Steam jet heaters for vessels

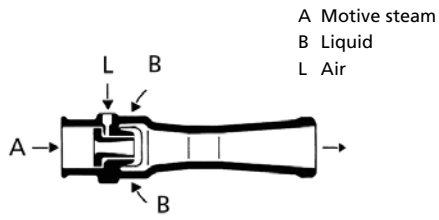
APPLICATION

Steam jet heaters are used to heat all kinds of liquids in vessels. Heating is achieved by means of direct condensation of steam. The steam condensate mixes with the liquid.

MODE OF OPERATION

The steam jet emerging from the motive nozzle accelerates the liquid present in its vicinity and in the mixing nozzle, and condenses (see also "General information on jet pumps", ↗ | ab | 1).
In this way a controlled flow is produced. Furthermore, the whole content of the vessel is set in motion and the heat transferred to the liquid is evenly distributed throughout the vessel.
All the heaters are provided with a threaded connection for an air pipe. Normally it is not necessary to operate with air supply. However, the admission of air greatly intensifies the movement of the circulating liquid; it can also assists in avoiding condensation hammers and rattling that may occur when starting with a cold liquid.
If air is to be supplied, a corresponding line with installed regulation valve has to be connected (see **fig. 1**). Depending on the application, atmospheric air which is sucked in by the heater itself is sufficient.
To operate the steam jet heater, a steam overpressure of at least 1.5 bar is necessary to overcome the static pressure of the liquid and to achieve the minimum speed at which no disturbing noise is produced.
The heaters described can also be used for operating with low pressure steam (special construction).

FIG. 1



PERFORMANCE CHART

On the bottom scale, the chart in **fig. 2** gives the heat flow in kW for each size. This is the heat content of the inflowing steam. However, the heat actually transferred to the liquid is less. It is reduced by the heat contained in the condensate.
The condensate flow produced by the condensation of the inflowing steam is given on the top scale. With the aid of this scale and the temperature ϑ of the heated liquid, the heat flow actually transferred is calculated as follows:

$$\dot{Q}_{tr} = \dot{Q} - \dot{M}_C \cdot c \cdot \vartheta \cdot \left(\frac{1}{3600}\right) \text{kW}$$

Whereas:

$\dot{Q}_{tr}$	Transferred heat flow in kW
$\dot{Q}$	Heat flow in kW = Enthalpy of the inflowing steam
$\dot{M}_C$	Condensate flow in kg/h
c	Specific heat capacity of the condensate in kJ/kg °C (water = 4.2)
ϑ	Temperature of the heated water in °C

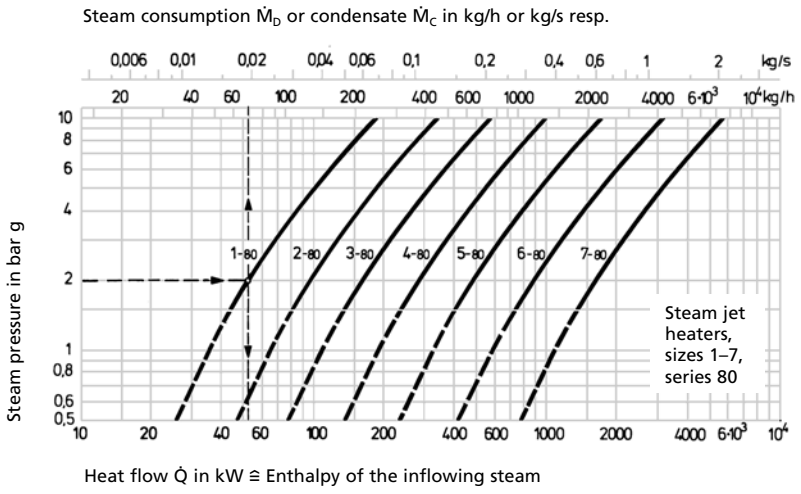
EXAMPLE

GIVEN: A steam quantity of approx. 70 kg/h is required to heat a vessel.
Steam at 2 bar g is available.
SOLUTION: The chart in **fig. 2** shows that size 1-80 matches the example.

