The Innovation Company

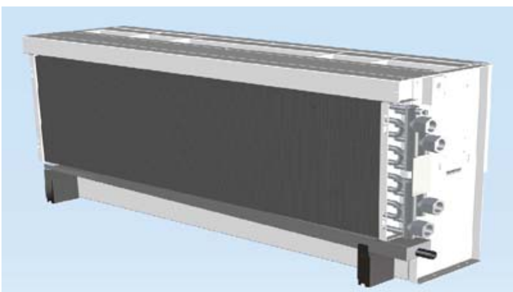
LTG Incorporated

Technical Brochure

LTG Air-Water Systems

LTG Induction

Induction units



Sill installation

www.LTG-INC.net

Induction units for perimeter installation

LTG Comfort Air Technology

Air-Water-Systems

Air Diffusers

Air Distribution

Content

Notes

Dimensions stated in this brochure are in inches and mm.

Dimensions stated in this brochure are subject to General Tolerances according to DIN ISO 2768-vL.
For the outlet grille special tolerances stated in the drawing apply.

Straightness and twist tolerances for extruded aluminum profiles according to DIN EN 12020-2.

The surface finish is designed to meet the requirements for applications in buildings - room climate according to DIN 1946 part 2. Other requirements on request.

The actual specifications are available as a word document at your local distributor or at www.LTG-INC.net.

Induction units for perimeter installation

LTG offers air distribution with various flow patterns:

- Mixed/displacement flow from the sill
- tangential flow from the sill
- Indivent® flow from the ceiling
- displacement air flow from the sill

LTG-Klimavent® units are induction units for medium/high-pressure air conditioning systems.

The induction system is a combined air and water system:

- The air system ensures ventilation and room air humidity control.
- The water system, which is very economical for the transport of energy, additionally heats or cools the air using heat exchangers.

This provides the two most significant features of the induction unit: energy-saving operation and low space requirements.

Klimavent® induction units with casing

Models and sizes

LTG offers differents models and sizes for any application. The main distinctive feature of the LTG induction units is the way the temperature is controlled.
Each of the LTG induction units is available in five sizes: 500 - 630 - 800 - 1000 - 1250.

Two-pipe system
The induction unit has only one heat exchanger through which chilled water flows for cooling and hot water for heating. Therefore, it is only possible to either heat or cool within a single water circuit.

Four-pipe system
The induction unit has two separate water systems, one for heating, the other one for cooling. Therefore, chilled and hot water will always remain separated. The four-pipe system fulfills all requirements on varying loads and small control zones.

Valve control (water-side control)
The heating or cooling output of the heat exchanger is controlled by modifying the water flow.

Damper control (air-side control)
The heating or cooling output is controlled by modifying the flow of secondary air. Adjustable dampers guide the air stream through the cooling or heating coil or they divert the secondary air through a bypass around the heat exchangers.

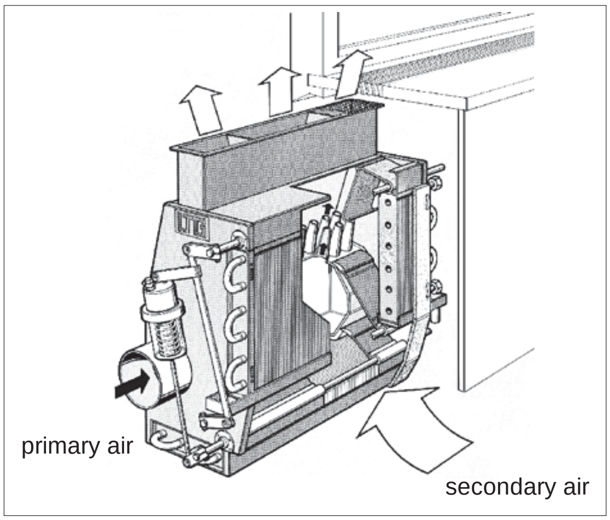
Advantages

- **High cooling and heating capacity**
  due high performance heat exchanger
- **Low energy consumption**
  due to high capacity natural convection
- **Low noise**
  due to special nozzle design and arrangement of nozzles.
- **Flexible nozzle assembly**
  due to the availability of several sets of nozzles which may also be combined, resulting in a particularly advantageous room air flow pattern to meet any demand.
- **No sequence overlaps**
  The actuator of the air-side controlled damper is designed to make simultaneous heating and cooling of the unit impossible.
- **High operational reliability**
  The air dampers are mounted on robust shafts with low-friction ball bearings.
- **Maintenance-free actuators**
  The electric and pneumatic actuators for all control types are reliable and maintenance-free.
- **High induction ratio**
  due to optimum aerodynamic energy conversion of the primary air.
- **Wide range of models**
  The wide selection of models includes units to meet all demands:
  - air-side (damper) or water-side (valve) control
  - for two-pipe or four-pipe systems
  - each model is available in different sizes.
- **Optimized selection**
  Klimavent® induction units are dimensioned using special LTG selection software.
- **Fire safety**
  due to primary air nozzles of aluminum and primary air sockets of sheet metal (on request).

Induction units for perimeter installation

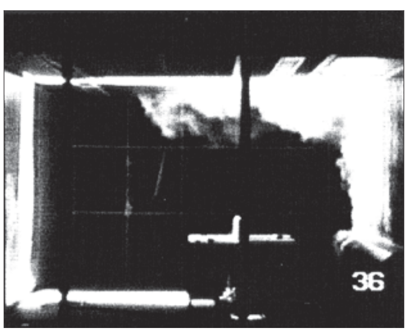
Mode of operation

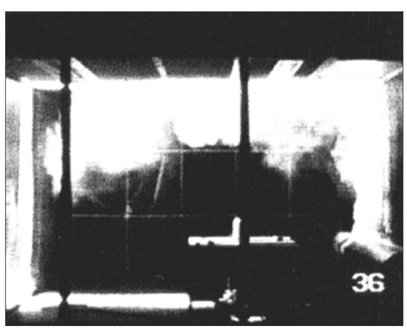
The primary air (usually the outside air requirement) from the central air conditioning unit is pushed through nozzles at high speed. This causes secondary air to be pulled in from the room.
The secondary air flows through a heat exchanger and is being heated or cooled.
Then, the primary air is mixed with the heated or cooled secondary air inside the unit and flows into the room through an outlet grille or diffuser.

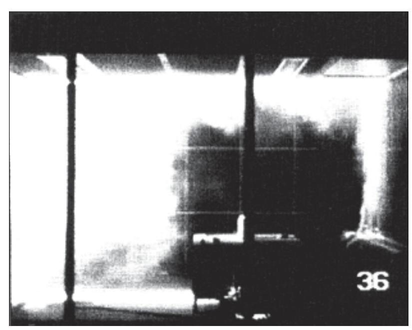


Mode of operation of LTG induction unit type HFH

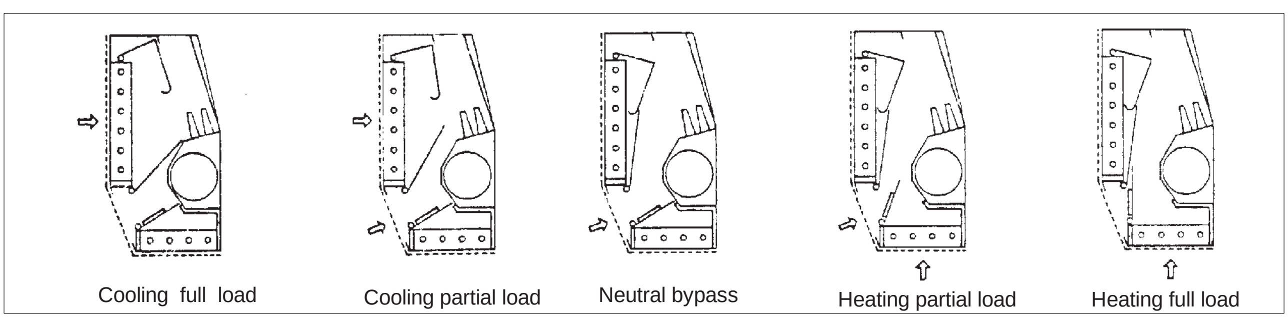
Room airflow







Room airflow of induction units with a tangential air flow (smoke test pictures in three time intervals)



Control of induction unit type HFH, mode of operation

Accessories, special versions

(see brochure: Accessories for LTG A/C systems)

- Units without secondary air filter and safety grille on the outlet (standard is with filter and grille).
- Condensate pan with drainage connection.
- Balancing device for the primary air connection.
- For water-side connection of the unit:
  screw fitting 3/8" or 1/2" with or without air vents,
  flexible connecting hoses with and without air vent.
- Aluminum outlet grille.
- Straight discharge neck (length 3" or 4.5").
- Air connection from below (standard: on the side).
- Primary air nozzles of aluminum, primary air socket of sheet metal for increased fire safety.
- Various installation types: wall mounting brackets or floor stands.
- Air outlet grille and frame.
- Thermostat connection with probe holder inside the pipe.
- Controls

Induction units for perimeter installation
Type HFG-0, two-pipe system – cooling or heating

Specification

Induction unit with one heat exchanger for heating or cooling the secondary air.
Central water-side control.
Vertical or horizontal installation.
Air connection on the right, left or from below.
Water connection on the right or left.

Dimensions

Size	A [inch] [mm]	B [inch] [mm]	C [inch] [mm]	D [inch] [mm]	E [inch] [mm]
500	19.57 (497)	18.39 (467)	20.83 (529)	24.53 (623)	23.03 (585)
630	25.28 (642)	24.09 (612)	26.53 (674)	28.27 (718)	28.74 (730)
800	31.38 (797)	30.2 (767)	32.64 (829)	34.37 (873)	34.84 (885)
1000	39.25 (997)	38.07 (967)	40.51 (1029)	42.24 (1073)	42.72 (1085)
1250	48.9 (1242)	47.72 (1212)	50.16 (1274)	51.89 (1318)	52.56 (1335)

Selection

The technical specifications on the following page are valid under the following conditions:
Selection of unit:
- for standard water flow rates
- with filter
- with rubber nozzles
- with air outlet neck
- without casing

Corrections for other water quantities, see page 23.

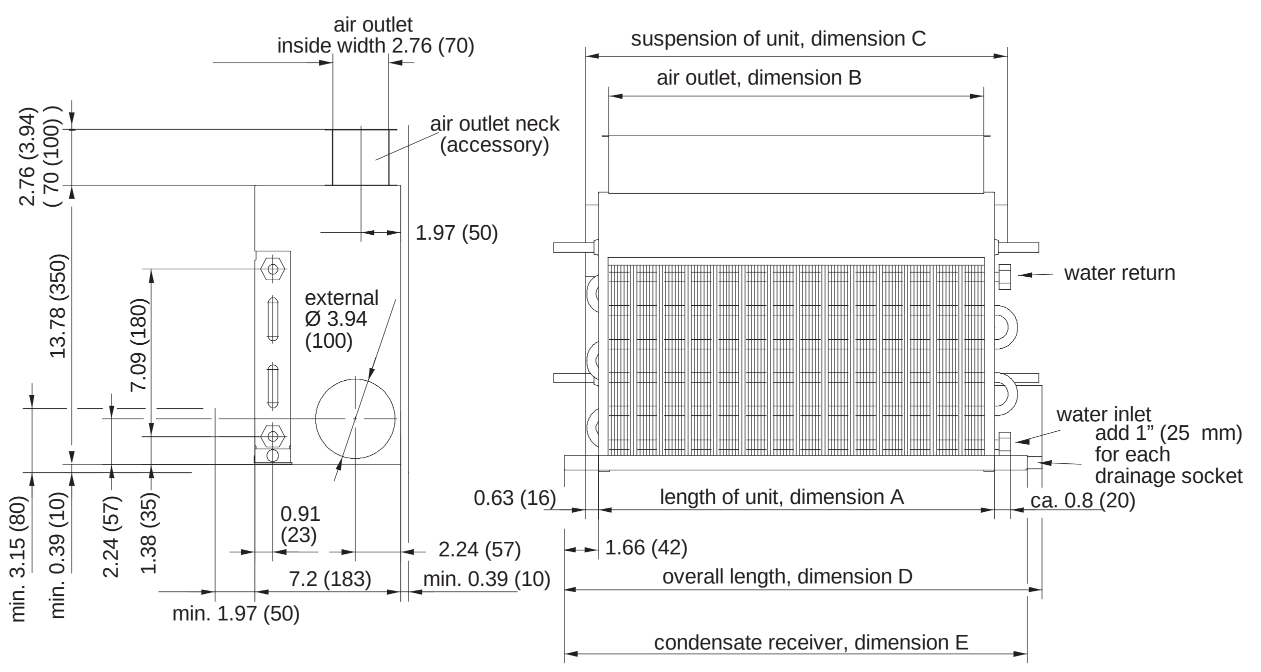
Without filter: output increases by 5%.

With aluminum nozzles: sound power level plus 2 - 3 dB(A).

According to room configuration, sound pressure level reduced by 2 - 7 dB(A).

For other conditions the stated performance data may vary.

The heating performance data for natural convection Q_{Ec} are based on the following:
Room air temperature 68 °F (at standard water flow rate)
Water supply temperature 158 °F ➔ Δ t = 90 F



Dimension in " (mm)

Subject to technical modifications. Actual drawings on request.

Induction units for perimeter installation
Type HFG-0, two-pipe system – cooling or heating

Technical data size 500

Δp "H_2O	V_P [cfm]	L_{WA} [dB(A)]	NC	$Q_P/\Delta t$ BTU/h·Δt^{-1}	$Q_c/\Delta t$ BTU/h·Δt^{-1}	$Q_h/\Delta t$ BTU/h·Δt^{-1}
0.8	18	26		19.0	55.0	55.0
	24	25		24.6	62.5	62.5
	29	28		32.2	66.3	66.3
1.0	18	28		19.0	56.9	56.9
	24	27		24.6	64.4	64.4
	29	29		32.2	70.1	70.1
1.2	18	29		19.0	58.8	58.8
	24	32		24.6	68.2	68.2
	29	30		32.2	73.9	73.9
	35	33		37.9	77.7	77.7

Q_{Ec} = 1,430 BTU/h
m = 24.2 lbs
Δp_W at w_{oc} = 7.2 feet with 0.88 gpm
Δp_W at w_{oh} = 6.0 feet with 0.88 gpm

Technical data size 630

Δp "H_2O	V_P [cfm]	L_{WA} [dB(A)]	NC	$Q_P/\Delta t$ BTU/h·Δt^{-1}	$Q_c/\Delta t$ BTU/h·Δt^{-1}	$Q_h/\Delta t$ BTU/h·Δt^{-1}
0.8	24	27		24.6	72.0	72.0
	29	26		32.2	79.6	79.6
	35	28		37.9	85.3	85.3
1.0	24	29		24.6	75.8	75.8
	29	31		32.2	85.3	85.3
	35	29		37.9	91.0	91.0
1.2	24	31		24.6	77.7	77.7
	29	33		32.2	87.2	87.2
	35	31		37.9	94.8	94.8
	41	33		43.6	98.6	98.6

Q_{Ec} = 1,716 BTU/h
m = 29.7 lbs
Δp_W at w_{oc} = 7.2 feet with 1.10 gpm
Δp_W at w_{oh} = 6.0 feet with 1.10 gpm

Technical data size 800

Δp "H_2O	V_P [cfm]	L_{WA} [dB(A)]	NC	$Q_P/\Delta t$ BTU/h·Δt^{-1}	$Q_c/\Delta t$ BTU/h·Δt^{-1}	$Q_h/\Delta t$ BTU/h·Δt^{-1}
0.8	29	28		32.2	89.1	89.1
	38	28		41.7	102.4	102.4
	47	31		51.2	109.9	109.9
1.0	29	30		32.2	92.9	92.9
	38	33		41.7	108.0	108.0
	47	32		51.2	115.6	115.6
1.2	29	32		32.2	96.7	96.7
	38	34		41.7	111.8	111.8
	47	33		51.2	119.4	119.4
	53	35		56.9	125.1	125.1

Q_{Ec} = 2,023 BTU/h
m = 36.3 lbs
Δp_W at w_{oc} = 7.2 feet with 1.32 gpm
Δp_W at w_{oh} = 6.0 feet with 1.32 gpm

