the Program Enable jumper to be in the "On" position. The first is to apply power to the unit with both the Enter and Down buttons pressed for 3 seconds. The second is to change the value of parameter 95 to 5.

### ***JP1 (Program Enable Jumper)***

The JP1 jumper is located under the dust cover on the back end of the upper board. When the jumper is set to the "Off" position, all programming features are locked out to the front panel user. When the jumper is in the "On" position, the programming parameters are open to change. JP1 is shipped in the "Off" position.

### ***Programming Step by Step Guide***

1. Remove the power source from the controller. Following the procedures in your facility, lockout or tagout the power source.
2. Remove the cover from the control enclosure.
3. At the connection end of the drive, lift the black plastic dust cover up slightly and slide it out of the back of the drive.
4. Locate the jumper labeled "JP1."
5. Move the JP1 jumper from the "OFF" position to the "ON" position.
6. Slide the black plastic cover back into position.
7. Install the enclosure cover.
8. Remove any lockout/tagout devices in use as per procedures in place at your facility, then connect the controller to the power source and power the unit up.
9. Press the Enter button until parameter selection mode is entered. When the drive is in Parameter-Selection Mode, the far left of the display will be a "P."
10. Use the Up and Down Arrow buttons to navigate to the desired parameter.
11. When the parameter number to be changed is displayed press the Enter button to enter Value Mode. When in Value Mode, the two dots which form the colon between digits two and three will alternately flash.
12. Use the Up and Down Arrow buttons to change the parameter's displayed value.
13. Press the Enter button to return to Parameter-Selection Mode.

14. Use the Up and Down Arrow buttons to go to the next parameter to be modified. Repeat as required for any remaining parameters.
15. When all program modifications are completed, use the Up and Down Arrow buttons to go to parameter “0” then press the Enter button to return to run mode.
16. Remove the power source from the controller. Following the procedures in your facility, lockout or tagout the power source.
17. Remove the dust cover from the control enclosure.
18. At the connection end of the drive lift the black plastic cover up slightly then slide it out of the back of the drive.
19. Locate the jumper labeled “JP1”.
20. Move the JP1 jumper from the “ON” position to the “OFF” position.
21. Slide the black plastic cover back into position.
22. Install the enclosure cover.
23. Remove any lockout/tagout devices in use as per procedures in place at your facility, then connect the controller to the power source and power the unit up.
24. The drive is now ready to be used.

**The required programming values for Extruder Tracking Control are located on drawing number A0541236, one of three drawings that are included with the additive feeder. If you do not have these drawings contact service to have them forwarded to you.**

**Parameter # 37 requires the installer to program the correct pulses per revolution from the extrusion machine.(See Chapter 5)**

### ***Extruder Tracking Control Application Notes***

#### **Input Pulse Signal Requirements**

The drive uses a 5 volt DC square wave (TTL NPN type RPM signal) on its S2 input terminal as a reference signal from the extruder. Please contact us for application assistance if your extruder is not equipped with a method to provide this signal.

#### **Minimum Input Pulse Rate**

Extruder Tracking units are programmed to follow an extruder that provides eight pulses per revolution. **Additive Feeders used in extruder tracking systems REQUIRE end user programming to match the master rate signal from the extruder’s screw if the signal does NOT provide eight pulses per revolution.** The value programmed into parameter P37 must be set to match the number of pulses per revolution that the extruder generates.

In addition, the drive must be provided a MINIMUM of 240 pulses per minute to provide accurate results.

**Example 1:** An extruder rotating at 30 RPM and providing 8 pulses per revolution generates 240 pulses per minute will provide excellent results.

**Example 2:** An extruder rotating at 15 RPM and providing 1 pulse per revolution generates 15 pulses per minute and will provide poor results.

#### **Maximum Input Pulse Rate**

As programmed, the drive is capable of accurately following an extruder's rate signal of up to 50,000 pulses per minute. Extruders that provide rate signals above this frequency REQUIRE end user programming to provide accurate results. The value programmed into parameter P16 must be modified to a value that filters this pulse rate to an acceptable frequency. Please refer to the parameter description section for additional information.

**Example 1:** An extruder rotating at 175 RPM and providing 8 pulses per revolution generates 1,400 pulses per minute will provide excellent results.

**Example 2:** An extruder rotating at 250 RPM and providing 250 pulses per revolution generates 62,500 pulses per minute and will provide poor results.

#### **Minimum and Maximum Percent Setpoints**

The drive rotates the additive feeder's auger at a constant percentage of the extruder screw. If the extruder screw is turning at 100 RPM and the setpoint is 50%, the additive feeder turns at 50 RPM. Increasing the extruder speed to 110 RPM will make the additive feeder rotate at 55 RPM. Decreasing the extruder speed to 90 RPM will make the additive feeder rotate at 45 RPM.

As programmed, the drive accepts percentage setpoints from 10% to 200% of the extruder's speed. The drive and motor's acceptable operating speed range is 3 to 71 RPM.

Increasing the percent setpoint to a value that would cause the auger to rotate over 71 RPM will NOT cause the feeder's auger to rotate OVER 71 RPM.

**Example 1:** The extruder is rotating at 75 RPM, and the additive feeder percent setpoint is 85%. The additive feeder's auger will rotate at 63.75 RPM.

**Example 2:** The same extruder's speed setpoint is increased to 100 RPM without changing the additive feeder percent setpoint of 85%. The additive feeder will rotate at its maximum speed of 71 RPM, not at 85 RPM. If your application requires that additives be fed at a higher rate than what 71 RPM provides the simplest method is to increase the size of the auger and sleeve your additive feeder is equipped with. Please refer to the parts section for a complete listing of available sizes.

The minimum and maximum percent setpoints may be custom programmed to more precisely reflect the range of speeds in use at your facility. Please refer to the parameter description section for additional information.

# Chapter 5: Program Parameter Descriptions

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## 5-1 Defining Program Parameters

### Parameter 0 – Exit to Running Mode

When parameter 0 is selected in Parameter-Selection Mode, the unit will return to Running Mode and display the running value. This should be selected once changes to parameters are completed.

### Parameter 10 – Operating Mode

This parameter defines the operating mode for the entire unit. There are two basic modes of operation, master and follower. In master modes, the unit controls the load using rate or time units. In follower mode, the unit controls the load in percentage of master rate.

#### Mode 1 – Master, Rate Mode

In Rate Mode, the drive displays in user-defined rate units such as RPM, Gallons per Hour, or Feet per Second.

#### Mode 3 – Follower Mode

In Follower Mode, the drive displays in percentage units, where 1000 equals 100.0 percent of the master rate. For example, if the display indicates 985, 98.5, or 9.85, the drive will attempt to run at exactly 98.5% of the master rate. Display settings are always entered ignoring the decimal point's position.

### Parameter 13 – Decimal Point (DP) Position

This selects the format of the display with respect to the decimal point's position. This parameter does not affect the value entry for other parameters. For example, if the user desires to display 10.00 at 300RPM, then parameter 30 would be set to 1000, parameter 31 would be set to 300, and parameter 13 would be set to 2.

