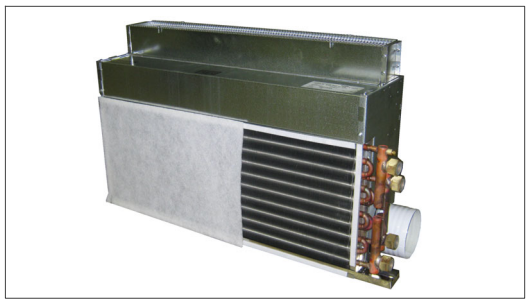
AIR TECH
SYSTEMS

Translation of Original Operating/Installation/Maintenance Instructions

LTG Air-Water Systems

LTG Induction

Induction units HFG



Installation in sills

www.LTG.net

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Induction units HFG, installation in sills

LTG Comfort Air Technology

Air Diffusers

Air Distribution

Notes

Dimensions stated in this brochure are in mm.

For the dimensions given in this brochure, the General Tolerances according to DIN ISO 2768-vL apply.
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.

Content

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EC Declaration of Conformity

AIR TEC SYSTEM

EC declaration of conformity

As defined by the EC Council Directive on Machinery 2006/42/EC, Annex II, Nr. 1A

We herewith declare that the machine described in the following conforms to all relevant provisions of the EC Machinery Directive 2006/42/EC.

Manufacturer:	**LTG Aktiengesellschaft** **Grenzstr. 7, 70435 Stuttgart, Germany**
Designation of machinery:	**Induction Units**
Machinery type:	**HF... with electric actuator** all sizes
Relevant EC Council Directives:	Machinery Directive 2006/42/EC, Low Voltage Directive 2014/35/EC
Applied harmonized standards, in particular:	DIN EN ISO 12100, DIN EN ISO 13857, DIN EN 349, DIN EN 60335-2-40
Other standards:	DIN EN 60730-1, DIN EN 60730-2, DIN EN 50121-3-2, DIN EN 61000-6-2, DIN EN 61000-6-3

Stuttgart, 11.10.2018

Signature of manufacturer

Position of signatory: Wagner ppa. Dehlwes

Innovative Solutions for Humans and Products.

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Translation of Original Installation/Operating/Maintenance Instructions
Induction units HFG, installation in sills

1. Safety

The installation, maintenance, and repair must be performed by qualified and trained staff only.

1.1 Explanation of symbols and hints

Operating safety symbol

This symbol is placed alongside every operating safety instruction in these operating instructions, wherever there is a danger to life and limb. Observe these instructions and in such cases proceed with extreme caution. Pass on all the operating safety instructions to other users. In addition to the instructions contained in these operating instructions, the generally applicable safety and accident prevention regulations must be observed; as shown here, for example: Warning of hazard point.

Information symbol

This information symbol is placed alongside those points in the manual which must be specifically observed in order to ensure that the guidelines, regulations, instructions and correct operating sequences are observed and to prevent damage to or destruction of the unit and/or other components in the system.

These mandatory symbols are linked to the operating safety instructions and show which protective measures must be complied with at the appropriate workstations and therefore specifically mandate a certain action, as shown here as an example: Wear protective gloves.

These prohibition symbols are linked to the operating safety instructions banning a dangerous or risky action, as shown here as an example: Do not touch.

1.2 Safety Instructions

Carefully read the safety instructions before using any LTG induction unit.
Always follow the safety instructions!
The units meet any pertinent safety standards.

The installation and maintenance of air conditioning units may be dangerous because of high pressures and electrical components being alive. Therefore, the installation, maintenance, and repair must be performed by qualified and trained staff only.

Electrical connections of optional control units are to be provided, removed, or modified by authorized persons only observing all relevant safety instructions.

Safety instructions in the technical documentation and on unit labels must be followed at all times.

Any work regarding the electrical equipment is to be performed by skilled and trained staff only. Connections to the main power supply and the safety earth terminal must be executed exactly as described in the wiring diagram.

Electrical operation of the unit in a partly disassembled condition or of individual components is not permitted since earth terminals might be interrupted.

During continuous operation the motor may reach temperatures of up to +65 °C. If necessary, allow the motor to cool off or wear gloves.

Be careful when performing work on the heat exchangers. Blades and housing parts are sharp-edged. Wear gloves during work and handling.

The standard version of the heat exchangers is designed for an operating pressure of 10 bar (test pressure 16 bar). High water pressures may be hazardous. Higher operating pressures, therefore, require LTG's express permission.
Wear safety glasses.

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Continuation 1.2 Safety instructions

Be careful when working overhead and provide protection against parts falling from above.

Keep objects and dirt from entering the impeller. A damaged fan impeller or objects being ejected by the impeller may be hazardous

The casing on site also serves as a protection and should be removed for maintenance and cleaning only.

Avoid any additional load to the unit or the suspensions since stability might be insufficient

The unit must be checked by an expert immediately
- if it has been mechanically damaged
- if it is suffering from a water damage,,
- der Ventilator Schäden aufweist (Unwucht, Lagerschaden, Motorschaden),
- if the suspension or the casing show clear signs of corrosion or ageing

Do not put the unit back into operation before all necessary maintenance and repair has been performed by an expert !

Take the unit entirely off the main power supply until all repairs have been completed by an expert even if this might result in not being able to operate undamaged units.

It is in any case imperative to take a damaged unit completely off the main power supply!

2. Transport, Storage, Delivery

The unit requires dry and dust-free conditions during transport, storage, installation, and operation.

Units are stacked on Euro or single trip pallets and secured with straps. Pallets may be moved using forklifts or cranes.

Do not remove the packaging unless immediately prior to installation on site to protect the unit from pollution and damages.

LTG Aktiengesellschaft will not take responsibility for any pollution of or damages to the unit.

2.1 Transport Instructions

Handle units appropriately and with care during transport.

Do not throw, let drop to the ground or bump into other items or walls.

Make sure that units are safely fastened during transport and avoid damage through other items.

It is recommended to always have units handled by at least two persons.

The packaging is not weather-resistant.

2.2 Storage

Make sure that units are entirely protected against weathering, humidity, and other adverse conditions that might result in damages during storage.

The storage location must meet the following climatic requirements:

Temperature between + 5 °C and + 55 °C with a relative humidity of 90 % max. (non-condensing).

2.3 Delivery

If not otherwise required, units are delivered in wrap boxes which may be used for protection during installation. Boxes must be stored in an upright position (see arrow on box). The packaging is disposable and is not to be returned to LTG Aktiengesellschaft.

The unit is supplied in corrugated board boxes secured with straps.

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3. Function

Using a round socket, primary air with general pressures of 150...300 Pa is introduced at high speed through plastic or metal nozzles into the induction unit. By injection effect, indoor air is sucked in, passing the heat exchanger cooling or heating it, and reintroduced together with the primary air.

Heat exchangers are usually provided with a filter to protect the unit.

Water is used as a means for thermal energy transport to the heat exchangers with temperatures between about 14 °C (in case of low inlet temperatures condensate formation) up to 80 °C.

Water connection to choice, on the left or right side.

Depending on the specific version, air connection may be performed laterally, on the right or left side, or from below.

If, in the cooling mode, the cold water temperature drops below dew point a condensate tray with possible connecting socket may be used to collect the condensate and for connection to a condensate drainage system.

Dimensioning of the plant should be in a way to avoid any condensate formation during routine operation since the unit has not been designed for an operation with continuous condensation. Furthermore, draught phenomena may occur with low diffused air temperatures.

With view to dimensioning, the most important data are the caloric output, the sound power level and the air flow rate. The units' caloric output is determined trough the water flow rate, water and indoor air temperatures, and damper or valve setting. The sound power depends on the initial pressure at the primary air inlet socket, the flow rate, the unit size, and the nozzle assembly.

Further data of interest when dimensioning the unit are the water mass flow rate and the heat exchanger's water-side pressure loss.

3.1 Intended Use

Induction units HFG intended for use in closed rooms.

They are designed for ambient temperatures of +5...+40 °C and a maximum relative humidity of up to 90 % (non-condensing).
The maximum admissible supply temperature is, therefore, limited to +80 °C.
Any other operating conditions require the express and written permission of LTG Aktiengesellschaft.

LTG Aktiengesellschaft does not assume responsibility for any damages resulting from unintended use.

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4. Techncal data

4.1 Type HFG-0/B/2, 2-pipe system

Specification

Induction unit with one heat exchanger for heating or cooling the secondary air.
Central 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.

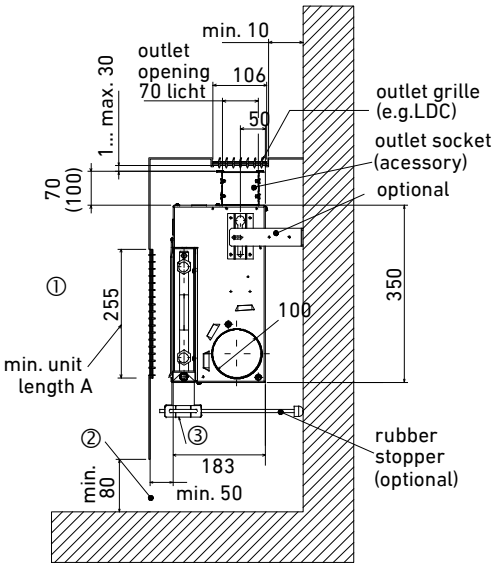
Dimensions

Size	A [mm]	B [mm]	C [mm]	D [mm]	E [mm]
500	497	467	529	623	585
630	642	612	674	718	730
800	797	767	829	873	885
1000	997	967	1029	1073	1085
1250	1242	1212	1274	1318	1335

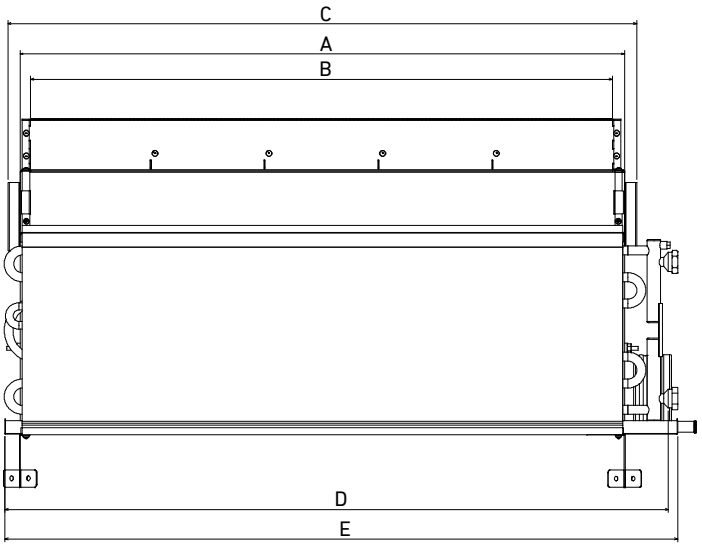
Design

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

Corrections for other flow rates, see from page 23
With filter: output by 5% less
According to equipment, sound pressure level reduced by 2...7 dB(A).
The stated performance data may vary in case of other conditions.
The heating performance data for natural convection Q_{Ek} are based on the following:
Room air temperature 20 °C (standard water flow rate)
Water supply temperature 70 °C ➔ Δ t = 50 K

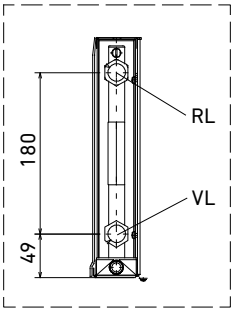


(3) clamping clip



Seondary air suction via
- suction grille with 50 % free section (1) or
- shadow gap (2)

Detail heat exchanger



Subjet to technical modifiations, active drawings on request

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Continuation 4.1 Type HFG-0/B/2, 2-pipe system

Performance data size 500

Nozzle assembly	Δp [Pa]	V_P [m³/h]	L_{A18} [dB(A)]	L_{wA} [dB(A)]	$Q_P/\Delta t_P$ [W/K]	$Q_{k/\Delta t}$ [W/K]	$Q_{h/\Delta t}$ [W/K]	Q_k 1) [W]	Q_P 2) [W]	$Q_{k\ ges}$ 1,2) [W]	$Q_{k\ sens}$ 4) [W]	Q_{total} 4) [W]	$Q_{k\ ges}$ 4) [W]	Q_H 3) [W]
XS	150	21	17	23	7	23	23	230	70	300	416	560	630	759
S		26	18	24	9	28	28	280	87	367	457	600	690	924
M		31	19	25	10	31	31	310	103	413	497	640	743	1023
L		36	19	25	12	32	32	320	120	440	531	670	788	1056
XL		44	20	26	15	34	34	340	147	487	570	690	842	1122
XS	200	24	20	26	8	29	29	290	80	370	489	645	726	957
S		31	20	26	10	31	31	310	103	413	554	706	810	1023
M		36	21	27	12	33	33	330	120	450	487	732	852	1089
L		41	21	27	14	35	35	350	137	487	617	750	888	1155
XL		51	23	29	17	38	38	380	170	550	672	776	947	1254
XS	300	30	24	30	10	34	34	340	100	440	610	770	870	1122
S		38	25	31	13	38	38	380	127	507	672	813	941	1254
M		44	25	31	15	40	40	400	147	547	707	828	976	1320
L		50	26	32	17	41	41	410	167	577	737	836	1003	1353
XL		61	27	33	20	44	44	440	203	643	789	883	1088	1452

Q_{Ek} = 419 W
m = 11 kg

w_{ok} / Δp_w = 200 / 21 [kg/h] / [kPa]
w_{oh} / Δp_w = 200 / 21 [kg/h] / [kPa]

Performance data size 630

Nozzle assembly.	Δp [Pa]	V_P [m³/h]	L_{A18} [dB(A)]	L_{wA} [dB(A)]	$Q_P/\Delta t_P$ [W/K]	$Q_{k/\Delta t}$ [W/K]	$Q_{h/\Delta t}$ [W/K]	Q_k 1) [W]	Q_P 2) [W]	$Q_{k\ ges}$ 1,2) [W]	$Q_{k\ sens}$ 4) [W]	Q_{total} 4) [W]	$Q_{k\ ges}$ 4) [W]	Q_H 3) [W]
XS	150	29	19	25	10	32	32	320	97	417	562	748	845	1056
S		34	20	26	11	34	34	340	113	453	610	799	912	1122
M		40	21	27	13	37	37	370	133	503	680	863	996	1221
L		47	20	26	16	41	41	410	157	567	720	900	1057	1353
XL		52	20	26	17	42	42	420	173	593	753	924	1097	1386
XS	200	33	22	28	11	36	36	360	110	470	636	830	940	1188
S		40	23	29	13	40	40	400	133	533	708	900	1034	1320
M		45	23	29	15	42	42	420	150	570	750	935	1086	1386
L		54	22	28	18	46	46	460	180	640	811	978	1159	1518
XL		61	22	28	20	48	48	480	203	683	910	1052	1256	1584
XS	300	41	27	33	14	45	45	450	137	587	803	1000	1139	1485
S		49	28	34	16	49	49	490	163	653	875	1053	1185	1617
M		55	29	35	18	52	52	520	183	703	920	1079	1227	1716
L		66	27	33	22	56	56	560	220	780	987	1109	1286	1848
XL		73	28	34	24	57	57	570	243	813	1037	1164	1363	1881

Q_{Ek} = 503 W
m = 13.5 kg

w_{ok} / Δp_w = 250 / 21 [kg/h] / [kPa]
w_{oh} / Δp_w = 250 / 21 [kg/h] / [kPa]

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Continuation 4.1 Type HFG-0/B/2, 2-pipe system

Performance data size 800

Düsen-bestück.	Δp [Pa]	V_P [m³/h]	L_{A18} [dB(A)]	L_{wA} [dB(A)]	$Q_P/\Delta t_P$ [W/K]	$Q_{k/\Delta t}$ [W/K]	$Q_{h/\Delta t}$ [W/K]	Q_k 1) [W]	Q_P 2) [W]	$Q_{k\ ges}$ 1,2) [W]	$Q_{k\ sens}$ 4) [W]	Q_{total} 4) [W]	$Q_{k\ ges}$ 4) [W]	Q_H 3) [W]
XS	150	35	19	25	12	38	38	380	117	497	670	900	1017	1254
S		42	21	27	14	42	42	420	140	560	756	992	1132	1386
M		52	22	28	17	47	47	470	173	643	845	1080	1253	1551
L		63	20	26	21	52	52	520	210	730	940	1160	1370	1716
XL		70	20	26	23	55	55	550	233	783	980	1188	1421	1815
XS	200	41	22	28	14	44	44	440	137	577	780	1020	1157	1452
S		49	24	30	16	48	48	480	163	643	862	1102	1266	1584
M		61	24	30	20	54	54	540	203	743	959	1183	1388	1782
L		74	24	30	25	59	59	590	247	837	1038	1236	1480	1947
XL		80	24	30	27	60	60	600	267	867	1081	1258	1526	1980
XS	300	50	27	33	17	53	53	530	167	697	948	1191	1358	1749
S		60	29	35	20	59	59	590	200	790	1043	1266	1467	1947
M		75	32	38	25	65	65	650	250	900	1152	1328	1580	2145
L		90	30	36	30	70	70	700	300	1000	1241	1394	1696	2310
XL		98	30	36	33	72	72	720	327	1047	1282	1440	1768	2376

Q_{ek} = 593 W
m = 16.5 kg

w_{ok} / Δp_w = 300 / 20 [kg/h] / [kPa]
w_{oh} / Δp_w = 300 / 21 [kg/h] / [kPa]

Performance data size 1000

Düsen-bestück.	Δp [Pa]	V_P [m³/h]	L_{A18} [dB(A)]	L_{wA} [dB(A)]	$Q_P/\Delta t_P$ [W/K]	$Q_{k/\Delta t}$ [W/K]	$Q_{h/\Delta t}$ [W/K]	Q_k 1) [W]	Q_P 2) [W]	$Q_{k\ ges}$ 1,2) [W]	$Q_{k\ sens}$ 4) [W]	Q_{total} 4) [W]	$Q_{k\ ges}$ 4) [W]	Q_H 3) [W]
XS	150	45	1	25	15	50	50	500	150	650	882	1173	1323	1650
S		50	20	26	17	52	52	520	167	687	937	1232	1399	1716
M		62	21	27	21	59	59	590	207	797	1042	1335	1542	1947
L		72	23	29	24	63	63	630	240	870	1119	1400	1640	2079
XL		90	25	31	30	69	69	690	300	990	1227	1472	1772	2277
XS	200	53	22	28	18	56	56	560	177	737	1012	1312	1490	1848
S		58	22	28	19	59	59	590	193	783	1057	1356	1550	1947
M		72	25	31	24	66	66	660	240	900	1168	1448	1689	2178
L		83	26	32	28	70	70	700	277	977	1243	1498	1776	2310
XL		104	28	34	35	84	84	840	347	1187	1357	1550	1898	2772
XS	300	65	27	33	22	69	69	690	217	907	1222	1514	1732	2277
S		71	29	35	24	71	71	710	237	947	1269	1547	1785	2343
M		88	31	37	29	78	78	780	293	1073	1387	1613	1908	2574
L		100	31	37	33	82	82	820	333	1153	1450	1631	1966	2706
XL		128	33	39	43	90	90	900	427	1327	1601	1798	2227	2970

Q_{ek} = 719 W
m = 19.5 kg

w_{ok} / Δp_w = 350 / 22 [kg/h] / [kPa]
w_{oh} / Δp_w = 350 / 21 [kg/h] / [kPa]

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Induction units HFG, installation in sills