Technical data size 1000

Δp "H_2O	V_P [cfm]	L_{WA} [dB(A)]	NC	$Q_P/\Delta t$ BTU/h·Δt^{-1}	$Q_c/\Delta t$ BTU/h·Δt^{-1}	$Q_h/\Delta t$ BTU/h·Δt^{-1}
0.8	38	30		41.7	113.7	113.7
	47	30		51.2	125.1	125.1
	59	33		62.5	134.6	134.6
1.0	38	32		41.7	117.5	117.5
	47	31		51.2	130.8	130.8
	59	34		62.5	142.2	142.2
1.2	38	33		41.7	121.3	121.3
	47	36		51.2	136.5	136.5
	59	35		62.5	147.8	147.8
	65	37		70.1	151.6	151.6

Q_{Ec} = 2,453 BTU/h
m = 42.9 lbs
Δp_W at w_{oc} = 7.2 feet with 1.54 gpm
Δp_W at w_{oh} = 6.0 feet with 1.54 gpm

Technical data size 1250

Δp "H_2O	V_P [cfm]	L_{WA} [dB(A)]	NC	$Q_P/\Delta t$ BTU/h·Δt^{-1}	$Q_c/\Delta t$ BTU/h·Δt^{-1}	$Q_h/\Delta t$ BTU/h·Δt^{-1}
0.8	47	32		51.2	144.1	144.1
	59	32		62.5	161.1	161.1
	74	36		79.6	174.4	174.4
1.0	47	33		51.2	149.7	149.7
	59	36		62.5	168.7	168.7
	74	37		79.6	182.0	182.0
1.2	47	34		51.2	155.4	155.4
	59	37		62.5	174.4	174.4
	74	38		79.6	189.5	189.5
	88	41		94.8	200.9	200.9

Q_{Ec} = 2,975 BTU/h
m = 50.6 lbs
Δp_W at w_{oc} = 7.2 feet with 1.85 gpm
Δp_W at w_{oh} = 6.0 feet with 1.85 gpm

Legend

- **Δp** - static pressure at the primary air socket
- V_P - primary air flow rate (± 10 %)
- L_{WA} - sound power (± 3 dB)
- Q_P - cool. capacity of primary air (fresh air) (± 5 %)
- Q_c - cool. cap., secondary air (heat exch.) (± 5 %)
- Q_h - heating capacity, secondary air (± 5 %)
- Q_{Ec} - heating capacity with natural convection
- **m** - weight
- w_{oc} - standard water flow rate at cooling capacity
- w_{oh} - standard water flow rate at heating capacity
- **Δt** - temperature difference between air temperature entering the heat exchanger and water supply temperature
- Δt_P - temperature difference between room air and primary air
- Δp_W - water-side pressure loss

Induction units for perimeter installation
Type HFG-0, four-pipe system – cooling and heating

Specification

Induction unit with one heat exchanger for heating and cooling the secondary air, for high outputs at low water flow rates.
Water-side control by valves.
Vertical or horizontal installation.
Air connection on the right, left or from below.
Water connection on the right or left.

Dimensions

Size	A [inch] [mm]	B [inch] [mm]	C [inch] [mm]	D [inch] [mm]	E [inch] [mm]
500	19.57 (497)	18.39 (467)	20.83 (529)	25.67 (652)	23.03 (585)
630	25.28 (642)	24.09 (612)	26.53 (674)	31.38 (797)	28.74 (730)
800	31.38 (797)	30.2 (767)	32.64 (829)	33.54 (852)	34.84 (885)
1000	39.25 (997)	38.07 (967)	40.51 (1029)	45.35 (1152)	42.72 (1085)
1250	48.9 (1242)	47.72 (1212)	50.16 (1274)	55.2 (1402)	52.56 (1335)

Selection

The technical specifications on the following page are valid under the following conditions:
Selection of unit:
- for standard water flow rates
- with filter
- with rubber nozzles
- with air outlet neck
- without casing

Corrections for other water quantities, see page 25.

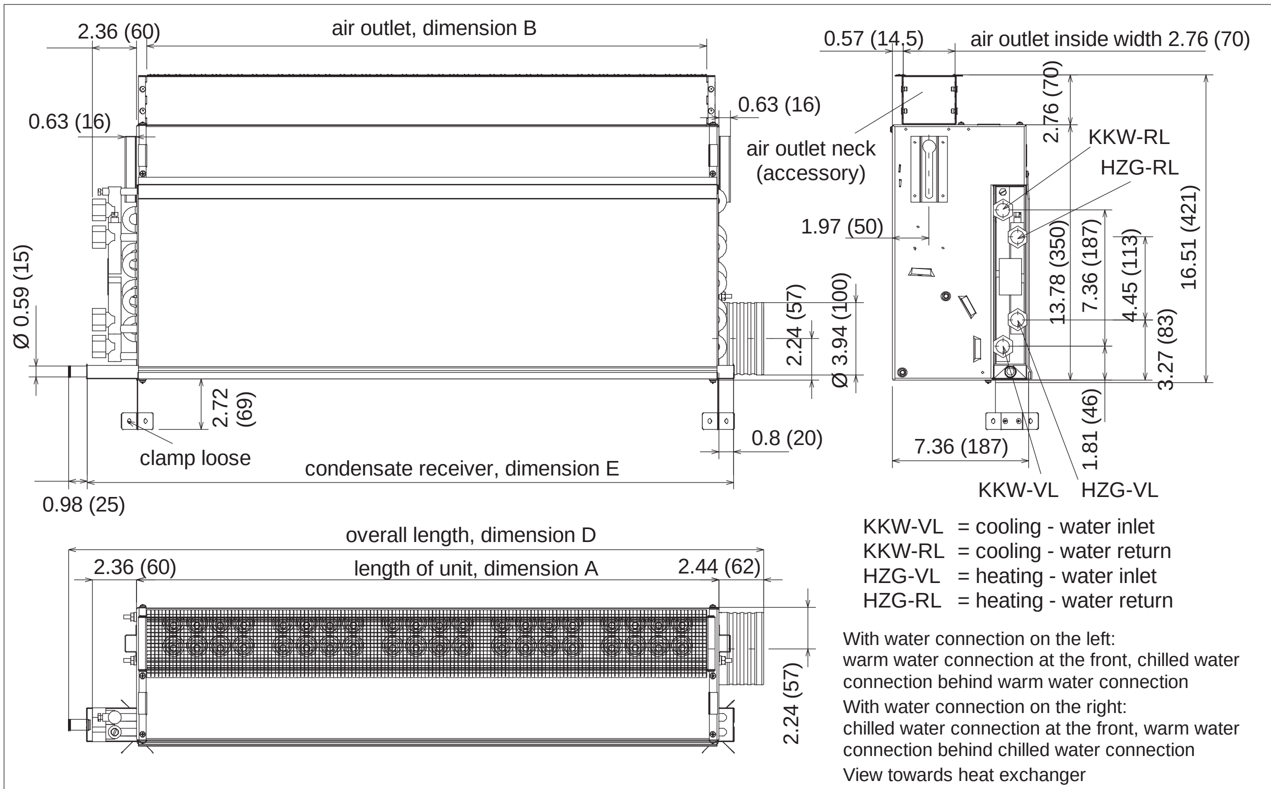
Without filter: output increases by 5%.

With aluminum nozzles: sound power level + 2-3 dB(A).

According to room configuration, sound pressure level reduced by 2 - 7 dB(A).

For other conditions the stated performance data may vary.

The heating performance data for natural convection Q_{Ek} are based on the following:
Room air temperature 68 °F (at standard water flow rate)
Water supply temperature 158 °F ➔ Δ t = 90 F



KKW-VL = cooling - water inlet
KKW-RL = cooling - water return
HZG-VL = heating - water inlet
HZG-RL = heating - water return

With water connection on the left:
warm water connection at the front, chilled water connection behind warm water connection
With water connection on the right:
chilled water connection at the front, warm water connection behind chilled water connection
View towards heat exchanger
Shown unit: water left side - air right side

Dimension in " (mm)

Subject to technical modifications. Actual drawings on request.

Induction units for perimeter installation
Type HFG-0, four-pipe system – cooling and heating

Technical data size 500

Δp "H_2O	V_P [cfm]	L_{WA} [dB(A)]	NC	$Q_P/\Delta t$ BTU/h·Δt^{-1}	$Q_c/\Delta t$ BTU/h·Δt^{-1}	$Q_h/\Delta t$ BTU/h·Δt^{-1}
0.8	18	26		19.0	43.6	36.0
	24	25		24.6	49.3	41.7
	29	28		32.2	53.1	45.5
1.0	18	28		19.0	43.6	37.9
	24	27		24.6	51.2	41.7
	29	29		32.2	55.0	47.4
1.2	18	29		19.0	47.4	39.8
	24	32		24.6	55.0	47.4
	29	30		32.2	60.7	51.2
	35	33		37.9	62.5	53.1

Q_{Ec} = 1,170 BTU/h
m = 24.2 lbs
Δp_W at w_{oc} = 0.6 feet with 0.35 gpm
Δp_W at w_{oh} = 0.3 feet with 0.35 gpm

Technical data size 630

Δp "H_2O	V_P [cfm]	L_{WA} [dB(A)]	NC	$Q_P/\Delta t$ BTU/h·Δt^{-1}	$Q_c/\Delta t$ BTU/h·Δt^{-1}	$Q_h/\Delta t$ BTU/h·Δt^{-1}
0.8	24	27		24.6	56.9	47.4
	29	26		32.2	62.5	53.1
	35	28		37.9	68.2	56.9
1.0	24	29		24.6	58.8	49.3
	29	31		32.2	64.4	55.0
	35	29		37.9	70.1	58.8
1.2	24	31		24.6	62.5	51.2
	29	33		32.2	70.1	58.8
	35	31		37.9	75.8	64.4
	41	33		43.6	79.6	66.3

Q_{Ec} = 1,406 BTU/h
m = 29.7 lbs
Δp_W at w_{oc} = 1.0 feet with 0.44 gpm
Δp_W at w_{oh} = 0.7 feet with 0.44 gpm

Technical data size 800

Δp "H_2O	V_P [cfm]	L_{WA} [dB(A)]	NC	$Q_P/\Delta t$ BTU/h·Δt^{-1}	$Q_c/\Delta t$ BTU/h·Δt^{-1}	$Q_h/\Delta t$ BTU/h·Δt^{-1}
0.8	29	28		32.2	70.1	60.7
	38	28		41.7	81.5	68.2
	47	31		51.2	87.2	73.9
1.0	29	30		32.2	73.9	62.5
	38	33		41.7	83.4	70.1
	47	32		51.2	89.1	75.8
1.2	29	32		32.2	81.5	66.3
	38	34		41.7	89.1	73.9
	47	33		51.2	96.7	81.5
	53	35		56.9	102.4	87.2

Q_{Ec} = 1,658 BTU/h
m = 36.3 lbs
Δp_W at w_{oc} = 1.7 feet with 0.53 gpm
Δp_W at w_{oh} = 1.1 feet with 0.53 gpm

Technical data size 1000

Δp "H_2O	V_P [cfm]	L_{WA} [dB(A)]	NC	$Q_P/\Delta t$ BTU/h·Δt^{-1}	$Q_c/\Delta t$ BTU/h·Δt^{-1}	$Q_h/\Delta t$ BTU/h·Δt^{-1}
0.8	38	30		41.7	94.8	79.6
	47	30		51.2	104.2	87.2
	59	33		62.5	113.7	94.8
1.0	38	32		41.7	96.7	79.6
	47	31		51.2	106.1	89.1
	59	34		62.5	115.6	96.7
1.2	38	33		41.7	104.2	87.2
	47	36		51.2	113.7	96.7
	59	35		62.5	127.0	106.1
	65	37		70.1	138.4	113.7

Q_{Ec} = 1,996 BTU/h
m = 42.9 lbs
Δp_W at w_{oc} = 3.3 feet with 0.66 gpm
Δp_W at w_{oh} = 2.0 feet with 0.66 gpm

Technical data size 1250

Δp "H_2O	V_P [cfm]	L_{WA} [dB(A)]	NC	$Q_P/\Delta t$ BTU/h·Δt^{-1}	$Q_c/\Delta t$ BTU/h·Δt^{-1}	$Q_h/\Delta t$ BTU/h·Δt^{-1}
0.8	47	32		51.2	121.3	100.5
	59	32		62.5	134.6	111.8
	74	36		79.6	147.8	123.2
1.0	47	33		51.2	121.3	102.4
	59	36		62.5	138.4	115.6
	74	37		79.6	149.7	125.1
1.2	47	34		51.2	134.6	111.8
	59	37		62.5	151.6	127.0
	74	38		79.6	164.9	136.5
	88	41		94.8	174.4	145.9

Q_{Ec} = 2,439 BTU/h
m = 50.6 lbs
Δp_W at w_{oc} = 5.4 feet with 0.79 gpm
Δp_W at w_{oh} = 3.3 feet with 0.79 gpm

Legend

Δp - static pressure at the primary air socket
V_P - primary air flow rate (± 10 %)
L_{WA} - sound power (± 3 dB)
Q_P - cool. capacity of primary air (fresh air) (± 5 %)
Q_c - cool. cap., secondary air (heat exch.) (± 5 %)
Q_h - heating capacity, secondary air (± 5 %)
Q_{Ec} - heating capacity with natural convection
m - weight
w_{oc} - standard water flow rate at cooling capacity
w_{oh} - standard water flow rate at heating capacity
Δt - temperature difference between air temperature entering the heat exchanger and water supply temperature
Δt_P - temperature difference between room air and primary air
Δp_W - water-side pressure loss

Induction units for perimeter installation
Type HFK-0, four-pipe system – cooling and heating

Specification

Induction unit with one heat exchanger for heating and cooling the secondary air, for high outputs at low water flow rates.
Water-side control by valves.
Vertical or horizontal installation.
Air connection on the right, left or from below.
Water connection on the right or left.

Dimensions

Size	A [inch] [mm]	B [inch] [mm]	C [inch] [mm]	D [inch] [mm]	E [inch] [mm]
630	25.28 (642)	24.09 (612)	26.53 (674)	31.38 (797)	28.74 (730)
800	31.38 (797)	30.2 (767)	32.64 (829)	37.48 (952)	34.84 (885)
1000	39.25 (997)	38.07 (967)	40.51 (1029)	45.35 (1152)	42.72 (1085)
1250	48.9 (1242)	47.72 (1212)	50.16 (1274)	55.2 (1402)	52.56 (1335)

Selection

The technical specifications on the following page are valid under the following conditions:
Selection of unit:
- for standard water flow rates
- with filter
- with rubber nozzles
- with air outlet neck
- without casing

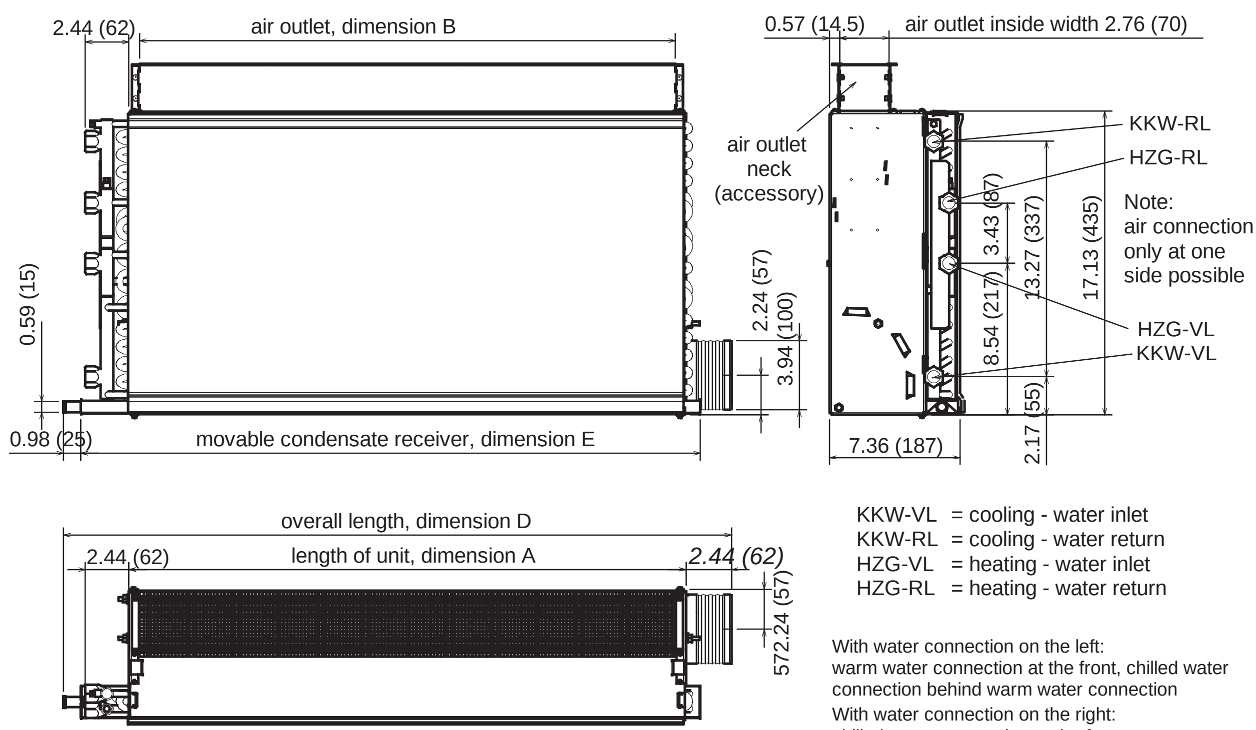
Corrections for other water quantities, see page 24 and 26.