**Mode 0: Fixed XXXX**

**Mode 1: Fixed X.XXX**

**Mode 2: Fixed XX.XX**

**Mode 3: Fixed XXX.X**

**Mode 4: Fixed XXXX.**

### Parameter 14 – Keypad Mode

This parameter selects the operating mode of the front-panel push buttons. In some applications, increasing or decreasing the scroll rate provides the user more controllability when entering settings. Parameters 14 and 15 affect only the Up and Down buttons when the user interface is in Running Mode.

#### Mode 1: Linear, Constant Rate

In linear mode, pressing and holding the Up or Down buttons will cause the display to continuously change value in the requested direction until either the Display Minimum or Display Maximum is reached. The displayed value will scroll at a constant rate which is specified using parameter 15.

### Mode 2: Non-linear, Accelerating Rate

In non-linear mode, pressing and holding the Up or Down buttons will cause the display to continuously change value in the requested direction until either the Display Minimum or Display Maximum is reached. The displayed value will initially scroll at a slow rate and increase in speed until the maximum scroll rate is achieved. The initial scroll rate is specified using parameter 15.

### Parameter 15 – Keypad Scroll Mode

This parameter sets the scroll speed for the front-panel push buttons. The function of this parameter varies slightly depending on the Keypad Mode. See parameter 14 for more details.

### Parameter 16 – S1 / S2 Input Edge & Prescaler Configuration

This parameter determines how the drive processes the S1 and S2 signal inputs. It specifies which signal edge is used for measurements and the value of the internal frequency dividers or prescalers. Modes with prescalers greater than 1 should only be used if the input pulse rate on S1 or S2 exceeds the unit's maximum native pulse rate (see specifications for details); otherwise, the control loop may become sluggish and unnecessarily inaccurate. Use the following chart to configure this parameter. As an example, assume an application requires input pulse rates on S1 of 120,000 pulses-per-minute and S2 of 35,000 pulses-per minute. According to the electrical specifications, the unit can only accept 50,000 pulses per-minute on each the S1 and S2 inputs. With this in mind, the S1 and S2 prescalers should be selected as Falling / 4 and Rising / 1, respectively. In this case, parameter 16 would be set to 2.

Selection Chart		S1 Input Edge and Prescaler			
		Rising / 1	Falling / 1	Falling / 4	Falling / 16
S2 Input Edge and Prescaler	Rising / 1	0	1	2	3
	Falling / 1	4	5	6	7
	Falling / 4	8	9	10	11
	Falling / 16	12	13	14	15

### Parameter 18 – Power-up Mode

This parameter defines the mode which determines the default Running Value when power is initially applied to the drive.

#### Mode 1: Default to Zero

When in this mode, the unit will default to zero (display units).

#### Mode 2: Default to Power-Up Value

When in this mode, the unit will default to the Power-up Value, parameter 19.

#### Mode 3: Default to Previously Running Value

When in this mode, the unit will default to the previous running value before power was removed. A previous running value must have been active for at least 3 seconds to be recalled after power has been disconnected and reapplied.

#### Mode 11: Display Intensity

Set value between 0-31 to adjust display brightness (31=brightest).

**Parameter 19 – Power-up Value**

When Power-up Mode is set to 2, this parameter will designate the default display value at power-up in display units.

**Parameter 20 – Display Minimum**

This parameter defines the lower end of the display range. This is the value which limits how low the user is able to scroll the displayed value in Running Mode. In Rate and Time modes, this value is set in display units. In Follower Mode, this is set in percentage of the master rate. For example, in Follower Mode, 1250 represents 125.0 percent of the master rate. This value can be changed but the feeder may not run consistently (choppy operation) if the number of pulses per minute from the extruder are insufficient.

**Parameter 21 – Display Maximum**

This parameter defines the upper end of the display range. This is the value which limits how high the user is able to scroll the displayed value in Running Mode. In Rate and Time modes, this value is set in display units. In Follower Mode, this is set in percentage of the master rate. For example, in Follower Mode, 150 represents 15.0 percent of the master rate.

**Parameter 23 – Acceleration Setting**

This parameter determines how fast the drive will accelerate toward the displayed target setting. This parameter is set in display units of change per second such as RPM, GPM, or feet per second. In Follower Mode, this parameter is set in RPM units.

**Parameter 24 – Deceleration Setting**

This parameter determines how fast the drive will decelerate toward the displayed target setting. This parameter is set in display units of change per second such as RPM, GPM, or feet per second. In Follower Mode, this parameter is set in RPM units.

**Parameter 26 – Proportional (P) Gain**

The Proportional Gain is the first of two parameters which define the responsiveness of the control with respect to how fast it responds to changing loads. Because the drive controls are pulse-accumulation drives, the P Gain responds differently than the same parameter in a standard velocity-form PID control. The higher the P Gain, the more aggressively the unit will drive the load.

**Parameter 27 – Integral (I) Gain**

The Integral Gain is the second of two parameters which define the responsiveness of the control with respect to how fast it responds to changing loads. The higher the I Gain, the more aggressively the unit will drive the load. When using high PPR pickups or encoders, it will be necessary to decrease the I Gain to prevent unwanted oscillation and instabilities.

**Parameter 30 – Signal Input 1 (S1) Display Reference**

This is the number to be displayed when at the user-specified motor Reference RPM. In Rate Mode, this value represents rate units such as feet, ounces, or revolutions. In Time Mode, this value represents the reference time measured in seconds or minutes. If the desired display is HH:MM, then all values should be entered in minutes. If MM:SS is desired, then all values should be entered in seconds. In Follower Mode, this value is the percentage of the master rate in 0.1% units. For example, 1000 equates to 100%.

### **Parameter 31 – Signal Input 1 (S1) Reference RPM**

This is the reference RPM at which the Display Reference value should be displayed. In Rate and Time Modes, this value represents the RPM of the encoder to which the Display Reference corresponds. In Follower Modes, this value is not used.

### **Parameter 32 – Signal Input 1 (S1) Pulses per Revolution**

This is the number of pulses per revolution for the signal input 1 (S1). The drive supports pickups and encoders from 1 to 2048 pulses per revolution.

### **Parameter 33 – Signal Input 1 (S1) Deadband (Follower Mode Only)**

When in Follower Mode, it is often desirable for the follower unit to continue to slowly make-up the small pickup pulse differential between the master and follower's position. In some applications, it is not necessary for the follower to continue to slowly seek the master's exact pulse position when the master rate is at zero. In these cases, the Deadband parameter can be set above zero to force the drive to stop driving the motor slowly and cause it to inhibit until the master starts rotating again. At that point, the follower will automatically make-up the pulse differential as it starts to rotate. The deadband is disabled by setting it to zero seconds.

### **Parameter 35 – Signal Input 2 (S2) Input Configuration**

This parameter determines the operating mode of signal input 2 (S2).

