

# **KOMAX**

*MIXING BY DESIGN*

## ***DIRECT INJECTION STEAM HEATERS***



**The KOMAX Steam Heater** has gained a well-earned reputation for solving difficult in-line heating requirements around the globe. KOMAX is the leading supplier of steam heaters and static mixers for industries such as:

- Oil and Gas
- Pharmaceuticals
- Food Processing
- HVAC
- Pulp and Paper

### STEAM HEATER APPLICATIONS

**Direct in-line injection of steam** into water-compatible products has been common industry practice for well over 100 years. Our near 100% heating efficiency makes this process very attractive in a variety of applications. KOMAX has assisted customers in applying our heater technology to:

- Water
- Slurries
- Paper Pulp Stock
- Starch Cooking
- Sludge
- Preheating Boiler Water



The KOMAX Steam Heater

### KOMAX PATENTED DESIGN FEATURES

- 1.** Very low levels of noise and vibration are achieved by keeping the steam velocity well below the speed of sound in steam.
- 2.** The steam flow path is very smooth with no sudden directional changes. This allows much of the steam momentum to be conserved. The product flow is aided by this momentum and minimizes the pressure drop.
- 3.** A very open mixing structure is used, for free flow of product and steam with no plugging and with low pressure drop.
- 4.** Other steam heaters require a long length of pipe following the heater before thermowells can be installed. This can be expensive and cumbersome. The KOMAX Steam Heater does not require this. Thermowells can be positioned as close as two pipe diameters from the heater exit.

## BENEFITS OF A KOMAX STEAM HEATER

### Smooth Operation

- **Low Noise Levels** means our unit is safe for nearby personnel.
- **No Vibration** prevents system damage that may occur with other units.

### Broad Operating Range

- **Handles high turn-up and turn-down** of flow rates.
- **Functions under a wide range** of temperature requirements.

### Creates Minimal Pressure Drop

- **Results in unique energy efficiency.**

### No Moving Parts

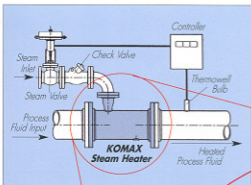
- **KOMAX steam heaters are maintenance free.**

### Cost Effective

- **Much lower cost** than a shell and tube heat exchanger.

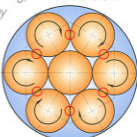
## OTHER ADVANTAGES

- **The length of a typical KOMAX Steam Heater is less than three pipe diameters and standard units are available from 2 inches to 24 inches in diameter.**

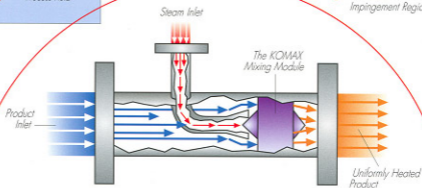


## WHY THE KOMAX HEATER WORKS

**The key to the KOMAX Steam Heater** is a special mixing module. This consists of six equal-diameter cylindrical cavities mounted symmetrically about the main pipe axis. Each cavity contains a single helical mixing element, with all mixing elements having the same sign of twist. The product and steam combination emerges from each cavity violently rotating, with all rotations in the same direction. This produces many impingement mixing zones at the exit of the module (see illustration at right). Complete mixing of product and steam occurs, resulting in a truly uniform product temperature.



○ = Interaction or Impingement Regions



## SELECTING YOUR KOMAX STEAM HEATER

The steam flow rate required for heating a water like material may be estimated using the following formula:

$$M = 0.43 \times dT \times Q \text{ pounds per hour}$$

where  $Q$  = product flow rate in gallons per minute, and  $dT$  = rise in temperature required in °F

For very accurate calculations, use the following formula:

$$M = (60 \times Q \times \rho \times dT \times C_p) / (H_S - H_W) \text{ pounds per hour}$$


where  $\rho$  = product density in pounds per gallon;  $C_p$  = product-specific heat in BTU per pound;

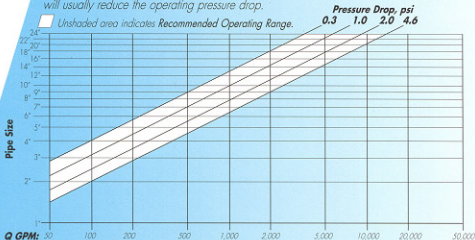
$H_S$  = total heat of steam input in BTU per pound; and

$H_W$  = total heat of product at the exit temperature in BTU per pound

## KOMAX STEAM HEATER SIZING GUIDE

Enter the **Heater Sizing Guide** below at the main product flow rate  $Q$  GPM and move up to a pipe size within the recommended operating range. The pressure drop indicated for a given pipe size is for a water like product without any steam flow. The onset of steam flow will usually reduce the operating pressure drop.

 Unshaded area indicates Recommended Operating Range.



## OTHER KOMAX PRODUCTS INCLUDE...

- Static Mixers
- Scepters for tank heating with steam
- De-Superheaters

# KOMAX SYSTEMS INC

### MIXING BY DESIGN



P.O. Box 1323

Wilmington, California 90748-1323

Phone: 310.830.4320

Fax: 310.830.9826

Toll Free: 800.826.0760

Email: [info@komax.com](mailto:info@komax.com)

Web Site: [www.komax.com](http://www.komax.com)