Without filter: output increases by 5%.

With aluminum nozzles: sound power level plus 2 - 3 dB(A).

According to room configuration, sound pressure level reduced by 2 - 7 dB(A).

For other conditions the stated performance data may vary. The heating performance data for natural convection Q_{Ec} are based on the following:
Room air temperature 68 °F (at standard water flow rate)
Water supply temperature 158 °F ➔ Δ t = 90 F



KKW-VL = cooling - water inlet
KKW-RL = cooling - water return
HZG-VL = heating - water inlet
HZG-RL = heating - water return

With water connection on the left:
warm water connection at the front, chilled water connection behind warm water connection
With water connection on the right:
chilled water connection at the front, warm water connection behind chilled water connection
View towards heat exchanger
Shown unit: water left side - air right side

Dimension in “ (mm)

Subject to technical modifications. Actual drawings on request.

Induction units for perimeter installation
Type HFK-0, four-pipe system – cooling and heating

Technical data size 630

Δp "H_2O	V_P [cfm]	L_{WA} [dB(A)]	NC	$Q_P/\Delta t$ BTU/h·Δt[-1]	$Q_c/\Delta t$ BTU/h·Δt[-1]	$Q_h/\Delta t$ BTU/h·Δt[-1]
0.6	24 29 35	27 27 28		24.6 32.2 37.9	64.4 70.1 72.0	36.0 37.9 41.7
0.8	24 29 35	27 28 29		24.6 32.2 37.9	66.3 73.9 79.6	37.9 39.8 41.7
1.0	24 29 35	28 29 30		24.6 32.2 37.9	70.1 77.7 83.4	37.9 41.7 43.6
1.2	29 35 41	29 30 31		24.6 32.2 37.9	79.6 87.2 91.0	43.6 45.5 47.4

Q_{Ec} = 1,460 BTU/h
m = 30.8 lbs
Δp_W at w_{oc} = 0.9 feet with 0.53 gpm
Δp_W at w_{oh} = 0.6 feet with 0.44 gpm

Technical data size 800

Δp "H_2O	V_P [cfm]	L_{WA} [dB(A)]	NC	$Q_P/\Delta t$ BTU/h·Δt[-1]	$Q_c/\Delta t$ BTU/h·Δt[-1]	$Q_h/\Delta t$ BTU/h·Δt[-1]
0.6	29 38 47	27 28 29		32.2 41.7 51.2	81.5 89.1 92.9	45.5 47.4 47.4
0.8	29 38 47	27 29 30		32.2 41.7 51.2	83.4 92.9 100.5	47.4 49.3 51.2
1.0	29 38 47	29 30 32		32.2 41.7 51.2	91.0 98.6 104.2	49.3 51.2 55.0
1.2	38 47 53	31 33 34		41.7 51.2 56.9	100.5 108.0 111.8	53.1 56.9 58.8

Q_{Ec} = 1,856 BTU/h
m = 46.2 lbs
Δp_W at w_{oc} = 1.4 feet with 0.66 gpm
Δp_W at w_{oh} = 0.9 feet with 0.55 gpm

1) with 61 °F water supply temperature, 79 °F room temp. at a height of 3.6 ft and non-condensing operation
2) with 61 °F primary air temp. and 79 °F air inlet temp.
3) with 158 °F water supply temp. and 68 °F air inlet temp.

Values are given for the following conditions:
- Standard water flow rate
- Unit with filter Gs/K80z
- With primary air nozzles of plastic
- With discharge duct 2.76”
- Without casing

Reduced capacity (depending on exact operating point)

- without air outlet socket	ca. 5 %
- without filter	< 5 %
- with mixed/displacement flow deflector in the discharge duct	up to approx. 20 %

Technical data size 1000

Δp "H_2O	V_P [cfm]	L_{WA} [dB(A)]	NC	$Q_P/\Delta t$ BTU/h·Δt[-1]	$Q_c/\Delta t$ BTU/h·Δt[-1]	$Q_h/\Delta t$ BTU/h·Δt[-1]
0.6	35 44 53	28 29 30		37.9 49.3 56.9	102.4 109.9 113.7	55.0 56.9 62.5
0.8	35 44 53	28 29 31		37.9 49.3 56.9	104.2 115.6 127.0	58.8 62.5 66.3
1.0	35 44 53	30 31 33		37.9 49.3 56.9	113.7 123.2 132.7	60.7 64.4 66.3
1.2	44 53 59	32 34 36		49.3 56.9 62.5	125.1 134.6 138.4	68.2 70.1 72.0

Q_{Ec} = 1,911 BTU/h
m = 55.0 lbs
Δp_W at w_{oc} = 2.2 feet with 0.79 gpm
Δp_W at w_{oh} = 1.2 feet with 0.64 gpm

Technical data size 1250

Δp "H_2O	V_P [cfm]	L_{WA} [dB(A)]	NC	$Q_P/\Delta t$ BTU/h·Δt[-1]	$Q_c/\Delta t$ BTU/h·Δt[-1]	$Q_h/\Delta t$ BTU/h·Δt[-1]
0.6	35 47 59	27 28 30		37.9 51.2 62.5	128.9 140.3 151.6	60.7 66.3 68.2
0.8	35 47 59	28 29 31		37.9 51.2 62.5	136.5 149.7 161.1	62.5 68.2 72.0
1.0	35 47 59	29 30 32		37.9 51.2 62.5	142.2 155.4 168.7	66.3 72.0 79.6
1.2	47 59 71	31 33 36		51.2 62.5 77.7	159.2 176.3 180.1	75.8 77.7 79.6

Q_{Ec} = 2,323 BTU/h
m = 61.6 lbs
Δp_W at w_{oc} = 4.0 feet with 1.06 gpm
Δp_W at w_{oh} = 1.7 feet with 0.75 gpm

Legend

Δp - static pressure at the primary air socket
V_P - primary air flow rate (± 10 %)
L_{WA} - sound power (± 3 dB)
Q_P - cooling capacity of primary air (fresh air) (± 5 %)
Q_k - cooling cap., secondary air (heat exch.) (± 5 %)
Q_h - heating capacity, secondary air (± 5 %)
Q_{Ec} - heating capacity with natural convection
m - weight
w_{oc} - standard water flow rate at cooling capacity
w_{oh} - standard water flow rate at heating capacity
Δt - temperature difference between air temperature entering the heat exchanger and water supply temperature
Δt_P - temperature difference between room air and primary air
Δp_W - water-side pressure loss

Induction units for perimeter installation
Type HFS, four-pipe system – cooling and heating

Specification

Space-saving induction unit with an extremely low installation height of 5.87” (149 mm).
With one heat exchanger for heating and cooling the secondary air, for high outputs at low water flow rates (two-pipe unit for cooling only on request).
Water-side control by valves.
Vertical installation.
Air connection on the right or left.
Water connection on the right or left.

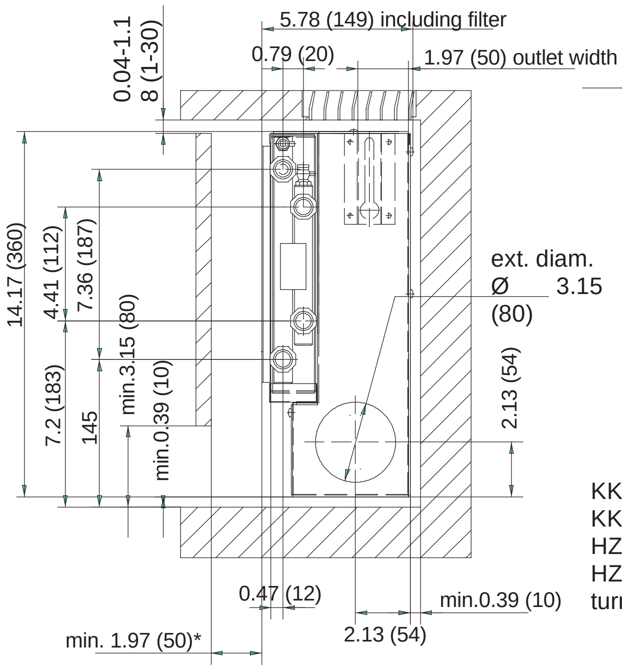
Dimensions

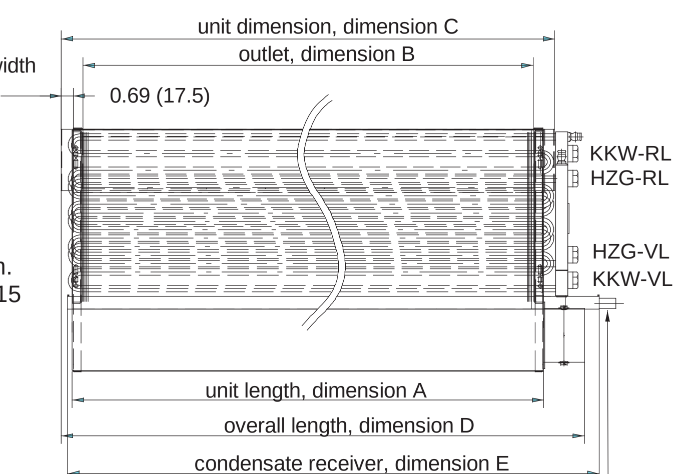
Size	A [inch] [mm]	B [inch] [mm]	C [inch] [mm]	D [inch] [mm]	E [inch] [mm]
500	19.57 (497)	18.39 (467)	20.83 (529)	24.53 (623)	23.03 (585)
630	25.28 (642)	24.09 (612)	26.54 (674)	28.27 (718)	28.74 (730)
800	31.38 (797)	30.2 (767)	32.64 (829)	34.37 (873)	34.84 (885)
1000	39.25 (997)	38.1 (967)	40.51 (1029)	42.24 (1073)	42.72 (1085)
1250	48.9 (1242)	47.72 (1212)	50.15 (1274)	51.89 (1318)	52.56 (1335)

Selection

The technical specifications on the following page are valid under the following conditions:
Selection of unit:
- for standard water flow rates
- with filter
- with rubber nozzles
- with air outlet neck
- without casing

Corrections for other water quantities, see page 25.
Without filter: output increases by 5%.
With aluminum nozzles: sound power level plus 2 - 3 dB(A).
According to equipment, sound pressure level reduced by 2 - 7 dB(A).
For other conditions the stated performance data may vary.
The heating performance data for natural convection Q_{Ec} are based on the following:
Room air temperature 68 °F (at standard water flow rate)
Water supply temperature 158 °F ➔ Δ t = 90 F





KKW-VL = cooling - water inlet
KKW-RL = cooling - water return
HZG-VL = heating - water inlet
HZG-RL = heating - water return

add 1” (25 mm) for each drainage socket

With water connection on the left:
warm water connection at the front, chilled water connection behind warm water connection
With water connection on the right:
chilled water connection at the front, warm water connection behind chilled water connection
View towards heat exchanger
Shown unit: water left side - air right side

With 1/2” connection air vent is always on top.

* Distance may be reduced to 0.4 - 0.8” (10-20 mm) if casing has a 50% free area.

Dimension in “

Subject to technical modifications. Actual drawings on request.

Induction units for perimeter installation
Type HFS, four-pipe system – cooling and heating

Technical data size 500

Δp "H_2O	V_P [cfm]	L_{WA} [dB(A)]	NC	$Q_P/\Delta t$ BTU/h·Δt⁻¹	$Q_c/\Delta t$ BTU/h·Δt⁻¹	$Q_h/\Delta t$ BTU/h·Δt⁻¹
0.8	15 24 32*	26 29 33		15.2 24.6 34.1	36.0 41.7 45.5	28.4 34.1 36.0
1.0	15 24 32*	27 30 34		15.2 24.6 34.1	37.9 45.5 51.2	30.3 36.0 41.7
1.2	15 24 32* 35*	28 31 35 36		15.2 24.6 34.1 37.9	41.7 53.1 58.8 62.5	32.2 41.7 47.4 49.3

Q_{Ec} = 1,170 BTU/h
m = 24.2 lbs
Δp_W at **w_{oc}** = 0.6 feet with 0.35 gpm
Δp_W at **w_{oh}** = 0.3 feet with 0.35 gpm

Technical data size 630

Δp "H_2O	V_P [cfm]	L_{WA} [dB(A)]	NC	$Q_P/\Delta t$ BTU/h·Δt⁻¹	$Q_c/\Delta t$ BTU/h·Δt⁻¹	$Q_h/\Delta t$ BTU/h·Δt⁻¹
0.8	18 26 35*	27 29 33		19.0 28.4 37.9	43.6 51.2 60.7	34.1 39.8 47.4
1.0	18 26 35*	28 30 34		19.0 28.4 37.9	45.5 53.1 64.4	36.0 41.7 51.2
1.2	18 26 35* 44*	29 31 35 37		19.0 28.4 37.9 47.4	47.4 56.9 70.1 77.7	37.9 45.5 55.0 60.7

Q_{Ec} = 1,406 BTU/h
m = 29.7 lbs
Δp_W at **w_{oc}** = 1.0 feet with 0.44 gpm
Δp_W at **w_{oh}** = 0.7 feet with 0.44 gpm

Technical data size 800

Δp "H_2O	V_P [cfm]	L_{WA} [dB(A)]	NC	$Q_P/\Delta t$ BTU/h·Δt⁻¹	$Q_c/\Delta t$ BTU/h·Δt⁻¹	$Q_h/\Delta t$ BTU/h·Δt⁻¹
0.8	24 32 44*	28 30 34		24.6 34.1 47.4	60.7 72.0 81.5	47.4 56.9 64.4
1.0	24 32 44*	29 31 35		24.6 34.1 47.4	60.7 75.8 87.2	49.3 60.7 70.1
1.2	24 32 44* 53*	30 32 36 38		24.6 34.1 47.4 56.9	64.4 79.6 92.9 100.5	51.2 62.5 73.9 79.6

Q_{Ec} = 1,658 BTU/h
m = 36.3 lbs
Δp_W at **w_{oc}** = 1.7 feet with 0.53 gpm
Δp_W at **w_{oh}** = 1.1 feet with 0.53 gpm

Technical data size 1000

Δp "H_2O	V_P [cfm]	L_{WA} [dB(A)]	NC	$Q_P/\Delta t$ BTU/h·Δt⁻¹	$Q_c/\Delta t$ BTU/h·Δt⁻¹	$Q_h/\Delta t$ BTU/h·Δt⁻¹
0.8	29 38 47*	29 30 36		32.2 41.7 51.2	89.1 100.5 106.1	70.1 79.6 83.4
1.0	29 38 47*	30 32 37		32.2 41.7 51.2	92.9 104.2 113.7	73.9 83.4 91.0
1.2	29 38 47* 59*	31 33 38 40		32.2 41.7 51.2 62.5	98.6 109.9 117.5 123.2	77.7 87.2 92.9 98.6

Q_{Ec} = 1,996 BTU/h
m = 42.9 lbs
Δp_W at **w_{oc}** = 3.3 feet with 0.66 gpm
Δp_W at **w_{oh}** = 2.0 feet with 0.66 gpm

Technical data size 1250

Δp "H_2O	V_P [cfm]	L_{WA} [dB(A)]	NC	$Q_P/\Delta t$ BTU/h·Δt⁻¹	$Q_c/\Delta t$ BTU/h·Δt⁻¹	$Q_h/\Delta t$ BTU/h·Δt⁻¹
0.8	38 47 59*	31 32 36		41.7 51.2 62.5	119.4 125.1 134.6	94.8 100.5 106.1
1.0	38 47 59*	32 34 39		41.7 51.2 62.5	123.2 130.8 140.3	98.6 104.2 111.8
1.2	38 47 59* 74*	33 35 40 42		41.7 51.2 62.5 79.6	127.0 136.5 147.8 157.3	100.5 108.0 117.5 125.1

Q_{Ec} = 2,439 BTU/h
m = 50.6 lbs
Δp_W at **w_{oc}** = 5.4 feet with 0.79 gpm
Δp_W at **w_{oh}** = 3.3 feet with 0.79 gpm

Legend

Δp - static pressure at the primary air socket
V_P - primary air flow rate (± 10 %)
L_{WA} - sound power (± 3 dB)
Q_P - cool. capacity of primary air (fresh air) (± 5 %)
Q_c - cool. capacity, secondary (heat exch.) (± 5 %)
Q_h - heating capacity, secondary (± 5 %)
Q_{Ec} - heating capacity with natural convection
m - weight
w_{oc} - standard water flow rate at cooling capacity
w_{oh} - standard water flow rate at heating capacity
Δt - temperature difference between air temperature entering the heat exchanger and water supply temperature
Δt_P - temperature difference between room air and primary air
Δp_W - water-side pressure loss
* Air flow rate only possible with the use of alu nozzles

Induction units for perimeter installation
Type HFS, four-pipe system – cooling and heating

Serial connection

If for reasons of space the induction units cannot be connected individually through an air distribution duct, several units with low primary air flow rates may be connected in a serial set-up. The maximum number of units depends on the primary air flow rate.

