MAGUIRE PRODUCTS INC.

MXF EXTRUSION FEEDER®

Model MXF®

MAGUIRE EXTRUSION FEEDER

INSTRUCTION MANUAL

Maguire Products Inc.

Model MXF EXTRUSION FEEDER

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To every person concerned with use and maintenance of the MXF Extrusion Feeder it is recommended to read thoroughly these operating instructions. Maguire Products Inc. accepts no responsibility or liability for damage or malfunction of the equipment arising from non-observance of these operating instructions.

To avoid errors and to ensure trouble-free operation, it is essential that these operating instructions are read and understood by all personnel who are to use the equipment.

Should you have problems or difficulties with the equipment, please contact Maguire Products Inc. or your local Maguire distributor.

These operating instructions only apply to the equipment described within this manual.

Manufacturer's Contact Information

Maguire Products Inc.
11 Crozerville Road
Aston, PA. 19014

Phone: 610.459.4300
Fax: 610.459.2700

Website: http://www.maguire.com

Email: info@maguire.com

Maguire MXF Overview

The Model MXF starve feeder carefully regulates the volume of material supplied to the feed throat of the process machine. The Model MXF starve feeder, weighing less than 50 pounds, is compact and easy to install. It is mounted between the existing hopper and the feed throat of the machine adding only 13½ inches to the height of your hopper. Your hopper remains directly over the feed throat of your machine and is not off-set as is the case with some competitors' units.

IMPROVES CONTROL OF VENTED SCREW

When used in conjunction with a vented screw the MSF starve feeder allows the operator to regulate the feed to the rear portion of the screw. If the front portion of the screw is unable to extrude plastic as rapidly as the rear portion, then the excess flow from the rear will be forced out the vent. This condition could result from:

A. The use of backpressure during screw return time
B. Worn screw flights in the forward zone
C. Intentionally unbalanced temperatures over the length of the barrel, etc.

Use of a starve feeder allows careful regulation of the volume of material that is metered to the rear feed section of the screw, so an operator may override the tendency for material to escape from the vent.

IMPROVES MATERIAL PROCESSING

As plastic pellets are heated and plasticized, surface moisture and some volatiles will be driven off as vapor and steam. The vapor and steam that travel backwards will re-condense on the colder pellets in the feed zone and hopper, and then will be carried into the screw over and over again. "Starve feeding" does two things to help remedy this problem. First, a "starved" screw will have a continuous air passage directly behind the spiraling screw flight that will allow vapors to easily escape back through to the feed throat. Second, the starve feeder itself provides a vent to atmosphere so that vapors need not travel up through the cold resin in the hopper.

REDUCE DRIVE MOTOR TORQUE

Some granular forms of resin feed so efficiently at the feed section of the screw that the horsepower or torque available to drive the screw is not sufficient, and the drive motor becomes overloaded. Starve feeding will correct this problem by metering resin at a rate that does not exceed the horsepower or torque of the drive motor.

CONTROL SLIPPAGE

When the feed zone of a process machine is NOT cooled, the plastic pellets in the throat may preheat considerably if throughput rate is low and residence time in the throat is too long. This may cause premature melting in the barrel, resulting in screw slippage that will produce erratic and extended screw return times. Starve feeding eliminates residence time and consequently prevents screw lippage. In these situations, starve feeding actually can produce a shorter screw return time than with "flood" feeding.

MXF Key Features

1. Large clear viewing window is standard allowing a visual check of flow rates. High temperature models use a stainless steel door with Ulten® sight windows.

2. Controls also allow the operator to operate the unit MANUALLY for testing or for production when the operator wishes to have full manual control over feed rate.

3. Material sensor prevents over-feeding or 'stuffing' of material if operator should accidentally use incorrect control settings.

4. Full, unrestricted flow is easily achieved by removing the feed channel tray, thereby flooding the feed throat.

5. Removing the feed channel tray clears all pellets that normally lay under the feed auger. This minimizes possible pellet contamination during color changes.

