Goedhart VCI

Industrial air coolers for cooling & freezing applications
Cu/Al

R404A - CO_2

engineering for a better world

GEA Heat Exchangers

Goedhart VCI

The extensive range Goedhart VCI single discharge ceiling mounted industrial air coolers are available with capacities between 2,8 and 264,4 kW. The Goedhart VCI air coolers are suitable for cooling and freezing applications and with a wide variety of accessories and options available. The coil block is standard build from aluminium end plates, copper tubes and aluminium fins The fans are arranged for blow-through air configuration for the Goedhart VCI-B and draw-through for the Goedhart VCI-Z (please state which is required when ordering).. The modular design incorporates 5 different sizes of fan, with model options of up to 8 fans per cooler.

Type description

Goedhart VCI-B 62567

B=blow through
Z=draw through

Number of rows deep
Number of fans
Fan diameter [cm]
Fins spacing [mm]

Coil block

- Tube pitch : 50x50 mm straight
- Fin spacing : 4, 6, 7, 8, 10 and 12 mm
- Material : 15mm o.d copper tube
- : aluminium HT-lamellen
- Optimized cooling circuits
- Standard refrigerant connections are positioned on the left hand side of the unit when looking with the direction of the airflow.
- A good thermal contact is achieved by expansion of the tubes into the fin collars, that are also utilised as spacers to provide a constant distance between the fins.
- All coolers are pressure tested to 30 bar (lower by cooling mediums) and are supplied with a light over pressure charge of dry nitrogen.
- Suitable for all known refrigerants and coolants, with the exception of NH3.

Casing

- Construction for ceiling mounting
- The flush mounting protects against and prevents accumulation of dust and dirt.
- Casing material of galvanized sheet steel
- Finishing is standard white epoxy spray (RAL 9003)
- Bend/header projection by end covers, easy removed for maintenance
- Defrost by hot gas spiral or electric defrost elements will be fixed to the bottom side of the coil.
- Stainless steel fasteners

Capacity

The listed nominal cooling capacities are are based on R404A, DT1, RH of 85% and 4 pole 3 phase fans connected in Δ.

Influence of Coating on Capacity
The use of coated fins, or of a fully coated coil will result in a capacity decrease of approximately 3%

Capacity optimisation
Since Goedhart tries to limit stock products, we are capable of optimising the circuitry of our evaporators. In order to do this, the following information is needed :

- Design capacity
- Air volume
- Refrigerant
- Air on temperature
- Evaporating temperature
- Liquid temperature before expansion valve.

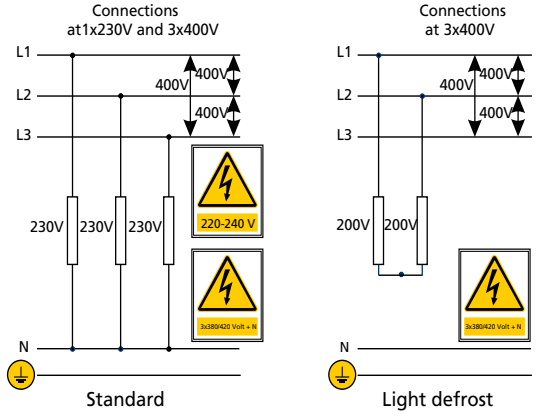
Sound data

The mean sound pressure (LpA @ 3m ± 2 dB (A)) each air cooler is a calculated indication value according to the EN13487 standard parallel pipe. Goedhart uses the fan manufacturer's sound power level (LwA) at the inlet side of the fan. Changes to or by the fan or the product, affect the sound, in these cases, consult the manufacturer for the new indication value. In critical sound requirements, we advise you to consult an expert.

Defrostsystem:

For room temperatures where ice build-up can be expected and where the coilblock can not be defrosted by the room air, electric or hotgas defrost is necessary.
With low temperatures we also advise fan periphery heating.

Electrical defrost:
The Goedhart VRB and VRZ can be provided with electric defrost. A distinction can be made here between heavy defrost loads for low temperatures and light defrost load for higher temperatures (room temperature approximately 0 °C). The stainless steel heater elements are fitted in the coilblock in tubes, which forms a high conductive medium between the heaters and the fins. The driptray heaters are fitted to the underside of the aluminium inner tray with aluminium profiles.The heater elements which are rated for 220/240 V are connected for supply 380/415 V with neutral. The coilblock elements are removable from the end opposite to the refrigerant connections, whilst the tray heater elements can be removed once the outer tray has been taken off.