Continuation 4.1 Type HFG-0/B/2, 2-pipe system

Performance data size 1250

Düsen-bestück.	Δp [Pa]	V_P [m³/h]	L_{A18} [dB(A)]	L_{wA} [dB(A)]	$Q_P/\Delta t_P$ [W/K]	$Q_{k/\Delta t}$ [W/K]	$Q_{h/\Delta t}$ [W/K]	Q_k 1) [W]	Q_P 2) [W]	$Q_{k\ ges}$ 1,2) [W]	$Q_{k\ sens}$ 4) [W]	Q_{total} 4) [W]	$Q_{k\ ges}$ 4) [W]	Q_H 3) [W]
XS	150	58	20	26	19	63	63	630	193	823	1127	1496	1689	2079
S		63	20	26	21	66	66	660	210	870	1185	1558	1768	2178
M		78	23	29	26	74	74	740	260	1000	1275	1693	1953	2442
L		87	24	30	29	78	78	780	290	1070	1393	1756	2046	2574
XL		96	24	30	32	81	81	810	320	1130	1451	1801	2121	2673
XS	200	67	22	28	22	72	72	720	223	943	1012	1312	1909	2376
S		72	24	30	24	76	76	760	240	1000	1057	1356	1973	2508
M		89	26	32	30	84	84	840	297	1137	1168	1448	2150	2772
L		100	27	33	33	88	88	880	333	1213	1243	1498	2253	2904
XL		112	28	34	37	93	93	930	373	1303	1357	1550	2343	3069
XS	300	82	29	35	27	91	91	910	273	1183	1222	1514	2289	3003
S		88	29	35	29	94	94	940	293	1233	1269	1547	2346	3102
M		110	31	37	37	104	104	1040	367	1407	1387	1613	2526	3432
L		123	32	38	41	109	109	1090	410	1500	1450	1631	2610	3597
XL		137	33	39	46	114	114	1140	457	1597	1601	1798	2729	3762

Q_{Ek} = 872 W
m = 23 kg
w_{ok} / Δp_w = 420 / 22 [kg/h] / [kPa]
w_{oh} / Δp_w = 420 / 19 [kg/h] / [kPa]

1) Cooling capacity of secondary air via heat exchanger (non condensing),
t_{room} = 26 °C, $t_{cold\ water\ inlet}$ = 16 °C,
2) Cooling capacity of primary air,
t_{room} = 26 °C, t_{prim} = 16 °C
3) Heating capacity via heat exchanger,
t_{room} = 22 °C, $t_{hot\ water\ inlet}$ = 55 °C, t_{prim} = 22 °C
4) Cooling capacity via heat exchanger (condensing),
t_{room} = 26 °C, $t_{cold\ water\ inlet}$ = 6 °C

Δp - static pressure at the primary air socket
V_P - primary air flow rate (± 10 %)
L_{A18} - sound pressure level with 18 m² Sabine room absorption
L_{wA} - sound power level (± 3 dB)
Q_P - cooling capacity of primary air (outside air) (± 5 %)
Δt_P - temperature difference between room air and primary air
Q_k - cooling capacity of secondary air (via heat exchanger) (± 5 %)
Q_h - heating capacity of secondary air (± 5 %)
Δt - temperature difference between suction air temperature before entering the heat exchanger and water supply
$Q_{k\ ges}$ - total cooling capacity (non condensing)
$Q_{k\ sens}$ - sensible cooling capacity
Q_{total} - total cooling capacity (condensing)
Q_{Ek} - heating capacity with natural convection
m - weight
w_{ok} - nominal water flow rate at cooling capacity
w_{oh} - nominal water flow rate at heating capacity
Δp_w - water-side pressure loss

Translation of Original Installation/Operating/Maintenance Instructions
Induction units HFG, installation in sills

4.2 Type HFG-0/B/4, 4-pipe system

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

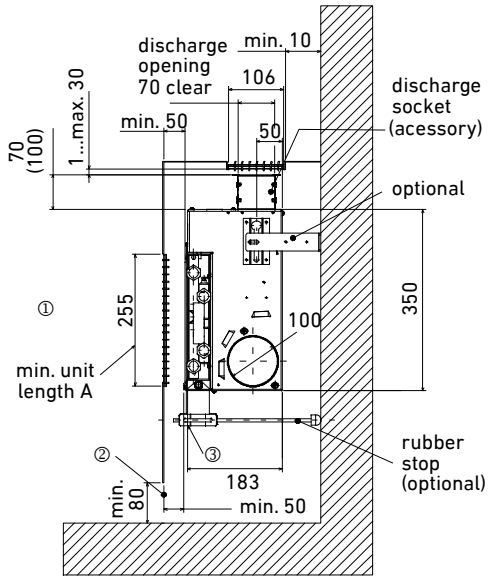
Size	A [mm]	B [mm]	C [mm]	D [mm]	E [mm]
500	497	467	529	623	585
630	642	612	674	718	730
800	797	767	829	873	885
1000	997	967	1029	1073	1085
1250	1242	1212	1274	1318	1335

Design

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

Corrections for other water flow rates, see from page 23
With filter: output reduced by 5 %
With aluminum nozzles: sound power level + 2...3 dB(A)
According to equipment, sound pressure level reduced by 2...7 dB(A).
The stated performance data may vary in case of other conditions.
The heating performance data for natural convection Q_{Ek} are based on the following:
Room air temperature 20 °C (standard water flow rate)
Water supply temperature 70 °C ➔ Δt = 50 K

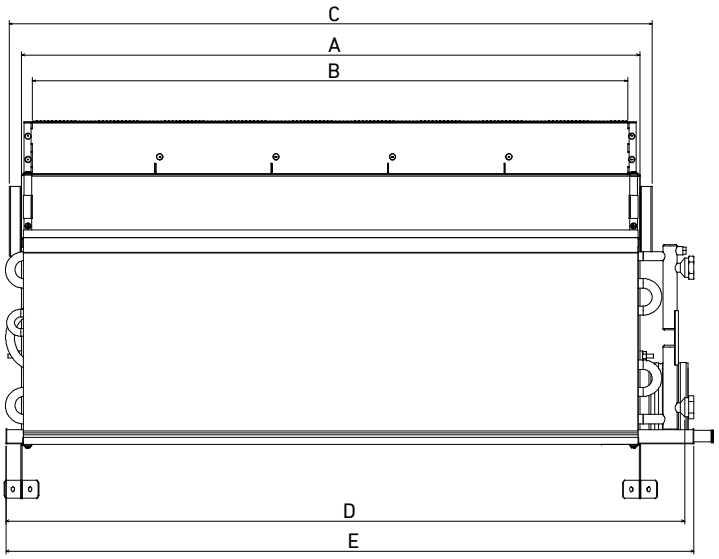
Lateral view right side



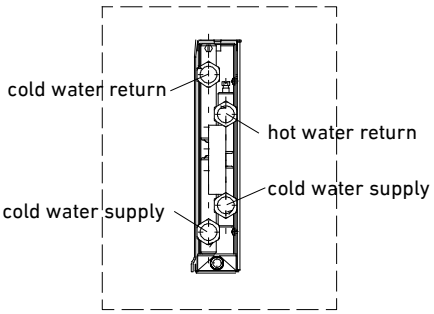
③ clamping clip

Intake of secondary air via
① intake grille with 50 % free section or
② shadow gap

Front view



Detail heat exchanger



Subject to technical modifications. Actual drawings on request.

Translation of Original Installation/Operating/Maintenance Instructions
Induction units HFG, installation in sills

Continuation 4.2 type HFG-0/B/4, 4-pipe system

Performance data size 500

Düsen-bestück.	P [Pa]	V_P [m³/h]	L_{A18} [dB(A)]	L_{wA} [dB(A)]	Q_P/t_P [W/K]	$Q_{k/t}$ [W/K]	$Q_{h/t}$ [W/K]	Q_k 1) [W]	Q_P 2) [W]	$Q_{k\,ges}$ 1,2) [W]	$Q_{k\,sens}$ 4) [W]	Q_{total} 4) [W]	$Q_{k\,ges}$ 4) [W]	Q_H 3) [W]
XS	150	21	17	23	7	19	16	190	70	260	331	444	514	528
S		26	18	24	9	21	18	210	87	297	378	497	584	594
M		31	19	25	10	23	19	230	103	333	411	529	632	627
L		36	19	25	12	26	22	260	120	380	456	573	693	726
XL		44	20	26	15	27	23	270	147	417	483	585	732	759
XS	200	24	20	26	8	21	18	210	80	290	370	490	570	594
S		31	20	26	10	25	21	250	103	353	440	560	663	693
M		36	21	27	12	26	22	260	120	380	460	580	700	726
L		41	21	27	14	28	24	280	137	417	500	610	747	792
XL		51	23	29	17	30	29	300	170	470	540	620	790	957
XS	300	30	24	30	10	26	23	260	100	360	460	580	680	759
S		38	25	31	13	30	25	300	127	427	530	641	768	825
M		44	25	31	15	31	26	310	147	457	560	650	797	858
L		50	26	32	17	34	29	340	167	507	600	680	847	957
XL		61	27	33	20	36	29	360	203	563	630	710	913	957

Q_{ek} = 343 W
m = 11 kg

w_{ok} / Δp_w = 80 / 1.7 [kg/h] / [kPa]
w_{oh} / Δp_w = 80 / 0.9 [kg/h] / [kPa]

Performance data size 630

Düsen-bestück.	P [Pa]	V_P [m³/h]	L_{A18} [dB(A)]	L_{wA} [dB(A)]	Q_P/t_P [W/K]	$Q_{k/t}$ [W/K]	$Q_{h/t}$ [W/K]	Q_k 1) [W]	Q_P 2) [W]	$Q_{k\,ges}$ 1,2) [W]	$Q_{k\,sens}$ 4) [W]	Q_{total} 4) [W]	$Q_{k\,ges}$ 4) [W]	Q_H 3) [W]
XS	150	29	17	23	7	25	21	190	70	260	441	587	657	693
S		34	18	24	9	27	23	210	87	297	480	628	715	759
M		40	19	25	10	29	25	230	103	333	514	658	761	825
L		47	19	25	12	32	27	260	120	380	567	708	828	891
XL		52	20	26	15	33	28	270	147	417	592	726	873	924
XS	200	33	22	28	11	28	24	280	110	390	500	652	762	792
S		40	23	29	13	31	26	310	133	443	570	710	843	858
M		45	23	29	15	32	28	320	150	470	571	712	862	924
L		54	22	28	18	36	30	360	180	540	637	768	948	990
XL		61	22	28	20	38	32	380	203	583	675	790	993	1056
XS	300	41	27	33	14	35	30	350	137	487	630	787	924	990
S		49	28	34	16	38	33	380	163	543	687	828	991	1089
M		55	29	35	18	39	34	390	183	573	701	830	1013	1122
L		66	27	33	22	44	37	440	220	660	776	871	1091	1221
XL		73	28	34	24	45	38	450	243	693	803	902	1145	1254

Q_{ek} = 412 W
m = 13.5 kg

w_{ok} / Δp_w = 100 / 3.0 [kg/h] / [kPa]
w_{oh} / Δp_w = 100 / 2.0 [kg/h] / [kPa]

Translation of Original Installation/Operating/Maintenance Instructions
Induction units HFG, installation in sills

Continuation 4.2 type HFG-0/B/4, 4-pipe system

Performance data size 800

Düsen-bestück.	P [Pa]	V_P [m^3/h]	L_{A18} [dB(A)]	L_{wA} [dB(A)]	Q_P/t_P [W/K]	$Q_{k/t}$ [W/K]	$Q_{h/t}$ [W/K]	Q_k 1) [W]	Q_P 2) [W]	$Q_{k\,ges}$ 1,2) [W]	$Q_{k\,sens}$ 4) [W]	Q_{total} 4) [W]	$Q_{k\,ges}$ 4) [W]	Q_H 3) [W]
XS	150	35	19	25	12	32	25	320	117	437	575	769	886	825
S		42	21	27	14	34	29	340	140	480	600	790	930	957
M		52	22	28	17	38	32	380	173	553	673	860	1033	1056
L		63	22	28	21	42	35	420	210	630	740	917	1127	1155
XL		70	22	28	23	44	37	440	233	673	780	946	1179	1221
XS	200	41	22	28	14	37	29	370	137	507	664	870	1007	957
S		49	24	30	16	39	33	390	163	553	690	877	1040	1089
M		61	24	30	20	43	36	430	203	633	764	942	1145	1188
L		74	24	30	25	47	39	470	247	717	836	990	1237	1287
XL		80	24	30	27	48	40	480	267	747	861	1002	1269	1320
XS	300	50	27	33	17	45	36	450	167	617	808	1014	1181	1188
S		60	29	35	20	47	40	470	200	670	831	1008	1208	1320
M		75	32	38	25	51	43	510	250	760	918	1058	1308	1419
L		90	32	38	30	56	47	560	300	860	989	1110	1410	1551
XL		98	32	38	33	57	48	570	327	897	1021	1147	1474	1584

Q_{Ek} = 486 W
m = 16,5 kg

w_{ok} / Δp_w = 120 / 6 [kg/h] / [kPa]
w_{oh} / Δp_w = 120 / 4 [kg/h] / [kPa]

Performance data size 1000

Düsen-bestück.	P [Pa]	V_P [m^3/h]	L_{A18} [dB(A)]	L_{wA} [dB(A)]	Q_P/t_P [W/K]	$Q_{k/t}$ [W/K]	$Q_{h/t}$ [W/K]	Q_k 1) [W]	Q_P 2) [W]	$Q_{k\,ges}$ 1,2) [W]	$Q_{k\,sens}$ 4) [W]	Q_{total} 4) [W]	$Q_{k\,ges}$ 4) [W]	Q_H 3) [W]
XS	150	45	20	26	15	42	35	420	150	570	735	978	1128	1155
S		50	20	26	17	44	37	440	167	607	781	1027	1194	1221
M		62	21	27	21	49	41	490	207	697	869	1112	1319	1353
L		72	23	29	24	53	44	530	240	770	950	1188	1428	1452
XL		90	25	31	30	57	48	570	300	870	1023	1226	1526	1584
XS	200	53	22	28	18	47	40	470	177	647	843	1094	1271	1320
S		58	22	28	19	50	41	500	193	693	881	1130	1323	1353
M		72	25	31	24	55	46	550	240	790	973	1207	1447	1518
L		83	26	32	28	59	48	590	277	867	1054	1271	1548	1584
XL		104	28	34	35	64	53	640	347	987	1130	1291	1638	1749
XS	300	65	27	33	22	57	48	570	217	787	1018	1262	1479	1584
S		71	29	35	24	59	50	590	237	827	1057	1290	1527	1650
M		88	31	37	29	65	54	650	293	943	1156	1344	1637	1782
L		100	31	37	33	69	57	690	333	1023	1230	1384	1717	1881
XL		128	33	39	43	75	63	750	427	1177	1334	1499	1926	2079

Q_{ek} = 585 W
m = 19.5 kg

w_{ok} / Δp_w = 150 / 10 [kg/h] / [kPa]
w_{oh} / Δp_w = 150 / 7 [kg/h] / [kPa]

Translation of Original Installation/Operating/Maintenance Instructions
Induction units HFG, installation in sills

Continuation 4.2 type HFG-0/B/4, 4-pipe system

Performance data size 1250

Düsen-bestück.	P [Pa]	V_P [m³/h]	L_{A18} [dB(A)]	L_{wA} [dB(A)]	Q_P/t_P [W/K]	$Q_{k/t}$ [W/K]	$Q_{h/t}$ [W/K]	Q_k 1) [W]	Q_P 2) [W]	$Q_{k\ ges}$ 1,2) [W]	$Q_{k\ sens}$ 4) [W]	Q_{total} 4) [W]	$Q_{k\ ges}$ 4) [W]	Q_H 3) [W]
XS	150	58	20	26	19	53	44	530	193	723	941	1249	1442	1452
S		63	20	26	21	54	46	540	210	750	962	1265	1475	1518
M		78	23	29	26	61	52	610	260	870	1088	1394	1654	1716
L		87	24	30	29	65	54	650	290	940	1164	1467	1757	1782
XL		96	24	30	32	67	57	670	320	990	1195	1483	1803	1881
XS	200	67	22	28	22	61	51	610	223	833	1084	1407	1630	1683
S		72	24	30	24	62	52	620	240	860	1093	1406	1646	1716
M		89	26	32	30	69	58	690	297	987	1224	1525	1822	1914
L		100	27	33	33	74	61	740	333	1073	1373	1656	1989	2013
XL		112	28	34	37	77	65	770	373	1143	1362	1620	1993	2145
XS	300	82	29	35	27	76	63	760	273	1033	1355	1682	1955	2079
S		88	29	35	29	77	65	770	293	1063	1359	1655	1948	2145
M		110	31	37	37	86	72	860	367	1227	1522	1777	2144	2376
L		123	32	38	41	91	76	910	410	1320	1622	1836	2246	2508
XL		137	33	39	46	94	78	940	457	1397	1664	1869	2326	2574

Q_{Ek} = 715 W
m = 23 kg
w_{ok} / Δp_w = 180 / 18 [kg/h] / [kPa]
w_{oh} / Δp_w = 180 / 11 [kg/h] / [kPa]

1) Cooling capacity of secondary air via heat exchanger (non condensing),
t_{room} = 26 °C, $t_{cold\ water\ inlet}$ = 16 °C,
2) Cooling capacity of primary air,
t_{room} = 26 °C, t_{prim} = 16 °C
3) Heating capacity via heat exchanger,
t_{room} = 22 °C, $t_{hot\ water\ inlet}$ = 55 °C, t_{prim} = 22 °C
4) Cooling capacity via heat exchanger (condensing),
t_{room} = 26 °C, $t_{cold\ water\ inlet}$ = 6 °C

Δp - static pressure at the primary air socket
V_P - primary air flow rate (± 10 %)
L_{A18} - sound pressure level with 18 m² Sabine room absorption
L_{wA} - sound power level (± 3 dB)
Q_P - cooling capacity of primary air (outside air) (± 5 %)
Δt_P - temperature difference between room air and primary air
Q_k - cooling capacity of secondary air (via heat exchanger) (± 5 %)
Q_h - heating capacity of secondary air (± 5 %)
Δt - temperature difference between suction air temperature before entering the heat exchanger and water supply
$Q_{k\ ges}$ - total cooling capacity (non condensing)
$Q_{k\ sens}$ - sensible cooling capacity
Q_{total} - total cooling capacity (condensing)
Q_{Ek} - heating capacity with natural convection
m - weight
w_{ok} - nominal water flow rate at cooling capacity
w_{oh} - nominal water flow rate at heating capacity
Δp_w - water-side pressure loss

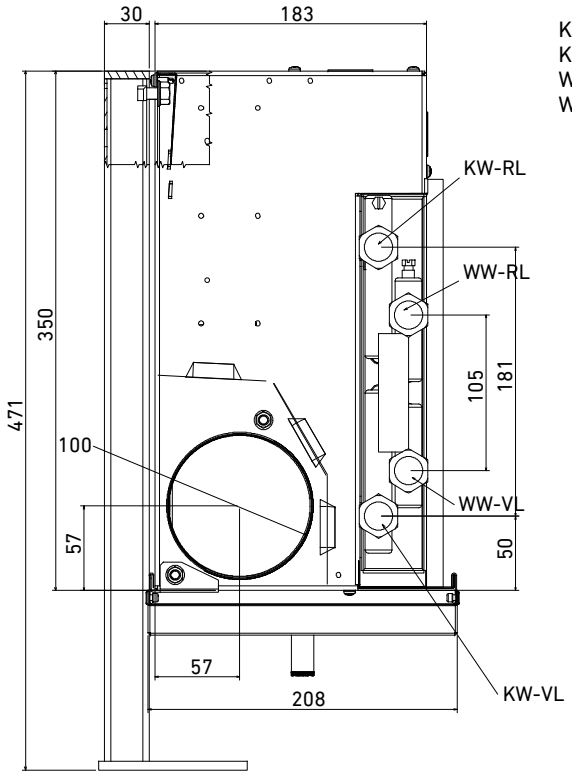
4.3 Type HFG-0E/4, 4-pipe system, condensing

Dimensions

Size	**A** [mm]	$\mathbf{A_{max}}$ [mm]	**B** [mm]	**E** [mm]
500	497	370	467	730
630	642	515	612	875
800	797	670	767	1030
1000	997	870	967	1230
1250	1242	1115	1212	1475

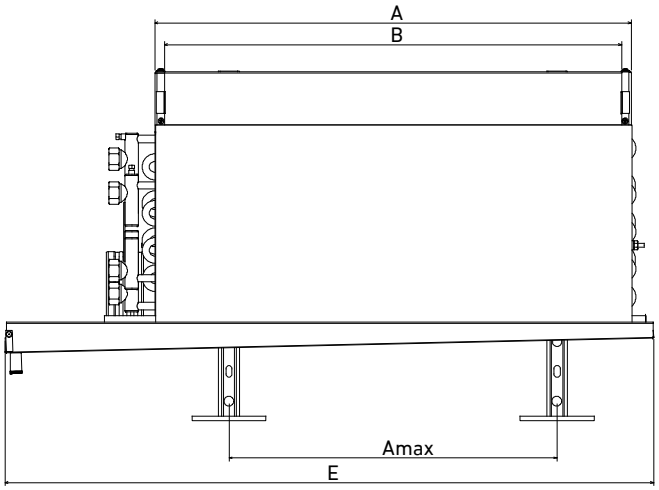
2-pipe units for condensing operation available: type HFG-0E/2.