6. Hinged door allows quick access for clean-out if required.

7. Controls are microprocessor-based with full noise suppression and transient voltage protection developed over many years of actual in-plant operation under the most demanding industrial environments.

8. Motor speed regulation is precisely held through digital tachometer feedback. Plant voltage fluctuations have no adverse effect on metering rates.

9. The MXF Feeder with controls is compact and easy to install, weighing less than 50 pounds. It is mounted between your existing hopper and the feed throat of your machine and adds only 13½ inches to the height of your hopper. Your hopper remains located directly over the feed throat of your machine, not offset, as is the case with some competitive units.

Installation

1. The unit is shipped to you fully assembled. It must be mounted directly to the throat of your process machine under your existing natural material hopper.

2. In selecting the proper ORIENTATION for mounting, consider the following:

   - Easy viewing through the clear window.
   - Easy viewing and access to the controller front panel.
   - Ease of access to hinged door.

3. Remove the existing natural material hopper from your process machine. Locate and drill the proper bolt pattern on both top and bottom plates of the 10" square ADAPTOR frame. This frame will be bolted directly to the feed throat of your process machine and the natural material hopper will be bolted on top.

4. A 110 or 230-volt continuous power source is required for operation.

5. **WIRING:**
   - **a.** Connect the Black 110 VAC (or 230 VAC).
   - **b.** Locate the Black lead labeled “0-10 VDC”. This lead has two wires:
     Black (+) positive 10 VDC
     White (-) negative 0 VDC
     Connect these wires to your extruder’s 0-10 VDC .
   - **c.** Connect the sensor cable to the sensor.
   - **d.** If the controller is remotely mounted, connect the hinged door interlock cable.

SETUP / STARTUP INSTRUCTIONS - EXTRUSION FOLLOWING CONTROLLERS

1. The power cord must be plugged into any 110-volt continuous power outlet.

2. The 0-10 VDC line provided must be installed from the extruder to the controller. On the extruder, this line must be connected to the 0-10 VDC for following.

3. CALIBRATION OF ELECTRONICS - (required one time only):
   Calibration is necessary to match feeder electronics to the particular voltage output of your extruder. In the upper right corner of the front of the controller, there is a small access hole (labeled “MODE”). This provides access to a small one-turn trim pot. This trim pot must be adjusted one time only for your extruder. To do this:

   1. Set the controller to 100.
   2. While your extruder is running, adjust the trim pot so that the display represents the percent (%) of full speed that the extruder is running. For example, if your extruder is capable of running 150 RPMs and is currently at 50 RPMs, adjust the trim pot until the display (labeled “COUNTER”) reads 33 (i.e., 33% of full speed).
   3. After this is done, your controller is calibrated and the formula provided will now be accurate for setting the digital counter for each particular job.

      NOTE: The MANUAL-OFF-EXTRUSION FOLLOWING switch should be in the Extrusion Following position for normal operation. The MANUAL position will allow you to force the controller to run even when the extruder is not running, or running very slowly. In this mode, controller speed will follow the setting of the digital counter and may be controlled accordingly. FLUCTUATION OF SPEED IS NORMAL IN THIS MODE.

      NOTE: If your following voltage is very low, you may not be able to reach a high enough motor speed even when the calibration knob is turned to its maximum position. If this happens, do the following:

      1. Set calibration knob in its middle position 1/2 way between full left and full right.

      2. On the back of the controller, you will note an Allen head screw located at the lower left when facing the back panel. This screw serves to prevent access to another adjustment pot. Remove the screw and use this adjustment to obtain the proper display as required in Step 2 above. This is a course adjustment. Replace the screw and fine tune with the calibration pot in front.

If you have calibrated your unit properly, the following should occur:

$$\frac{\text{Display number}}{\text{Setting number}} = \frac{\text{Current extruder speed}}{\text{Maximum extruder speed}}$$

At FULL SPEED, number displayed will EQUAL Counter setting.

At HALF SPEED, number displayed will be HALF of setting.

At REST, (O voltage) number displayed will be 0.

IF the controller continues to run and display a number when no extrusion voltage is present; recalibrate the electronics as follows.