#### **Mode 1: Disabled (Follower Mode)**

The S2 input is inactive. This is the required setting for Follower Mode.

#### **Mode 2: Emergency Stop When S2 High (Not Wired To Common)**

When the S2 input is at an electrically high (+5V) state or allowed to float disconnected, the drive will enter emergency-stop mode. While in this mode, the armature output will immediately be turned off. Once the S2 input returns to an electrically low state or wired to the unit's common, the output will become active.

#### **Mode 3: Emergency Stop When S2 Low (Wired To Common)**

When the S2 input is at an electrically low state or wired to the unit's common, the drive will enter emergency-stop mode. While in this mode, the armature output will immediately be turned off. Once the S2 input returns to an electrically high (+5V) state or allowed to float disconnected, the output will become active.

#### **Mode 4: Inhibit When S2 High (Not Wired To Common)**

When the S2 input is at an electrically high (+5V) state or allowed to float disconnected, the drive will enter inhibit mode. While inhibited, the armature output will decrease according to the decel setting until zero output is reached. Once the S2 input returns to an electrically low state or is wired to the unit's common, the output will start to accelerate toward the previous running value.

#### **Mode 5: Inhibit When S2 Low (Wired To Common)**

When the S2 input is at an electrically low state or wired to the unit's common, the drive will enter inhibit mode. While inhibited, the armature output will decrease according to the decel setting until zero output is reached. Once the S2 input returns to an electrically high (+5V) state or allowed to float disconnected, the output will start to accelerate toward the previous running value.

**Parameter 36 – Signal Input 2 (S2) Setpoint**

When the S2 configuration, parameter 35, is set to one of the jog modes, this parameter defines the jog setpoint in display units. If the drive operating mode is set to Follower Mode, then this parameter is set in RPM units. This allows a follower control to be jogged when the master is stopped.

**Parameter 37 – Signal Input 2 (S2) Pulses per Revolution**

This is the number of pulses per revolution for the signal input 2 (S2). The drive supports pickups and encoders from 1 to 2048 pulses per revolution.

**Parameter 95 – Factory Default Command**

When set to a value of 5, the unit will be reset to factory default settings. This can also be achieved by applying power to the unit with both the Enter and Down buttons depressed. The programming jumper must be in the "On" position for this method to function.

**Parameter 98 – Save to User Default Area Command**

When set to a value of 5, the unit will store all adjustable parameters to the user default area. The user default area is intended to be a location where an end user can store settings specific to their application. Using this, an end user can easily refresh their custom settings in the field if an someone accidentally reconfigures the unit unsuccessfully. Another common use for this area is testing and initial setup. The user can store known-good settings here and easily experiment without the fear of losing the optimal configuration.

**Parameter 99 – Restore from User Default Area Command**

When set to a value of 1, the unit will restore the all adjustable parameters from the user default area. See parameter 98 for additional information.

# Chapter 6: Maintenance

## 6-1 Preventative Maintenance Schedule

The checklist below contains a list of items which should be inspected and/or replaced to keep your Additive Feeder operating at peak efficiency. Perform each inspection at the regular intervals listed below.

System model #						Serial #							
Every week	Date/By	Date/By	Date/By	Date/By	Date/By	Date/By	Date/By	Date/By	Date/By	Date/By	Date/By	Date/By	Date/By
Inspect auger, sleeve and hopper throat. Clean if dirty.													

Every month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Lock out electrical power and inspect electrical wiring for integrity.												
Visually inspect the operation of motor and auger while it is operating.												

**- Photocopy this page for your maintenance records -**

## 6-2 Preventative Maintenance

This section describes maintenance procedures which will increase the longevity and efficiency of your additive feeder. Perform them at the regular intervals listed on the checklist on the previous page.

### **Material Cleanout/Changeover**



**Caution!**

*Never put hands or tools in or near the auger assembly when power is connected!*

*Do not wear gloves or loose clothing when working near the auger assembly!*

1. Remove all remaining additive from the supply hopper by opening the cleanout hatch. The motor assembly must be disengaged to fully open the cleanout hatch.
2. Re-engage the motor assembly and run any remaining additive out of the feeder by opening the calibration hatch and holding the three-position motor switch in the **MANUAL** position.
3. Disengage the motor assembly and remove the auger. Release the insert by pulling the auger insert release knob on the side of the material transfer tube assembly. Slide the insert out through the motor end of the transport tube. Clean both the auger and the insert.
4. Clean the interior of the supply hopper and any additive remaining in the calibration or cleanout hatches.

## 6-3 Corrective Maintenance

This section provides you with the information necessary to correct or repair any issues which might appear during the normal operation of your additive feeder. Although we have listed how to perform these procedures, it is recommended that you call the Service Department to have any in-depth maintenance performed.

### **Auger Assembly Changeover**

Our additive feeder auger assemblies may be removed and installed without tools. All auger sizes are interchangeable.

**Caution!**      *Disconnect and/or lock out electrical power before removing an auger assembly or performing any service or maintenance.*



### **Removing Auger Assembly**

1. Empty the supply hopper by swinging open the cleanout hatch.
2. Disengage the motor assembly from the auger by removing the motor mount linchpin and swinging out the motor.
3. Pull the auger out.
4. Swing open the calibration hatch.
5. Release the UHMW auger insert by pulling out the spring loaded plunger and turning it a quarter turn.
6. Slide the auger insert out through the transport tube assembly.
7. Clean any remaining additive from inside the feeder.

### **Installing Auger Assembly**

Make sure the insert and auger to be installed are a matching set.

1. Slide the UHMW insert into the material transport tube. Line up the insert's groove with the locking pin in the side of the transport tube. Be sure the locking pin is retracted.
2. When the locking pin is aligned with the insert's groove, release the locking pin. The locking pin will ride in the groove as the insert is pushed into the transport tube.
3. When the insert is in place, the locking pin will snap into a retaining slot in the insert's guide groove.
4. Insert the matching auger into the insert and line up the motor coupler with the pin on the end of the auger.
5. Fasten the motor assembly into place by restoring the linchpin to its original position.
6. Close and secure the calibration and cleanout hatches.

### **Motor Brush Replacement**

The two (2) motor brushes should be replaced when they are worn down to less than 1 inch in length. Replacement brushes are “pre-worn” by the manufacturer and require no break-in period.

**Caution!**

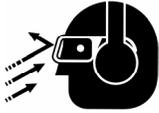
***Disconnect power to the Additive Feeder before changing the motor brushes.***



1. Remove a brush cap screw near the back of the motor.

**Caution!**

***The motor brushes are spring loaded. Use care to avoid eye injury when removing the cap screw. Wear safety glasses when performing this procedure.***



2. Remove the brush. Make note of the direction of the tapered end of the brush face.
3. Insert the new brush with the tapered end facing the same way as the worn brush.
4. Secure the new brush with the cap screw.
5. Repeat the above steps for the other brush.

The motor is now ready for use.