Hot gas defrost:

The coil block is suited for hot gas defrost (hot gas supply through the suction header). At an extra price the driptray can be provided with a hotgas/cooling medium spiral. The stainless steel tubes of the hotgas spiral are enclosed in special aluminium profiles that are rigidly secured to the underside of the aluminium inner tray, thus providing a good bond for maximum heat transfer.Just as with electric defrost a distinction is made with hotgas defrost between light defrost load (room temperature about 0°C) and heavy defrost load.

Accessories:

Standard accessories for the Goedhart VCI air coolers are:

- blow-through / draw-through air configuration
- Electric defrost, hot gas defrost and/or water defrost
- Fan periphery heating
- Hinged drip tray.
- Insulated drip tray
- Insulated hygienic polyester drip tray
- Goedhart VCI-Z supplied with bellmouth connection per fan for a longer air throw
- Goedhart VCI-B supplied with air diffusor for a longer air throw
- Goedhart VCI-B supplied with air diffusor with air operated damper to increase defrost efficiency (airvolume reduced to approx. 90% and capacity reduced to approx. 95%)

The accessories are included in the price list.

Optional extras:

Various optional extras for the VCI are available, price and delivery upon request:

- Isulation disks
- Feet for floor mounting
- Coating of the coil block
- Fan hood
- Hinged fan plates
- 60 Hz motors
- EC-fans
- Single phase motors
- Coolants (glycol, water, etc.)
- Pump system
- Other casing materials
- Other fin spacings
- Sea water resistant fins

Mounting and Maintenance

Goedhart VCI is delivered on a wooden frame. When on the frame, Goedhart VCI can be handled by forklift truck, which makes positioning and installation simple. Refer to our maintenance and installation manual.

Fans

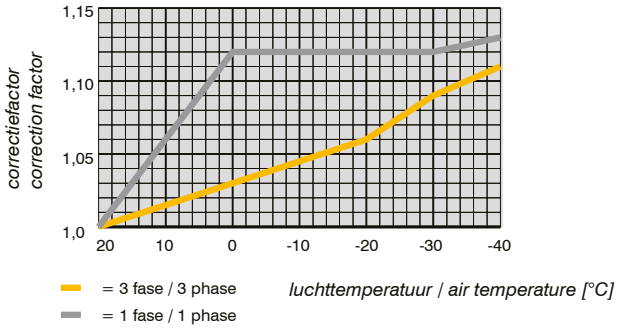
Because of the flexible construction of the Goedhart VCI air cooler, in principle it is possible to deliver with different fans. GEA Goedhart selected a standard fan range of Ziehl Abegg (we reserve the right to alter the manufacturer) which fit perfectly on the Goedhart VCI air coolers. The fans can be supplied in both blow-through and draw-through executions. Against an extra price and with extra delivery times stainless steel guards and EC-fans are available.

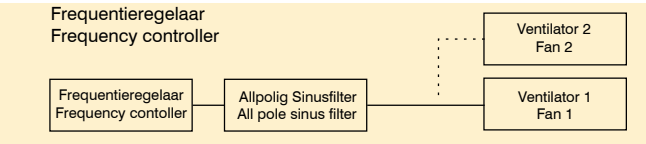
Execution
The fans meet the ErP directive. The fans have very good aerodynamic features because of the special impeller geometry. This special impeller geometry gives the fan a low noise level and an high efficiency.

1x230V fans are suitable for a room temperature till -25°C. 3x400V fans are suitable for a room temperature till -40°C. When lower room temperatures are desired, special fans are need.

Tension : 3x400V-50Hz-3 phase
: 1x230V-50Hz-1 phase
(60Hz execution on request)
Protection class : IP44 / IP54
Color : RAL9005 (black)
Speed controlling : - 3 Phase motors are suitable for 2-speed regulation by Δ-Y reconnection.
- 3 Phase motors are suitable for frequency controller with all-pole sinus filter.
- 1 Phase motors are suitable for phase control and transformator.

The motors are standard executed with a thermo contact (TB) and must be connected to prevent motor damages. The maximum allowable working data in the table and on the name plate of the fans are to operate in an air temperature of 20 °C (air density of ρ = 1,2 kg/m³). For air temperatures lower then +20 °C, the current amperage can be calculated by using the diagram multiplication factor, suitable thermal overloads can then be selected.