Repeat low following voltage calibration steps 1 and 2 above this time setting the controller to 500 instead of 100. This means that if you were operating at 100% voltage your controller will display 100 while set at 500. All formulas mentioned in this manual will be multiplied by (5).

$$\frac{\text{Display number X 5}}{\text{Setting number}} = \frac{\text{Current extruder speed}}{\text{Maximum extruder speed}}$$

DESCRIPTION OF CONTROLS and OUTPUTS

1. MANUAL-OFF-EXTRUSION FOLLOWING SWITCH

EXTRUSION FOLLOW: The controller will follow the speed of the extruder based on the voltage signal that it receives from the extruder.

OFF: Will prevent the controller from running and will remove power to the computer controls. If a voltage spike transient power surge should cause the processor to become "confused", switching to OFF may be necessary to re-start the processor.

MANUAL SPEED CONTROL: The controller will run continuously as long as 110-volt power is present at the controller power cord. Speed is controlled by and directly follows the setting of the thumbwheel switch.

The MANUAL-OFF- EXTRUSION FOLLOWING switch should be in the FOLLOW position for normal operation. The MANUAL position will allow you to force the controller to run even when the extruder is not running, or running very slowly. In this mode, controller speed will follow the setting of the digital counter and may be controlled accordingly. SOME FLUCTUATION OF SPEED IS NORMAL IN THIS MODE.

2. MOTOR FORWARD/REVERSE SWITCH

This switch should be in the FORWARD position for all normal operation. Holding the switch down in the REVERSE position will cause the controller motor to run backwards. In the center position the switch is OFF.

3. THUMBWHEEL SWITCHES

In the FOLLOW mode, the thumbwheel switch setting determines the MAXIMUM rate of speed of the controller. This is the rate of speed you would expect when your extruder is running at 100% of full rated speed. In the MANUAL mode, the setting directly controls the RPMs of the motor output shaft.

4. DISPLAY WINDOW

The window will display motor RPMs. Flashing of this display at half-second intervals indicates that the motor is not running at the full speed that is necessary to deliver the quantity of material requested by the counter setting.

5. SIGNAL AND MOTOR LIGHTS

The Signal Light indicates power is present at the signal cord; in other words, the process machine screw is turning. The Motor Light indicates the computer processor is outputting a D.C. voltage to the controller motor; the motor is turning.

DESCRIPTION OF MECHANICAL FEATURES

1. SENSOR

There are two types of sensors used on MXF Feeders; one type of sensor is used on Standard MXF Feeders while another type is used on High Heat MXF Models. On Standard MXF Feeders the sensor is located behind the window, inside the frame. It hangs by the clip provided so that it rests close to the outlet opening in the bottom of the feeder frame. On High Heat MXF Models, the sensor is mounted on the outside of the MXF frame near the base. Each sensor has its own instructions for adjustment.

SENSOR ADJUSTMENT:

Standard Sensor Adjustment:

To adjust the sensor, locate the small adjusting screw on the rear of the sensor body. With the sensor uncovered, adjust the sensitivity screw until the LED light comes on. Rotate the adjusting screen in the opposite direction until the LED light goes out. Then rotate the adjustment screw approximately two more rotations further to prevent false readings. You can verify the adjustment by placing your hand over the end of the sensor and observe that the LED light comes ON when covered and OFF when uncovered. The sensor will be adjusted so that the indicator light is OUT during normal 'starved' operation. The indicator light should go ON as soon as plastic pellets are forced to accumulate up against the end of the sensor.

High Heat Sensor Adjustment:

While the Sensor is uncovered, Press and HOLD the sensor button until the green light blinks once a second and then release the sensor button. To test the sensor adjustment, an uncovered sensor should show a green light. A covered sensor should show a green and yellow light lit together. If the sensor is showing green and red at the same time, the sensor is out of adjustment. Testing the sensor can be done accessing the sensor from the outside, not by reaching into the enclosure. Place your finger on side close to the end of the sensor. From here, you should be able to trigger the sensor to the covered position.

2. VIEWING WINDOW

The viewing window / door can be opened to allow access for clean out in the event you change materials or change colors.