The first unit in air flow direction receives the full air flow rate, i.e. in case of a flow rate of 23.5 cfm (40 m^3/h) per unit and 5 units, e.g. a total flow rate of 118 cfm (200 m^3/h).

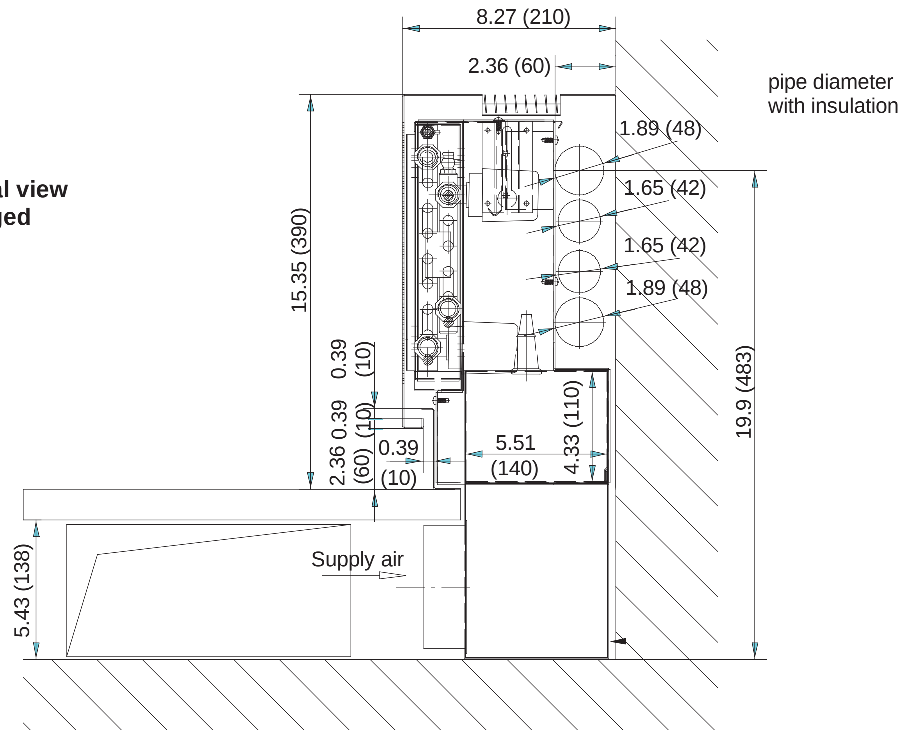
Therefore, the air velocity entering the first unit is high and will produce the decisive flow noises for the overall sound level.

The pressure loss between the units is small.

The sound power increase depends on the primary air flow rate, the nozzle pressure, the number of units and the unit size.

Design example

Air flow rate per unit	23.5 cfm (40 m^3/h)
Total flow rate	118 cfm (200 m^3/h)
Sound power per unit	28 dB(A)
Increase of sound power level due to increased air speed	32 dB(A) per unit
Total sound power level (5 units):	39 dB(A)



Dimensions in “ (mm)

Subject to technical modifications. Actual drawings on request.

Installation example of serial connection: 5 HFS 1000 connected in series. Units with duct connection in the false floor.

Induction units for perimeter installation
Type HFG with bypass, two-pipe system - cooling and heating

Specification

Induction unit with one heat exchanger for heating or cooling the secondary air, for installation in window sills.
Adjustment of the bypass dampers for air-side control with a built-in pneumatic or electric actuator.
Air connection on the right, left or from below.
Water connection on the right or left.

Dimensions

Size	A [inch] [mm]	B [inch] [mm]	C [inch] [mm]	D [inch] [mm]	E [inch] [mm]
..500	19.57 (497)	18.39 (467)	20.83 (529)	27.24 (692)	23.03 (585)
630	25.28 (642)	24.09 (612)	26.53 (674)	32.96 (837)	28.74 (730)
800	31.38 (797)	30.2 (767)	32.64 (829)	39.06 (992)	34.84 (885)
1000	39.25 (997)	38.07 (967)	40.51 (1029)	46.93 (1192)	42.72 (1085)
1250	48.9 (1242)	47.72 (1212)	50.16 (1274)	56.57 (1437)	52.56 (1335)

Selection

The technical specifications on the following page are valid under the following conditions:
Selection of unit:
- for standard water flow rates
- with filter
- with rubber nozzles
- with air outlet neck
- without casing

Corrections for other flow rates, see page 23.

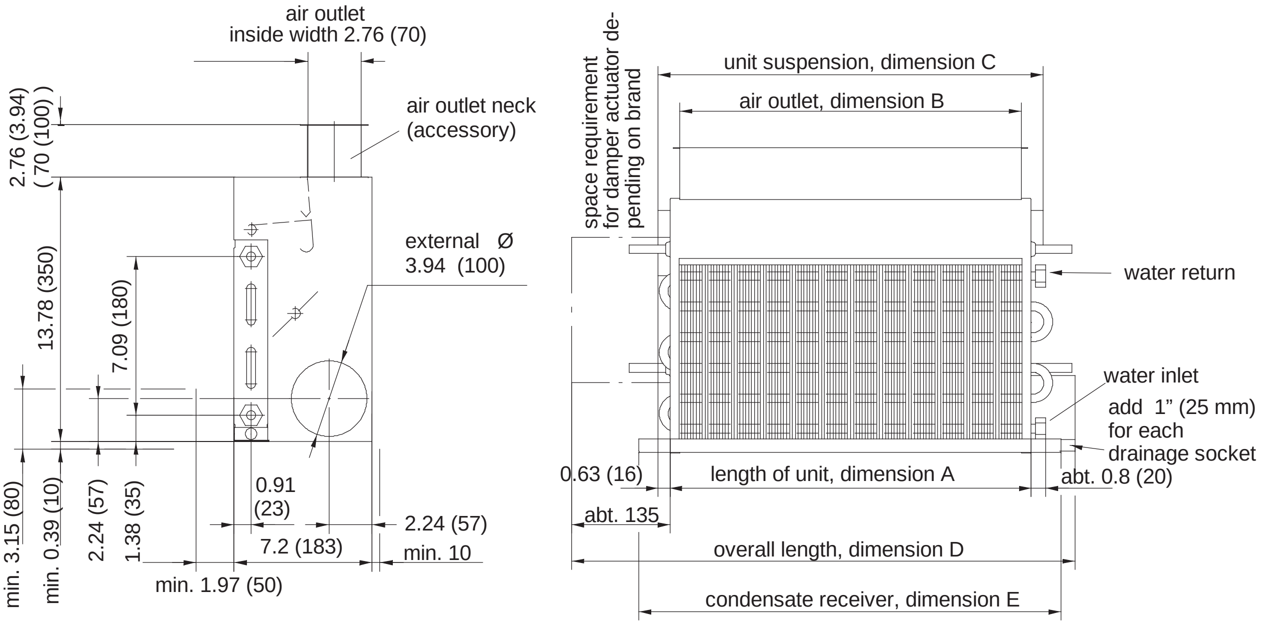
Without filter: output increases by 5%.

With aluminum nozzles: sound power level + 2-3 dB(A).

According to room configuration, sound pressure level reduced by 2 - 7 dB(A).

For other conditions the stated performance data may vary.

The heating performance data for natural convection Q_{Ec} are based on the following:
Room air temperature 68 °F (at standard water flow rate)
Water supply temperature 158 °F ➔ Δ t = 90 F



Dimension in " (mm)

Subject to technical modifications. Actual drawings on request.

Induction units for perimeter installation
Type HFG with bypass, two-pipe system – cooling or heating

Technical data size 500

Δp "H_2O	V_P [cfm]	L_{WA} [dB(A)]	NC	$Q_P/\Delta t$ BTU/h·Δt⁻¹	$Q_c/\Delta t$ BTU/h·Δt⁻¹	$Q_h/\Delta t$ BTU/h·Δt⁻¹
0.8	18	26		19.0	53.1	53.1
	24	25		24.6	62.5	62.5
	29	28		32.2	66.3	66.3
1.0	18	28		19.0	56.9	56.9
	24	27		24.6	64.4	64.4
	29	29		32.2	70.1	70.1
1.2	18	29		19.0	58.8	58.8
	24	32		24.6	68.2	68.2
	29	30		32.2	73.9	73.9
	35	33		37.9	77.7	77.7

Q_{Ec} = 812 BTU/h
m = 24.2 lbs
Δp_W at **w_{oc}** = 7.2 feet with 0.88 gpm
Δp_W at **w_{oh}** = 6.0 feet with 0.88 gpm

Technical data size 630

Δp "H_2O	V_P [cfm]	L_{WA} [dB(A)]	NC	$Q_P/\Delta t$ BTU/h·Δt⁻¹	$Q_c/\Delta t$ BTU/h·Δt⁻¹	$Q_h/\Delta t$ BTU/h·Δt⁻¹
0.8	24	27		24.6	72.0	72.0
	29	26		32.2	79.6	79.6
	35	28		37.9	85.3	85.3
1.0	24	29		24.6	73.9	73.9
	29	31		32.2	85.3	85.3
	35	29		37.9	91.0	91.0
1.2	24	31		24.6	77.7	77.7
	29	33		32.2	87.2	87.2
	35	31		37.9	94.8	94.8
	41	33		43.6	98.6	98.6

Q_{Ec} = 972 BTU/h
m = 29.7 lbs
Δp_W at **w_{oc}** = 7.2 feet with 1.10 gpm
Δp_W at **w_{oh}** = 6.0 feet with 1.10 gpm

Technical data size 800

Δp "H_2O	V_P [cfm]	L_{WA} [dB(A)]	NC	$Q_P/\Delta t$ BTU/h·Δt⁻¹	$Q_c/\Delta t$ BTU/h·Δt⁻¹	$Q_h/\Delta t$ BTU/h·Δt⁻¹
0.8	29	28		32.2	89.1	89.1
	38	28		41.7	102.4	102.4
	47	31		51.2	109.9	109.9
1.0	29	30		32.2	92.9	92.9
	38	33		41.7	108.0	108.0
	47	32		51.2	115.6	115.6
1.2	29	32		32.2	96.7	96.7
	38	34		41.7	111.8	111.8
	47	33		51.2	119.4	119.4
	53	35		56.9	125.1	125.1

Q_{Ec} = 1,140 BTU/h
m = 36.3 lbs
Δp_W at **w_{oc}** = 7.2 feet with 1.32 gpm
Δp_W at **w_{oh}** = 6.0 feet with 1.32 gpm

Technical data size 1000

Δp "H_2O	V_P [cfm]	L_{WA} [dB(A)]	NC	$Q_P/\Delta t$ BTU/h·Δt⁻¹	$Q_c/\Delta t$ BTU/h·Δt⁻¹	$Q_h/\Delta t$ BTU/h·Δt⁻¹
0.8	38	30		41.7	113.7	113.7
	47	30		51.2	125.1	125.1
	59	33		62.5	134.6	134.6
1.0	38	32		41.7	117.5	117.5
	47	31		51.2	132.7	132.7
	59	34		62.5	142.2	142.2
1.2	38	33		41.7	121.3	121.3
	47	36		51.2	136.5	136.5
	59	35		62.5	147.8	147.8
	65	37		70.1	151.6	151.6

Q_{Ec} = 1,375 BTU/h
m = 42.9 lbs
Δp_W at **w_{oc}** = 7.2 feet with 1.54 gpm
Δp_W at **w_{oh}** = 6.0 feet with 1.54 gpm

Technical data size 1250

Δp "H_2O	V_P [cfm]	L_{WA} [dB(A)]	NC	$Q_P/\Delta t$ BTU/h·Δt⁻¹	$Q_c/\Delta t$ BTU/h·Δt⁻¹	$Q_h/\Delta t$ BTU/h·Δt⁻¹
0.8	47	32		51.2	144.1	144.1
	59	32		62.5	161.1	161.1
	74	36		79.6	174.4	174.4
1.0	47	33		51.2	149.7	149.7
	59	36		62.5	168.7	168.7
	74	37		79.6	182.0	182.0
1.2	47	34		51.2	155.4	155.4
	59	37		62.5	174.4	174.4
	74	38		79.6	189.5	189.5
	88	41		94.8	200.9	200.9

Q_{Ec} = 1,665 BTU/h
m = 50.6 lbs
Δp_W at **w_{oc}** = 7.2 feet with 1.85 gpm
Δp_W at **w_{oh}** = 6.0 feet with 1.85 gpm

Legend

Δp - static pressure at the primary air socket
V_P - primary air flow rate (± 10 %)
L_{WA} - sound power (± 3 dB)
Q_P - cool. capacity of primary air (fresh air) (± 5 %)
Q_c - cool. cap., secondary air (heat exch.) (± 5 %)
Q_h - heating capacity, secondary air (± 5 %)
Q_{Ec} - heating capacity with natural convection
m - weight
w_{oc} - standard water flow rate at cooling capacity
w_{oh} - standard water flow rate at heating capacity
Δt - temperature difference between air temperature entering the heat exchanger and water supply temperature
Δt_P - temperature difference between room air and primary air
Δp_W - water-side pressure loss

Induction units for perimeter installation
Type HFL, four-pipe system – cooling and heating

Specification

Induction unit with two separate heat exchangers for heating and cooling the secondary air.
Adjustment of the bypass dampers for air-side control with a built-in pneumatic or electric actuator.
Vertical or horizontal installation.
Air connection on the right, left or from below.
Water connection on the right or left (opposite to the air connection).

Dimensions

Size	A [inch] [mm]	B [inch] [mm]	C [inch] [mm]	D [inch] [mm]
500	19.57 (497)	18.39 (467)	20.83 (529)	27.13 (689)
630	25.28 (642)	24.09 (612)	26.53 (674)	32.83 (834)
800	31.38 (797)	30.2 (767)	32.64 (829)	38.94 (989)
1000	39.25 (997)	38.07 (967)	40.51 (1029)	46.81 (1189)
1250	48.9 (1242)	47.72 (1212)	50.16 (1274)	56.46 (1434)

Selection

The technical specifications on the following page are valid under the following conditions:
Selection of unit:
- for standard water flow rates
- with filter
- with rubber nozzles
- with air outlet neck
- without casing

Corrections for other water quantities, see page 23 and 24.