Back view



Lateral view left side

KW-VL = cooling - water inlet
KW-RL = cooling - water return
WW-VL = heating - water inlet
WW-RL = heating - water return



Fixation with floor stand only

Subject to technical modifications. Actual drawings on request.

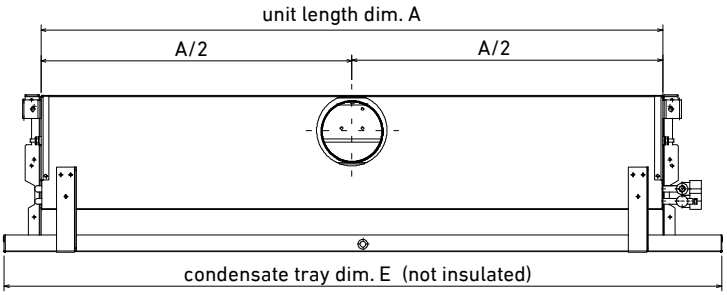
Translation of Original Installation/Operating/Maintenance Instructions
Induction units HFG, installation in sills

4.4 Type HFG-0/D/4, 4-pipe system, horizontal installation in the ceiling

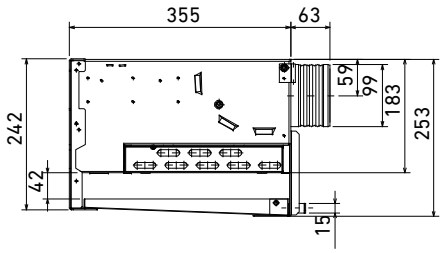
Dimensions

Size	**A** [mm]	**B** [mm]	**E** [mm]
500	497	467	730
630	642	612	875
800	797	767	1027
1000	997	967	1230
1250	1242	1212	1475

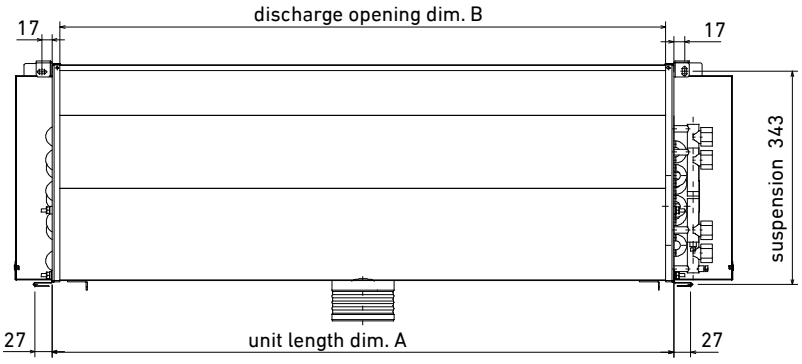
Rear view



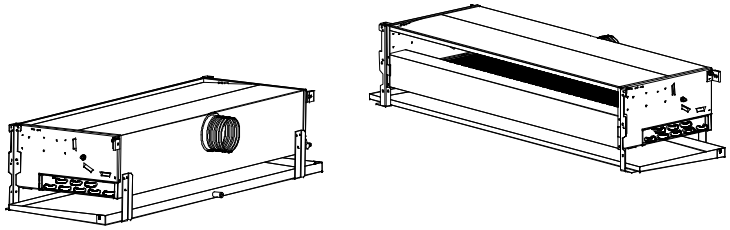
Lateral view left side



Top view



Isometric views



Air connection and condensate drain on the rear side

Subject to technical modifications. Actual drawings on request.

Translation of Original Installation/Operating/Maintenance Instructions
Induction units HFG, installation in sills

4.5 Type HFG-K/B/4, 4-pipe system, increased capacity

Specification

Induction unit with one heat exchanger for heating and cooling the secondary air, for very 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.

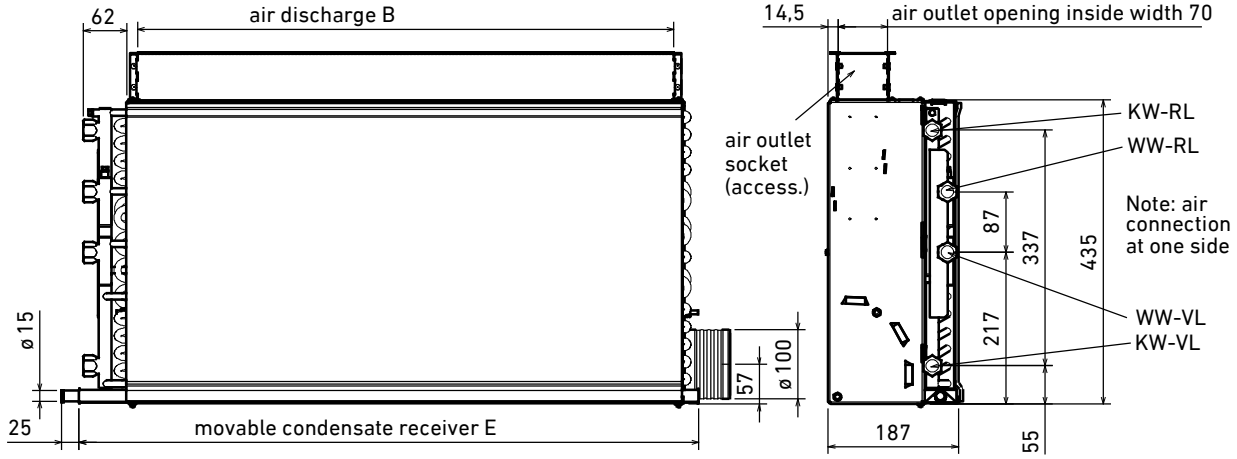
Dimensions

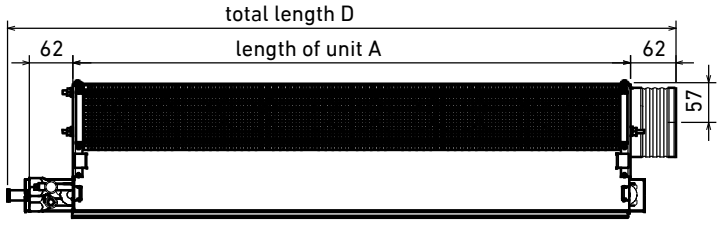
Size	A [mm]	B [mm]	C [mm]	D [mm]	E [mm]
630	642	612	674	797	730
800	797	767	829	952	885
1000	997	967	1029	1152	1085
1250	1242	1212	1274	1402	1335

Dimensioning

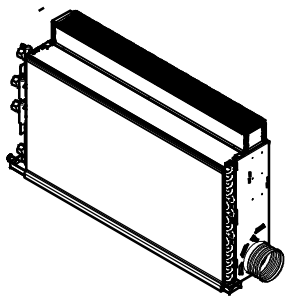
The technical specifications on the following pages are valid under the following conditions:
Selection of unit: - for nominal water flow rates
- with filter,
- with rubber nozzles
- with air outlet neck
- without casing

Corrections for other flow rates, see from page 23.
Without filter: output increased by 5%.
With alumin. nozzles: sound power level + 2...3 dB(A).
Accord. to equipment, sound pressure level reduced by 2...7 dB(A).
The stated performance data may vary in case of other conditions.
The heating performance data for natural convection Q_{Ek} are based on the following:
Room air temp. +20 °C (nominal water flow rate)
Water supply temperature +70 °C ➔ Δt = 50 K





Isometric view



KW-VL = cold water inlet
KW-RL = cold water return
WW-VL = hot water inlet
WW-RL = hot water return

If water connection on the left :
heating with a distance to the unit
cooling directly on the unit

If water connection on the right:
heating directly on the unit
cooling with a distance to the unit

View to heat exchanger

Diagramed unit:
water left side - air right side

Subject to technical modifications.
Actual drawings on request.

Translation of Original Installation/Operating/Maintenance Instructions
Induction units HFG, installation in sills

Continuation 4.5 Type HFG-K/B/4, 4-pipe system, increased capacity

Technical data size 630

Δp [Pa]	V_P [m³/h]	L_{wA} [dB(A)]	$Q_P/\Delta t_P$ [W/K]	$Q_k/\Delta t$ 1) [W/K]	$Q_h/\Delta t$ 2) [W/K]
150	40	27	13	34	19
	50	27	17	37	20
	60	28	20	38	22
200	40	27	13	35	20
	50	28	17	39	21
	60	29	20	42	22
250	40	28	13	37	20
	50	29	17	41	22
	60	30	20	44	23
300	50	29	13	42	23
	60	30	17	46	24
	70	31	20	48	25

Q_{Ek} 3) = 428 W **w_{ok} / Δp_w** = 120 / 2.6 [kg/h] / [kPa]
m = 14 kg **w_{oh} / Δp_w** = 100 / 1.9 [kg/h] / [kPa]

Technical data size 1000

Δp [Pa]	V_P [m³/h]	L_{wA} [dB(A)]	$Q_P/\Delta t_P$ [W/K]	$Q_k/\Delta t$ 1) [W/K]	$Q_h/\Delta t$ 2) [W/K]
150	60	28	20	54	29
	75	29	26	58	30
	90	30	30	60	33
200	60	28	20	55	31
	75	29	26	61	33
	90	31	30	67	35
250	60	30	20	60	32
	75	31	26	65	34
	90	33	30	70	35
300	75	32	26	66	36
	90	34	30	71	37
	100	36	33	73	38

Q_{Ek} 3) = 560 W **w_{ok} / Δp_w** = 180 / 6.5 [kg/h] / [kPa]
m = 25 kg **w_{oh} / Δp_w** = 145 / 3.6 [kg/h] / [kPa]

Technical data size 800

Δp [Pa]	V_P [m³/h]	L_{wA} [dB(A)]	$Q_P/\Delta t_P$ [W/K]	$Q_k/\Delta t$ 1) [W/K]	$Q_h/\Delta t$ 2) [W/K]
150	50	27	17	43	24
	65	28	22	47	25
	80	29	27	49	25
200	50	27	17	44	25
	65	29	22	49	26
	80	30	27	53	27
250	50	29	17	48	26
	65	30	22	52	27
	80	32	27	55	29
300	65	31	22	53	28
	80	33	27	57	30
	90	34	30	59	31

Q_{Ek} 3) = 544 W **w_{ok} / Δp_w** = 150 / 4.1 [kg/h] / [kPa]
m = 21 kg **w_{oh} / Δp_w** = 125 / 2.8 [kg/h] / [kPa]

Technical data size 1250

Δp [Pa]	V_P [m³/h]	L_{wA} [dB(A)]	$Q_P/\Delta t_P$ [W/K]	$Q_k/\Delta t$ 1) [W/K]	$Q_h/\Delta t$ 2) [W/K]
150	60	27	20	68	32
	80	28	27	74	35
	100	30	33	80	36
200	60	28	20	72	33
	80	29	27	79	36
	100	31	33	85	38
250	60	29	20	75	35
	80	30	27	82	38
	100	32	33	89	42
300	80	31	27	84	40
	100	33	33	93	41
	120	36	41	95	42

Q_{Ek} 3) = 681 W **w_{ok} / Δp_w** = 240 / 12 [kg/h] / [kPa]
m = 28 kg **w_{oh} / Δp_w** = 170 / 5 [kg/h] / [kPa]

1) 16 °C water supply temperature; 26 °C room temp. at a height of 1.1 m; non-condensing operation
2) 16 °C primary air temp. and 26 °C air inlet temp.
3) 70 °C water supply temp. and 20 °C air inlet temp.

Values are given for the following conditions:
- Nominal water flow rate
- Unit with filter
- With plastic nozzles
- With discharge duct 70 mm
- 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 %

Δp - static pressure at the primary air socket
V_P - primary air flow rate (± 10 %)
L_{wA} - sound power level (± 3 dB)
Q_P - cooling capacity of primary air (outside air) (± 5 %)
Q_k - cooling capacity, secondary (via heat exch.) (± 5 %)
Q_h - heating capacity, secondary (± 5 %)
Q_{Ek} - heating capacity with natural convection
m - weight
w_{ok} - nominal water flow rate at cooling capacity
w_{oh} - nominal water flow rate at heating capacity
Δt - temperature difference between suction air temp. before entering heat exchanger, and water supply
Δt_P - temperature difference room air / primary air
Δp_w - water-side pressure loss

Translation of Original Installation/Operating/Maintenance Instructions
Induction units HFG, installation in sills

4.6 Type HFG-S/B/4, 4-pipe system, low installation height

Specification

Space-saving induction unit with an extremely low installation height (149 mm).
With one heat exchanger for heating and cooling the secondary air, for high outputs at low water flow rates (2-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 [mm]	B [mm]	C [mm]	D [mm]	E [mm]
500	497	467	529	623	585
630	642	612	674	718	730
800	797	767	829	873	885
1000	997	967	1029	1073	1085
1250	1242	1212	1274	1318	1335

Dimensioning

The technical specifications given on the following pages are valid under the following conditions:
Selection of unit:
- for nominal water flow rates
- with filter
- with rubber nozzles
- with air disharge neck
- without casing

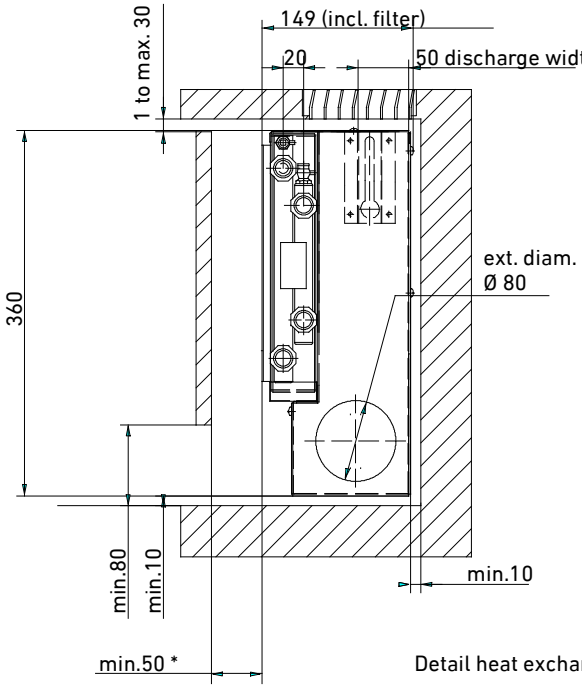
Corrections for other flow rates, see from page 23

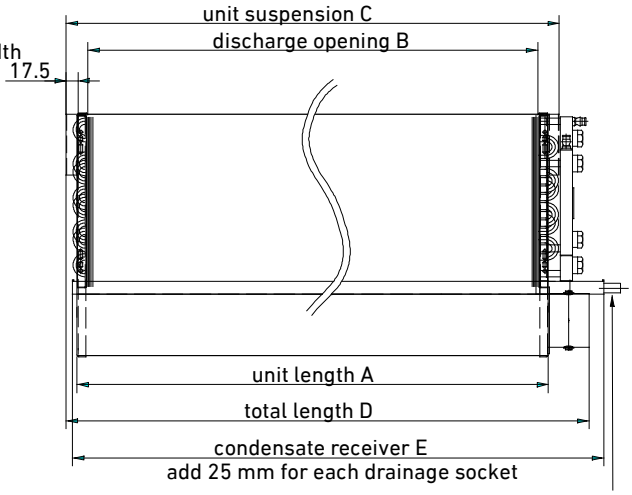
Without filter: output increased by 5 %.

According to equipment, sound pressure level reduced by 2...7 dB(A).

The stated performance data may vary in case of other conditions.

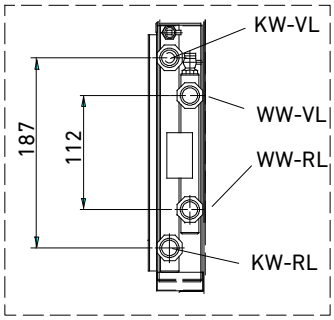
The heating performance data for natural convection Q_{Ek} are based on the following:
Room air temperature +20 °C (nominal water flow rate)
Water supply temperature +70 °C ➔ Δt = 50 K





* distance may be reduced to 10...20 mm, if the casing offers a 50 % free section.

Detail heat exchanger



Water and air connection on the right (see figure).
On request, also available on the left.

If water connection on the right (see figure):
heating (6-pipe) on the unit,
cooling (10-pipe) on the heat exchanger's front.

If water connection on the left:
cooling (10-pipe) on the unit,
heating (6-pipe) on the heat exchanger's front.

With 1/2" connection venting always on top.

KW-VL = cold water inlet
KW-RL = cold water return
WW-VL = hot water inlet
WW-RL = hot water return

Subject to technical modifications.
Actual drawings on request.

Translation of Original Installation/Operating/Maintenance Instructions
Induction units HFG, installation in sills

Continuation 4.6 Type HFG-S/B/4, 4-pipe system, low installation height

Technical data size 500

Δp [Pa]	V_P [m³/h]	L_{wA} [dB(A)]	$Q_P/\Delta t_P$ [W/K]	$Q_k/\Delta t$ [W/K]	$Q_h/\Delta t$ [W/K]
200	25	26	8	19	15
	40	29	13	22	18
	55 *	33	18	24	19
250	25	27	8	20	16
	40	30	13	24	19
	55 *	34	18	27	22
300	25	28	8	22	17
	40	31	13	28	22
	55 *	35	18	31	25
	60 *	36	20	33	26

Q_{Ek} = 343 W
m = 11 kg
w_{ok} / Δp_w = 80 / 1.8 [kg/h] / [kPa]
w_{oh} / Δp_w = 80 / 1.0 [kg/h] / [kPa]

Technical data size 1000

Δp [Pa]	V_P [m³/h]	L_{wA} [dB(A)]	$Q_P/\Delta t_P$ [W/K]	$Q_k/\Delta t$ [W/K]	$Q_h/\Delta t$ [W/K]
200	50	29	17	47	37
	65	30	22	53	42
	80 *	36	27	56	44
250	50	30	17	49	39
	65	32	22	55	44
	80 *	37	27	60	48
300	50	31	17	52	41
	65	33	22	58	46
	80 *	38	27	62	49
	100 *	40	33	65	52

Q_{Ek} = 585 W
m = 19.5 kg
w_{ok} / Δp_w = 150 / 10 [kg/h] / [kPa]
w_{oh} / Δp_w = 150 / 6 [kg/h] / [kPa]

Technical data size 630

Δp [Pa]	V_P [m³/h]	L_{wA} [dB(A)]	$Q_P/\Delta t_P$ [W/K]	$Q_k/\Delta t$ [W/K]	$Q_h/\Delta t$ [W/K]
200	30	27	10	23	18
	45	29	15	27	21
	60 *	33	20	32	25
250	30	28	10	24	19
	45	30	15	28	22
	60 *	34	20	34	27
300	30	29	10	25	20
	45	31	15	30	24
	60 *	35	20	37	29
	75 *	37	25	41	32

Q_{Ek} = 412 W
m = 13.5 kg
w_{ok} / Δp_w = 100 / 3 [kg/h] / [kPa]
w_{oh} / Δp_w = 100 / 2 [kg/h] / [kPa]

Technical data size 1250

Δp [Pa]	V_P [m³/h]	L_{wA} [dB(A)]	$Q_P/\Delta t_P$ [W/K]	$Q_k/\Delta t$ [W/K]	$Q_h/\Delta t$ [W/K]
200	65	31	22	63	50
	80	32	27	66	53
	100 *	36	33	71	56
250	65	32	22	65	52
	80	34	27	69	55
	100 *	39	33	74	59
300	65	33	22	67	53
	80	35	27	72	57
	100 *	40	33	78	62
	125 *	42	42	83	66

Q_{Ek} = 715 W
m = 23 kg
w_{ok} / Δp_w = 180 / 16 [kg/h] / [kPa]
w_{oh} / Δp_w = 180 / 10 [kg/h] / [kPa]

Technical data size 800

Δp [Pa]	V_P [m³/h]	L_{wA} [dB(A)]	$Q_P/\Delta t_P$ [W/K]	$Q_k/\Delta t$ [W/K]	$Q_h/\Delta t$ [W/K]
200	40	28	13	32	25
	55	30	18	38	30
	75 *	34	25	43	34
250	40	29	13	32	26
	55	31	18	40	32
	75 *	35	25	46	37
300	40	30	13	34	27
	55	32	18	42	33
	75 *	36	25	49	39
	90 *	38	30	53	42

Q_{Ek} = 486 W
m = 16.5 kg
w_{ok} / Δp_w = 120 / 5 [kg/h] / [kPa]
w_{oh} / Δp_w = 120 / 3.3 [kg/h] / [kPa]

Δp - static pressure at the primary air socket
V_P - primary air flow rate (± 10 %)
L_{wA} - sound power level (± 3 dB)
Q_P - cooling capacity of primary air (outside air) (± 5 %)
Δt_P - temp. difference between room air / primary air
Q_k - cooling capacity, secondary (via heat exchanger) (± 5 %)
Q_h - heating capacity, secondary ((± 5 %)
Δt - temp. diff. between suction air temp. before entering the heat exchanger and water supply
Q_{Ek} - heating capacity with natural convection
m - weight
w_{ok} - nominal water flow rate at cooling capacity
w_{oh} - nominal water flow rate at heating capacity
Δp_w - water-side pressure loss

* Air flow rate only possible with the use of alu nozzles.