Contact Service to identify the correct brushes for your additive feeder. Be sure to have the serial number of the equipment to be services to expedite the parts request.

# Chapter 7: Troubleshooting

## 7-1 Introduction

The utmost in safety precautions should be observed at all times when working on or around the machine and the electrical components. All normal troubleshooting must be accomplished with the power off, line fuses removed, and with the machine tagged as out of service.

The use of good quality test equipment cannot be over-emphasized when troubleshooting is indicated. Use a good ammeter that can measure at least twice the AC and DC current that can be encountered for the machine. Be sure that the voltmeter has at least minimum impedance of 5,000 OHMS-per-volt on AC and 20,000 OHMS-per-volt on DC scales. Popular combination meters, VOM and VTVM can be selected to provide the necessary functions.

Before making haphazard substitutions and repairs when defective electrical components are malfunctioning, we recommend that you check the associated circuitry and assemblies for other defective devices. It is common to replace the obviously damaged component without actually locating the real cause of the trouble. Such hasty substitutions will only destroy the new component. Refer to wiring diagrams and schematics.

Locating mechanical problems, should they occur, is relatively straightforward. When necessary, refer to the parts catalog section.

Problem	Possible cause	Corrective action
Feeder will not run with switch in <b>AUTO</b> or <b>MANUAL</b> position.	No power to the control.	Plug in control.
	Power switch is off.	Turn power on.
	Fuse is blown.	Replace fuse.
	Auger is jammed.	Clear.
	Loose control wiring.	Tighten.
	Power switch has failed.	Replace.
	Motor switch has failed.	Replace.
	Feeder is wired incorrectly to the processing machine.	Refer to the control enclosure wiring diagram.
	Control relay has failed.	Replace.
	Motor control has failed.	Replace.
	Motor brushes are worn.	Replace.
	Controller is in the program mode. Display reads <b>PROG.</b>	Reset DIP Switch 7.
	Optional timer set incorrectly.	Reset timer.
	Optional timer mode set incorrectly.	Set operation mode to <b>H</b> and configuration to <b>d</b> .
Optional timer has failed.	Replace.	

<b>Problem</b>	<b>Possible cause</b>	<b>Corrective action</b>
Motor will not stop.	Field contact jumper (J1) has not been removed. <b>AUTO MODE.</b>	Remove jumper and wire the terminals to the processing machine relay.
	Field contact to the processing machine has failed.	Check wiring/check the relay on the processor.
	Motor switch has failed.	Replace.
	Field contact to process machine missing or loose.	Correct.
	Control relay has failed.	Replace.
	Motor control has failed.	Replace.
	Optional timer set incorrectly.	Reset.
	Optional timer has failed.	Replace.
Motor runs only at maximum speed.	Signal from motor speed sensor missing.	Secure the sensor connections.
	Motor control has failed.	Replace.
	Motor speed sensor has failed.	Replace.
	Motor speed sensor magnet misaligned.	Adjust.
Motor speed not constant.	Intermittent signal from motor speed sensor.	Secure the sensor connections.
	Motor speed sensor has failed.	Replace.
	Motor control has failed.	Replace.
	Material flow problem.	Inspect for blockage, etc.
Additive is contaminated by color from previous run.	Feeder was not cleaned adequately prior to operation.	See Section 6-2 on Page 39 for cleanout instructions.
Display is blank.	Power not applied	Using a volt meter, verify that a voltage is measured between the L and N terminal block positions.
	Defective unit.	Contact technical service.
Display is dim.	Display intensity.	Check wiring/check the relay on the processor.

When power is applied, “LF-L” OR “LF-H” is displayed.	AC line supplying power has too much noise.	Review routing of power wires in machine to minimize electrical noise. Look for other devices which share the same circuit and may be producing unacceptable levels of line noise. In some applications, such as welding equipment, a careful regiment of applying an AC line filter, re-routing wires, dividing circuits, using shielded cable, and properly grounding devices will usually solve the problem.
	AC line supplying power to unit has an abnormally high frequency.	The unit is designed to operate with AC lines from 48-62 Hertz (cycles per second). This is typically not a problem because the international standards are 50 and 60 Hertz.

**Other service problems or questions can be answered by contacting the Service Department.**

# Chapter 8: Appendix

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## 8-1 Warranty

The manufacturer warrants all equipment manufactured by it to be free from defects in workmanship and material when used under recommended conditions. The company's obligation is limited to repair or replace FOB the factory any parts that are returned prepaid within one year of equipment shipment to the original purchaser, and which, in the company's opinion, are defective. Any replacement part assumes the unused portion of this warranty.

This parts warranty does not cover any labor charges for replacement of parts, adjustment repairs, or any other work. This warranty does not apply to any equipment which, in the company's opinion, has been subjected to misuse, negligence, or operation in excess of recommended limits, including freezing or which has been repaired or altered without the company's express authorization. If the serial number has been defaced or removed from the component, the warranty on that component is void. Defective parts become the property of the warrantor and are to be returned.

The company is not liable for any incidental, consequential, or special damages or expenses. The company's obligation for parts not furnished as components of its manufactured equipment is limited to the warranty of the manufacturers of said parts.

Any sales, use, excise, or other tax incident to the replacement of parts under this warranty is the responsibility of the purchaser.

The company neither assumes nor authorizes any other persons to assume for it any liability in connection with the sale of its equipment not expressed in this warranty.

Many types of the manufacturer's equipment carry an additional one-year service policy. Consult your sales representative for specific details.