Three phase - 50 Hz

Fan type	Tension	Δ				Y				
		Speed	Input	FLC	Sound power indication each fan LwA (+/-2dB(A))	Seed	Input	FLC	Sound power indication each fan LwA (+/-2dB(A))	Wiring diagram blow-through/ draw-trhough
	V	min⁻¹	Watt	A	dB(A)	min⁻¹	Watt	A	dB(A)	
4 pole (n=1500 min⁻¹ nom.)										
FN040	3x400/690	1370	230	0.44	76	1110	170	0.27	70,5	108B/108A
FN045	3x400/690	1250	350	0.64	78	950	220	0.35	70	108B/108A
FN050	3x400/690	1330	830	1.45	81	940	550	0.97	75	108B/108A
FN056	3x400/690	1280	1050	2.20	85	920	580	1.10	76	108B/108A
FE063	3x400/690	1330	1450	2.60	89	1080	980	1.60	84	108B/108A
6 pole (n=1000 min⁻¹ nom.)										
FN045	3x400/690	860	180	0.39	67	640	100	0.19	61	108B/108A
FN050	3x400/690	870	290	0.74	72	590	150	0.36	64	108B/108A
FN056	3x400/690	870	340	0.70	73	630	210	0.38	65	108B/108A
FN063	3x400/690	900	630	1.25	74	720	440	0.73	69	108B/108A

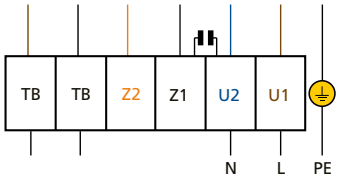
Single phase - 50 Hz

Fan type	Speed	Input	FLC	Sound power indication each fan LwA (+/-2dB(A))	Wiring diagram blow-through/ draw-trhough
	min⁻¹	Watt	A	dB(A)	
4 pole (n=1500 min⁻¹ nom.)					
FN040	1350	240	1.10	76	104B/104A
FN045	1290	390	1.75	80	104B/104A
FN050	1230	750	3.35	81,5	104B/104A
6 pole (n=1000 min⁻¹ nom.)					
FN040	950	130	0.58	68	104B/104A
FN045	860	180	0.82	68,5	104B/104A
FN050	910	300	1.30	71,5	104B/104A

Wiring diagram fans for blow-through air coolers

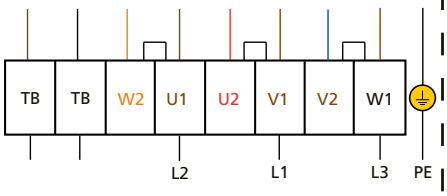
Ziehl Abegg 1x230V-50Hz (104XB)

U1 =bruin
U2 =blauw
Z1 =zwart
Z2 =oranje
TB =wit



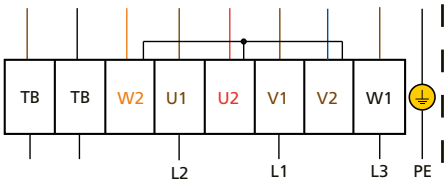
Ziehl Abegg 3x400V (Δ)-50Hz (108XB)

U1 =bruin
V1 =blauw
W1=zwart
U2 =rood
V2 =grijs
W2=oranje
TB =wit



Ziehl Abegg 3x400V (Y)-50Hz (108XB)

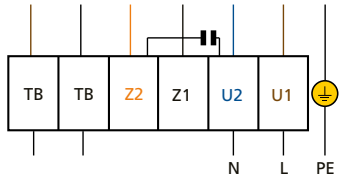
U1 =bruin
V1 =blauw
W1=zwart
U2 =rood
V2 =grijs
W2=oranje
TB =wit



Wiring diagram fans for draw-through air coolers

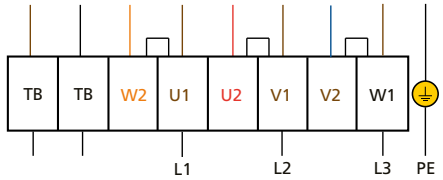
Ziehl Abegg 1x230V-50Hz (104XA)

U1 =bruin
U2 =blauw
Z1 =zwart
Z2 =oranje
TB =wit



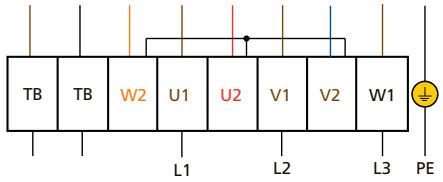
Ziehl Abegg 3x400V (Δ)-50Hz (108XA)