Translation of Original Installation/Operating/Maintenance Instructions
Induction units HFG, installation in sills

Continuation 4.6 Type HFG-S/B/4, 4-pipe system, low installation height

Series connection

If for reasons of space the induction units cannot be connected individually through an air distribution line, several units with low primary air flow rates may be air-supplied in series, the maximum number of units depending on the primary air flow rate.

The first unit in direction of air flow being applied air receives the full air flow rate, i.e. in case of a flow rate of 40 m^3/h per unit, e.g. a total flow rate of 200 m^3/h for 5 units. Therefore, the air speed when entering the first unit is high and will cause the flow noises decisive for the overall sound level.

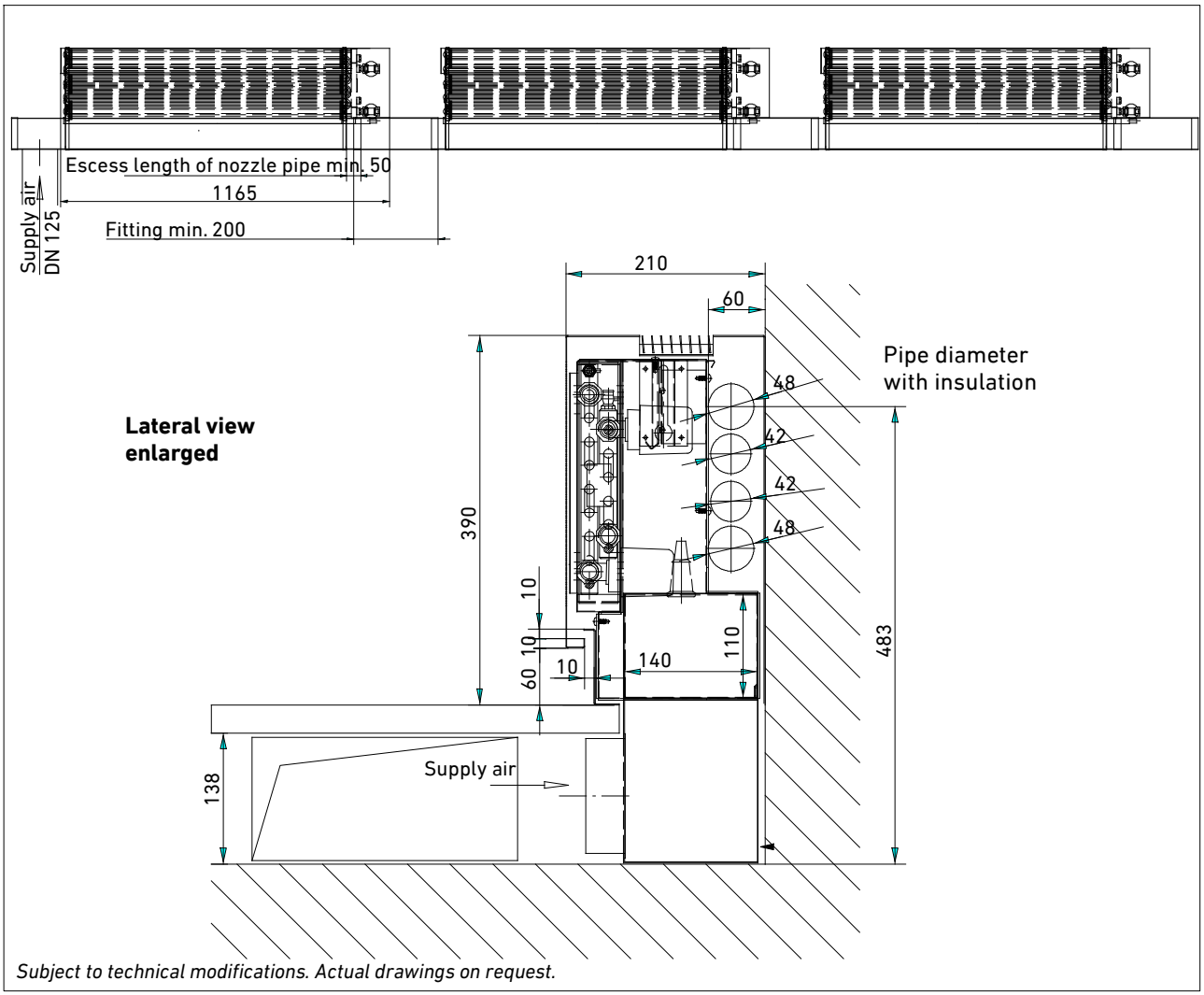
There is only a minor pressure loss between the units.

Dimensioning example

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

Air flow rate per unit	40 m^3/h
Total flow rate	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)

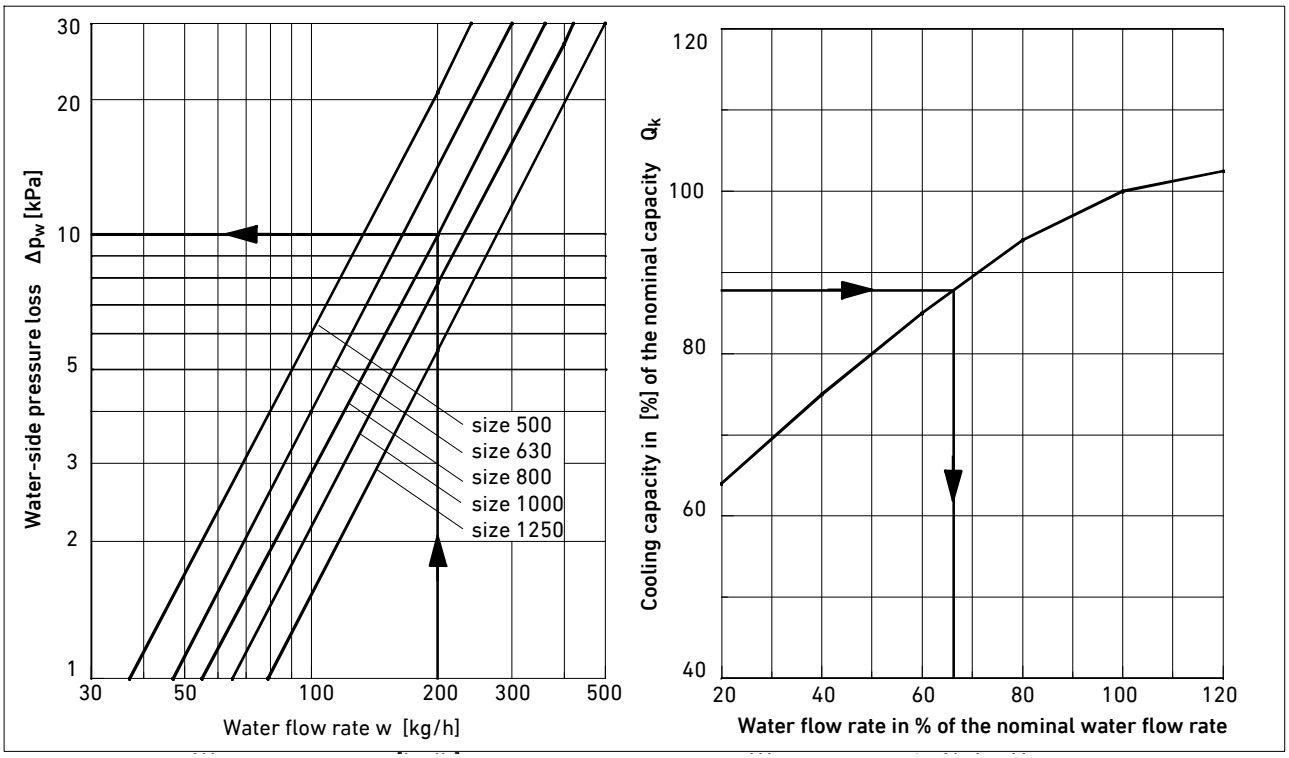
Series connection example



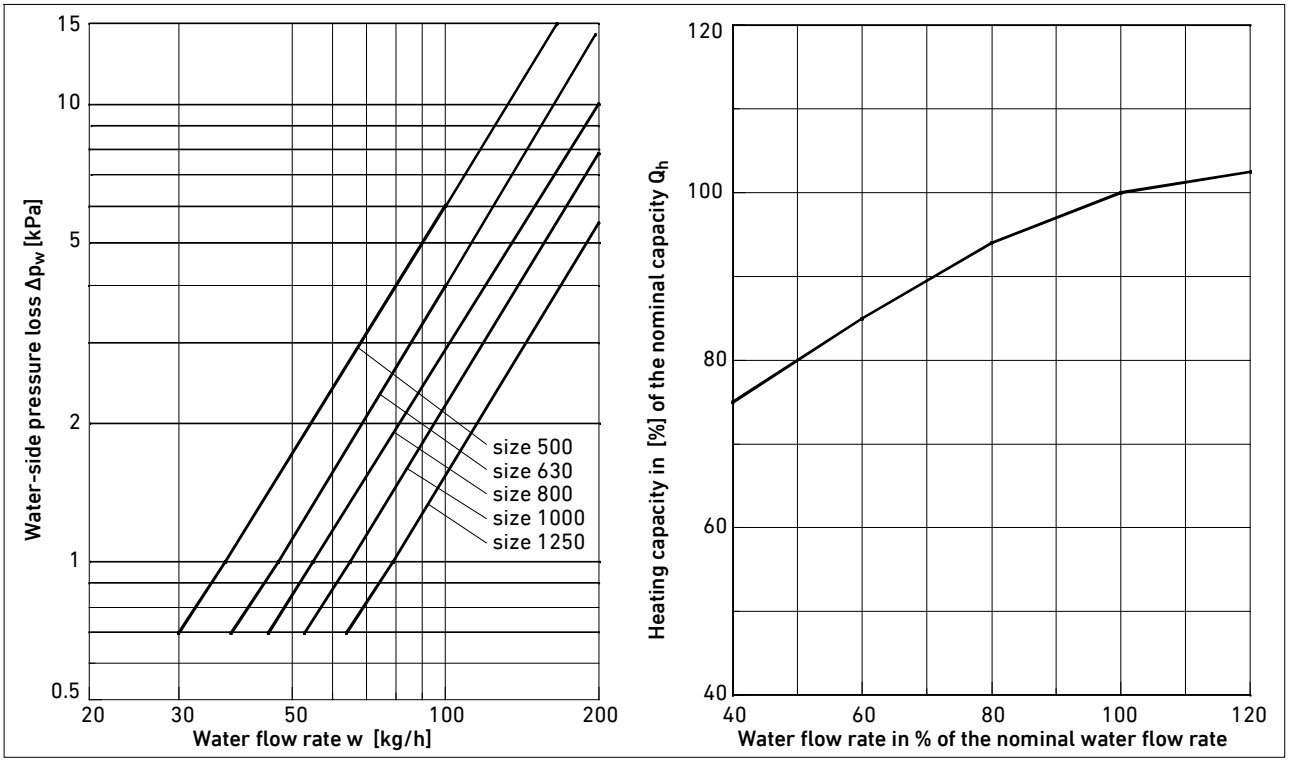
Installation example of series connection: 5 HFG-S/4/1000 connected in series. Units with duct connection in the false floor.

4.7 Type HFG-0/2, 2-pipe system

Water-side pressure loss and cooling capacity with different water flow rates



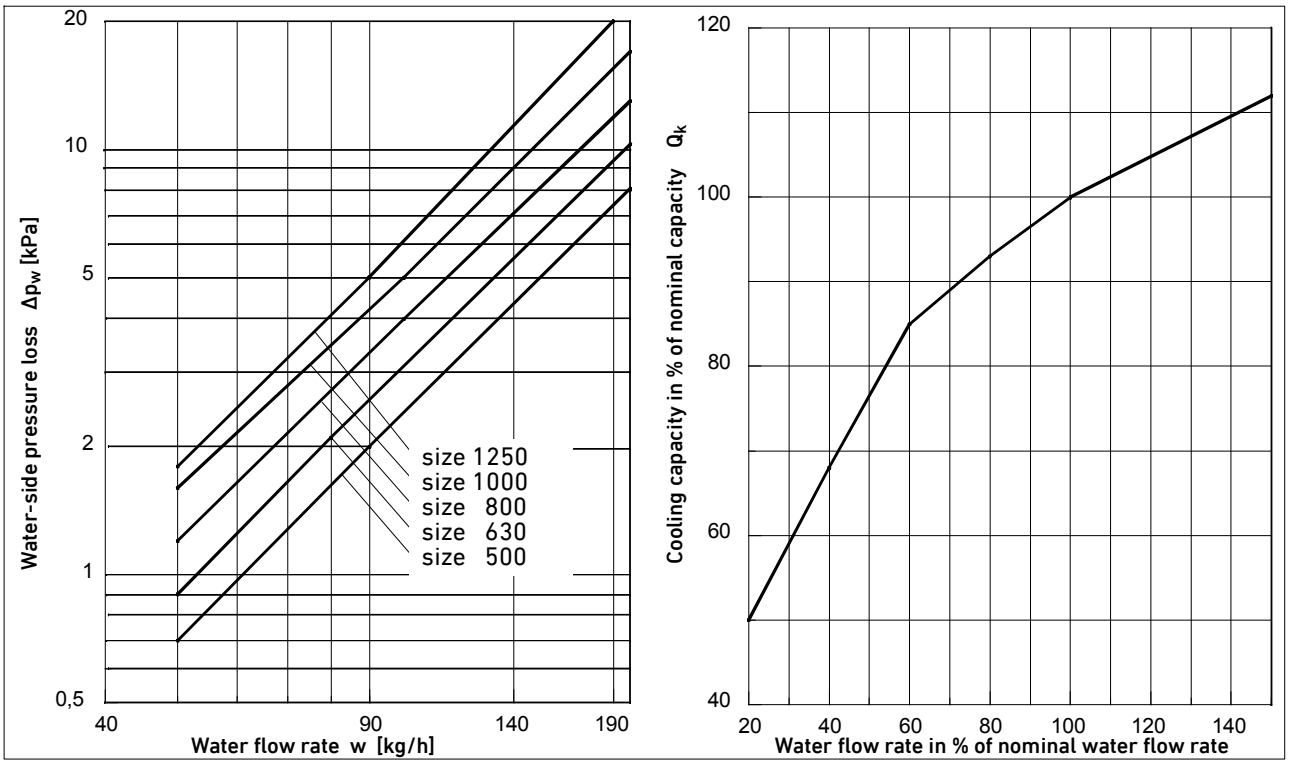
Water-side pressure loss and heating capacity with different water flow rates



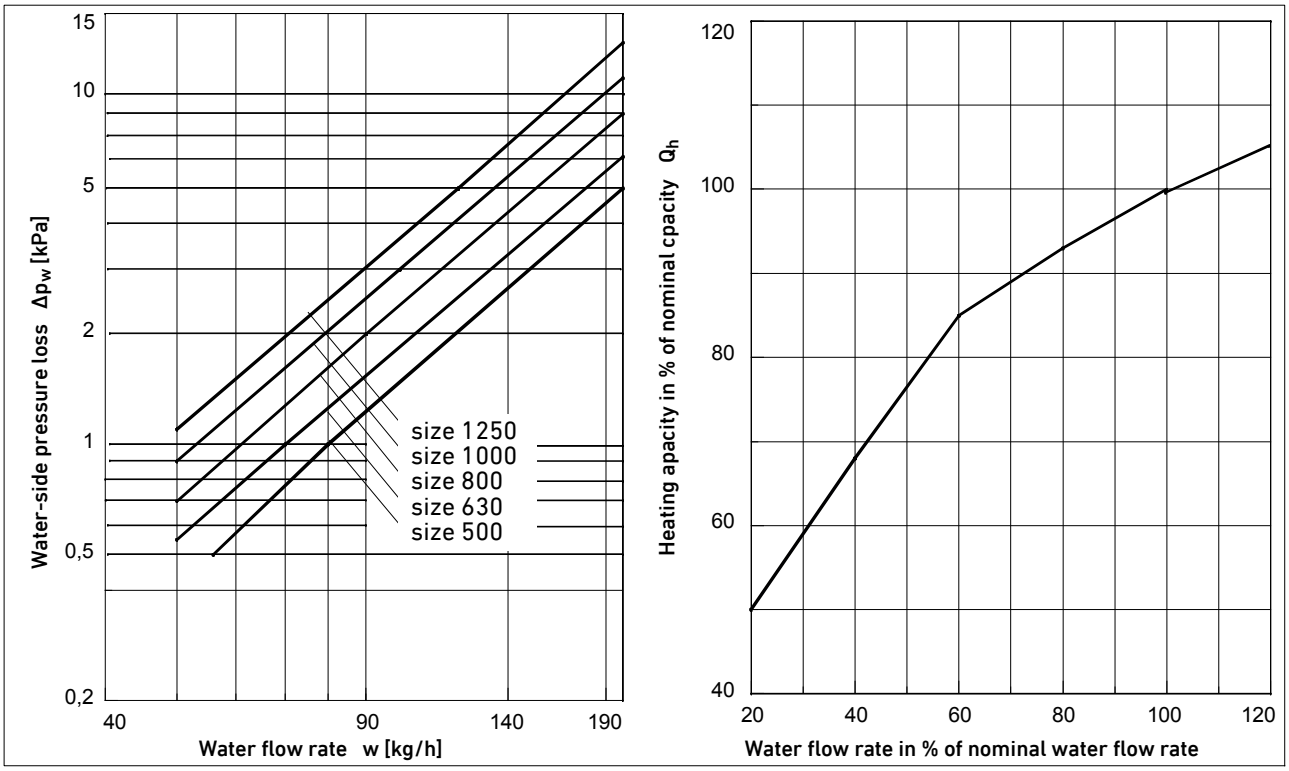
Note: *The minimum water flow rate must not be lower than 20 % of the standard flow rate for cooling, and 40 % for heating, considering the water-side pressure compensation.*