## 8-2 Technical Specifications

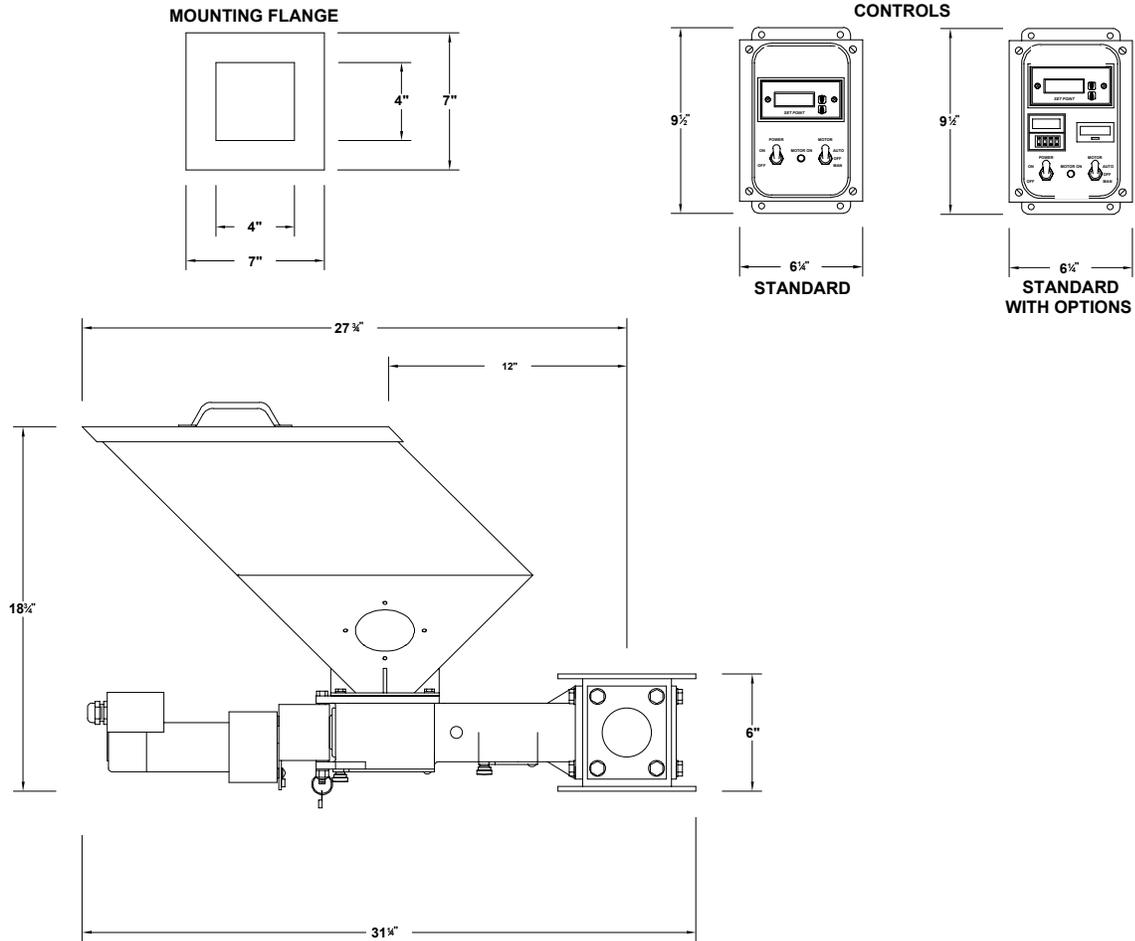
### ***Annex B Information***

The following design information is provided for your reference:

1. No modifications are allowed to this equipment that could alter the CE compliance
2. Ambient temperature: 0 degrees Celsius – Maximum (104 degrees Fahrenheit)
3. Environment: Clean, dust-free and non-explosive
4. Radiation: None
5. Vibration: Minimal, i.e. machine mounting
6. Allowable voltage fluctuation: +/- 10%
7. Allowable frequency fluctuation: Continuous +/- 1%  
Intermittent +/- 2%
8. Nominal supply voltage: 460/3/60 (Verify on serial number tag)
9. Earth ground type: TN (system has one point directly earthed through a protective conductor)
10. Power supply should include a ground connection.
11. Over-current protection is supplied in the additive feeder, but additional protection should be supplied by the user.
12. The door-mounted disconnect serves as the electrical disconnect device.
13. Additive feeder is not equipped with local lighting.
14. Functional identification
15. Additive Feeder is equipped with a CE mark
16. Additive Feeder is supplied with an operating manual in the language of the destination country.
17. Cable support may be required for power cord, depending on final installation.
18. No one is required to be in the interior of the electrical enclosure during the normal operation of the unit. Only skilled electricians should be inside the enclosure for maintenance.
19. Doors can be opened with a screwdriver, but no keys are required.
20. Two-hand control is not required or provided.
21. All additive feeders should be moved around and set in a place with a lift truck or equivalent.
22. There are no frequent repetitive cycles that require manual control—repetitive functions are automatic while the additive feeder is operating.
23. An inspection report detailing the functional test is included with the additive feeder.
24. The machine is not equipped with cableless controls.
25. Color-coded (harmonized) power cord is sufficient for proper installation.

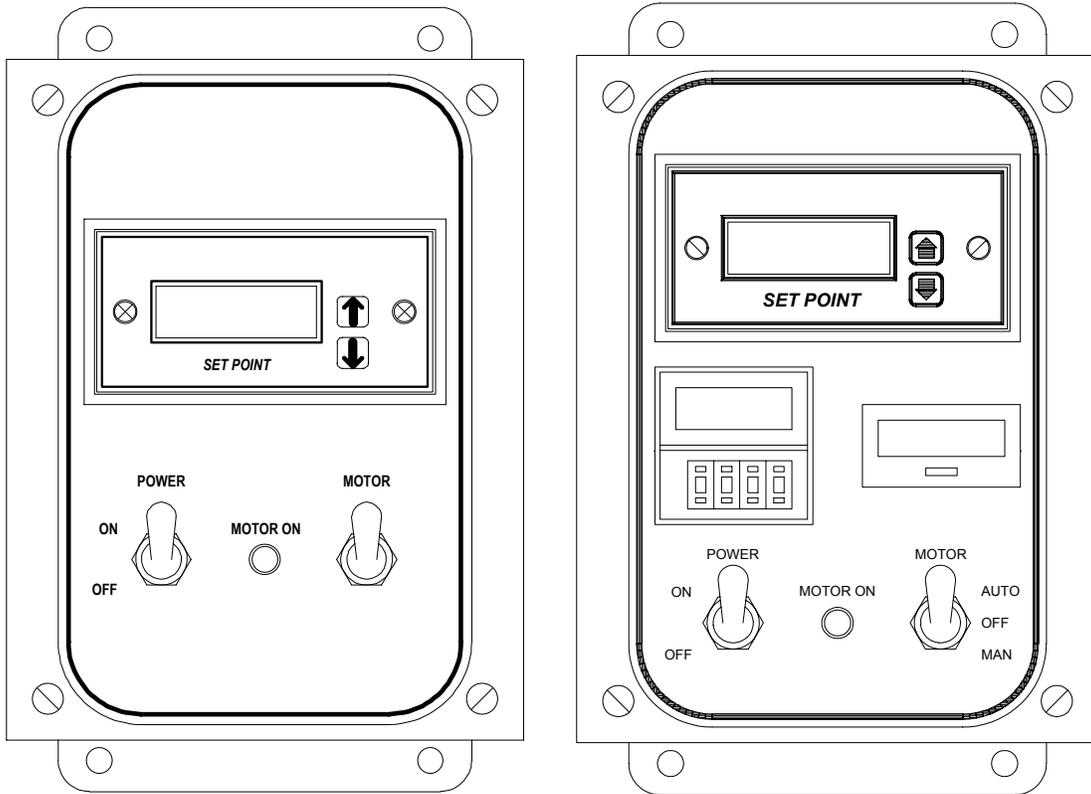
### 8-3 Drawings and Diagrams

Figure 3: Additive Feeder Specifications and Overall Dimensions



Additive Feeder Type	Hopper capacity	Electrical supply	Amp draw	Shipping weight
1 Component	1.0 Cu. Ft.	115-1-60	1.3	50 lbs.
2 Component	(2) 1.0 Cu. Ft.	115-1-60	2.5	90 lbs.