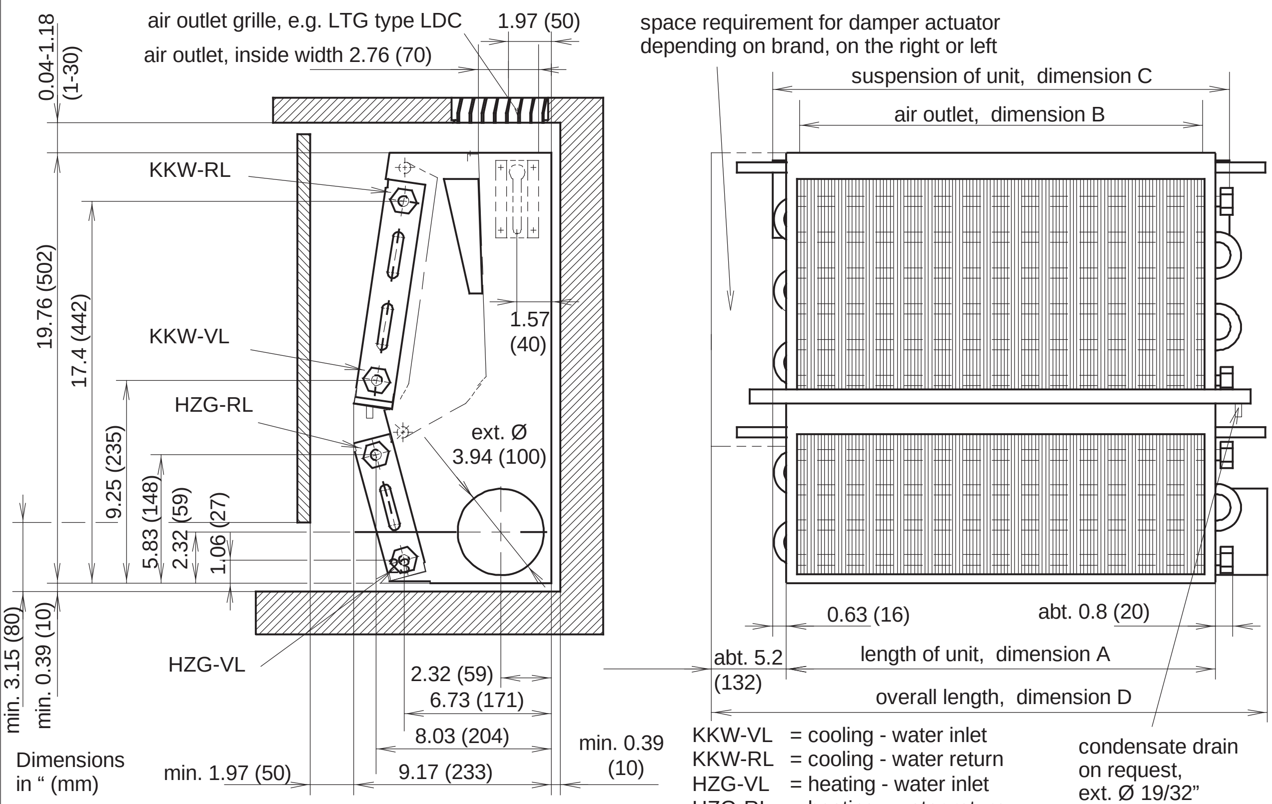
Without filter: output increases by 5%.

With aluminum nozzles: sound power level plus 2 - 3 dB(A).

According to room configuration, sound pressure level reduced by 2 - 7 dB(A).

For other conditions the stated performance data may vary.

The heating performance data for natural convection Q_{Ec} are based on the following:
Room air temperature 68 °F (standard water flow rate)
Water supply temperature 158 °F ➔ Δ t = 90 F



KKW-VL = cooling - water inlet
KKW-RL = cooling - water return
HZG-VL = heating - water inlet
HZG-RL = heating - water return

Subject to technical modifications. Actual drawings on request.

Induction units for perimeter installation
Type HFL, four-pipe system – cooling and heating

Technical data size 500

Δp "H_2O	V_P [cfm]	L_{WA} [dB(A)]	NC	$Q_P/\Delta t$ BTU/h·Δt^{-1}	$Q_c/\Delta t$ BTU/h·Δt^{-1}	$Q_h/\Delta t$ BTU/h·Δt^{-1}
0.8	18 24 29	26 25 28		19.0 24.6 32.2	45.5 51.2 55.0	34.1 37.9 41.7
1.0	18 24 29	28 27 29		19.0 24.6 32.2	49.3 55.0 60.7	36.0 39.8 43.6
1.2	18 24 29 35	29 32 30 33		19.0 24.6 32.2 37.9	51.2 56.9 62.5 66.3	36.0 39.8 43.6 47.4

Q_{Ec} = 856 BTU/h
m = 33.0 lbs
Δp_W at **w_{oc}** = 7.2 feet with 0.88 gpm
Δp_W at **w_{oh}** = 0.5 feet with 0.31 gpm

Technical data size 630

Δp "H_2O	V_P [cfm]	L_{WA} [dB(A)]	NC	$Q_P/\Delta t$ BTU/h·Δt^{-1}	$Q_c/\Delta t$ BTU/h·Δt^{-1}	$Q_h/\Delta t$ BTU/h·Δt^{-1}
0.8	24 29 35	27 26 28		24.6 32.2 37.9	60.7 66.3 72.0	45.5 49.3 53.1
1.0	24 29 35	29 31 29		24.6 32.2 37.9	64.4 72.0 77.7	47.4 51.2 55.0
1.2	24 29 35 41	31 33 31 33		24.6 32.2 37.9 43.6	68.2 73.9 81.5 85.3	49.3 53.1 55.0 58.8

Q_{Ec} = 1,013 BTU/h
m = 37.4 lbs
Δp_W at **w_{oc}** = 7.2 feet with 1.10 gpm
Δp_W at **w_{oh}** = 0.5 feet with 0.35 gpm

Technical data size 800

Δp "H_2O	V_P [cfm]	L_{WA} [dB(A)]	NC	$Q_P/\Delta t$ BTU/h·Δt^{-1}	$Q_c/\Delta t$ BTU/h·Δt^{-1}	$Q_h/\Delta t$ BTU/h·Δt^{-1}
0.8	29 38 47	28 28 31		32.2 41.7 51.2	75.8 85.3 91.0	56.9 62.5 68.2
1.0	29 38 47	30 33 32		32.2 41.7 51.2	81.5 91.0 98.6	58.8 64.4 70.1
1.2	29 38 47 53	32 34 33 35		32.2 41.7 51.2 56.9	85.3 94.8 104.2 108.0	60.7 66.3 70.1 73.9

Q_{Ec} = 1,187 BTU/h
m = 44.0 lbs
Δp_W at **w_{oc}** = 7.2 feet with 1.32 gpm
Δp_W at **w_{oh}** = 0.5 feet with 0.42 gpm

Technical data size 1000

Δp "H_2O	V_P [cfm]	L_{WA} [dB(A)]	NC	$Q_P/\Delta t$ BTU/h·Δt^{-1}	$Q_c/\Delta t$ BTU/h·Δt^{-1}	$Q_h/\Delta t$ BTU/h·Δt^{-1}
0.8	38 47 59	30 30 33		41.7 51.2 62.5	94.8 102.4 113.7	72.0 77.7 83.4
1.0	38 47 59	32 31 34		41.7 51.2 62.5	100.5 109.9 119.4	73.9 79.6 87.2
1.2	38 47 59 65	33 36 35 37		41.7 51.2 62.5 70.1	106.1 115.6 127.0 130.8	75.8 81.5 89.1 91.0

Q_{Ec} = 1,433 BTU/h
m = 52.8 lbs
Δp_W at **w_{oc}** = 7.2 feet with 1.54 gpm
Δp_W at **w_{oh}** = 0.5 feet with 0.48 gpm

Technical data size 1250

Δp "H_2O	V_P [cfm]	L_{WA} [dB(A)]	NC	$Q_P/\Delta t$ BTU/h·Δt^{-1}	$Q_c/\Delta t$ BTU/h·Δt^{-1}	$Q_h/\Delta t$ BTU/h·Δt^{-1}
0.8	47 59 74	32 32 36		51.2 62.5 79.6	121.3 132.7 145.9	91.0 98.6 108.0
1.0	47 59 74	33 36 37		51.2 62.5 79.6	128.9 142.2 155.4	94.8 100.5 109.9
1.2	47 59 74 88	34 37 38 41		51.2 62.5 79.6 94.8	136.5 147.8 164.9 172.5	96.7 106.1 111.8 119.4

Q_{Ec} = 1,726 BTU/h
m = 63.8 lbs
Δp_W at **w_{oc}** = 7.2 feet with 1.85 gpm
Δp_W at **w_{oh}** = 0.5 feet with 0.67 gpm

Legend

Δp - static pressure at the primary air socket
V_P - primary air flow rate (± 10 %)
L_{WA} - sound power (± 3 dB)
Q_P - cool. capacity of primary air (fresh air) (± 5 %)
Q_c - cool. cap., secondary air (heat exch.) (± 5 %)
Q_h - heating capacity, secondary air (± 5 %)
Q_{Ec} - heating capacity with natural convection
m - weight
w_{oc} - standard water flow rate at cooling capacity
w_{oh} - standard water flow rate at heating capacity
Δt - temperature difference between air temperature entering the heat exchanger and water supply temperature
Δt_P - temperature difference between room air and primary air
Δp_W - water-side pressure loss

Induction units for perimeter installation
Type HFH, four-pipe system – cooling and heating

Specification

Induction unit with two separate heat exchangers for heating and cooling the secondary air.
Adjustment of the bypass dampers for air-side control with a built-in pneumatic or electric actuator.
High heating capacity for natural convection.
Vertical or horizontal installation.
Water and air connection separately, on the right or left.

Dimensions

Size	A [inch] [mm]	B [inch] [mm]	C [inch] [mm]	D [inch] [mm]
500	19.57 (497)	18.39 (467)	20.83 (529)	27.24 (692)
630	25.28 (642)	24.09 (612)	26.53 (674)	32.95 (837)
800	31.38 (797)	30.2 (767)	32.64 (829)	30.06 (992)
1000	39.25 (997)	38.07 (967)	40.51 (1029)	46.93 (1192)
1250	48.9 (1242)	47.72 (1212)	50.16 (1274)	56.57 (1437)

Selection

The technical specifications on the following page are valid under the following conditions:
Selection of unit:
- for standard water flow rates
- with filter
- with rubber nozzles
- with air outlet neck
- without casing

Corrections for other water quantities, see page 23 and 24.

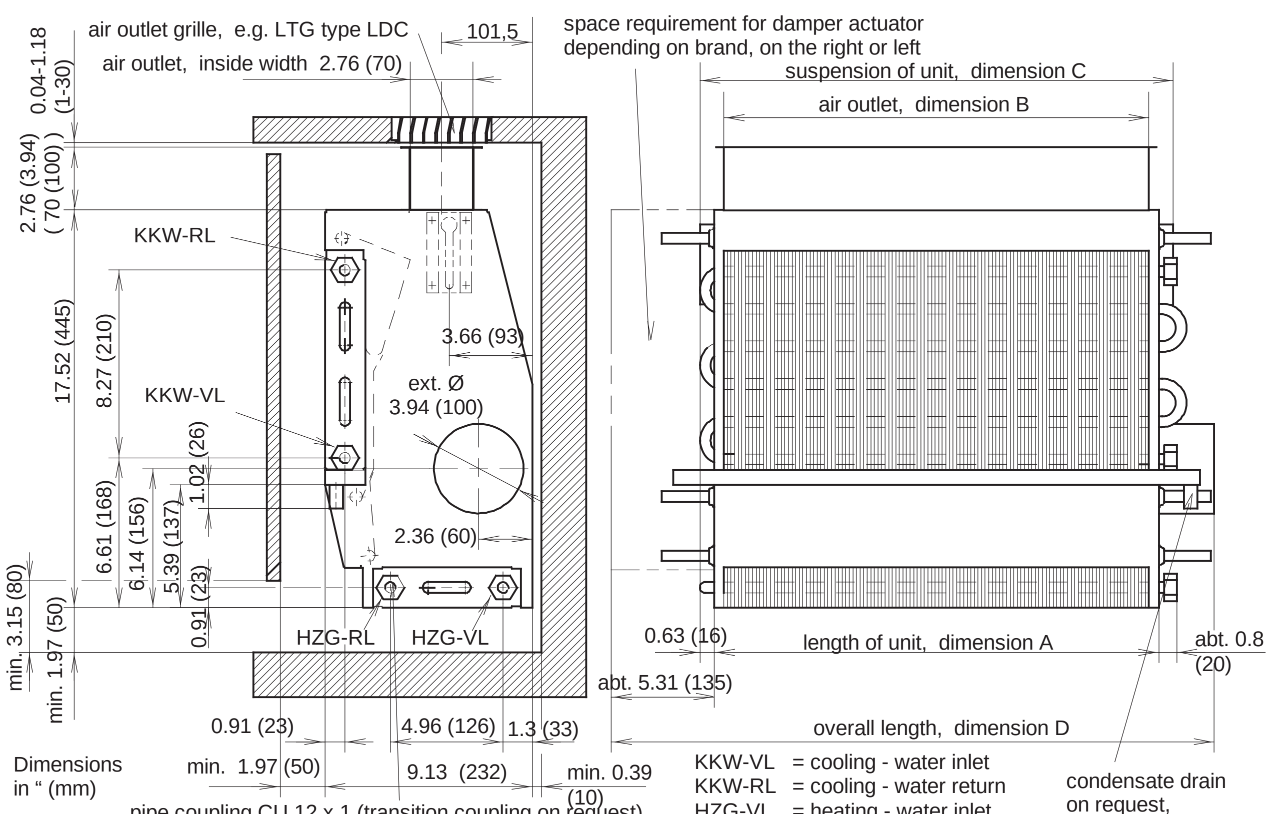
Without filter: output increases by 5%.

With aluminum nozzles: sound power level plus 2 - 3 dB(A).

According to room configuration, sound pressure level reduced by 2 - 7 dB(A).

For other conditions the stated performance data may vary.

The heating performance data for natural convection Q_{Ec} are based on the following:
Room air temperature 68 °F (standard water flow rate)
Water supply temperature 158 °F ➔ Δ t = 90 F



Dimensions in " (mm)

KKW-VL = cooling - water inlet
KKW-RL = cooling - water return
HZG-VL = heating - water inlet
HZG-RL = heating - water return

condensate drain on request, ext. Ø 19/32"

Subject to technical modifications. Actual drawings on request.