4.8 Typ HFG-0/4 (4-Leiter-System); Typ HFG-S Typ HFG

Water-side pressure loss and cooling capacity with different water flow rates



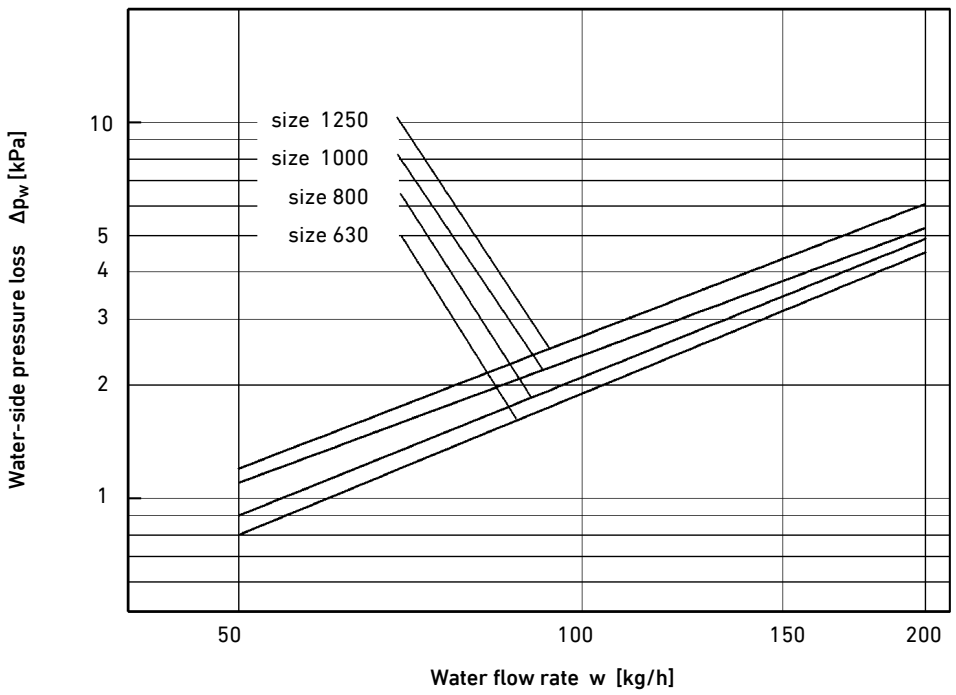
Water-side pressure loss and heating capacity with different water flow rates

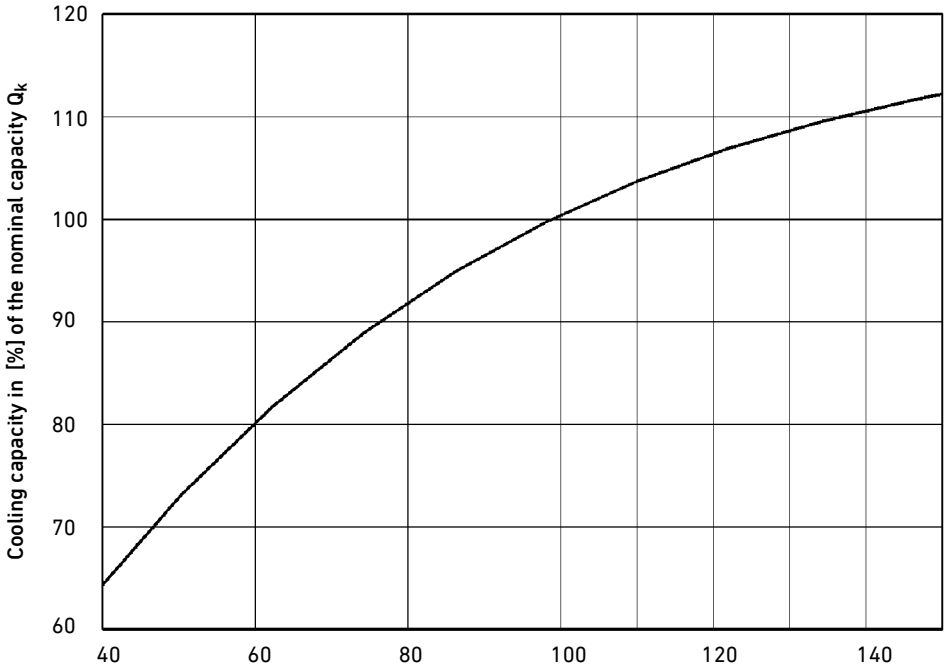


Note: *The minimum water flow rate must not be lower than 20 % of the standard flow rate for cooling, and 40 % for heating, considering the water-side pressure compensation.*

4.9 Type HFG-K/4, 4-pipe system, increased capacity

Water-side pressure loss and cooling capacity with different water flow rates



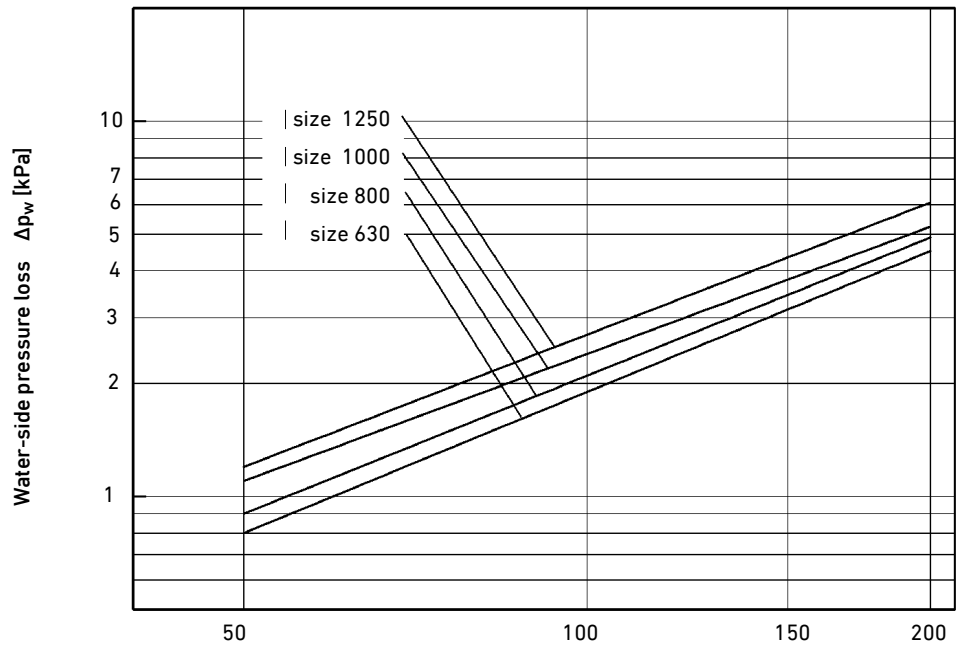


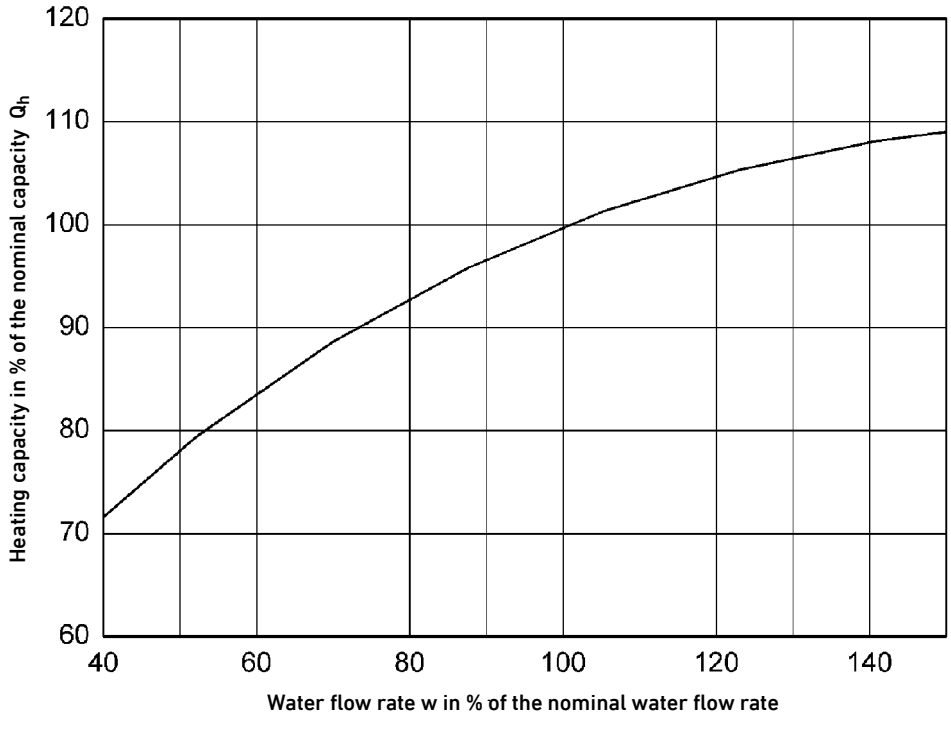
Note: *The minimum water flow rate must not be lower than 20% of the standard flow rate for cooling, and 40% for heating, considering the water-side pressure compensation.*

Translation of Original Installation/Operating/Maintenance Instructions
Induction units HFG, installation in sills

Continuation 4.9 Type HFG-K/4, 4-pipe system, increased capacity

Water-side pressure loss and heating 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.*

4.10 Caloric Output Data

Caloric output data were determined at a test stand in the LTG test lab.

Data are valid if the following applies:

- unit at operating temperature, steady-state condition
- steady-state condition during measurements
- no condensation at the heat exchanger in the cooling mode
- water without additives (drinking water quality)*
- water supply temperatures 12...16 °C in the cooling mode and 50...60 °C in the heating mode.

Parameters used:

- specific heat capacity of the water 4186 J/(kgK)
- specific heat capacity of the air 1004 J/(kgK)
- air density 1.2 kg/m^3

To ensure easy transferability, the specific caloric outputs - i.e. absolute caloric outputs in relation to the temperature difference between water intake and induction air before entering the heat exchanger - are given.

The outputs given in the chart do apply with specific nominal water flow rates only. These are stated for each type and size.

The correction charts give a graphic illustration of how outputs change with other water flow rates compared to nominal water flow rate output.

Flow rates have been determined through calculation and may vary by about 10 %.

*** Addition of ethylene glycol to lower the freezing point:**

To lower the freezing point, cooling water is often added some ethylene glycol. The lower specific thermal capacity of the mixture reduces the unit's cooling capacity.

4.11 Acoustic data

Acoustic data have been determined in a reverberation chamber in the LTG test lab.
The technical data sheet contain the A weighted sound pressure levels L_{A18} for different primary air flow rates/ static pressures at primary air socket.

Sound pressure levels apply to a room absorption surface of 18 m^2 which equals a room absorption of about 6 dB(A). Thus, sound power levels may easily be calculated.

$L_{WA} = L_{A18} + 6$ dB(A)

The data given apply to one unit, i.e. one room axle. If more than one unit is installed in the same room, the sound pressure level will rise accordingly.

Sound level increase
with several sound sources of the same type:

Number of sound sources of the same type	1	2	3	4
Sound level increase [dB]		3	5	6

Measuring accuracy is ± 10 %

4.12 Hydraulic Data

Heat exchangers are approved for an operating pressure of 10 bar max. (test pressure 16 bar).
Pressures exceeding 10 bar require the express permission of LTG.

Water-side pressure losses have been measured directly at the heat exchanger connections. Further resistances will have to be added.

Measuring accuracy is ± 10 %.

4.13 Weight

Weights (without packaging) in kg (approx.)

Unit type	Size 500	Size 630	Size 800	Size 1000	Size 1250
HFG-0	9	12	14	17	21
HFG-S	8	11	13	16	20

5. Installation

5.1 Notes

When to install

Installation should not be performed unless the prefabricated floor, the window sills, the intermediate ceiling, and any other dust producing work has been completed.

How to handle the units

Handle the units with care during transport and installation. Avoid dropping to the floor. Do not manually manipulate the damper-controlled units' kinematics. Do not remove the air motor piston rod manually. Operate the actuators with compressed air or voltage only (exception LM 24 with coupling, lateral black button).

In case of nonobservance, LTG Aktiengesellschaft will not take responsibility for any damages to the motors.

Never detach or readjust the damper levers since the kinematics is factory-set.

The connection for the pneumatic actuator's compressed control air has been hermetically factory sealed. Do not apply force and turn the nipple in another direction without removing the screw connection beforehand.

5.2 Installation, suspension

There are, in general, three ways to install or suspend the units:

- wall mounting (rear or lateral)
- installation using floor stands
- ceiling installation

Please consider the following when installing the units:

- To ensure unit stability and rigidity, use screws of at least the stated property class when fixing the unit. Fixings required for installation are not included.
- Use only the existing holes on the unit for the fixing elements.
- Use only the fixing elements described on the following pages for fixing the unit to ensure sufficient stability. Always observe the installation instructions!
- Do not use the induction units as supporting elements for other components and avoid loading them in any other way.

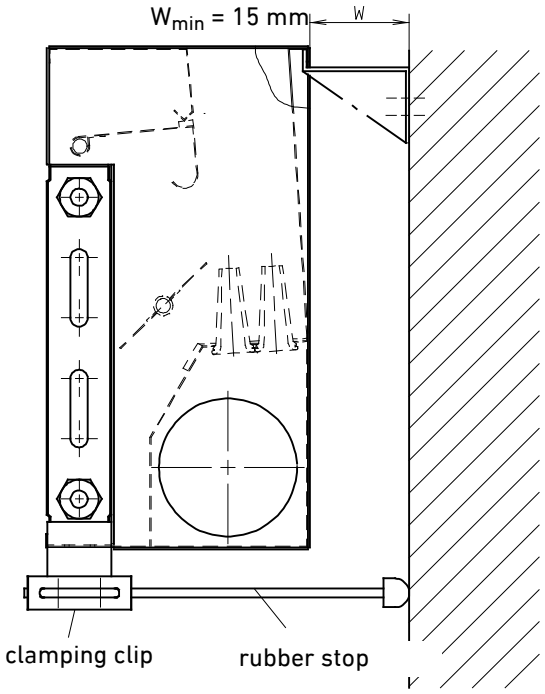
Select fittings in a way to ensure that sound transmission is avoided

5.2.1 Wall mounting, rear suspension

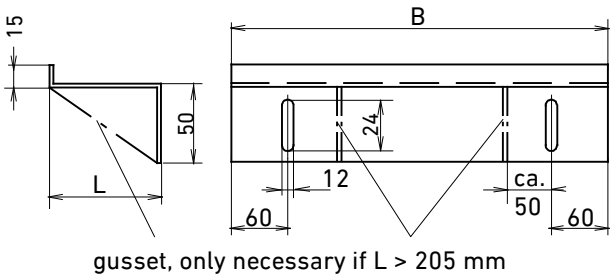
For rear suspension, a Z profile is available. It offers the possibility to subsequently adjust the unit in height by approx. ± **10 mm** and laterally, parallel to the wall, by approx. ± **50 mm**. However, the wall clearance cannot be adjusted. Therefore, always state the clearance W between the unit and the wall in your order. For stability reasons, this clearance must not exceed 200 mm when using the standard version, but for greater clearances, a reinforced version is available.

If the unit is not supported from below, use a spacer in addition to the wall bracket for safety reasons (consisting of clamping clips and rubber stops).
The unit housing can be supported in the same way on the front side (see figures - state clearance V !).
For wall mounting, screws of at least property class **M8 (8.8)** are to be used to ensure sufficient stability.

Version I (HFG-0, HFG-S)



Wall bracket



gusset, only necessary if L > 205 mm

Size	**B** [mm]	**L** [mm]
500	375	W + 5 mm
630	495	
800	670	
1000	870	
1250	1110	

5.2.2 Wall mounting, lateral suspension

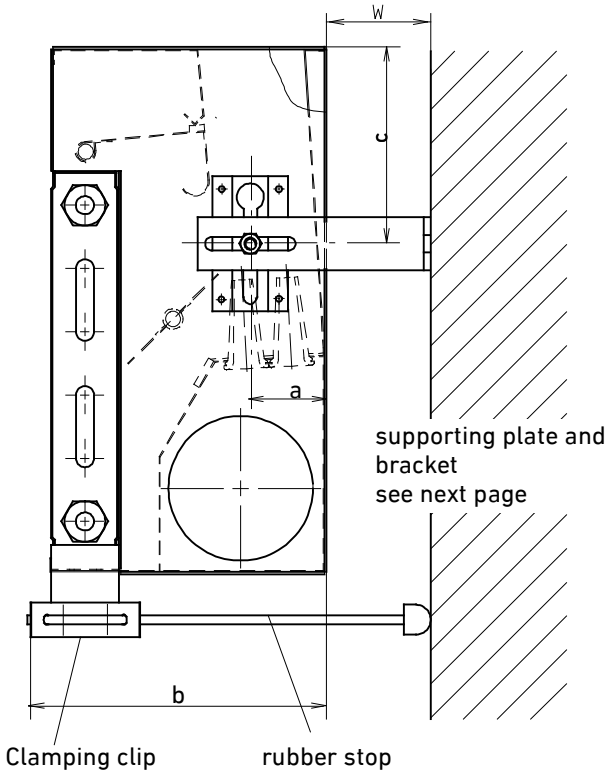
Another possibility to fix the unit is the lateral suspension, consisting of a supporting plate and a bracket.

The lateral suspension enables you to **adjust the unit in all three axes:**

- ± 25 mm laterally, parallel to the wall, in the slot of the bracket
- ± 25 regarding the wall clearance W, in the second slot of the bracket
- ± 25 mm in height, in the slot of the supporting plate.

In general, the supporting plate is not fixed to the unit, but must be ordered together with the lateral bracket. When ordering state the wall clearance W !
If the unit is not supported from below, use a spacer in addition to the wall bracket for safety reasons (consisting of clamping pieces and rubber stops).
The unit housing can be supported in the same way on the front side (see figures - state clearance V !)
For wall mounting, use screws of at least property class **M8 (8.8)** in order to ensure sufficient stability.
For fixing the supporting plate, use hammer head screws M8 x 20.

Version I (HFG-0, HFG-S)



Unit type	**a** [mm]	**b** [mm]	**c** [mm]
HFG	50	200	60

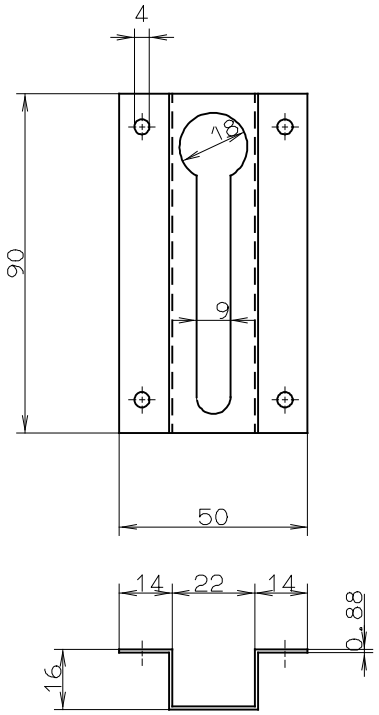
Translation of Original Installation/Operating/Maintenance Instructions
Induction units HFG, installation in sills

Continuation 5.2.2 Wall mounting, lateral suspension

Supporting plate and bracket for lateral suspension

Supporting plate (BCH 42/26), mounted to the unit
Id.-No. 48296.9

appropriate for hammer head screw M8 x 20
Id.-No. 20599.9 for profile 28/15
(washer A8,4 Id.-No. 21016.2)

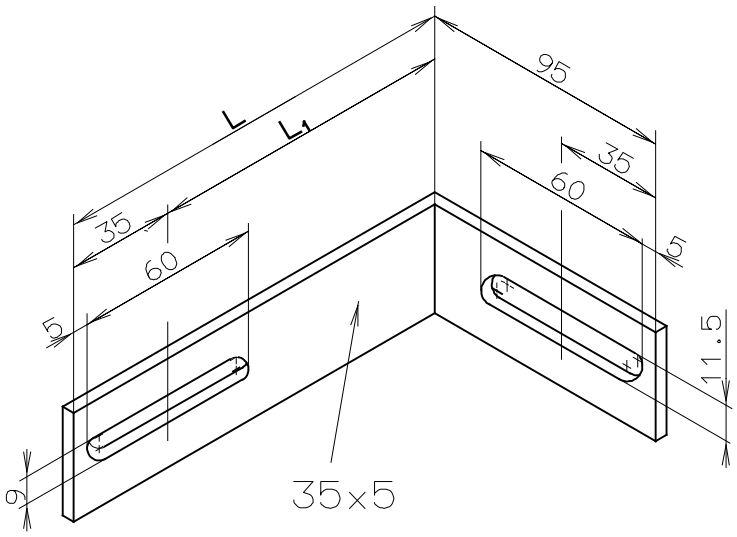


Bracket (HAX 156)

L - length of bracket:
L = W + a + 35
L = W + a + 17 (bei HFL)
L_{min} = 70 mm

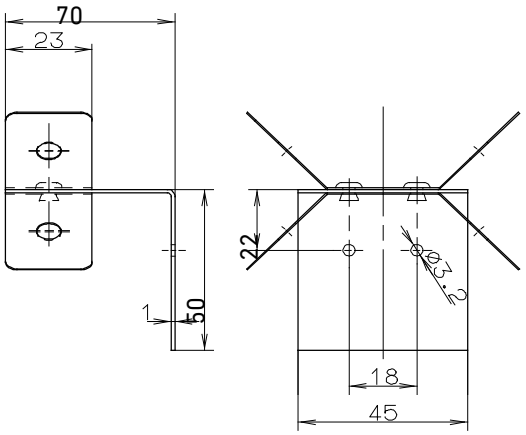
L_1 - clearance wall to center of slot
L_1 = W + a

W = clearance wall
dimension a see table previous page



Clamping clip for rear and lateral suspension

Clamping clip
Id.-Nr. 1014811



The clamping clip for HFG will be delivered separately and must be inserted between the condensate receiver and the housing.

