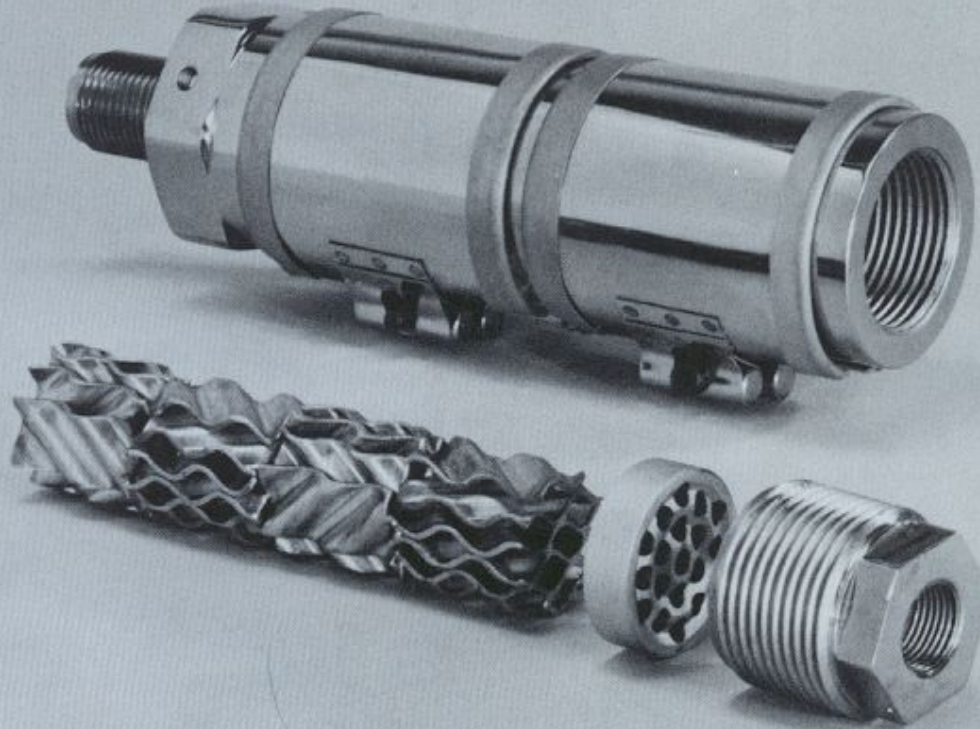




KOCH MIXING HEAD*



INSTRUCTIONS

INSTALLATION, OPERATION & MAINTENANCE

PLEASE FORWARD TO INSTALLER & OPERATORS

*Licensed exclusively from Sulzer Brothers of Winterthur, Switzerland under U.S. patents #3,785,620, #3,871,624

Warranty

The Koch mixing head is warranted for a period of six (6) months from the date of shipment against any defect in material or workmanship. Should the unit fail during that period when operated in accordance with Koch instructions, Koch will repair or replace the mixing head free of charge when the defective mixing head (or parts) are returned to Koch.

Koch shall in no case be liable for damages due to negligent operation, incidental, indirect, or consequential damages of any kind. In any case Koch's liability shall be limited to the purchase price of the unit.

The foregoing is Koch's entire obligation. There are no other warranties, express or implied, including warranties of merchantability or fitness for a particular purpose.

If You Still Have a Question...

If this manual hasn't answered all your questions, contact your Koch representative, or call or write Koch Engineering directly:

Polymer Mixing Division



KOCH
ENGINEERING COMPANY INC

P.O. Box 8127
Wichita, Kansas 67208
phone 316-832-5469
TWX 910-741-6920
Telex 041-7440

Installation

1. Fully retract the injection unit and remove the nozzle from the nozzle adaptor. Make sure the rear thread and opening are correct for the machine by checking them against the nozzle.