Induction units for perimeter installation
Type HFH, four-pipe system – cooling and heating

Technical data size 500

Δp "H_2O	V_P [cfm]	L_{WA} [dB(A)]	NC	$Q_P/\Delta t$ BTU/h·Δt^{-1}	$Q_c/\Delta t$ BTU/h·Δt^{-1}	$Q_h/\Delta t$ BTU/h·Δt^{-1}
0.8	18	26		19.0	51.2	32.1
	24	25		24.6	56.9	37.9
	29	28		32.2	62.5	43.6
1.0	18	28		19.0	55.0	36.0
	24	27		24.6	60.7	39.8
	29	29		32.2	66.3	43.6
1.2	18	29		19.0	56.9	37.9
	24	32		24.6	64.4	41.7
	29	30		32.2	70.1	45.5
	35	33		37.9	73.9	47.4

Q_{Ec} = 1,204 BTU/h
m = 35.2 lbs
Δp_W at w_{oc} = 7.2 feet with 0.88 gpm
Δp_W at w_{oh} = 0.5 feet with 0.31 gpm

Technical data size 630

Δp "H_2O	V_P [cfm]	L_{WA} [dB(A)]	NC	$Q_P/\Delta t$ BTU/h·Δt^{-1}	$Q_c/\Delta t$ BTU/h·Δt^{-1}	$Q_h/\Delta t$ BTU/h·Δt^{-1}
0.8	24	27		24.6	68.2	47.4
	29	26		32.2	73.9	51.2
	35	28		37.9	79.6	55.0
1.0	24	29		24.6	73.9	49.3
	29	31		32.2	79.6	51.2
	35	29		37.9	85.3	55.0
1.2	24	31		24.6	77.7	51.2
	29	33		32.2	85.3	53.1
	35	31		37.9	89.1	56.9
	41	33		43.6	94.8	60.7

Q_{Ec} = 1,426 BTU/h
m = 41.8 lbs
Δp_W at w_{oc} = 7.2 feet with 1.10 gpm
Δp_W at w_{oh} = 0.5 feet with 0.35 gpm

Technical data size 800

Δp "H_2O	V_P [cfm]	L_{WA} [dB(A)]	NC	$Q_P/\Delta t$ BTU/h·Δt^{-1}	$Q_c/\Delta t$ BTU/h·Δt^{-1}	$Q_h/\Delta t$ BTU/h·Δt^{-1}
0.8	29	28		32.2	87.2	58.8
	38	28		41.7	94.8	64.4
	47	31		51.2	102.4	70.1
1.0	29	30		32.2	92.9	60.7
	38	33		41.7	102.4	66.3
	47	32		51.2	108.0	72.0
1.2	29	32		32.2	96.7	62.5
	38	34		41.7	106.1	68.2
	47	33		51.2	113.7	72.0
	53	35		56.9	119.4	75.8

Q_{Ec} = 1,675 BTU/h
m = 48.4 lbs
Δp_W at w_{oc} = 7.2 feet with 1.32 gpm
Δp_W at w_{oh} = 0.5 feet with 0.42 gpm

Technical data size 1000

Δp "H_2O	V_P [cfm]	L_{WA} [dB(A)]	NC	$Q_P/\Delta t$ BTU/h·Δt^{-1}	$Q_c/\Delta t$ BTU/h·Δt^{-1}	$Q_h/\Delta t$ BTU/h·Δt^{-1}
0.8	38	30		41.7	106.1	72.0
	47	30		51.2	115.6	79.6
	59	33		62.5	125.1	87.2
1.0	38	32		41.7	113.7	75.8
	47	31		51.2	123.2	81.5
	59	34		62.5	132.7	89.1
1.2	38	33		41.7	121.3	77.7
	47	36		51.2	130.8	83.4
	59	35		62.5	140.3	91.0
	65	37		70.1	144.1	94.8

Q_{Ec} = 2,027 BTU/h
m = 57.2 lbs
Δp_W at w_{oc} = 7.2 feet with 1.54 gpm
Δp_W at w_{oh} = 0.5 feet with 0.48 gpm

Technical data size 1250

Δp "H_2O	V_P [cfm]	L_{WA} [dB(A)]	NC	$Q_P/\Delta t$ BTU/h·Δt^{-1}	$Q_c/\Delta t$ BTU/h·Δt^{-1}	$Q_h/\Delta t$ BTU/h·Δt^{-1}
0.8	47	32		51.2	138.4	92.9
	59	32		62.5	149.7	100.5
	74	36		79.6	161.1	109.9
1.0	47	33		51.2	147.8	96.7
	59	36		62.5	159.2	102.4
	74	37		79.6	170.6	111.8
1.2	47	34		51.2	155.4	100.5
	59	37		62.5	168.7	106.1
	74	38		79.6	182.0	113.7
	88	41		94.8	193.3	123.2

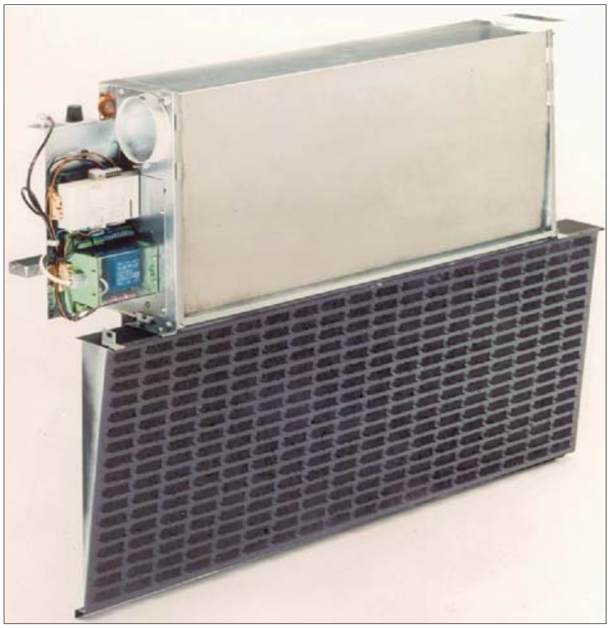
Q_{Ec} = 2,453 BTU/h
m = 68.2 lbs
Δp_W at w_{oc} = 7.2 feet with 1.85 gpm
Δp_W at w_{oh} = 0.5 feet with 0.67 gpm

Legend

- Δp - static pressure at the primary air socket
- V_P - primary air flow rate (± 10 %)
- L_{WA} - sound power (± 3 dB)
- Q_P - cool. capacity of primary air (fresh air) (± 5 %)
- Q_c - cool. cap., secondary air (heat exch.) (± 5 %)
- Q_h - heating capacity, secondary air (± 5 %)
- Q_{Ec} - heating capacity with natural convection
- **m** - weight
- w_{oc} - standard water flow rate at cooling capacity
- w_{oh} - standard water flow rate at heating capacity
- Δt - temperature difference between air temperature entering the heat exchanger and water supply temperature
- Δt_P - temperature difference between room air and primary air
- Δp_W - water-side pressure loss

Induction units for perimeter installation
Perimeter displacement induction unit type QHG

View of unit



LTG perimeter displacement induction unit type QHG
(example with complete control unit (optional))

The LTG perimeter displacement induction unit type QHG consists of a two-row heat exchanger for heating and cooling and a variable air displacement distributing box to adapt to different sill geometries.

Advantages

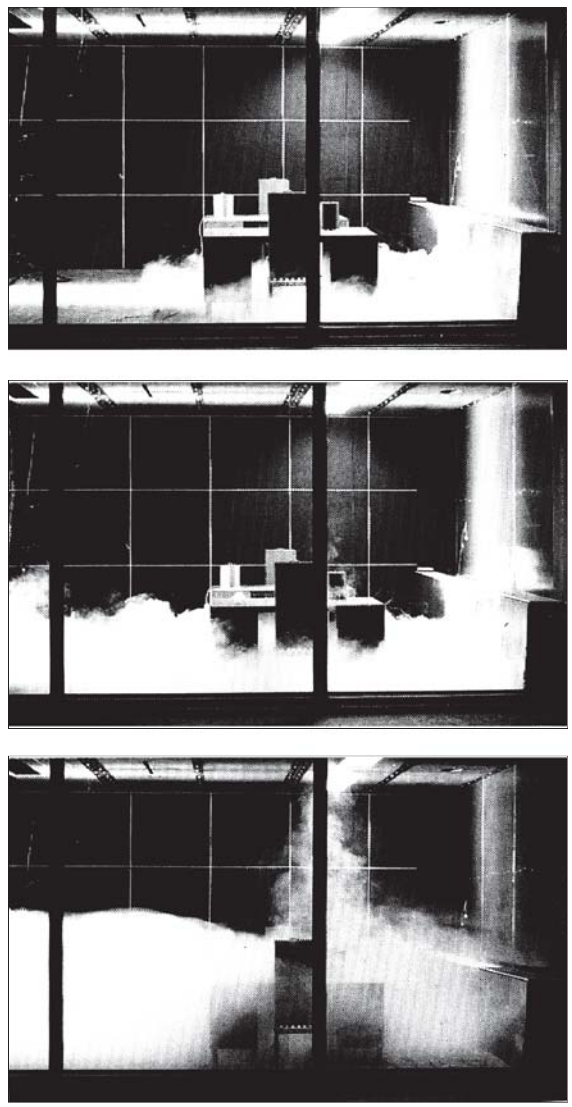
- **Comfort**
- High thermal comfort due to displacement effect.
- Improved indoor air quality (IAQ) as pollutants are removed from the occupied zone by ascending convection currents.
- Quick reduction of temperature difference between supply and room air.
- **Economy**
- Energy savings by directing the cool air flow from the floor upwards.
- Heating and cooling in one unit.
- Simple installation.
- **Flexibility**
- Centralized zone control.
- Outlet can be adapted to suit various sill heights and widths.
- **Selection**
- The sizing of the units is done with LTG selection software.
- **LEED credits**

Functional principle

Primary air, which is discharged from the nozzles at high speed, draws secondary air from the room through the heat exchanger due to the induction effect. Based on the water temperature in the heat exchanger, the air is either heated or cooled. The secondary air then enters the perimeter displacement distributing box along with the primary air.

Uniformity of discharge over the entire outlet height and width is guaranteed by specially arranged guide vanes in the distributing box. An additional induction effect is achieved by the special arrangement of the outlet openings, resulting in a quick reduction of temperature differences.

When designing the sill, the directions (see page 21) will have to be followed to ensure a trouble free operation of the ventilation system. The LTG Engineering Services are at your disposal to discuss any technical details.



Perimeter displacement sill installation.
(smoke picture in three time intervals)

Induction units for perimeter installation
Perimeter displacement induction unit type QHG

Design

Torsion-resistant casing of galvanized sheet metal. Heat exchanger designed for high output, consisting of copper tubes with press-fitted aluminum fins. Maximum operating pressure (standard version): 14.5 psi (10 bar). Replaceable primary air nozzles of plastic, designed for induction with high efficiency at low noise and effective reflection of the primary noise.

Connection for hot and cold water, condensate and primary air on the side of the unit.

Primary air socket of plastic with an outer diameter of 4“ (100 mm).

Condensate tray of galvanized sheet metal with an optional 19/32” diameter condensate drain connection on request.

Also on request, self-extinguishing easily replaceable secondary air filter of synthetically bonded polyamide fibers.

Easily detachable distribution box with guide vanes for air flow deflection at low pressure loss for uniform discharge and a secondary induction effect, adaptable to varying sill heights and widths.

Product range

Size:	500	630	800	1000	1250
Outlet length:	31.5”	40”	47”	55”	63”

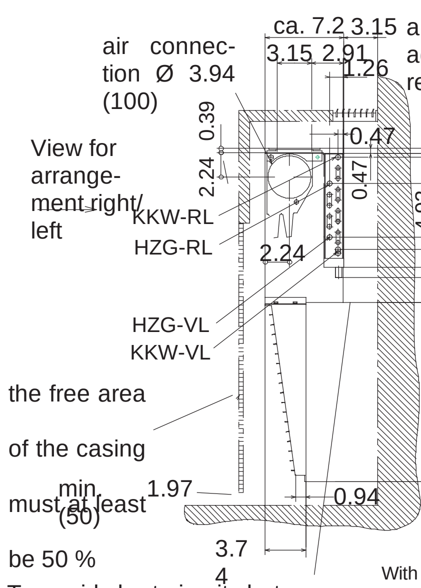
The above mentioned outlet widths are standard and may be adjusted to the sill, if required (*).
The standard outlet height is 16.5” (420 mm).

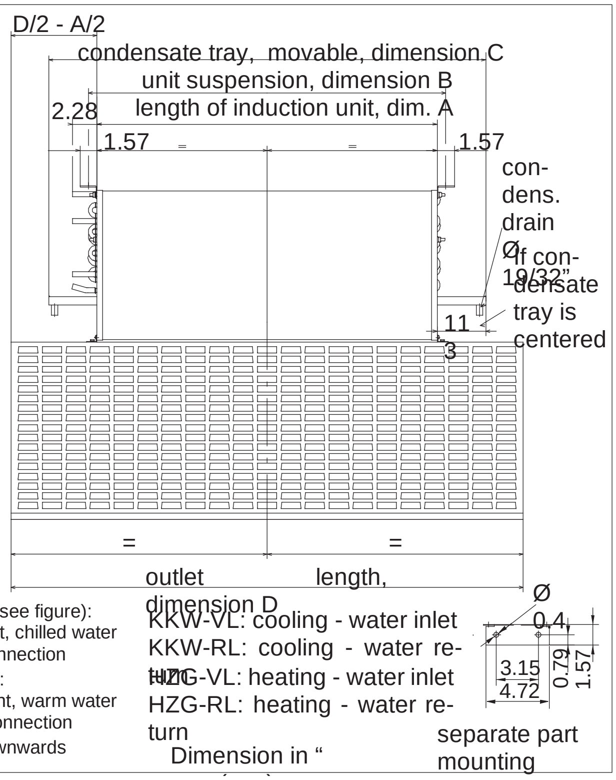
Accessories, special versions

- Optional as a two-pipe induction unit, for heating or alternatively cooling only.
- Galvanized condensate tray with drainage connection.
- Primary air flow balancing damper.
- Non-combustible aluminum nozzles and primary air sockets of sheet steel for improved fire safety.
- Easy-to-replace self-extinguishing secondary air filter.
- Full-way valve with 3 point control (24 V)
- Master/slave control.

Dimensions

Size	A [inch] [mm]	B [inch] [mm]	C [inch] [mm]	D* [inch] [mm]	Weight [lbs] [kg]
500	19.57 (497)	21.14 (537)	23.03 (585)	31.5 (800)	33 (15)
630	25.28 (642)	26.85 (682)	28.74 (730)	39.37 (1000)	41.8 (19)
800	31.38 (797)	32.95 (837)	34.84 (885)	47.24 (1200)	48.4 (22)
1000	39.25 (997)	40.83 (1037)	42.72 (1085)	55.12 (1400)	59.4 (27)
1250	48.9 (1242)	50.47 (1282)	52.56 (1335)	62.99 (1600)	72.6 (33)





To avoid short-circuits between the air intake and air outlet the unit will have to be sealed against the facade.

With water connection on the left (see figure): warm water connection at the front, chilled water connection behind warm water connection
With water connection on the right: chilled water connection at the front, warm water connection behind chilled water connection
Water connection always bent downwards

KKW-VL: cooling - water inlet
KKW-RL: cooling - water return
HZG-VL: heating - water inlet
HZG-RL: heating - water return

Dimension in “

Subject to technical data.
Actual drawings on request.

Induction units for perimeter installation
Perimeter displacement induction unit type QHG

Technical data size 500

nozzle	Δp "H_2O	V_P [cfm]	L_{A18} [dB(A)]	NC	$Q_P/\Delta t$ BTU/h·Δt^{-1}	$Q_c/\Delta t$ BTU/h·Δt^{-1}	$Q_h/\Delta t$ BTU/h·Δt^{-1}
Y	0.8	10	19		13.3	37.9	28.4
	1.2	12	25		17.1	45.5	34.1
	1.6	14	28		19.0	49.3	36.0
A	0.8	15	21		19.0	43.6	32.2
	1.2	18	25		24.6	49.3	37.9
	1.6	21	29		28.4	55.0	41.7
B	0.8	21	22		28.4	49.3	36.0
	1.2	25	27		34.1	55.0	41.7
	1.6	28	31		37.9	58.8	45.5

Q_{Ec} = 426 BTU/h
Δp_W at w_{oc} = 0.7 feet with 0.35 gpm
Δp_W at w_{oh} = 0.7 feet with 0.35 gpm

Technical data size 630

nozzle	Δp "H_2O	V_P [cfm]	L_{A18} [dB(A)]	NC	$Q_P/\Delta t$ BTU/h·Δt^{-1}	$Q_c/\Delta t$ BTU/h·Δt^{-1}	$Q_h/\Delta t$ BTU/h·Δt^{-1}
Y	0.8	14	20		19.0	49.3	36.0
	1.2	16	26		22.7	56.9	41.7
	1.6	19	30		24.6	60.7	45.5
A	0.8	19	22		26.5	55.0	41.7
	1.2	24	28		32.2	64.4	47.4
	1.6	28	31		37.9	70.1	51.2
B	0.8	27	24		36.0	60.7	45.5
	1.2	33	29		43.6	70.1	51.2
	1.6	38	33		51.2	75.8	56.9

Q_{Ec} = 546 BTU/h
Δp_W at w_{oc} = 1.0 feet with 0.44 gpm
Δp_W at w_{oh} = 0.7 feet with 0.44 gpm

Technical data size 800

nozzle	Δp "H_2O	V_P [cfm]	L_{A18} [dB(A)]	NC	$Q_P/\Delta t$ BTU/h·Δt^{-1}	$Q_c/\Delta t$ BTU/h·Δt^{-1}	$Q_h/\Delta t$ BTU/h·Δt^{-1}
Y	0.8	16	22		22.7	60.7	45.5
	1.2	21	28		28.4	72.0	53.1
	1.6	24	31		32.2	77.7	58.8
A	0.8	25	24		34.1	70.1	53.1
	1.2	30	29		39.8	81.5	60.7
	1.6	35	33		47.4	89.1	66.3
B	0.8	34	26		45.5	77.7	58.8
	1.2	41	32		55.0	89.1	66.3
	1.6	48	35		64.4	96.7	72.0

Q_{Ec} = 682 BTU/h
Δp_W at w_{oc} = 1.7 feet with 0.53 gpm
Δp_W at w_{oh} = 1.0 feet with 0.53 gpm