U1 =bruin
V1 =blauw
W1=zwart
U2 =rood
V2 =grijs
W2=oranje
TB =wit



Ziehl Abegg 3x400V (Y)-50Hz (108XA)

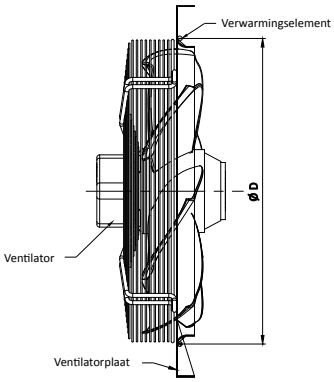
U1 =bruin
V1 =blauw
W1=zwart
U2 =rood
V2 =grijs
W2=oranje
TB =wit

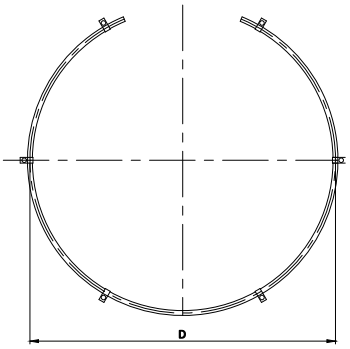


Fan heating

To prevent the freezing of the impeller of the fan during the defrost cyclus of the air cooler, a fan heater can be used.

Fan diameter	Diameter element	Power (230V)
mm	D in mm	kW
400	435	0,50
450	485	0,63
500	535	0,63
560	595	0,76
630	665	0,89





Correction factors

Correction factors DT1 (=air-on)

The capacities are based on R-404A direct expansion, DT1 and a RH of 85 %. DT1 is the difference between air-on temperature and the evaporation temperature of the cooler. The evaporation temperature is the saturate temperature corresponding to the pressure at the suction outlet of the cooler.

The nominal capacities: (SC1) t_o=0°C and DT1=10K
(SC2) t_o=-8°C and DT1 = 8K
(SC3) t_o=-25°C and DT1=7K

Correction factors for various air-on temperatures and temperature differences (DT1) are as indicated in the table below. The requested capacity must be multiplied by a correction factor from the table. so that a cooler with the resulting nominal capacity can be chosen from the selection tables.

Q nominal = factor x Q requested

Cooling

DT1	SC1-DT1 =10K-Air-on=10°C (0/+10)									
	Evaporation temperature (°C)									
K	+7	+6	+5	+4	+3	+2	+1	0	-1	-2
6	1,87	1,87	1,87	1,88	1,88	1,89	1,89	1,89	1,89	1,90
7	1,53	1,53	1,54	1,54	1,54	1,55	1,55	1,55	1,55	1,56
8	1,28	1,28	1,28	1,29	1,29	1,30	1,30	1,30	1,30	1,31
9	1,11	1,11	1,11	1,12	1,12	1,13	1,13	1,13	1,13	1,14
10	0,98	0,98	0,98	0,99	0,99	0,99	1,00	1,00	1,00	1,01
11	0,89	0,89	0,89	0,90	0,90	0,91	0,91	0,91	0,91	0,92
12	0,78	0,79	0,79	0,79	0,80	0,80	0,80	0,80	0,80	0,81

Cooling / Freezing

DT1	SC2-DT1 =8K-Air-on=0°C (-8/0)									
	Evaporation temperature (°C)									
K	-3	-4	-5	-6	-7	-8	-9	-10	-11	-12
6	1,32	1,34	1,39	1,43	1,46	1,46	1,47	1,47	1,48	1,49
7	1,05	1,08	1,12	1,15	1,18	1,19	1,19	1,20	1,20	1,21
8	0,86	0,88	0,91	0,94	0,97	1,00	1,00	1,01	1,01	1,02
9	0,76	0,76	0,78	0,80	0,82	0,86	0,86	0,87	0,87	0,88
10	0,66	0,67	0,69	0,71	0,73	0,74	0,74	0,75	0,75	0,76
11	0,58	0,59	0,59	0,60	0,62	0,64	0,64	0,65	0,66	0,67
12	0,55	0,54	0,54	0,54	0,55	0,55	0,56	0,57	0,58	0,59