**Figure 4: Typical Additive Feeder Controllers**



## 8-4 Spare Parts List

Figure 5: Exploded Assembly Drawing

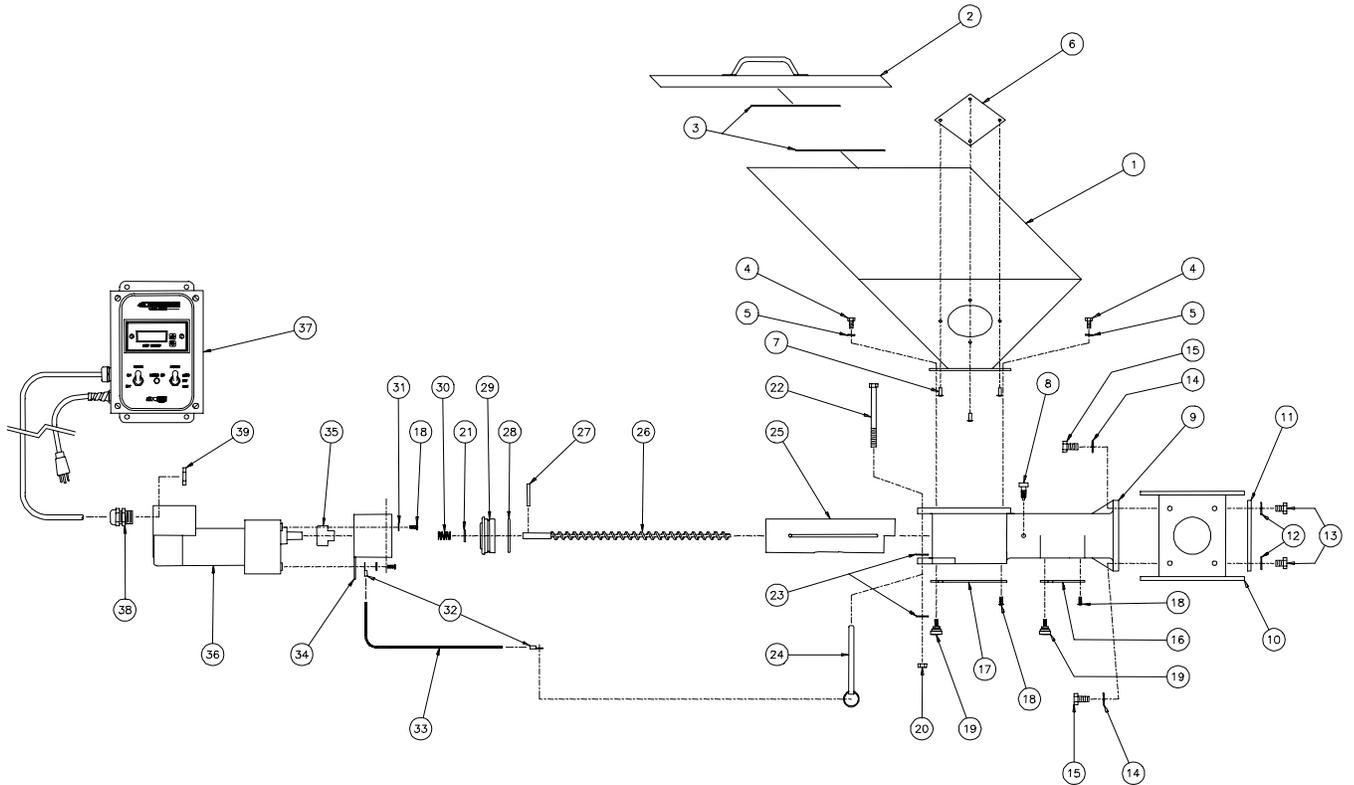


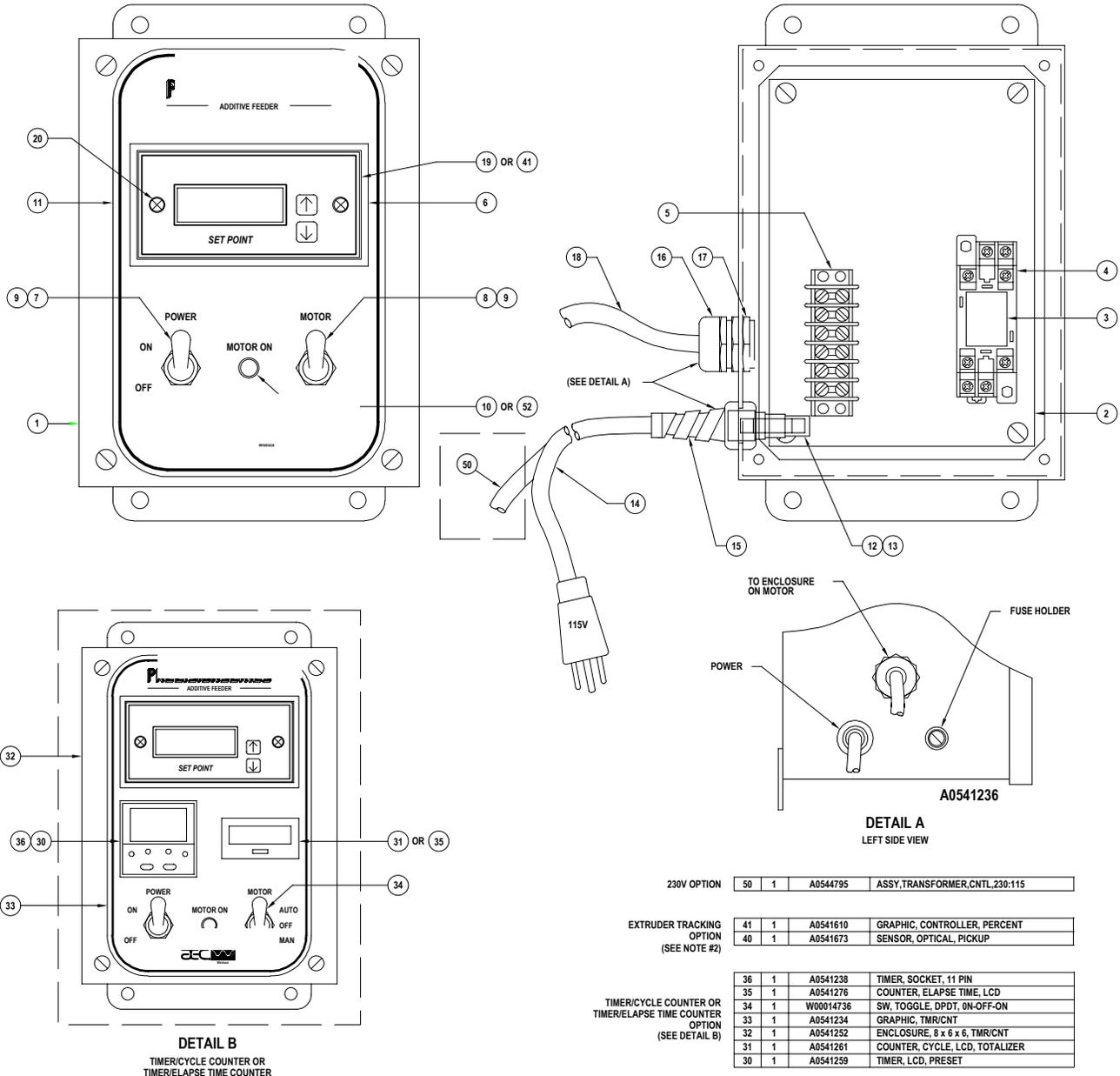
Figure 6: Parts List

Detail #	Part number	Part/assembly description
1	A0541207	Supply Hopper, 1.0 Cubic Foot
1	A0541208	Supply Hopper, 2.0 Cubic Foot
2	A0541225	Hopper Cover, Manual Fill
2	A0541226	Hopper Cover with Cutout for .1 Cubic Foot Hopper Loader
2	A0541227	Hopper Cover with Cutout for .25 Cubic Foot Hopper Loader
3	A0541286	Magnetic Stripping for Supply Hopper Cover
4	A0541285	Screw, 1/4-20 x 1/2", HHC, Grade 5
5	A0101190	Lock Washer, 1/4"
6	A0541206	Supply Hopper Sight Glass
7	W0012471	Blind Rivet, 3/16"
8	W00052210	Plunger Pin, Retractable
9	A0541201	Material Transfer Tube
10	A0541202	Main Throat, Standard, 6"
10	A0541208	Main Throat, Optional Expanded, 8"
11	A0541205	Main Throat Sight Glass
12	A0069242	Flat Washer, 5/16"
13	W00001948	Screw, 3/8-16 x 1/2"
14	A0069203	Lock Washer, 3/8"
15	A0069458	Screw, 3/8-16 x 3/4"
16	A0541216	Calibration Sample Port Plate
17	A0541215	Clean Out Port Plate
18	A0540904	Screw, 10-32 x 1/2"

Detail #	Part number	Part/assembly description
19	W00052550	Knob, Knurled
20	A0069218	Stop Nut, 5/16-18
21	A0069549	Flat Washer, 3/8"
22	A0541279	Screw, 5/16-18 x 4½"
23	A0069241	Flat Washer, ¼"
24	A0541277	Quick Release Pin
25	A0541209	Feed Tube Insert, 1/2"
25	A0541210	Feed Tube Insert, 3/4"
25	A0541211	Feed Tube Insert, 1"
25	A0541212	Feed Tube Insert, 1 1/4"
25	A0541213	Feed Tube Insert, 1 1/2"
25	A0541214	Feed Tube Insert, 1 3/4"
26	A0541219	Auger, 1/2"
26	A0541220	Auger, 3/4"
26	A0541219	Auger, 1"
26	A0541292	Auger, 1 1/4"
Assy.	A0541292	Auger Assembly, 1/2" *
Assy.	A0541293	Auger Assembly, 3/4" *
Assy.	A0541294	Auger Assembly, 1" *
Assy.	A0541295	Auger Assembly, 1 1/4" *
Assy.	A0541296	Auger Assembly, 1 1/2"
Assy.	A0541297	Auger Assembly, 1 3/4"
27	W00015504	Roll Pin
28	A0541284	O Ring
29	A0541217	Thrust Bearing
30	A0541283	Compression Spring
31	W00000947	Lock Washer, #10
32	A0103129	Terminal Ring for Retaining Cable
33	W00013647	Pin Retaining Cable
34	A0541229	Motor Mount
35	A0541282	Jaw Coupler
36	A0555661	Motor Assy, 115 VAC, 1/10 H.P.
36	A0541298	Motor Assembly, 115 VAC 1/20 H.P.
36	A0547487	Motor Assembly, 115 VAC, Low RPM 1/20 H.P.