Construction with thread

Construction with flange

FIG. 2



Performance chart for steam jet heaters, size 1 to 7, construction series 80, for water

Steam jet heater with thread, type 18.1

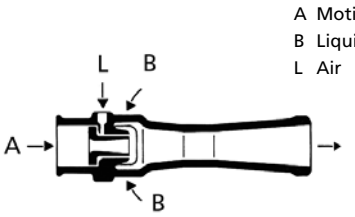
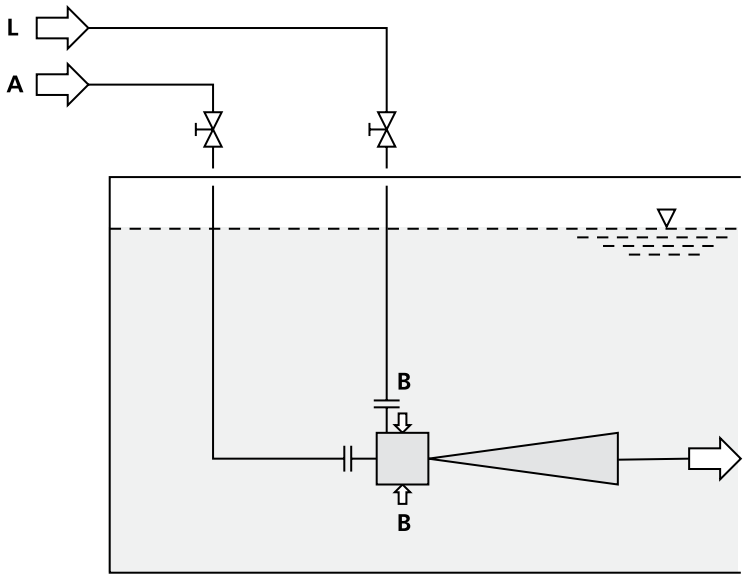
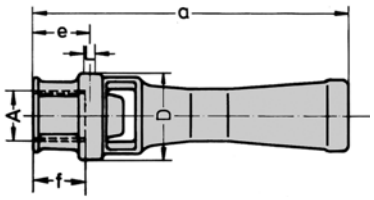


FIG. 4

EXAMPLE OF INSTALLATION: STEAM JET HEATER WITH THREAD, TYPE 18.1

FIG. 3





CONNECTIONS, DIMENSIONS AND WEIGHTS
STEAM JET HEATER WITH THREAD, TYPE 18.1

	Size	1-80	2-80	3-80	4-80	5-80	6-80	7-80
Nominal diameter	A	G 3/4	G 1	G 1 1/2	G 1 1/2	G 2	G 3	G 4
	L	G 1/8	G 1/8	G 1/4	G 1/4	G 1/4	G 3/8	G 3/8
Dimensions in mm	a	170	220	265	345	400	520	610
	D	52	60	75	85	100	125	160
	e	35	40	40	40	50	75	80
	f	20	25	24	24	30	33	40
Weight in kg		1	2	3	5	7	12	21

STANDARD CONSTRUCTIONS:

I Housing: cast iron EN-GJL-200 (GG20), motive nozzle: red brass
II Housing: cast iron EN-GJL-200 (GG20), motive nozzle: stainless steel
III Housing: cast stainless steel (1.4581), motive nozzle: stainless steel
Thread according to DIN ISO 228

SPECIAL CONSTRUCTIONS are possible in most of the usual materials.
Please indicate size, type and material with your order.

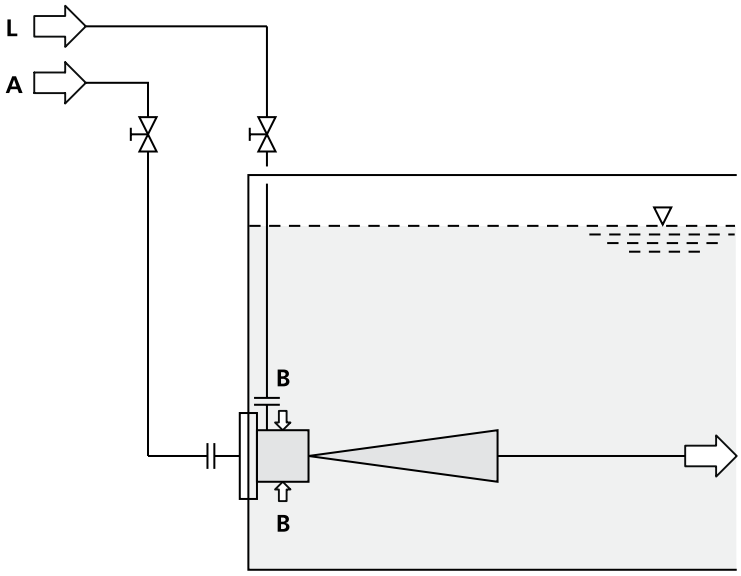
For inquiries please use our questionnaire.