Freezing

DT1	SC3-DT1 =7K-Air-on=-18°C (-25/-18)									
	Evaporation temperature (°C)									
K	-21	-22	-23	-24	-25	-26	-27	-28	-29	-30
6	1,20	1,20	1,21	1,21	1,22	1,22	1,23	1,23	1,24	1,24
7	0,99	0,99	0,99	1,00	1,00	1,00	1,01	1,01	1,02	1,02
8	0,83	0,84	0,84	0,84	0,85	0,85	0,85	0,85	0,86	0,86
9	0,72	0,72	0,72	0,73	0,73	0,73	0,73	0,74	0,74	0,74
10	0,63	0,63	0,63	0,64	0,64	0,64	0,64	0,65	0,65	0,65
11	0,56	0,56	0,56	0,57	0,57	0,57	0,50	0,58	0,58	0,58
12	0,50	0,51	0,51	0,51	0,51	0,51	0,52	0,52	0,52	0,52

Calculation example

Fin spacing	: 6 mm	-	DT1 = +3- (+10) = 7K
Required capacity	: 30 kW	-	Correction factor = 1,54
Air-on temperature	: +10 °C	-	Multiply required capacity
Refrigeration temp.	: +3 °C		with correction factor.
Condition	: SC1		30 kW x 1,54 = 46,2 kW
Refrigerant	: R-404A	-	Select air cooler from the table
			(SC1 type VCI-B 63506=47,5 kW)

Attention!

Moisture carry over from the coil block:

When you select VCI-B with a Ø500 mm fan in an application with a high relative humidity and/or defrost with room air, Goedhart advises the use of a fan with a low pitch angle or the draw-through execution VCI-Z. Thus, you will avoid the risk of moisture carry over from the coil block. The fan with a low pitch angle give a reducing of the capacity of approx. 5% and a reduction of the air volume of approx. 10%.

Air throw (only draw-through execution)**

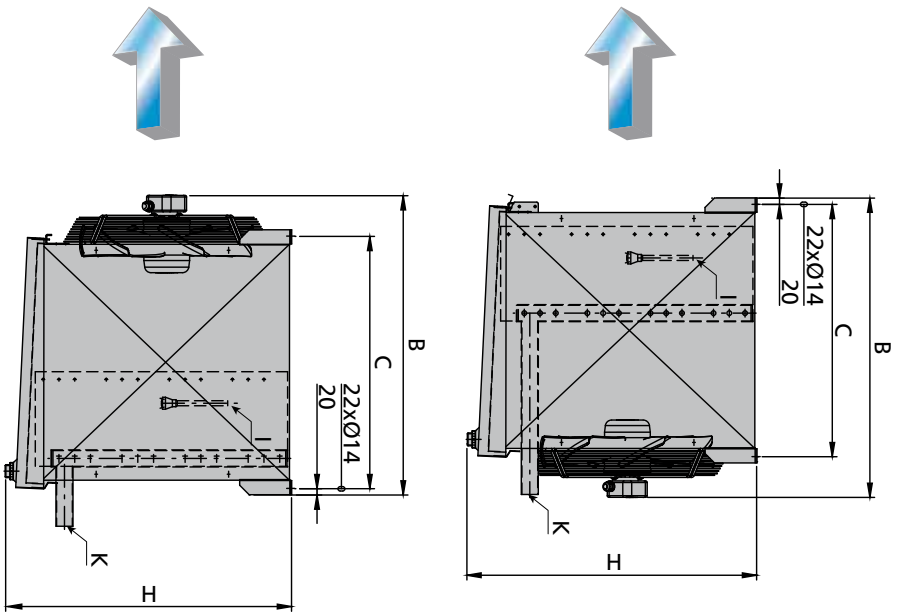
The air throw mentioned in the selection table indicated with ** is based on an air temperature of 20°C, blowing under a flat ceiling without any obstruction. The height and air circulation fold of the room can influence the air throw. The air speed at the end of the throw-length is 0,25 m/sec