Translation of Original Installation/Operating/Maintenance Instructions
Induction units HFG, installation in sills

5.2.3 Installation using floor stands

For an installation independent of the wall, galvanized floor stands with a plastic plug are available (2 floor stands required for each unit).

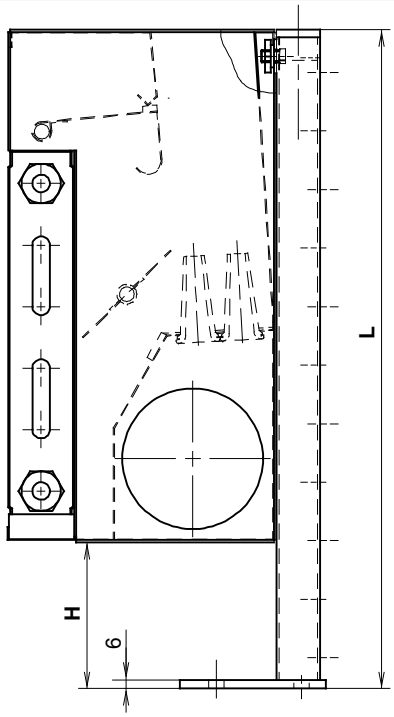
The floor stand height L depends on the unit type and the installation conditions. 'H' > 20 mm may be sufficient. Please always state the unit type and dimension 'H' when ordering.

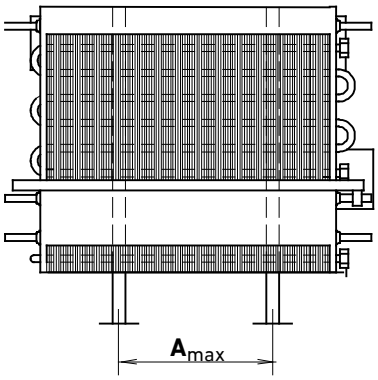
The unit is adjustable in height, upwards by approx. 5 mm, and downwards to H = 20 (80) mm. However, it should be considered that the floor stand may exceed the unit height.

Location screws (included in the delivery) are fixed to the rails of the floor stands and the unit is inserted in this fixing device.

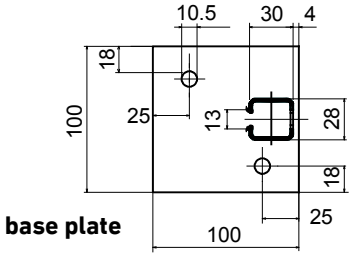
When fixing the unit to the floor, use screws of at least property class **M8 (8.8)**. These special screws are not included in the delivery.

Version I (HFG, HFG-S)





please state height **H** when ordering !



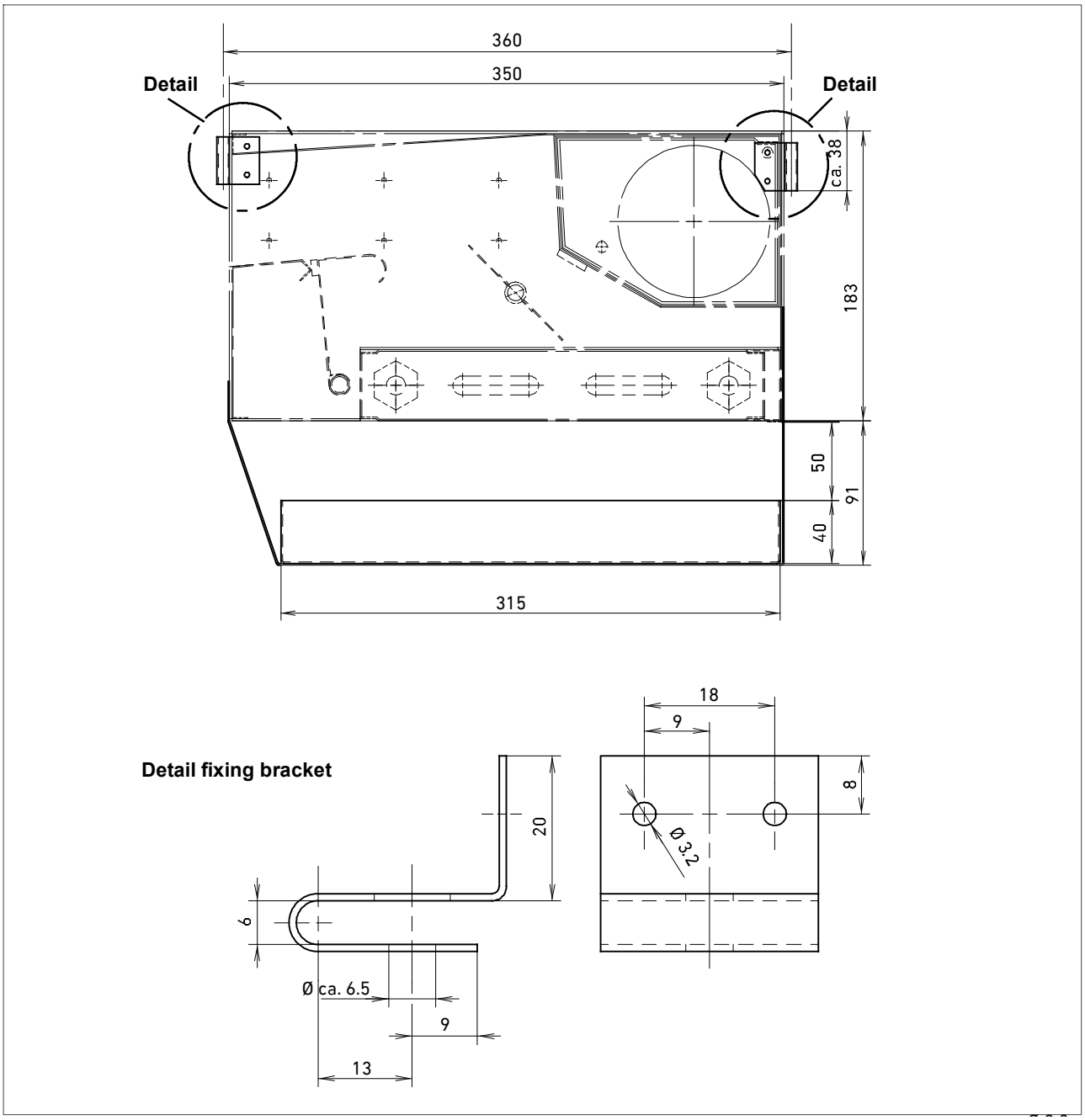
base plate

Size	max. Distance A [mm]	Height of stand L [mm]
500	430	H + 350
630	570	
800	730	
1000	930	
1250	1250	

5.2.4 Ceiling Installation

Inductions units HFG may also be installed horizontally to the ceiling.
This special type of installation must always be clearly stated in your order and is subject to an extra cost. The units require a larger condensate receiver and appropriate supporting plates.
For suspension, use threaded drop rods only! (Not included in the delivery !)

For horizontal installation, the cooler must be angled by 10° in order to allow the condensate drainage and to avoid condensate between the blades of the heat exchanger. This special arrangement will only be required if a constant condensate formation is to be expected, i.e. if the temperature of the cold water supply will constantly remain more than 2 K below the dew point of the ambient air.



5.3 Water connections

Remove the heat exchanger plugs prior to water connection.

Units are provided with heat exchangers with copper tubes and aluminum blades for 4-pipe operation with separate heating and cooling circuits or for 2-pipe operation.

The heat exchangers have been approved for a maximum operating pressure of 10 bar
(other pressures on request).

Depending on the unit type, water connections are supplied in the following versions:

1. Copper fitting with 12 mm outer diameter.. This connection is only suitable for flexible connection with quick coupling.
2. 1/2" internal thread fitting, conical and sealing.
3. Fitting with special LTG olive and union nut to connect flexible hoses or copper tubes.

Connections must be strainless.

Connecting lines must be able to expand.

Attention:
Prior to allowing water to enter the unit the flexible water connection hoses will have to be checked for proper and leakproof fixation. Even though hoses to the heat exchanger are preinstalled, fixations might have loosened during transport or installation of the unit on site.

You may use off-the-shelf control valves and shut-off valves.

When tightening the fittings, avoid damaging the heat exchanger pipes through bending or twisting. Pipe fittings must always be flush.

In order to adjust the water flow rate specified in the selection data, a regulating device or restricting olive will be required. A regulating device for each individual unit can be dispensed with only when the units are identical, with the same water quantities and the same pressure losses, in the case of the Tichelmann system. In this case, one regulating device for the entire line may be sufficient. Otherwise, a regulating device will be required for each heat exchanger.

If removal of a heat exchanger without draining the entire system is a requirement, two or four isolation valves will have to be provided for each unit. You may use off-the-shelf shut-off valves.

The unit fitting will only be provided with an integrated vent if specifically asked for. The water speed inside the heat exchanger is usually sufficient to carry along air bubbles and one venting device per line is therefore appropriate. In a case of emergency, the line may be vented by slightly loosening the standard fitting of the unit.

Included in the unit price and also in general provided with the unit - (unless special fittings such as transitions, straight-way or angle valves or hose connections are ordered) is a complete compression fitting for unit-side water connection, appropriate to take copper pipes with a 12 mm outer diameter, wall thickness of 0.7 to 1.0 mm, suitable for connecting hoses. The union nut is fixed to the heat exchanger pipe's flared end, while olive and banjo bolt will be delivered in packs of 2 or 4 - according to type of unit - in a bag attached to the unit.

Exception: The water connections of units HFG-0/4 and HFG-S/4 are provided with a sleeve with fixed internal thread or a soldered-on smooth 12 mm tube to take a quick coupling.

Due to possible condensation, the connections to the heat exchanger for cooling should be insulated, e.g. using Armaflex insulation.

The water connection side is to be specified when ordering the unit. Some units offer a possibility to still change the side during installation by removing 4 bolts.

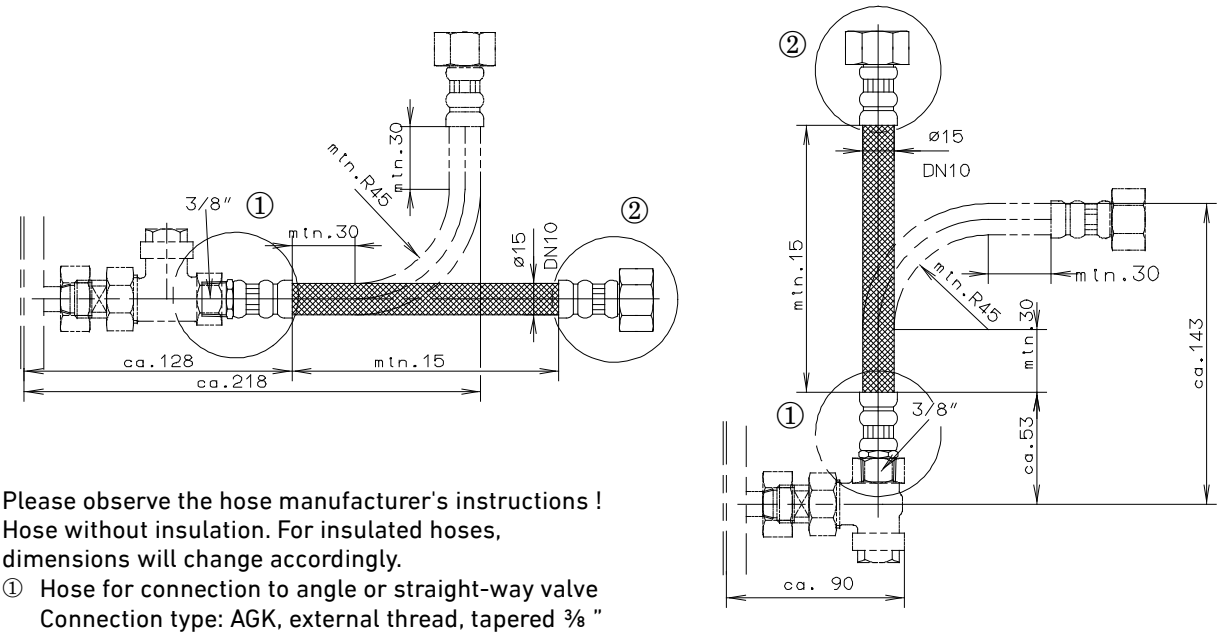
Execute the heat exchanger connection as follows:

- Vertical heat exchangers: water supply below
  water return above
- Horizontal heat exchangers: unit's front side:
  water supply
  unit's back side:
  water return

Translation of Original Installation/Operating/Maintenance Instructions
Induction units HFG, installation in sills

Continuation 5.3 Water connections

Examples for water connections using angle or straight-way valves and flexible hoses

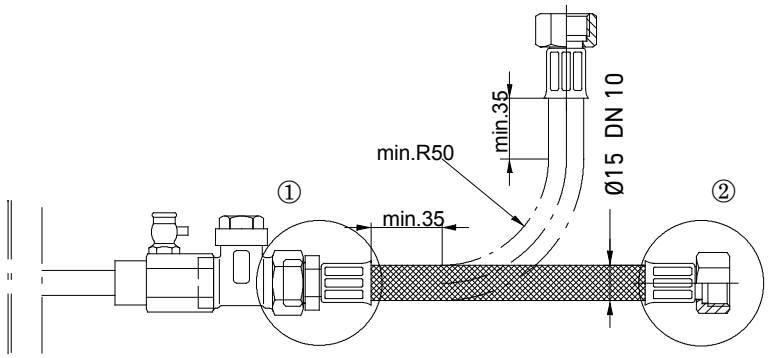


Please observe the hose manufacturer's instructions !
Hose without insulation. For insulated hoses,
dimensions will change accordingly.

① Hose for connection to angle or straight-way valve
Connection type: AGK, external thread, tapered ⅜ "

② Special connections (see above)
Thread diameter to customer requirement (or standard ⅜ ")

Example for water connections using transitions, straight-way valves and flexible hose



Please observe the hose manufacturer's instructions !
Hose without insulation. For insulated hoses, dimensions will change accordingly.

① Hose for connection to angle or straight-way valve
Connection type: AGK, external thread, tapered ½ "

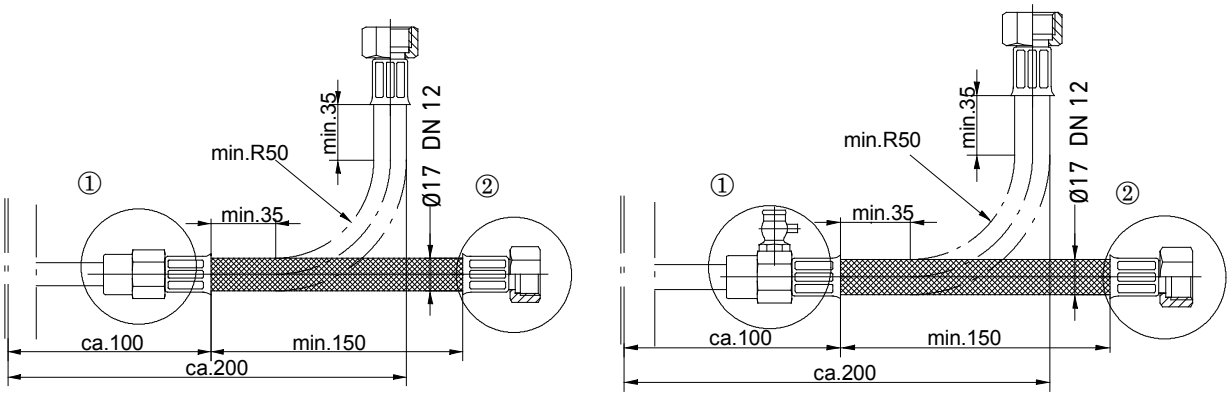
② Different hose connections (see above)
Thread diameter acc. to customer requirements or standard ½ "

Translation of Original Installation/Operating/Maintenance Instructions
Induction units HFG, installation in sills

Continuation 5.3 Water connections

Examples for water connectionsmit quick connection to bare pipe heat exchanger

Quick coupling connection to heat exchanger

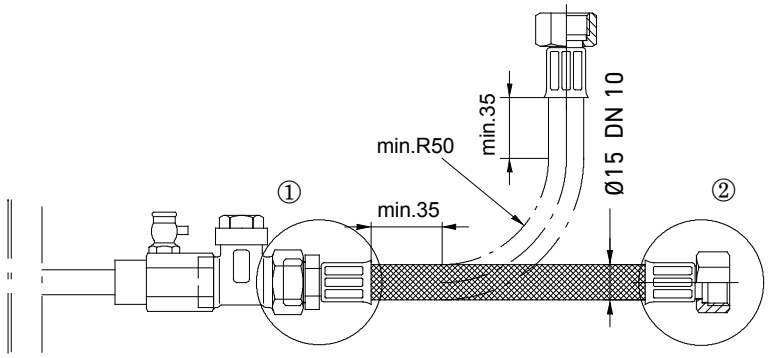


Please observe the hose manufacturer's instructions !
Hose without insulation. For insulated hoses, dimensions will change accordingly.
(10 mm Armaflex insulation)

① Hose for connection to LTG bare pipe heat exchangers
Connection types (see page 37): SK
SK + Eh

② Different hose connections (see page 37)
Thread diameter acc. to customer requirements or standard ½ "

Example for water connections using transitions, straight-way valves and flexible hose



Please observe the hose manufacturer's instructions !
Hose without insulation. For insulated hoses, dimensions will change accordingly.

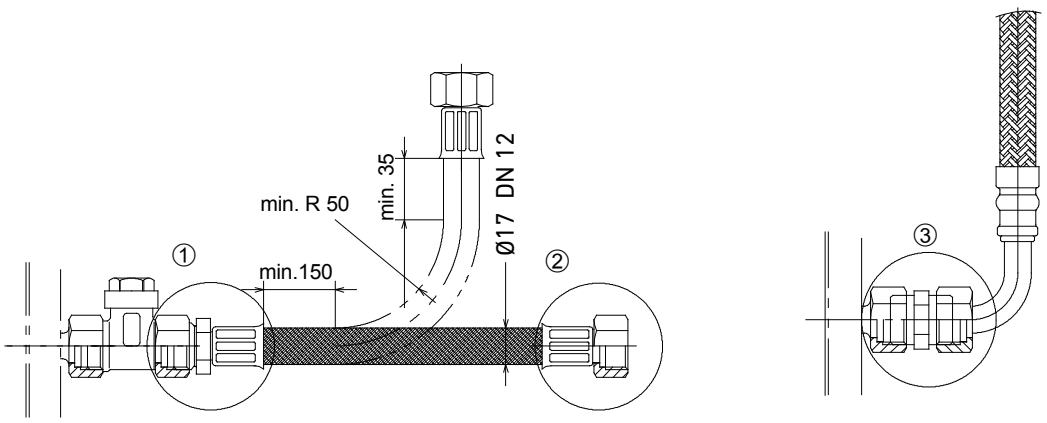
① Hose for connection to angle or straight-way valve
Connection type: AGK, external thread, tapered ½ "

② Different hose connections (see above)
Thread diameter acc. to customer requirements or standard ½ "

Translation of Original Installation/Operating/Maintenance Instructions
Induction units HFG, installation in sills

Continuation 5.3 Water connections

Example for water connection using valve and flexible hose (straight and 90° variant)



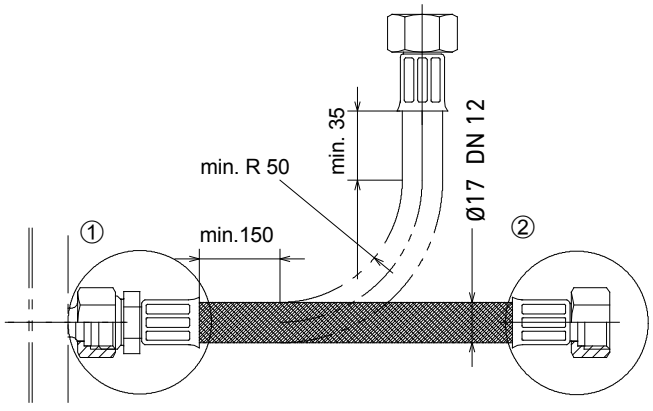
Hose without insulation. For insulated hoses, dimensions will change accordingly.
(10 mm Armaflex insulation)

① Hose for connection to angle or straight-way valve,
Connection type AGK, external thread, tapered 1/2"

② Different hose connections, thread diameter acc. to customer requirements or standard 1/2"

③ Connection for direct screwing into the heat exchanger in case of angle connection,
Connection type: double nipple 1/2"-1/2"; UFD hose connection, 1/2" flat seal union nut

Example for water connection for direct screwing into the heat exchanger



Hose without insulation. For insulated hoses, dimensions will change accordingly.