37	A0541265	Control, 115 VAC
37	A0541266	Control, 115 VAC, Timer/Cycle Counter
37	A0541267	Control, 115 VAC, Timer/Elapsed Timer
37	A0541268	Control, 115 VAC, Extruder Tracking
37	A0541269	Control, 115 VAC, Extruder Tracking, Timer/Elapsed Timer
37	A0544795	230 VAC/115 VAC Transformer Control Assembly
38	A0541039	Strain Relief for Control Cable
39	A0541262	Lock Nut for Strain Relief
	A0539035	Transition Flange, Feed Throat, 7" to 4" Square

\* Auger assemblies include details 26, 27, 28, 29, 30, & 12. Order the appropriately-sized feed tube insert (Detail 25) if needed.

**Figure 7: One Component Control Enclosure Parts Identification**



230V OPTION	50	1	A0544795	ASSY, TRANSFORMER, CNTL, 230-115
EXTRUDER TRACKING OPTION (SEE NOTE #2)	41	1	A0541610	GRAPHIC, CONTROLLER, PERCENT
	40	1	A0541673	SENSOR, OPTICAL, PICKUP
TIMER/CYCLE COUNTER OR TIMER/ELAPSE TIME COUNTER OPTION (SEE DETAIL B)	36	1	A0541238	TIMER, SOCKET, 11 PIN
	35	1	A0541276	COUNTER, ELAPSE TIME, LCD
	34	1	W00014736	SW, TOGGLE, DPDT, ON-OFF-ON
	33	1	A0541234	GRAPHIC, TMR/CNT
	32	1	A0541252	ENCLOSURE, 8 x 6 x 6, TMR/CNT
31	1	A0541261	COUNTER, CYCLE, LCD, TOTALIZER	
30	1	A0541259	TIMER, LCD, PRESET	

**NOTE:**  
1) OPTIONAL ITEMS ARE SHOWN WITH A DASHED BOX.  
2) ITEM #40 (NOT SHOWN ON DRAWING) TO BE FIELD INSTALLED.

ITEM	QTY	PART NUMBER	DESCRIPTION
20	2	A0541613	SCRW, ROUND HD, 6-32, 1/2" LG, BLK
19	1	A0541235	GRAPHIC, CONTROLLER
18	10ft	A0541258	CABLE, 6 COND, SHIELD
17	1	A0541262	NUT, LOCK, STRIAN RELIEF, 3/4"
16	1	A0541039	STRAIN RELIEF, 3/4"
15	1	A0536541	STRAIN RELIEF, PIGTAIL
14	1	W00012591	CORD, SET, W/PLUG, 9', 115V ONLY
13	1	A0541611	FUSE, 250V, MDL, 3/4 AMP
12	1	A0803495	FUSE, HOLDER
11	1	A0541233	GRAPHIC, STANDARD
10	1	A0536646	LIGHT, GREEN, NEON
9	2	W00014276	BOOT, RUBBER, TOGGLE SWITCH
8	1	A0541257	SW, TOGGLE, DPDT, ON-OFF-MOM
7	1	W00002540	SW, TOGGLE, SPST
6	1	A0541244	CONTROLLER, SPEED, STANDARD
5	1	W00020484	TERMINAL STRIP, 6 POSITION
4	1	A0534272	SOCKET, RELAY
3	1	A0903765	RELAY, DPDT
2	1	A0541253	PANEL, SUB, 8 x 6
1	1	A0541251	ENCLOSURE, 8 x 6 x 6, STANDARD
STANDARD BILL OF MATERIAL			

## 8-5 Returned Material Policy

### ***Credit Returns***

Prior to the return of any material **authorization** must be given by **the manufacturer**. A RMA number will be assigned for the equipment to be returned.