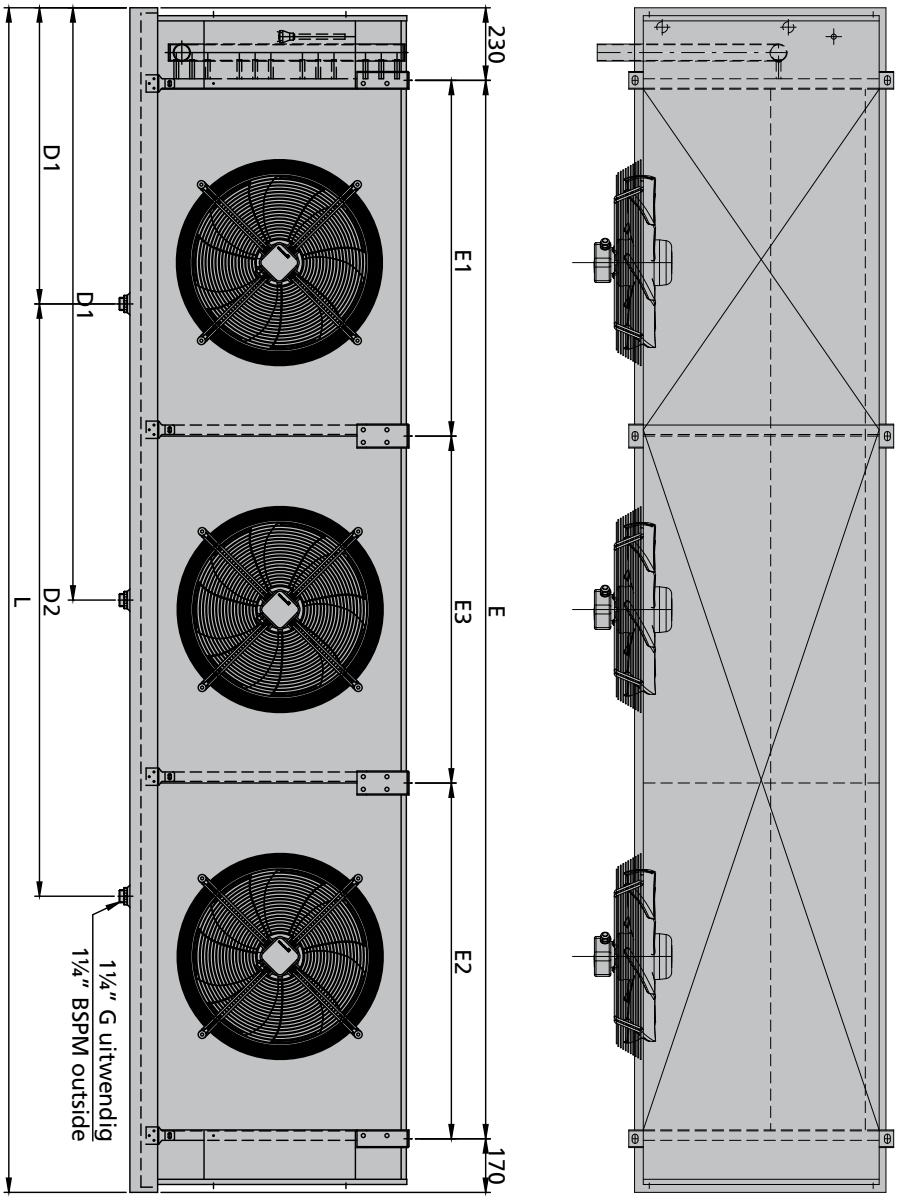
Goedhart VCI 6mm

	Type VCI	3x400V-50H-4pole (1500 min⁻¹ nom.) R404A					Surface	Internal volume	Weight	Dimensions									Connections Refrigerant			Air throw**
		DT1 = 10K (SC1) air on= 0°C (0/+10)	DT1 = 8K (SC2) air on= 0°C (-8/0)	DT1 = 7K (SC3) air on= -18°C (-25/-18)	Air volume	LpA @ 3 m (+/- 2 dB(A))*				L	B	H	C	E E1	E2	E3	D1	D2	In	Out	Hot gas	
		kW	kW	kW	m³/h	dB(A)	m²	dm³	kg	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	m
1x	**4.1.40.6**	6,2	4,3		3323	54,3	26	6	73	1156	640	620	500	756			578		15	15	19	20
	6.1.40.6	8,2	5,5	4,1	3105	54,3	39	9	87	1156	740	620	600	756			578		12	22	19	20
	8.1.40.6	9,5	6,5	4,6	2913	54,3	52	11	103	1156	840	620	700	756			578		12	22	19	20
	4.1.45.6	9,3	6,2		5027	56,2	35	8	87	1256	610	720	500	856			628		12	22	19	22,5
	6.1.45.6	11,6	8,0	5,7	4668	56,2	53	12	105	1256	710	720	600	856			628		12	22	19	22,5
	8.1.45.6	13,9	9,5	6,8	4364	56,2	71	16	125	1256	810	720	700	856			628		12	22	19	22,5
	4.1.50.6	12,5	8,4		7118	59,1	44	10	114	1456	730	720	600	1056			728		12	22	19	25
	6.1.50.6	16,3	11,1	7,9	6714	59,1	66	15	136	1456	830	720	700	1056			728		12	28	19	25
	8.1.50.6	19,1	12,9	9,3	6366	59,1	88	19	159	1456	930	720	800	1056			728		12	28	19	25
	4.1.56.6	17,4	11,3		10108	62,8	65	14	152	1556	830	920	700	1156			778		12	28	19	27,5
	6.1.56.6	23,5	15,9	11,1	9653	62,8	97	21	182	1556	930	920	800	1156			778		16	28	19	27,5
	8.1.56.6	25,1	17,1	12,3	9268	62,8	129	28	212	1556	1030	920	900	1156			778		16	28	19	27,5
	4.1.63.6	23,7	15,9		12567	66,6	88	19	198	1656	845	1120	700	1256			828		16	28	19	27,5
	6.1.63.6	31,0	21,0	15,0	12139	66,6	132	29	235	1656	945	1120	800	1256			828		16	35	19	27,5
	8.1.63.6	36,2	24,6	17,7	11727	66,6	176	38	274	1656	1045	1120	900	1256			828		16	35	19	27,5