GEA Wiegand GmbH
www.gea-wiegand.com
76275 Ettlingen · Germany · Tel.: +49 7243 705-0
Fax: +49 7243 705-330 · E-mail: info.gewi.de@geagroup.com

Steam jet heater with flange, type 28.1

EXAMPLE OF INSTALLATION: STEAM JET HEATER WITH FLANGE, TYPE 28.1

FIG. 5



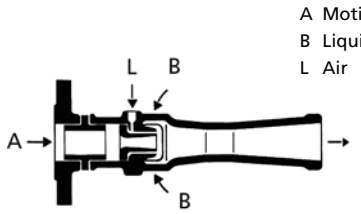
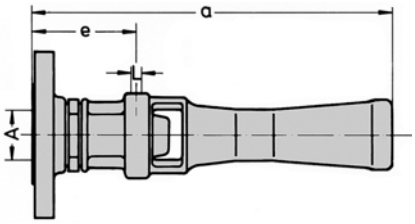


FIG. 6



CONNECTIONS, DIMENSIONS AND WEIGHTS
STEAM JET HEATER WITH FLANGE, TYPE 28.1

	Size	1-80	2-80	3-80	4-80	5-80	6-80	7-80
Nominal diameter	A	20	25	40	40	50	80	100
	L	G 1/8	G 1/8	G 1/4	G 1/4	G 1/4	G 3/8	G 3/8
Dimensions in mm	a	205	255	300	380	440	570	665
	e	70	75	75	75	90	125	135
Weight in kg		2	3	5	7	10	17	28

STANDARD CONSTRUCTIONS:

I Housing: cast iron EN-GJL-200 (GG20), motive nozzle: red brass
II Housing: cast iron EN-GJL-200 (GG20), motive nozzle: stainless steel
III Housing: cast stainless steel (1.4581), motive nozzle: stainless steel
Flanges according to DIN PN 16
Threads according to DIN ISO 228

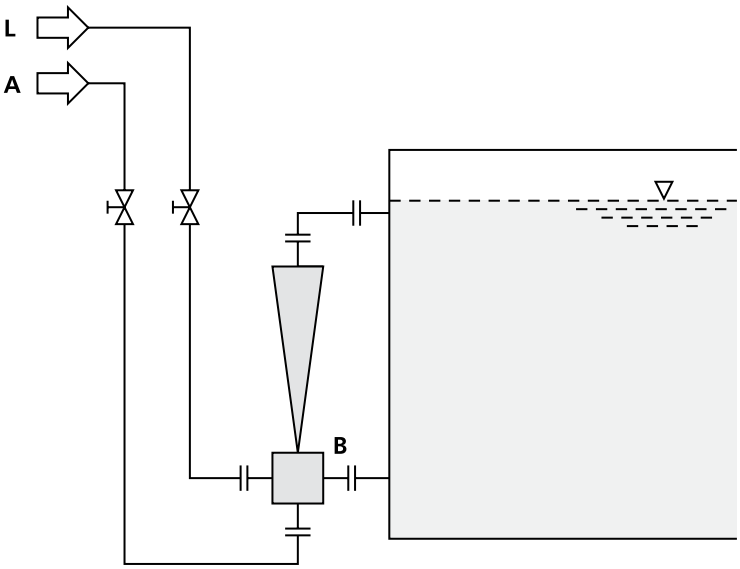
SPECIAL CONSTRUCTIONS are possible in most of the usual materials.
Please indicate size, type and material with your order.

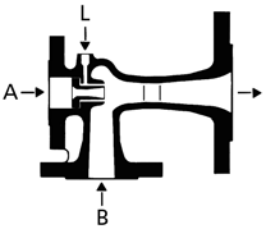
For inquiries please use our questionnaire.

EXAMPLE OF INSTALLATION: STEAM JET HEATER WITH HOUSING, TYPE 38.1

SPECIAL CONSTRUCTIONS DESIGNED ACCORDING TO THE CUSTOMER'S SPECIFICATION

FIG. 7





A Motive steam
B Liquid
L Air

Steam jet heaters, type 38.1 must only be used for a liquid level of min. 0.5 m above the heater.

Dimensions, connection dimensions, materials and special capacity data on request.

GEA Wiegand GmbH
www.gea-wiegand.com
76275 Ettlingen · Germany · Tel.: +49 7243 705-0
Fax: +49 7243 705-330 · E-mail: info.gewi.de@geagroup.com