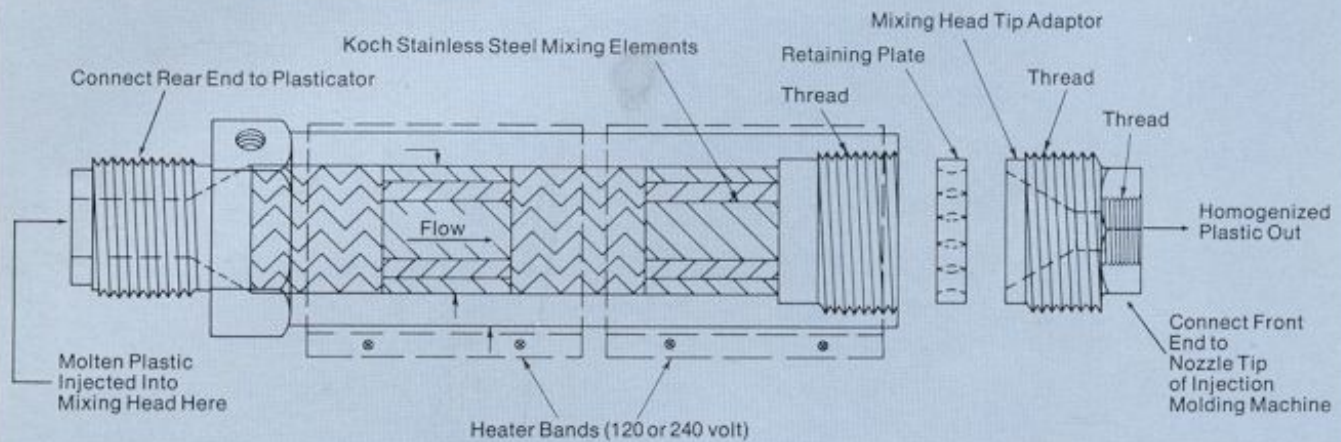
2. Adjust the stroke length of the carriage to accommodate the length of the mixing head.

retighten the bands at this temperature to assure intimate heater contact and longer heater life.

7. Install a nozzle tip of the proper radius and orifice size in the mixing head tip adaptor.

8. To prevent undue lateral stress in the mixing head, make certain that the sprue and nozzle tip are properly aligned.

Figure 1. Koch Mixing Head.



3. Apply a thin film of antisieze compound to the rear thread.

4. Screw the head into the nozzle adaptor. Tighten to ensure a good seal, using the hex on the rear end of the mixing head. Do not use pipe wrenches on the body of the unit. Pipe wrench marks under the heater bands may contribute to the premature failure of the heater.

5. Wire the heater bands (Fig. 2) to a 120 or 240-volt, single-phase AC circuit capable of carrying the wattage stamped on the bands.

Be sure to make a tight electrical connection and observe all governmental wiring codes.

Note: The user is responsible for "point of operation" guards to ensure the safety of operators from electrical shock and burn hazards.

6. Make certain the heater bands are tightly wrapped around the body of the mixing head. Test heat to 450°F and

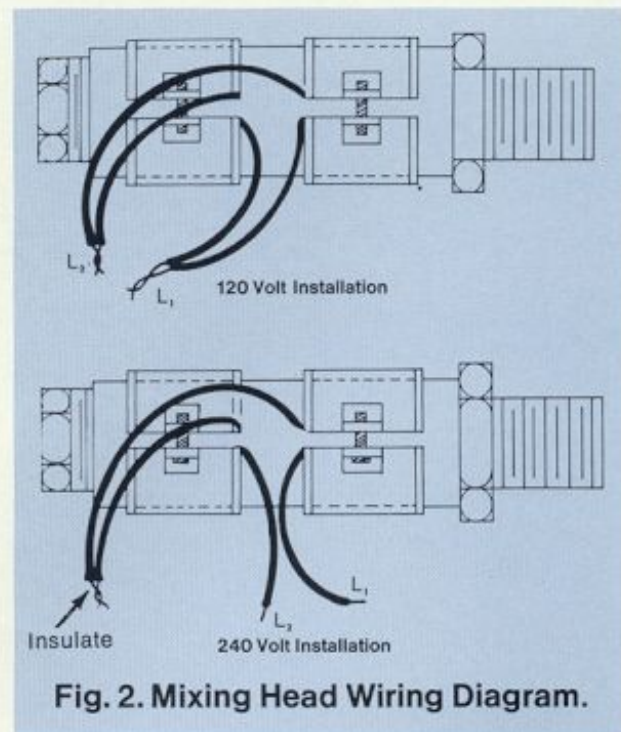


Fig. 2. Mixing Head Wiring Diagram.