Reason for requesting the return must be given.

ALL returned material purchased from **the manufacturer** returned is subject to 15% (\$75.00 minimum) restocking charge.

ALL returns are to be shipped prepaid.

The invoice number and date or purchase order number and date must be supplied.

No credit will be issued for material that is not within the manufacturer's warranty period and/or in new and unused condition, suitable for resale.

### ***Warranty Returns***

Prior to the return of any material, authorization must be given by **the manufacturer**. A RMA number will be assigned for the equipment to be returned.

Reason for requesting the return must be given.

All returns are to be shipped prepaid.

The invoice number and date or purchase order number and date must be supplied.

After inspecting the material, a replacement or credit will be given, at **the manufacturer's** discretion. If the item is found to be defective in materials or workmanship, and it was manufactured by our company, purchased components are covered under their specific warranty terms.

## 8-6 Safety Tag Information

### ***Additive Feeder Safety Tags***



**Read Operation  
and Installation  
Manual**



**Shear Hazard  
Rotating Auger**



**High Voltage  
Inside Enclosure**



**Earth Ground**



**Lifting Point**



**Protected Earth  
Ground**

**8-7 Additive Feeder Identification (Serial Number) Tag**  
(Located on back of Additive Feeder)

<b>COMPANY LOGO</b>					
<hr/>					
<b>Additive Feeder</b>			<b>Serial # XXXXXXX</b>		
<b>Model No. AF-XXX</b>					
<b>Volt</b>	<input type="text"/>	<b>Hz</b>	<input type="text"/>	<b>Ph</b>	<input type="text"/>
				<b>NEMA</b>	<input type="text"/>
<b>Motor</b>	<input type="text"/>		<b>AMP.</b>	<input type="text"/>	
<b>Control Circuit Volt</b>	<input type="text"/>				

## 8-8 Technical Assistance

### ***Parts Department***

Call toll-free 7am–5pm CST [800] 423-3183 or call [630] 595-1060, Fax [630] 475-7005

The ACS Customer Service Group will provide your company with genuine OEM quality parts manufactured to engineering design specifications, which will maximize your equipment's performance and efficiency. To assist in expediting your phone or fax order, please have the model and serial number of your unit when you contact us. A customer replacement parts list is included in this manual for your convenience. ACS welcomes inquiries on all your parts needs and is dedicated to providing excellent customer service.

### ***Service Department***

Call toll-free 8am–5pm CST [800] 233-4819 or call [630] 595-1060

Emergencies after 5pm CST, call [847] 439-5655

We have a qualified service department ready to help. Service contracts are available for most products.

### ***Sales Department***

Call [630] 595-1060 Monday–Friday, 8am–5pm CST

Our products are sold by a world-wide network of independent sales representatives. Contact our Sales Department for the name of the sales representative nearest you.

### ***Contract Department***

Call [630] 595-1060 Monday–Friday, 8am–5pm CST

Let us install your system. The Contract Department offers any or all of these services: project planning; system packages including drawings; equipment, labor, and construction materials; and union or non-union installations.

# Worksheet for Charting Feed Rates

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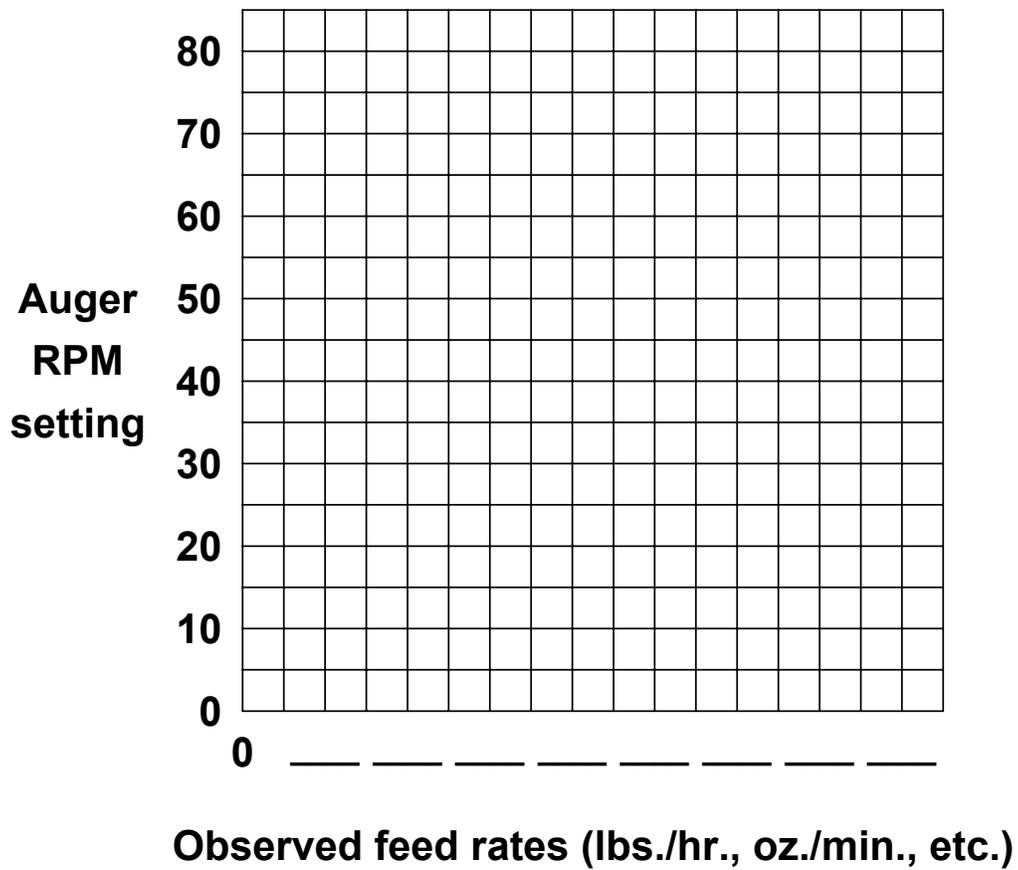
Material \_\_\_\_\_

Auger size \_\_\_\_\_

Feed rate unit of measure \_\_\_\_\_

Trial #1 rpm \_\_\_\_\_ Feed rate \_\_\_\_\_

Trial #2 rpm \_\_\_\_\_ Feed rate \_\_\_\_\_



*- Photocopy this page for your records -*