Technical data size 1000

nozzle	Δp "H_2O	V_P [cfm]	L_{A18} [dB(A)]	NC	$Q_P/\Delta t$ BTU/h·Δt^{-1}	$Q_c/\Delta t$ BTU/h·Δt^{-1}	$Q_h/\Delta t$ BTU/h·Δt^{-1}
Y	0.8	20	24		26.5	75.8	56.9
	1.2	25	29		34.1	89.1	66.3
	1.6	28	33		37.9	98.6	73.9
A	0.8	29	26		39.8	87.2	66.3
	1.2	36	31		47.4	100.5	75.8
	1.6	41	35		55.0	109.9	81.5
B	0.8	41	29		55.0	96.7	72.0
	1.2	49	34		66.3	109.9	83.4
	1.6	57	38		75.8	119.4	89.1

Q_{Ec} = 853 BTU/h
Δp_W at w_{oc} = 3.3 feet with 0.66 gpm
Δp_W at w_{oh} = 2.0 feet with 0.66 gpm

Technical data size 1250

nozzle	Δp "H_2O	V_P [cfm]	L_{A18} [dB(A)]	NC	$Q_P/\Delta t$ BTU/h·Δt^{-1}	$Q_c/\Delta t$ BTU/h·Δt^{-1}	$Q_h/\Delta t$ BTU/h·Δt^{-1}
Y	0.8	27	27		36.0	76.7	72.0
	1.2	33	32		43.6	111.8	83.4
	1.6	38	35		51.2	121.3	91.0
A	0.8	39	29		53.1	108.0	81.5
	1.2	48	34		64.4	125.1	94.8
	1.6	55	38		73.9	138.4	102.4
B	0.8	54	33		72.0	121.3	91.0
	1.2	66	38		89.1	138.4	104.2
	1.6	76	42		102.4	149.7	111.8

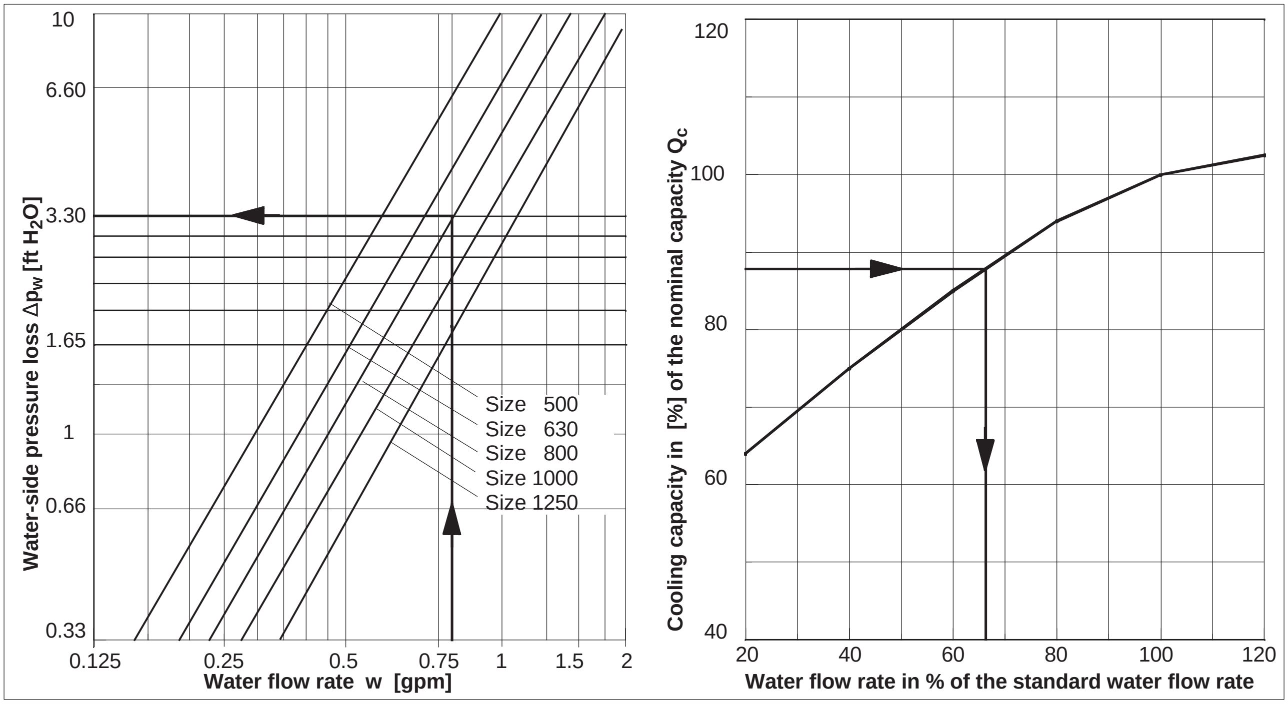
Q_{Ec} = 1,058 BTU/h
Δp_W at w_{oc} = 5.4 feet with 0.75 gpm
Δp_W at w_{oh} = 3.0 feet with 0.75 gpm

Legend

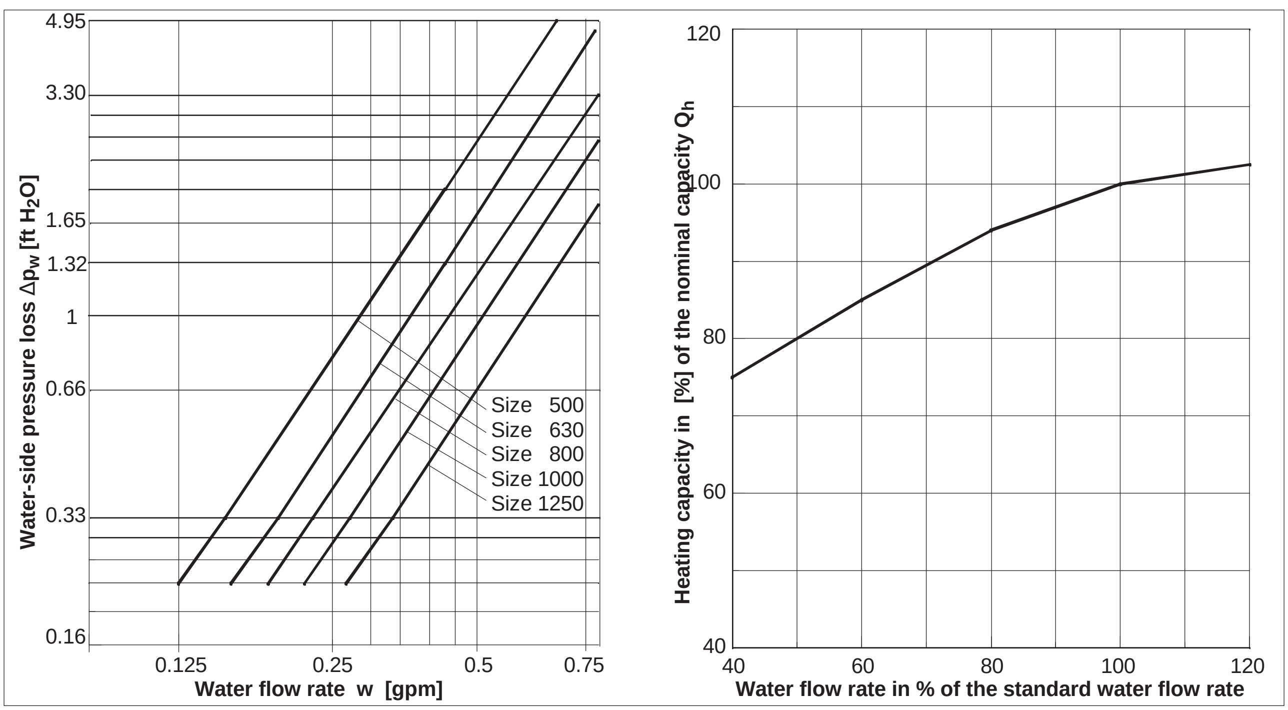
- **Δp** - static pressure at the primary air socket
- **V_P** - primary air flow rate (± 10 %)
- **L_{A18}** - sound power level at 18 m² Sabine
- **Q_P** - cool. capacity of primary air (fresh air) (± 5 %) (therm. room load μ_T = 0,8)
- **Q_c** - cooling capacity, secondary air (heat exch.) (± 5 %)
- **Q_h** - heating capacity, secondary air (± 5 %)
- **Q_{Ec}** - heating capacity with natural conv. Δt = 90 F
- **w_{oc}** - standard water flow rate at cooling capacity
- **w_{oh}** - standard water flow rate at heating capacity
- **Δt** - temperature difference between air temperature entering the heat exchanger and water supply temperature
- **Δt_P** - temperature difference between room air and primary air

Induction units for perimeter installation

Water-side pressure loss and <u>cooling</u> capacity with different water flow rates
Induction units type HFG with bypass, HFG-0 (2-pipe system), HFL, HFH – 6-tube cooler



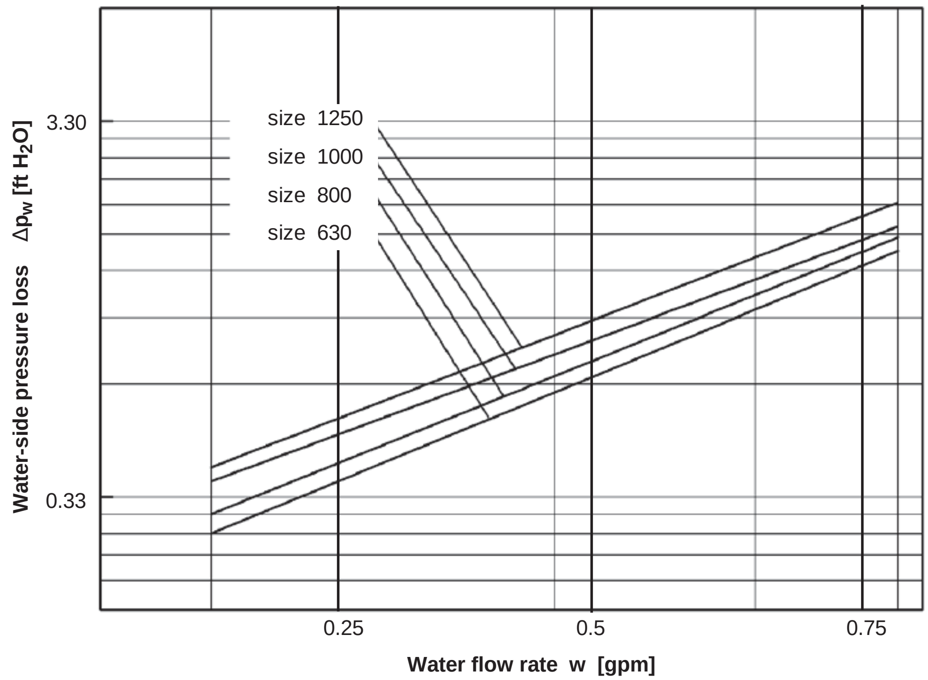
Water-side pressure loss and <u>heating</u> capacity with different water flow rates
Induction units type HFG with bypass, HFG-0 (2-pipe system), HFL, HFH – 6-tube heater



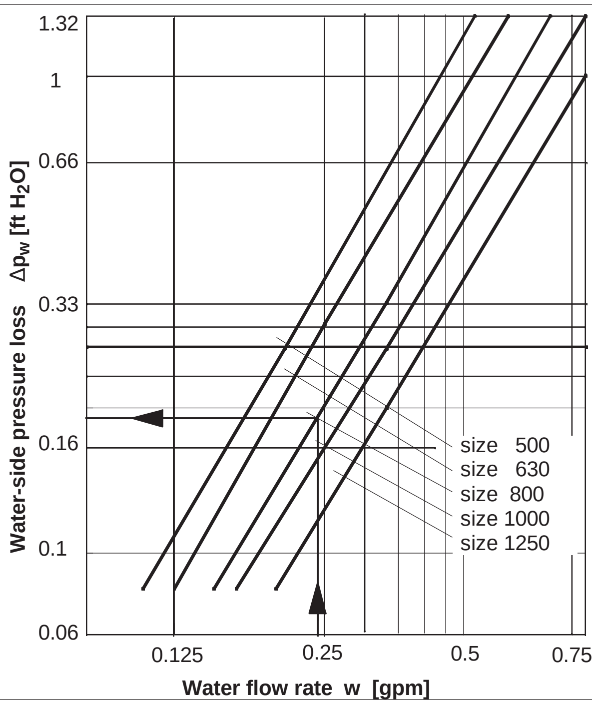
Note: *The minimum water flow rate must not be lower than 20% of the standard flow rate for cooling, and 40% for heating, considering the water-side pressure compensation.*

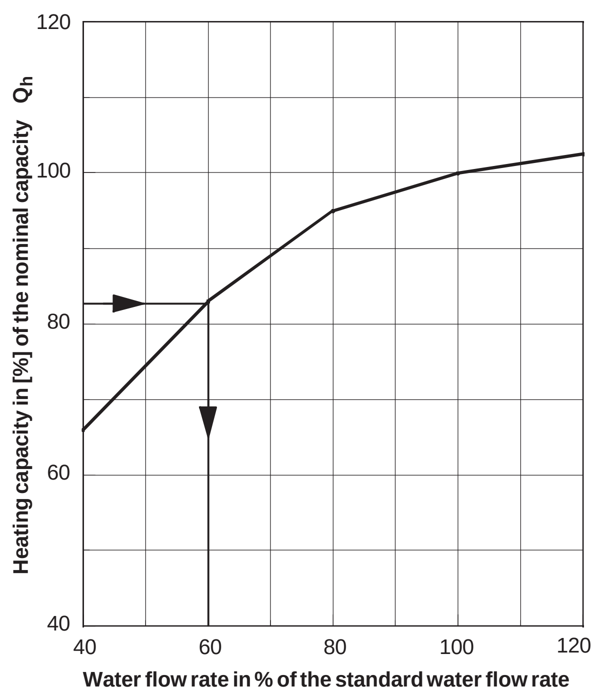
Induction units for perimeter installation

Water-side pressure loss and cooling capacity with different water flow rates
Type HFK-0 – 4-tube cooler



Water-side pressure loss and heating capacity with different water flow rates
Type HFL, HFH – 4-tube heater

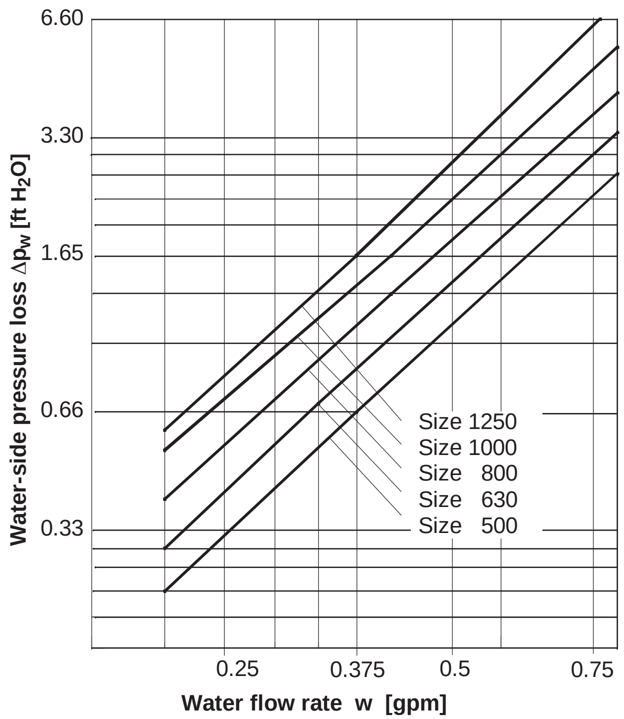


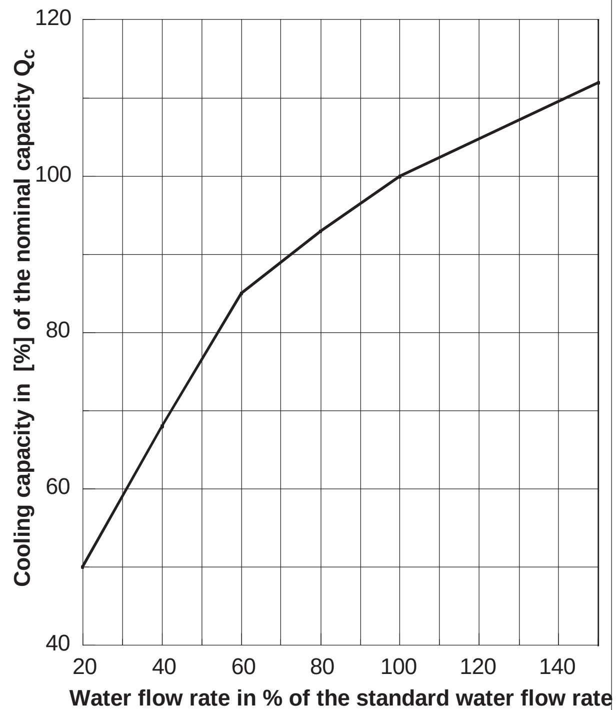


Note: *The minimum water flow rate must not be lower than 20% of the standard flow rate for cooling, and 40% for heating, considering the water-side pressure compensation.*