① Connection for direct screwing into the heat exchanger
Connection type: AGK, external thread, tapered 1/2"

② Different hose connections, thread diameter acc. to customer requirements or standard 1/2"

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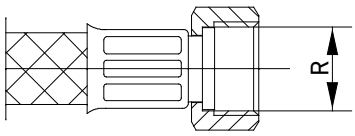
Induction units HFG, installation in sills

Continuation 5.3 Water connections

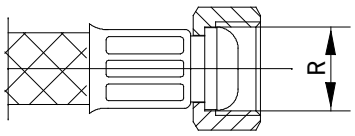
Water connection variants

If required, with insulated hose, 9 mm Armaflex® (standard)

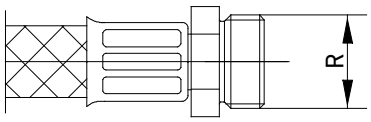
ÜFD
union nut, flat seal
R: ½ " or ¾ "



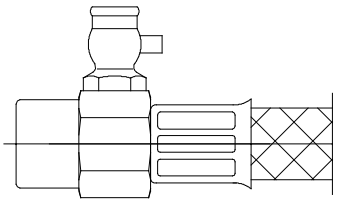
ÜKD
union nut, tapered seal
R: ½ " or ¾ "



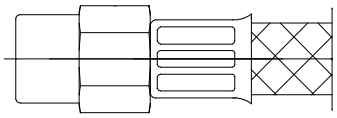
AGK
union nut, tapered
R: ⅜ " or ½ "



SK + Eh
quick coupling 12 mm
connection to heat exchanger
with small air-drain valve ⅛ "



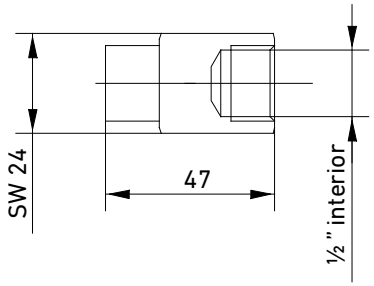
SK
quick coupling 12 mm
connection to heat exchanger



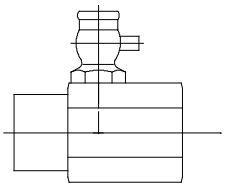
Transitions

Direct transition from bare pipe connection to thread (1/2" interior)

VSXG 9/2



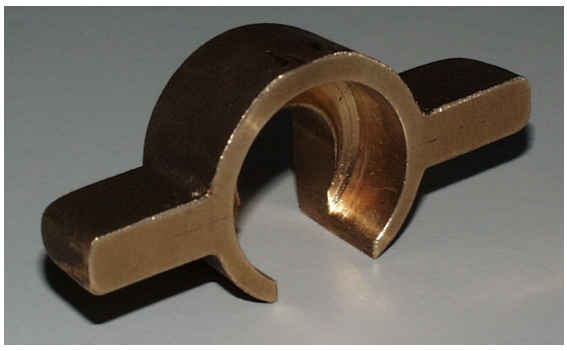
VSXG 10/2 EH (with ventilation)



wrench width 24
on request with small air-drain valve ⅛ "

Special tool for quick coupling removal

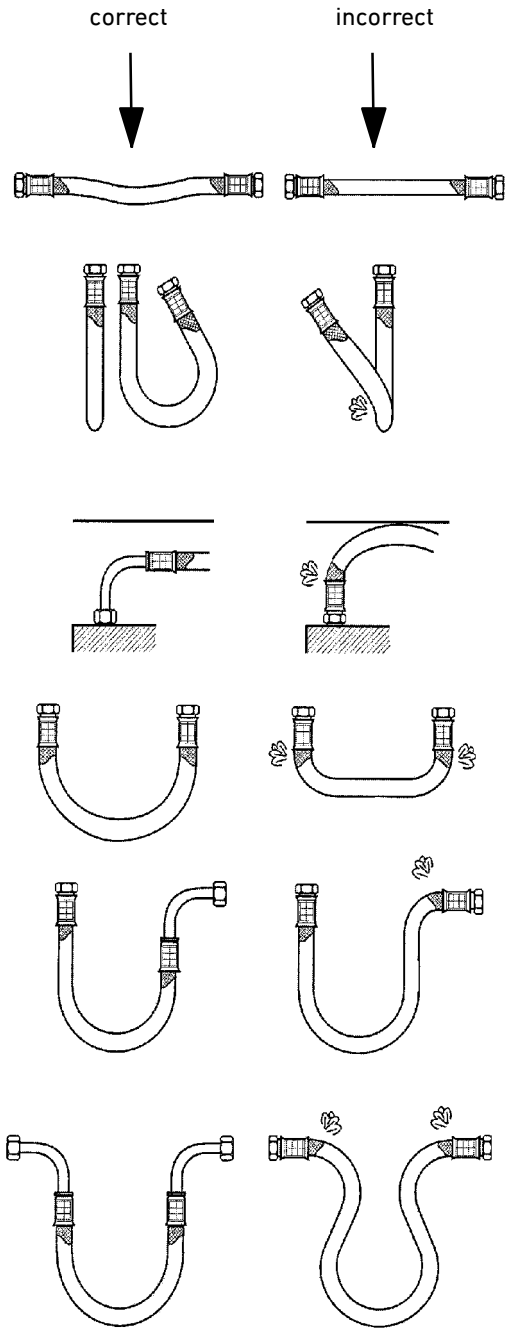
To remove the quick coupling a special tool is required. Each delivery of hoses/transitions is accompanied by an adequate number of these tools.
The tool is simply positioned on the 12 mm pipe and the quick coupling to easily remove the latter.



5.3.1 Instructions for installation of water connections using flexible hoses

Warranty will only apply if the following instructions are observed and if installation is performed in compliance with DIN-EN regulations.

In particular, corrosive, electrochemical, and bacteriological charges are to be excluded taking appropriate preventive measures.



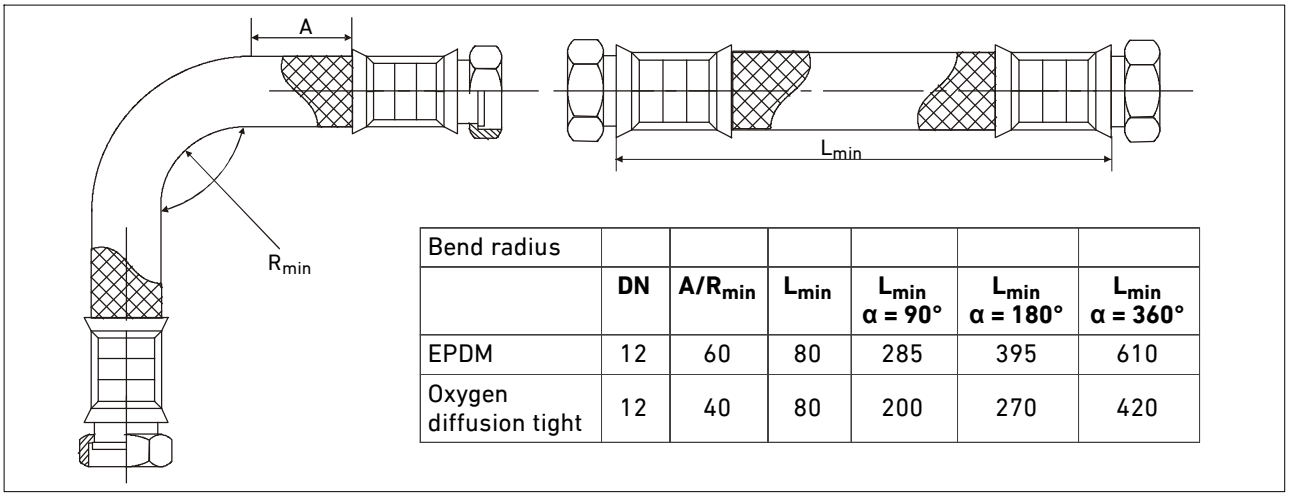
- Pressure and exposition to heat may result in slight elongation of the hose.
  Therefore, newly placed hoses must consider such potential elongation.
- Do not fall below the admissible bending radius R_{min} (chart), neither during transport, nor during installation or when installed.
  If it should turn out impossible to keep the admissible bending radius, choose a different installation type.
- For minimum length see chart below.
  If the hose is being placed by bending it, check whether there is sufficient hose length to allow for an open bow in order to avoid kinking and destruction of the hose at the connecting points.
- Absolutely avoid distorting or kinking the flexible connection.
- Do not subject the hose to any tensile or pressure loads applied from outside, neither during installation nor operation.
- Do not retighten rigid connections (outer thread) after fixing the second connection since this might result in distortion of or damage to the hose.
- In general, tightness of the connection (hose/connector) is the responsibility of the technician performing the installation.
- Any sealing material included in the delivery is to be verified by the technician for its suitability since the hose manufacturer has no information about the material or geometry of the connections.

Translation of Original Installation/Operating/Maintenance Instructions
Induction units HFG, installation in sills

Continuation 5.3.1 Instructions for installation of water connections using flexible hoses

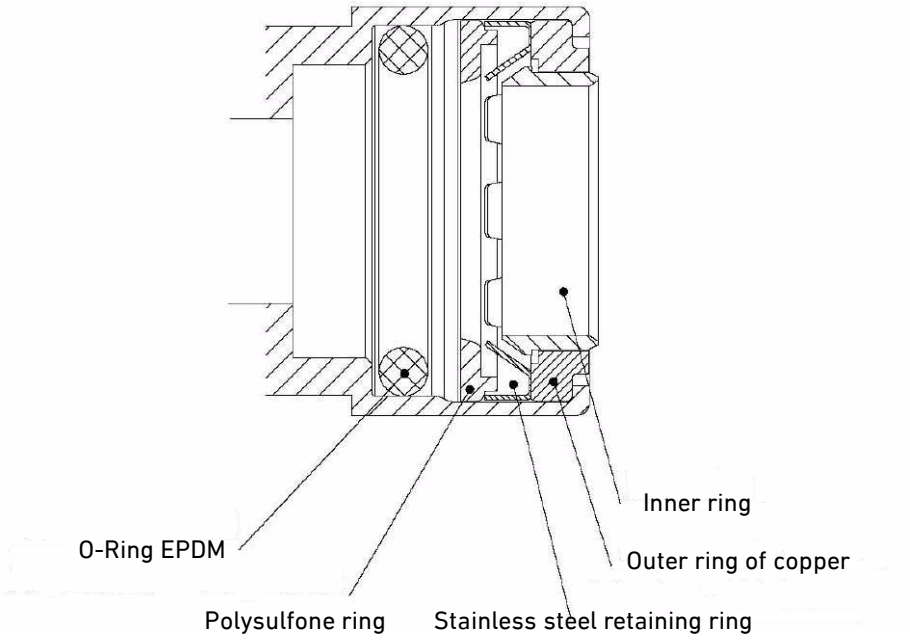
Flexible hoses

Type	EPDM	Oxygen diffusion tight
		Free of halogens, plasticisers and heavy metals. Tested acc. to DIN 4726
Braiding	Stainless steel wire acc. to AISI 304	
Ferrule	Stainless steel acc. to AISI 304	
Temperature range	-20 ... +100 °C	up to +80 °C
Max. operating pressure	15 bar	10 bar
Internal Ğ	12 mm	12 mm



Bend radius						
	DN	**A/R_{min}**	**L_{min}**	**L_{min} α = 90°**	**L_{min} α = 180°**	**L_{min} α = 360°**
EPDM	12	60	80	285	395	610
Oxygen diffusion tight	12	40	80	200	270	420

5.3.2 Plug-in Connection Cuprofit



Tube connection of plug-in fitting and bright copper tube according to EN 1057 and RAL 641/1 or suitable brass or red brass socket.

The used components conform to the KTW-recommendations.
The Cuprofit-connector was tested with Wieland copper pipes according to DVGW Arbeitsblatt W 534. This permanently tight connection is suitable for concealed installation.

Using special tools, this connection may be detached up to three times when not under pressure.
Prior to reconnection, check for undamaged condition of the seal.

Check every installation for tightness when completed.

Due to their specific design, Cuprofit connectors are not suitable for use as grounding conductors for electrical installations and therefore not to be considered in the compensation of potential.

Maximum operating pressure 10 bar / 93°C.
Test pressure 16 bar / 30°C

5.4 Primary air

Connection

All units are provided with primary air sockets with a (normally) 100 mm outer diameter (special versions: DN 80 or 125). Sockets are in general provided on both sides so that your mechanic can change the connection side, if required (floor units: connection on front).

If specifically required, air connection may also be provided on the bottom side.

Connection may be performed using e.g. flex tubes fixed with pipe clips. When installing the flex tubes take special care to ensure free movement of the clamping lever. Absolutely avoid any contact between the clip and the lever.

It is, therefore, recommended to use a thin flexible hose and to install the clip in a way to ensure a 2 mm minimum clearance between clamping screw and clip.

Primary air side pressure balance

One way to adjust the primary air flow rate is the use of a throttling device which may be integrated in the socket as original equipment (KLI 100/1) or retrofitted as an accessory (KLXG 100/1).

If supplied as an accessory (KLXG) it must be installed and will thus increase the constructional length.

Primary air flow control

When dimensioning the units the nozzle pressure and the corresponding flow rate are defined through selection of the nozzles with their specific diffusion section.

The air flow rate meets the calculated data if the set nozzle pressure is present. It is, therefore, highly recommended to random check the unit's nozzle pressure during the adjustment at start-up. The air flow rate cannot be measured directly at the socket. It requires sufficient measuring length. If the expected output is not achieved while water side conditions are all right, it means that something is wrong with the nozzle pressure since the nozzle sections are very precise as lab measurements have documented.

Use a pressure gauge to determine the pressure by inserting a hose into the nozzle.

If subsequently changing the air flow rate is a requirement, nozzles may be replaced (simply remove the plastic nozzles and carefully insert and fix the new nozzles, make sure they are properly seated in the opening.

Translation of Original Installation/Operating/Maintenance Instructions
Induction units HFG, installation in sills

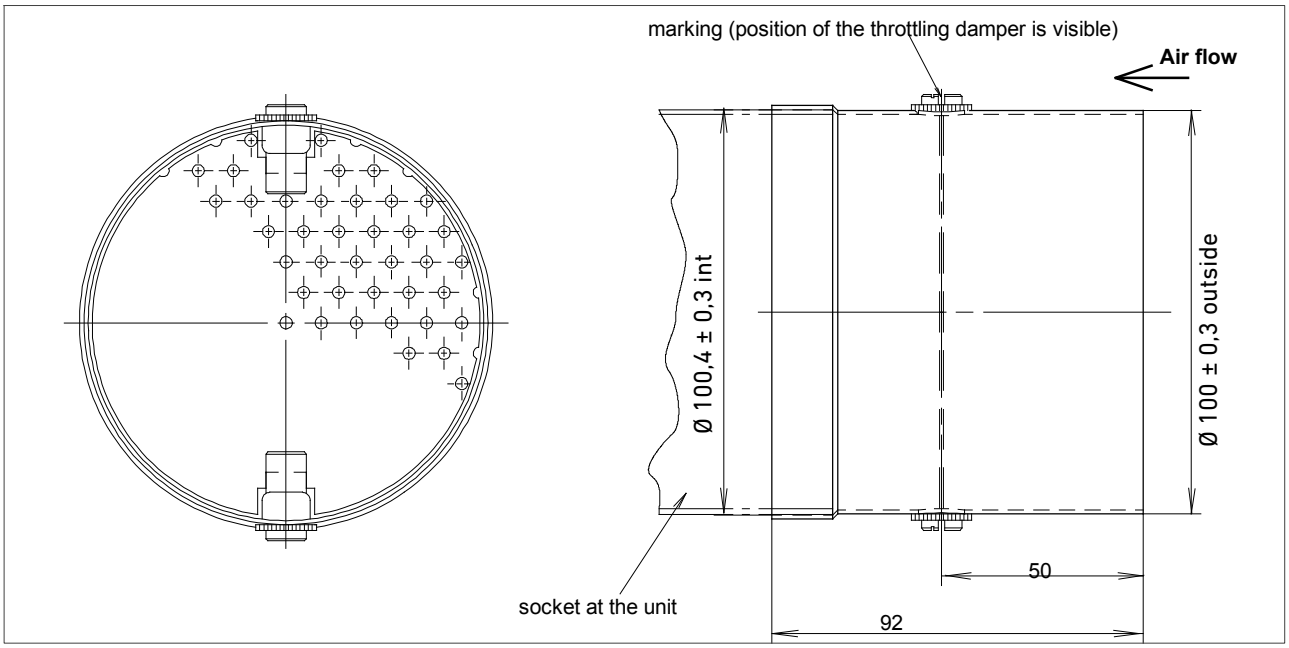
Continuation 5.4 Primary air
Throttling dampers KLX and KLI, for primary air

If required, a throttling damper for adjusting the primary air flow rate may be provided at the inlet socket of the unit (type KLX 100/1, delivered in a separate bag for subsequent installation) or may be factory-installed in the socket (type KLI). Please specify in your order. However, these devices for adjusting the air flow rate should only be used when other means have failed to result in pressure compensation.

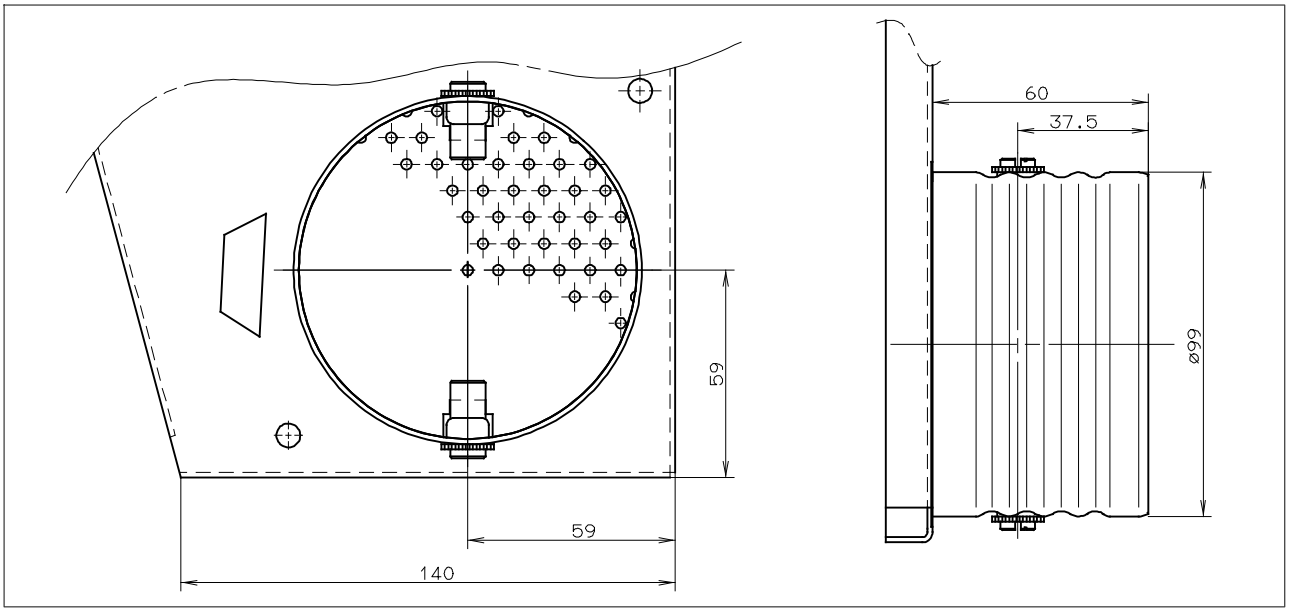
The dimensions of the throttling dampers are given below. The free area is 10.7 %.