9. The injection molding machine is now fitted with the Koch mixing head and ready for start-up operation.

Operating the Mixing Head

Start-Up Operation

1. With the injection unit fully retracted, bring the barrel and mixing head to operating temperature. There will be a 15 to 20-minute soaking period after the zone controls start to cycle.

2. Set the machine operation mode to manual and the boost and secondary pressure regulators to their lowest settings.

3. Quickly depress and release the injection switch. If the screw bounces back, allow more heat soaking time.

4. Once the polymer flows freely in a purging mode, increase the injection pressure as required and begin the molding operation. (See "Reducing Operating Costs" on page 5.)

Shutdown

If the mixing head is to be started up full of polymer, the machine should be shut down with the screw (or ram) left forward and the injection pressures turned down.

Restart

To reduce heat soaking time, temporarily elevate the controller's setting above the operating temperature. (The temperature should not be elevated if decomposition is a problem.) Decrease the controller's setting to the desired operating temperature once the resin flows freely. Then proceed with regular start-up procedures.

Note: Your injection molding machine has the capacity to ruin the mixing head internals. Do not force semi-molten resins through the mixing head by increasing the injection pressure during start-up. Stress in excess of 18,000 psi (hydraulic) will destroy the prestress in the elements, drastically reducing their life. Stress in excess of 19,500 psi will result in immediate failure of the internals.

Maintenance

The Koch mixing head normally requires no maintenance beyond simple purging. If thermal cleaning becomes necessary, however, the heater bands should be removed and the unit cleaned by any method that does not involve temperatures in excess of 950°F. Higher temperatures will destroy the heat treatment of the mixing elements and lead to their premature failure.

Note: Do not break factory seals and disassemble the unit. This will void your warranty. The internals are not user serviceable. Should problems develop, return the mixing head to Koch Engineering for repair.

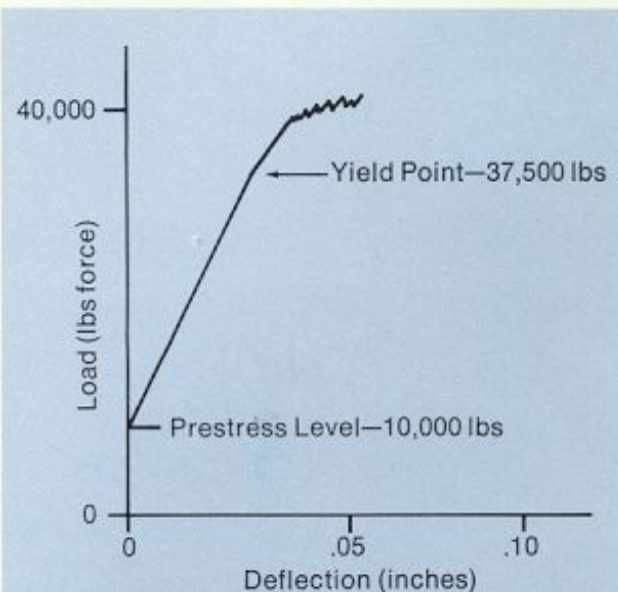


Figure 3. Koch Mixing Elements Are Built to Take Heavy Loads.

Test Specimen—4 type "BY" elements of .06" 17-7PH stainless steel 1 5/8" diameter x 6" long

Test Temperature—500°F

Test Fixture (support)—Mixing head retainer plate

Specifications and Operating Limits

Housing

The body of the mixing head is rated at 20,000 psi at 500°F. Consult your Koch representative if your injection molding machine's capacity exceeds this rating.