3. DOOR INTERLOCK

The door can on the MXF is equipped with an interlock switch that cuts power to the auger motor when the door is open. Do not attempt to defeat or bypass this interlock.

BENEFITS OF STARVE FEEDING

1. When used in conjunction with a vented screw--either injection molding or extrusion--the Starve Feeder allows the operator to regulate the feed to the rear portion of the screw. If the front portion of the screw is unable to extrude plastic as rapidly as the rear portion, then the excess flow from the rear will be forced out the vent.

This condition could result from:

   a. The use of back pressure during screw return time
   b. Worn screw flights in the forward zone
   c. Intentionally unbalanced temperatures over the length of the barrel, etc.

   Use of a "Starve Feeder" allows careful regulation over the volume of material that is metered to the rear feed section of the screw, thus allowing an operator to override the tendency for material to escape from the vent.

2. As plastic pellets are heated and plasticized, surface moisture and some volatiles will be driven off as vapor and steam. That portion that travels backwards will re-condense on the colder pellets in the feed zone and hopper and will again be carried into the screw over and over again. "Starve Feeding" does two things to help remedy this problem. First, a "starved" screw will have a continuous air passage directly behind the spiraling screw flight, which will allow all vapors to easily escape backwards to the feed throat. Second, the Starve Feeder itself is provided with a vent to atmosphere so that vapors need not travel up through the cold resin in the hopper.

3. Some granular forms of resin will feed so efficiently at the feed section of the screw that the horsepower or torque available to drive the screw is not sufficient and the drive motor becomes overloaded. "Starve Feeding" will correct this problem by metering resin at a rate that does not exceed the horsepower or torque of the drive motor.

4. When the feed zone of a process machine is NOT cooled, the plastic pellets in the throat may preheat considerably if thru-put rate is low and residence time in the throat is too long. This may cause premature melting in the barrel, resulting in screw slippage producing erratic and extended screw return times. "Starve Feeding" eliminates residence time and consequently prevents screw slippage. In these situations, "starve feeding" actually can produce a shorter screw return time than with "flood" feeding.

WARRANTY - Exclusive 5-Year

MAGUIRE PRODUCTS offers one of the MOST COMPREHENSIVE WARRANTIES in the plastics equipment industry. We warrant each MXF Feeder manufactured by us to be free from defects in material and workmanship under normal use and service; our obligation under this warranty being limited to making good at our factory any MXF Feeder which shall within FIVE (5) YEARS after delivery of such MXF Feeder to the original purchaser be returned intact to us, transportation charges PREPAID, and which our examination shall disclose to our satisfaction to have been thus defective; this warranty being expressly in lieu of all other warranties expressed or implied and of all other obligations or liabilities on our part, and MAGUIRE PRODUCTS neither assumes nor authorizes any other persons to assume for it any other liability in connection with the sale of its products.

This warranty shall not apply to any Feeder which shall have been repaired or altered outside MAGUIRE PRODUCTS factory, unless such repair or alteration was, in our judgment, not responsible for the failure; nor which has been subject to misuse, negligence or accident, incorrect wiring by others, or installation or use not in accord with instructions furnished by Maguire Products.

Our liability under this warranty will extend only to Feeders that are returned to our factory in Aston, Pennsylvania PREPAID.

It should be noted, however, that we strive to satisfy our customers in whatever manner is deemed most expedient to overcome any problems they may have in connection with our equipment.

Technical Support and Contact Information

Maguire Products Inc.
11 Crozerville Road
Aston, PA 19014
Tel: 610.459.4300
Fax: 610.459.2700
Email: info@maguire.com
Web: www.maguire.com

Maguire Europe
Tame Park
Tamworth
Staffordshire
B775DY
UK
Tel: + 44 1827 265 850
Fax: + 44 1827 265 855

Maguire Products Asia PTE LTD
45 Kallang Pudding Road
#01-02 Alpha Building
Singapore 349317
Tel: +65 6848 7117
Fax: +65 6744 3370
Email: magasia@singnet.com.sg