The diagram on the next page shows the throttling damper resistance and the sound level area. The noise perceivable in the room may be determined by adding the noise of the air conditioning unit and the noise of the damper, using the graph for level totalling.

Dimensions KLX for subsquent duct installation



Dimensions KLI integrated in the socket



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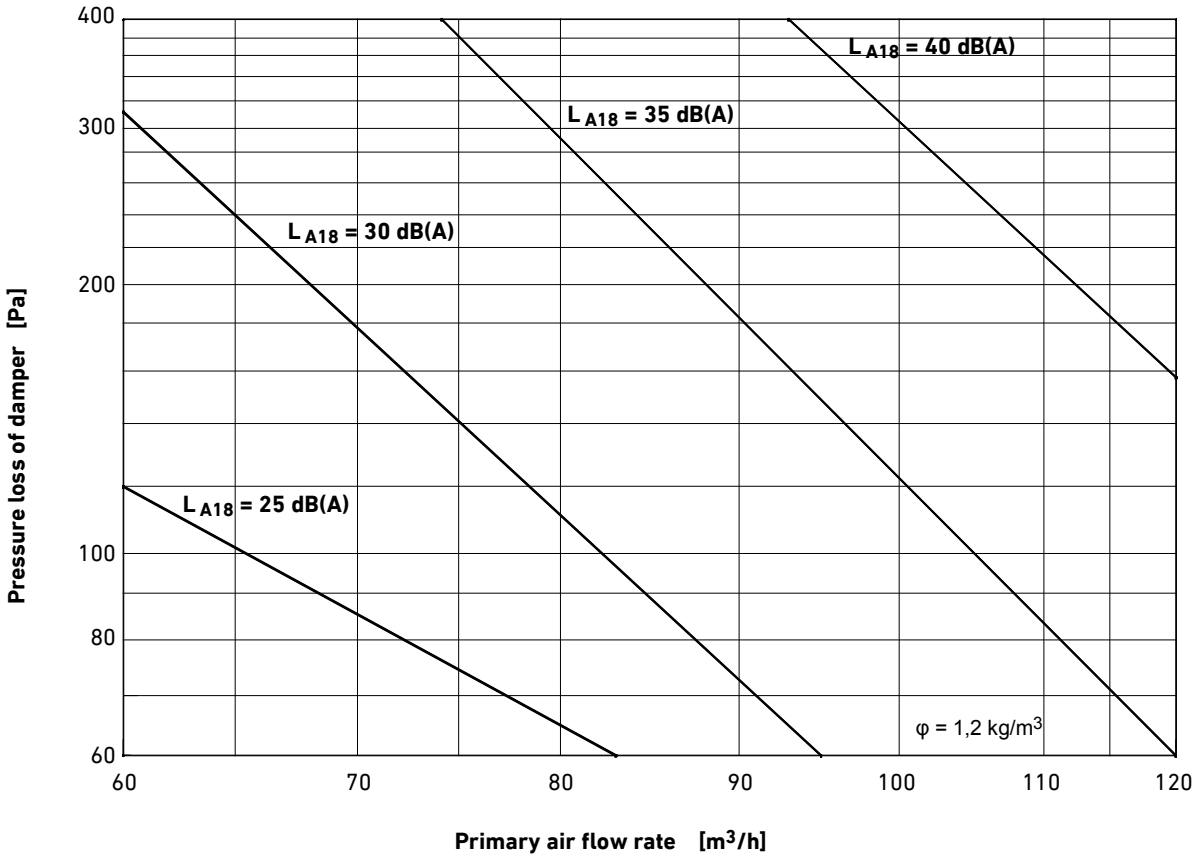
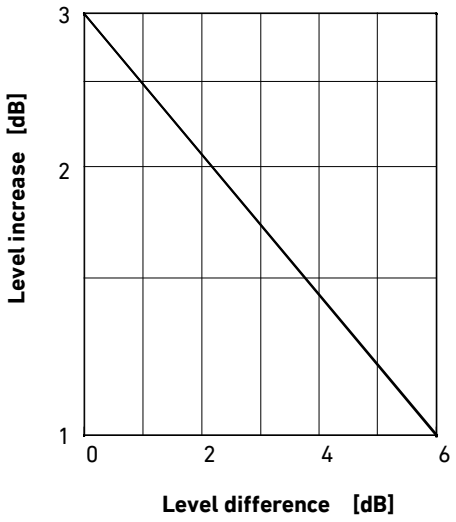
Induction units HFG, installation in sills

Continuation 5.4 primary air

Generated sound level of damper at room absorption 18 m² Sabine



Level totalling



Generated sound level of damper at room absorption

5.5 Condensate connection

Remove the condensate drainage plugs before connecting the condensate lines

Condensate formation occurs when the cold water supply temperature is below the ambient air dew point temperature. LTG induction units have not been designed for an operation with steady condensate formation which is why special care must be taken when setting the water inlet temperature not to fall below the dew point temperature. If necessary, provide a continuous control of the water temperature based on outside air humidity.
On request, units are available in a special insulated version for condensing operation (please consider when designing and ordering)

In any case, please observe the following:

- **Air conditioning with centralized cooling and dehumidification** (water temperature > 13 °C)

A certain water supply temperature will result in condensate formation since the temperature is below the ambient air dew point. This dew point, however, depends on indoor air humidity. The water supply temperature may be 1...2 K below the dew point of the air since the air temperature on the pipes is higher than the actual water temperature

If rooms are ventilated with a maximum supply air humidity of e.g. 8.5 g/kg L_{tr} the water supply temperature may be lowered to 15 °C without risk of condensate formation.

In case of an increased humidity of the air, there a two solutions:

Case A: Condensate tray not connected (condensate socket closed by plug)

- If outside air humidity is high keep windows closed.
- Alternative: If windows are opened use a window contact with closing/time-delayed opening system.
- Alternative: A central system controls the water supply temperature based on the outside air humidity whenever windows are opened, i.e. in case of a high humidity of the air the water supply temperature is increased. This will, however, reduce the cooling capacity.

Case B: Condensate tray connected

- No need for a window contact or central cold water supply temperature raise in case of high outside air humidity.
- If a short-term increase of the indoor air humidity is probable (unit in the intermediate ceiling above a wet room, e.g. a hotel) it is recommended to provide the tray with a thermal insulation.
- In general, VPI 6022 requirements are to be met with the installation of any condensate drain connection on site.

- **Ventilation without dehumidification or window opening** (water temperature > 16 °C)

In case of a ventilation without dehumidification the water supply temperature must be 16 °_C or up. If the supply air is not dehumidified or the ventilation is realized by opening windows, the air humidity might be very high which is why the following case will have to be considered:

The condensate tray must be connected

- A central cold water control and weather related cold water supply temperature raise is recommended since opening the windows might result in outside air with a high humidity entering the room and the temperature dropping below the air's dew point.

Whatever the case of application, all water carrying pipes and fittings outside the condensate tray's range must be insulated.

If a condensate drainage system is connected there must be sufficient slope and proper drainage of the condensate produced. Condensate trays and the condensate drainage system require cleaning and sanitation checks on a regular basis.

5.6 Check after installation

Mechanical check

Having completed the installation the unit is to be checked for any mechanical damages. Remainders of the packaging material and dust in or on the unit must be removed.

Check the following:

- leakproofness of the water connections (including heat exchanger connections),
- the insulation of all cold water carrying components to the heat exchanger for proper execution
- the condensate drainage (optional) for clear passage and sufficient slope,
- the fixing screws for proper fit,
- the suspension for rigidity and sufficient load-bearing capacity (ceiling units),
- the unit for not contacting the facade and the raw floor except via the seals provided and the supporting feet (floor units),
- the line voltage and frequency to match the data given on the type plate,
- the electrical connections for proper execution and conformity to pertinent regulations,
- proper functioning of the control (optional)
- proper functioning of the motors (actuators)
- the unit's fixation,
- the diffusion area/diffusion grille of the unit to be free of any obstructions,
- proper horizontal alignment, accurate to dimension,
- sufficient water hose lengths and strainless laying,

Check for Media Supply

- Check for proper availability of primary air, cold water, warm water, and electrical power or compressed air for the control.
- Check whether voltage and line frequency comply with the data given on the actuator's type plate. Never operate control devices with inappropriate voltage or frequency since this might result in destruction of the units and put people at risk.

6. First Use

Prior to first use any installation work and all checks must have been completed.

Check for proper water and power supply.

7. Operation, Maintenance and Repair

All units are virtually maintenance free, however certain things should be observed.

Any maintenance and repair work must be performed by skilled staff only.

Before starting any maintenance or repair work the unit is to be completely disconnected from the main power supply!

7.1 Heat Exchanger, water connections, condensate tray

It is recommended to vacuum clean the heat exchanger and the dry condensate tray on a regular basis.

The heat exchanger blades are sharp-edged.
Wear gloves for protection!

Check water connections and heat exchanger for tightness and possible corrosion damages.

If corrosion occurs inside the heat exchangers skilled staff must check the water treatment.

In case of condensation and existing condensate drainage the condensate tray will have to be wet cleaned and checked for contamination on a regular basis as required by VDI 6022.

7.2 Filter

Unit with filter

If a recirculated air filter exists it requires replacement about 2...3 months after first use of the unit. By that time, it will probably be saturated from carpet lints and construction dust residues.
Exact timing is subject to local conditions.

The filter must be replaced on a regular basis, every 6 months to 2 years depending on dust formation.

A 6-month filter change interval will be required if the unit is operated in an environment with heavy dust load, a lot of foot traffic, and only minimum primary air filter quality.

A 2-year filter change interval might be appropriate if the unit is operated under conditions without foot traffic, in a clean environment, and with a very good primary air filter quality.

Continuation 7.2 Filter

Unit without filter

The exchanger(s) is/are to be vacuum cleaned about 2...3 months after their putting into operation. By that time, heat exchangers are usually visibly polluted from carpet lints and construction dust remainders. Exact timing is subject to local conditions.

Heat exchanges will then have to be vacuum cleaned on a regular basis, every 6 months to 2 years depending on dust formation. This gains particular importance considering that condensate formation might result in hard-to-remove dust caking.

A 6-month cleaning interval might be required if the unit is operated in an environment with heavy dust load, a lot of foot traffic, and only minimum primary air filter quality, in case of condensate formation on the cooler even sooner.

A 2-year cleaning interval might be appropriate if the unit is operated under conditions without foot traffic, in a clean environment, with a very good primary air filter quality and without condensate formation on the cooler.

7.3 Two-pipe / four-pipe system

Here a few explanations regarding **two-pipe systems** and **four-pipe systems** for easier understanding:

The **two-pipe unit** has 2 water connections (supply and return) with one heat exchanger for either heating or cooling, or for heating in winter and cooling in summer.

The **four-pipe unit** has 4 water connections (2 each for supply and return, one each for warm water and cold water) with 2 heat exchangers or one heat exchanger with separate water circuits, for heating and cooling.

Units HFG-0 and HFG-S are provided with a control valve (by customer or as accessory) that adjusts the water flow rate running through the heat exchanger and thus the unit output.

7.4 Selecting the room temperature

Set the room temperature controller to the desired value (usually in the range's center). If, after a certain time, you consider this too cold turn the knob in direction of "warmer". If considered too warm, turn the knob in direction of "cooler".

In order to find the right setting meeting your personal needs adjust in small steps and allow sufficient time for walls, ceilings, floors, and furniture to adapt (about 1/2 to 1 hour).

There is a wide variety of temperature selectors with scales in °C, in temperature steps such as 1 to 10, or only "warmer" - "cooler" (+1-, red for warmer, blue for cooler etc.). For more information check with the installation manufacturer.

7.5 Excessive noise and draught

It might occur, especially after cleaning, that the units display increased noise and draught. It means that primary air duct nozzles have loosened or fallen off. Reinstall or replace them. Some units on the same pipe run may be blocked (e.g. polluted nozzles) resulting in the unit being operated with an increased primary air flow rate. In that case have the unit repaired.

7.6 Out-of-servie times

If the primary air system is not to be operated for a longer period of time in summer, shut off the cold water supply to the induction units' heat exchangers to avoid condensate formation, overflow, and thus damages.

7.7 Repair

If the damage is not obviously a mere "damage to the bodywork", e.g. on the condensate tray or outlet, units should be completely replaced and checked by the factory.

First, the unit is to be completely disconnected from the power supply by skilled staff.

The filter in front of the heat exchanger is easy to replace since it is fixed to the unit with a simple adhesive strip.

Replacement of the control unit should be performed by skilled staff only or by the factory.

Replacement of individual components is not recommended since the greater number of settings can only be performed in the factory using special equipment.

7.8. Troubleshooting and corrective action

7.8.1 Room temperature is not achieved

Trouble	Source	Action
No air movement at the unit's outlet grille	No primary air supply	Activate primary air supply unit, check fire protection flaps and, if necessary, open. It is imperative to investigate, find, and remedy the cause for the flaps closing In case of shut-off flaps for entire floors and duct runs, check and, if necessary, open Check control
Unit is heating or cooling, but set temperature is not achieved	Window is open	Close window
No air movement, poor air movement or only perceivable in parts of the diffuser grille	Suction opening or diffuser opening blocked or serverely impeded	Remove objects from diffuser grille and protective grille. Observe a minimum distance of 10 cm in front of the induction unit casing (massive furniture to floor level, boxes etc.)
Water supply lines to the unit and heat exchanger are at room temperature	No cold or hot water supply	Ensure cold and hot water supply, eliminate cold or hot water-related problems, open shut-off valves to supply
No control signal is applied to the (valve) actuator, or it is not the one according to setting (actuator performs wrong or no movement.) Refer to separate instructions for control.	Deficient control	Have unit checked by a specialized technician replacing or repairing broken parts
Only poor air movement perceivable on the induction unit air outlet	Filter or heat exchanger polluted Primary air nozzles polluted and, thus, partly blocked	Replace filter, clean heat exchanger Replace nozzles* or clean, if possible (dust deposits are usually hard to remove which makes replacement, in general, more economical than cleaning). This may be performed through the unit neck without need to remove the induction unit by simply lifting the diffuser grille and the protective grille located underneath. It is imperative to check the filter in the primary air center. Check for existance of a 2-step filtering with the 2nd step meeting at least EU 7, better EU 8 requirements according to DIN 24185, Part 2.

* Order replacement nozzles with LTG Aktiengesellschaft stating the 7-digit LTG order number, unit type, and nozzle assembly.
These data may be taken from the oblong type plate.
Contact LTG Aktiengesellschaft to first check since replacing older nozzles for new ones may not always be possible without certain restrictions.

7.8.2 Condensate formation

LTG induction units are not designed for operation with continuous condensate formation.
For a short-term condensate formation, units are provided with a condensate tray underneath the cooler which may also be connected to a drainage system. In case this condensate tray is not connected to a drainage system it may serve for short-term collection of condensate which will again evaporate from the tray. LTG Aktiengesellschaft does not recommend units without condensate drainage system unless either the windows cannot be opened or, in case the windows can be opened, all induction units of the corresponding room are automatically water-side disconnected.

If there is no such device, users must reliably disconnect the induction units water-side whenever windows are opened and if cooling is required since the condensate trays would overflow when the unit is operated with a long-term condensate formation resulting in considerable damages to the building and equipment.

If, during operation, condensate is overflowing close open windows without delay. If all windows were already closed units must be disconnected. Immediately catch any overflown water and remove to minimize potential damages to building and equipment.

Then investigate and remedy the cause of such excessive condensate formation.

Trouble	Source	Action
Increased indoor humidity, increased condensate formation	Window open	Close window, continue unit operation
No air movement at the induction unit's air outlets	Primary air plant failure	Switch unit back on and remove trouble, if any (see specific instructions)
Diffused air temperature at the induction unit diffuser outlets is extraordinarily high, in the primary air center no or too little water precipitation on the cooler	No or too little cooling of the primary air plant, therefore no or too little dehumidification	Check cooling system, remove trouble if any, check shut-off valves and dirt trap in the cold water ducts; if necessary, open valves and clean dirt traps; check control including valves and actuators; if necessary readjust parameter settings; repair/replace broken parts
Increased indoor air humidity perceivable	Considerable moisture sources in the room	Remove moisture sources If impossible, temporarily shut off unit water-side
Measured cold water temperature is lower than the setting (ask technician for setting). Therefore, diffused air temperature is extremely low	Cold water temperature to the units is too low	Check cold water control including valve and actuator. If necessary, restore proper settings, replace or repair broken parts
Part of the condensate trays is overflowing despite of drainage system	Condensate drainage system clogged	Remove clogging In the meantime, increase inlet temperature or shut off unit

7.9 Maintenance intervals of the individual components

Component	Activity	To perform	
		Months	As required
Unit in general	Check for pollution, damage, corrosion, correct positioning and fixation	**12**	
Filter	Check for pollution, damage and odours	**3**	
	Check the filter layer for tightness	**3**	
	Replace filter medium (document)	**12 ***	**x**
	Check for hygienic condition	**3**	
Heat exchanger	Check for pollution, damage and corrosion	**6**	
	Clean to maintain function	**6**	**x**
	Check water connections	**12**	
	Check proper function of water entry and return	**12**	
	Vent		**x**
	Check for hygienic condition	**6**	
Dirt and condensate tray	Check for pollution, damage, leak tightness and corrosion	**3**	
	Clean to maintain function		**x**
	Check for hygienic condition	**6**	
	Check heat insulation for damage (visual check)		**x**
	Check drain and siphon for proper functioning		**x**

* Shorten replacement intervals if outside or recirculating air are extremely dust loaded.

VDI 6022 sanitation requirements must be observed.

8. Spare parts

The following spare parts are available and may be ordered from LTG Aktiengesellschaft stating unit type and description.

For heat exchangers please state connection (3/8", 1/2", smooth copper tube)

Qty.	Ident-No.	Denomination	Minimum order quantity
		Base unit	
1	20280	Velcro 8 x 10 Nr. 151 - autoadhesive roll about 100 m	10
1	206179	Plug-in clips SCO Nr. 5049	20
1	480765	Rubber buffer ANG 15/1	20
3	18871	Filter mats in rolls of about 40 m for HFG-0	1
1		Heat exchanger HFG 4-pipe, size 500	1
1		Heat exchanger HFG 4-pipe, size 630	1
1		Heat exchanger HFG 4-pipe, size 800	1
1		Heat exchanger HFG 4-pipe, size 1000	1
1		Heat exchanger HFG 4-pipe, size 1250	1
1	116906	Condensate receiver, galvanized, without drainage, size 500	10
1	116914	Condensate receiver, galvanized, without drainage, size 630	10
1	440066	Condensate receiver, galvanized, without drainage, size 800	10
1	500878	Condensate receiver, galvanized, without drainage, size 1000	10
1	531170	Condensate receiver, galvanized, without drainage, size 1250	10
1		Condensate receiver with drainage, lateral or bottom. size 500...250	
1	489064	Plug for condensate receiver, accessory: sealing strip	20
1	484460	Protective grille for size 500	10
1	484478	Protective grille for size 630	10
1	484486	Protective grille for size 800	10
1	484494	Protective grille for size 1000	10
1	484501	Protective grille for size 1250	10
1	912502	Injection nozzles, plastic, black	20
1	912495	Injection nozzles, plastic, grey	20
1	912487	Injection nozzles, plastic, green	20
1	487365	Throttling damper KLXG 100/1	5

9. Decommissioning, disposal

When the fan is taken out of service, is no longer used and is disposed of as waste, the following must be complied with:

- all steel parts are waste for recycling
- all plastic parts are waste for recycling
- all secondary substances and lubricants must be disposed of in accordance with the provisions of the EWC (European Waste Catalogue) classification.
- Sound absorbers are waste for recycling
- Heat exhangers are waste for recycling (copper, aluminium)

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