Mixing Elements

The Koch static mixing unit, made up of four mixing elements, is a high-efficiency, low-pressure-drop motionless mixer for in-line homogenization of fluid streams. Because pressure drop is low, the "injection forward" time on the injection molding machine need not be increased; in some operations it may even be decreased with slight additional "boost" pressure due to the resultant homogeneity of the melt.

The rigid mixing elements are made of 17-7 PH™ stainless steel and are heat-treated for strength. Static load tests performed by an independent testing lab show that the elements have a yield point of 37,500 lbs (Fig. 3); the rigid elements are so strong that seven 1963 Lincoln Continentals could be supported by a static mixing unit on its retainer plate. (For more information ask your Koch representative for the static load test report.)

Koch mixing elements are prestressed to counteract the fatigue effect of repetitive loading in the injection molding operation; the threaded adaptors are factory sealed to prevent the loss of this prestress.

High injection rates and high polymer viscosity (low melt index) contribute to element fatigue. The operational life of a Koch mixing head is measured in terms of the total number of shots processed (which may be in the millions). Cost savings in your molding operation achieved with the mixing head will far exceed the repair or replacement price of a new unit.

Reducing Operating Costs

Proper use of the Koch mixing head will result in faster fill rates, quicker gate-to-gate cycle, reduced shot weight, color savings, and improved part quality.

1. Faster fill rates—Start the injection molding machine, wait 20 to 30 minutes for the unit to settle down, then fine tune the first and second stage injection timer clocks. The settings on both of these clocks may be reduced since use of the mixing head will result in a thermally homogeneous melt.

2. Quicker cycle—Since the Koch mixing head eliminates hot slugs in the melt, the setting on the clamp (or die) close timer clock (which has been set to keep the mold closed long enough to cool hot areas) can be reduced for a quicker gate-to-gate cycle.

Reduce the clock setting five percent, wait 15 to 20 minutes, and reduce it another five percent. Repeat this procedure for as long as the parts are acceptable.

3. Reduced shot weight—Because the mixing head produces a polymer stream of uniform viscosity, the injection ram has the same resistance from shot to shot. This allows you to use the lowest possible pressure setting on the second stage pump, minimizing overpacking of the shot and reducing shot weight.

4. Color savings—Check parts for color opacity by holding the "before" and "after" parts up to the light. If the "after" parts are too opaque, reduce color loading until the proper opacity is obtained.

5. Improved product quality—The Koch mixing head produces a smooth, continuous flow of polymer at faster injection rates and lower pressures. This eliminates short shots, difficult ejection, warpage, dimensional variations, and color streaking of the molded parts. Consistently better parts mean less waste in rejected products.

Introduction

The Koch mixing head (Fig. 1) improves product quality in injection molding operations while reducing cost and cycling time. Installed between the plasticator and the nozzle tip, the mixing head—unlike a conventional nozzle—contains Koch static mixing elements. The mixing elements consist of stainless steel, corrugated metal sheets welded together one on top of the other. Placed in the body of the mixing head in series, the mixing elements form a static mixing unit—a series of open, intersecting channels for fluid flow.

When molten plastic passes through the mixing head, it is completely mixed in the channels of the mixing unit. Inhomogeneities in temperature and composition are eliminated, so there are no hot or cold slugs in the melt injected into the runner and cavities of the mold: The length of the cycle is no longer determined by overheated hot slugs, and the pressures and injection rate are not hampered by cold-flowing slugs.

With proper installation, operation, and maintenance, the Koch mixing head can improve the performance of your injection molding machine for millions of shots. The pages that follow present instructions for the use and care of your Koch mixing head.

Before You Install the Mixing Head...

Before installation of the Koch mixing head, the injection molding machine should be fine tuned to assure the best cycle time, part quality, and production efficiency.

Record clock readings, fill rate, and the injection pressure of the first and second stage pumps. Remove and weigh ten complete shots before stopping the molding machine to install the mixing head. Use these shots to compare the performance of your injection molding operation before and after installation of the mixing head.