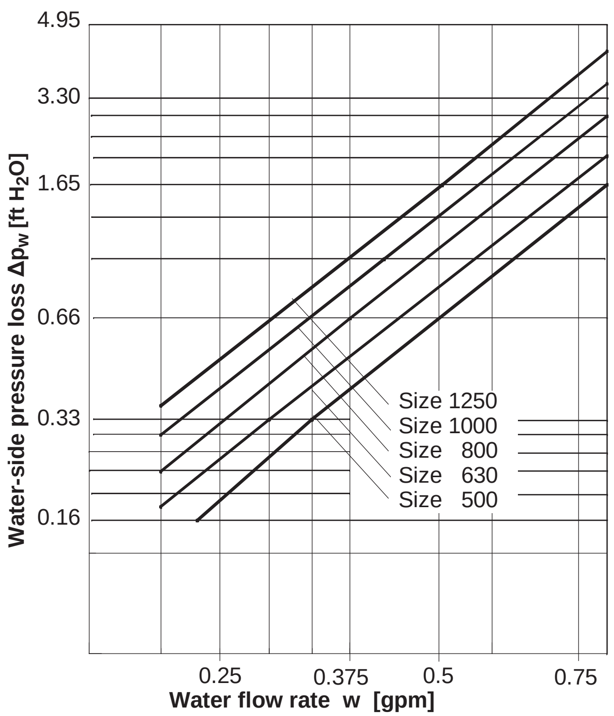
Klimavent® induction units for perimeter installation
Type HFG-0 (4-tube system), HFS, QHG

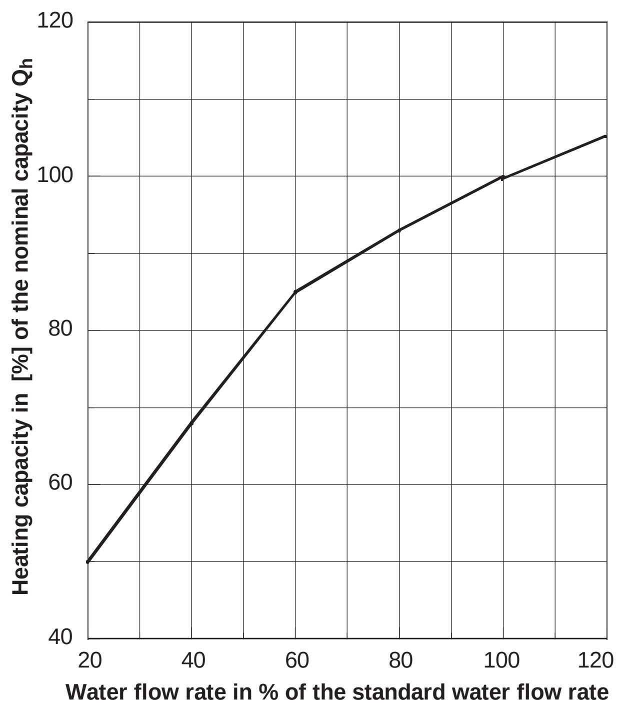
Water-side pressure loss and <u>cooling</u> capacity with different water flow rates





Water-side pressure loss and <u>heating</u> capacity with different water flow rates

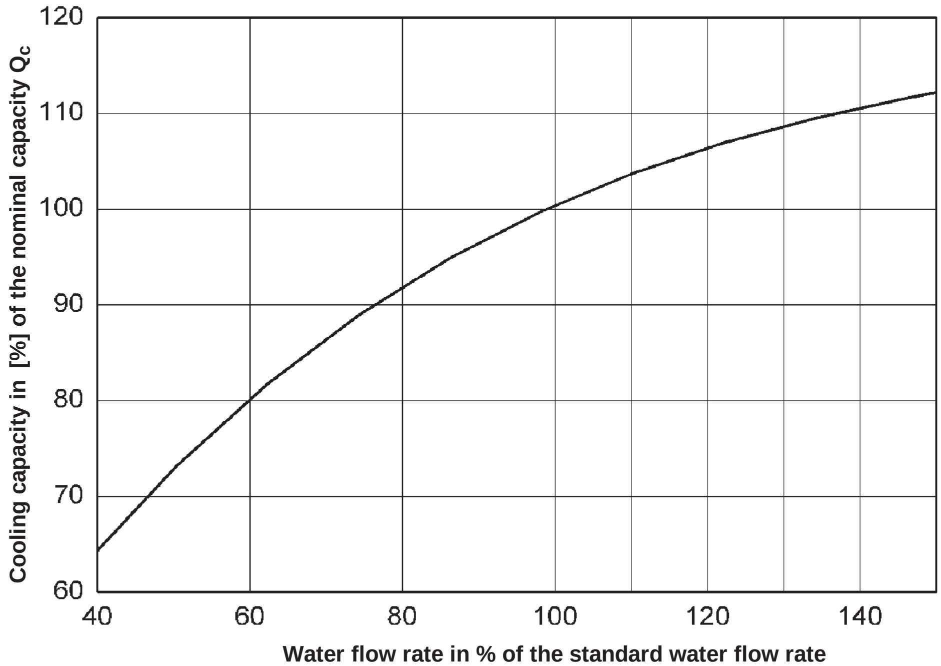




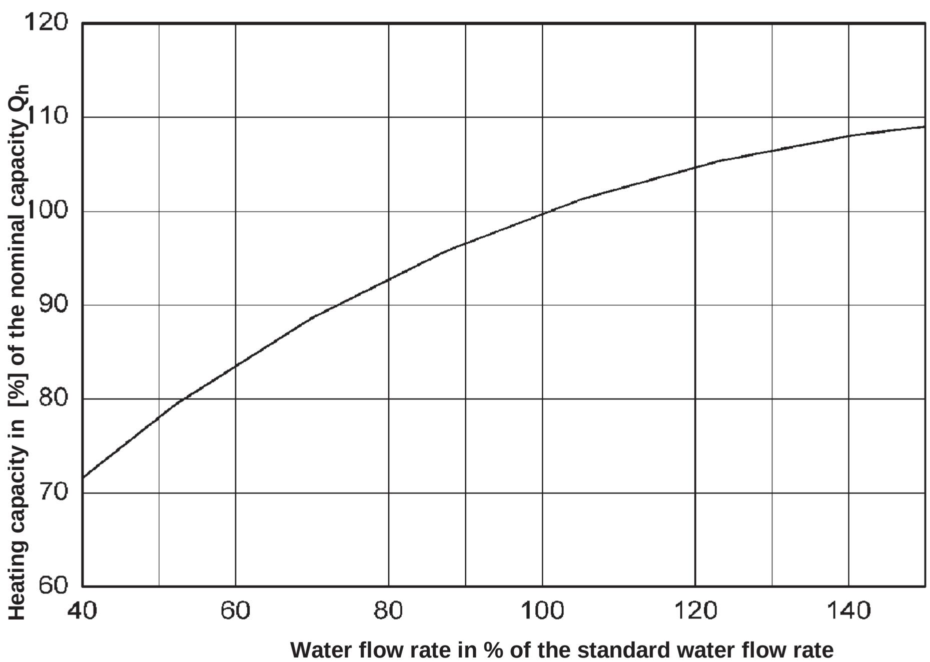
Note: *The minimum water flow rate must not be lower than 20% of the standard flow rate for cooling, and 40% for heating, considering the water-side pressure compensation.*

Induction units for perimeter installation

Water-side pressure loss and <u>cooling</u> capacity with different water flow rates
Type HFK-0, 4-pipe system



Water-side pressure loss and <u>heating</u> capacity with different water flow rates
Type HFK-0, 4-pipe system



Note: *The minimum water flow rate must not be lower than 20% of the standard flow rate for cooling, and 40% for heating, considering the water-side pressure compensation.*

Induction units for perimeter installation
Selection example

Set values

For this selection example the following unit was selected:

- type/size		**HFL 800** (see pages 16/17)
- primary air volume	V_P	**38 cfm**
- static pressure at the primary air socket	Δp	**1"H_2O**

Performance data

For the induction unit type HFL 800, the following values result from the table on page 17:

- sound power level	L_{WA}	**33 dB(A)**
- specific cooling capacity of primary air	$Q_P/\Delta t_P$	**41.7 BTU/h*Δt**
- specific cooling capacity of secondary air with a standard water flow rate of 300 kg/h	$Q_c/\Delta t$	**91 BTU/h*Δt**
- specific heating capacity of secondary air with a standard water flow rate of 95 kg/h	$Q_h/\Delta t$	**64.4 BTU/h*Δt**
- natural convection	Q_{Ec}	**1,187 BTU/h**

Cooling

Set values:

- room temperature in summer / suction air temperature before entering the heat exchanger (values may vary)	t_R/t_A	**79 °F**
- temperature of primary air	t_P	**61 °F**
⇒	Δt_P	t_R - t_P = 79 °F - 61 °F = **18 F**
- temperature of cooling water system	t_{KWV}	**63 °F**
⇒	Δt	t_A - t_{KWV} = 79 °F - 63 °F = **16 F**
- wanted cooling capacity	$Q_{c\ wanted}$	**2,050 BTU/h**

resulting in:

- primary cooling capacity	Q_P	41.7 BTU/h*Δt • 18 F = **750 BTU/h**
- required secondary cooling capacity ($Q_{k\ wanted}$ - Q_P)	$Q_{c\ req}$	2,050 BTU/h - 750 BTU/h = **1,300 BTU/h**
- potential secondary cooling capacity	Q_c	91 BTU/h*Δt • 16 F = **1,456 BTU/h**
- reduction of the capacity is necessary		1,300 BTU/h / 1456 BTU/h = **89 %**
- (see diagram on page 23) ⇒ 67 % of the standard water flow rate		1.32 gpm• 0.67 = **0.88 gpm**
- cooling water return temperature calculated from: Q = m·c·Δt $t_{KWR} = Q_{k\ erf.SK} / (m \cdot c) + t_{KWV}$ = 380/ (201·1,16) + 17 [K]	t_{KWR}	**65.5 F**
- water-side pressure loss (see diagram on page 32)	Δp_W	**3.35 feet**

Heating

Set values:

- room temperature in winter / suction air temperature before entering the heat exchanger (values may vary) t_R/t_A	**71.5 °F**	
- temperature of primary air	t_P	**61 °F**
⇒	Δt_P	t_R - t_P = 71.5 °F - 61 °F = **10.5 F**
- temperature of heating water system	t_{HWV}	**158 °F**
⇒	Δt	t_{HWV} - t_R = 158 °F - 71.5 °F = **86.5 F**
- wanted heating capacity	$Q_{h\ wanted}$	**4,100 BTU/h**

resulting in:

- primary capacity	Q_P	41.7 BTU/h*Δt • 10.5 F = **438 BTU/h**
- required secondary heating cap. ($Q_{h\ wanted}$ + Q_P)	$Q_{h\ req}$	4,100 BTU/h + 438 BTU/h = **4,538 BTU/h**
- potential secondary heating capacity	Q_h	64.4 BTU/h*Δt • 86.5 F = **5,570 BTU/h**
- reduction of the standard capacity is necessary		4,538 BTU/h / 5,570 BTU/h = **80 %**
- (see diagram on page 33) ⇒ 60 % of the standard water flow rate		0.42 gpm • 0.6 = **0.25 gpm**
- heating water return temperature resulting from: Q = m·c·Δt $t_{HWR} = t_{HWV} - [Q_{h\ erf} / (m \cdot c)]$ =70 - [1332 / (57·1,16)] [K]	t_{HWR}	**122 °F**
- water-side pressure loss (see diagram on page 33)	Δp_W	**0.2 feet**

Induction units for perimeter installation

Connection of units

The following table states possible arrangements for the a/c units presented in our literature:

Arrange-ment	Water connection	Primary air connection	Damper actuator	flute actuator	Type
I **II**	R L	R L	L R	- -	HFG*)**), HFH, HFK, HFL*), HFS, QHG
III	R	L	L	-	HFG, HFH, HFK, HFL, HFS, QHG
IV	L	R	R	-	HFG, HFH, HFK, HFL, HFS, QHG
V **VI** **VII** **VIII**	R L R L	R L L R	R L R L	- - - -	HFG, HFK, QHG

Legend:

L = left
R = right
Direction of view: view is always from the room towards the sill with the unit installed.

*) Connection of primary air from below in the center (special version) only possible for HFG, HFL.
**) HFG with bypass: no lateral wall suspension possible.

Actuators for damper-controlled units

The following damper actuators are available for damper-controlled LTG induction units:

HF.-B: **Belimo actuator**: 0 - 10 V, continuous

HF.-L: **Siemens, Landis & Stäfa:** 0 - 10 V, continuous; 3-point

HF.-P: **LTG pneumatic actuator:** 0.2 - 1.0 bar

Induction units for perimeter installation

Damper actuators for LTG A/C units:

The following actuators are available for damper-controlled LTG induction units:

No.	Actuator type	Product name	Product description	Method of control	Operating voltage
1	pneumatic	LTG SMA	hoisting motor	3 - 14.5 psi (on request 8.5 - 14.5 psi)	
2	electric	Belimo LH 24 SR	hoisting motor	DC 2 - 10 V, continuous	AC 24 V
3	electric	Belimo LM 24 SR	rotating motor	DC 2 - 10 V, continuous	AC 24 V
4	electric	Landis & Gyr GDB 131.2E	hoisting motor	3-point	AC 24 V
5	electric	Landis & Gyr GDB 131.1E	rotating motor	3-point	AC 24 V
6	electric	Landis & Gyr GDB 161.2E	hoisting motor	DC 0 - 10 V, continuous	AC 24 V
7	electric	Landis & Gyr GDB 161.1E	rotating motor	DC 0 - 10 V, continuous	AC 24 V

Control:

Unit types	Possible actuators (see above)	Full heating load	Neutral Bypass	Full cooling load
HFL, HFH	1 2.6 4.5	3 psi 2 V (0 V) 3-point	7 - 9 psi 5 - 6 V 3-point	14.5 psi 10 V 3-point
HFG*** Heating Cooling	1 3.7 5	3 psi 2 V (0 V) 3-point	14.5 psi 10 V 3-point	 3 psi 2 V (0 V) 3-point

* For design reasons, primary air connection and damper actuator cannot be on the same side of the unit. If the pneumatic/electric actuator is fully triggered (14.5 psi or 10 V), the unit will operate in cooling mode only with the primary air flow (second nozzle row open, heat exchanger and bypass closed).

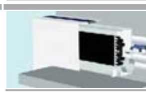
** Dampers and flute are driven by separate motors being installed on alternate sides of the unit. If the flute drive is fully triggered, the second nozzle row is open (full load cooling).

*** Floor mounted units: With the smallest control signal the heat exchanger is completely open with possibility for maximum cooling or heating load (bypass at > 3 psi or > 0 V signal).

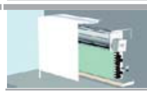
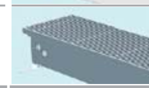
The Innovation Company
LTG Incorporated

Product Overview
LTG Air-Water Systems

LTG **Induction** – Induction Units

Ceiling installation	Sill Installation	Floor Installation
 HFF*suite* SilentSuite	 HFV / HFV*sf* System SmartFlow	 HFB / HFB*sf* System SmartFlow
 LHG System Indivent®	 HFG	
 HDF / HDF*sf* System SmartFlow	 QHG	
 HDC		

LTG **FanPower**– Fan Coil Units

Ceiling Installation	Sill Installation	Floor Installation
 LVC System Indivent®	 VFC	 VKB
 VKH	 QVC	 SKB
 VKE		
 KFA cool wave®		

LTG **Decentral** – Decentralised Ventilation Units

Ceiling Installation	Sill Installation	Floor Installation
 FVS Univent®	 FVM	 FVD
		 FVP*pulse* System PulseVentilation

Engineering Services

 LTG Engineering Services Comfort Air Technology