2x	**4.2.40.6**	12,9	8,6		6638	57,0	51	11	118	1856	640	620	500	1456			928		12	22	19	20
	6.2.40.6	16,7	11,3	8,1	6200	57,0	77	17	142	1856	740	620	600	1456			928		12	28	19	20
	8.2.40.6	19,1	13,0	9,3	5814	57,0	103	22	168	1856	840	620	700	1456			928		12	28	19	20
	4.2.45.6	19,0	12,7		10044	58,9	71	15	143	2056	610	720	500	1656			1028		12	28	19	22,5
	6.2.45.6	24,0	16,1	11,4	9321	58,9	106	23	175	2056	710	720	600	1656			1028		16	28	19	22,5
	8.2.45.6	27,8	18,9	13,5	8712	58,9	141	30	208	2056	810	720	700	1656			1028		16	35	19	22,5
	4.2.50.6	25,7	17,0		14226	61,7	88	19	193	2456	730	720	600	2056			1228		16	28	19	25
	6.2.50.6	33,4	22,2	15,7	13416	61,7	132	29	232	2456	830	720	700	2056			1228		16	35	35	25
	8.2.50.6	38,6	25,8	18,6	12717	61,7	176	38	271	2456	930	720	800	2056			1228		16	35	35	25
	4.2.56.6	35,0	22,6		20205	65,4	129	28	258	2656	830	920	700	2256			1328		16	35	35	27,5
	6.2.56.6	48,2	32,2	22,2	19293	65,4	194	42	312	2656	930	920	800	2256			1328		16	42	35	27,5
	8.2.56.6	52,2	35,1	24,6	18520	65,4	258	55	366	2656	1030	920	900	2256			1328		16	42	35	27,5
	4.2.63.6	48,6	32,2		25124	69,2	176	38	343	2856	845	1120	700	2456			1428		16	42	35	27,5
	6.2.63.6	63,2	42,1	29,9	24263	69,2	264	57	412	2856	945	1120	800	2456			1428		22	42	35	27,5
	8.2.63.6	73,3	49,1	35,4	23439	69,2	352	75	484	2856	1045	1120	900	2456			1428		22	54	35	27,5
3x	**4.3.45.6**	28,1	18,8		15061	60,4	106	23	199	2856	610	720	500	2456			1428		16	35	35	22,5
	6.3.45.6	36,5	24,5	17,6	13975	60,4	158	34	246	2856	710	720	600	2456			1428		16	35	35	22,5
	8.3.45.6	41,9	28,2	19,8	13060	60,4	211	45	293	2856	810	720	700	2456			1428		16	42	35	22,5
	4.3.50.6	39,0	25,8		21335	63,1	132	29	273	3456	730	720	600	1028	2228		864	1728	16	35	35	25
	6.3.50.6	50,5	33,6	23,6	20116	63,1	198	43	330	3456	830	720	700	1028	2228		864	1728	16	42	35	25
	8.3.50.6	58,3	38,8	27,8	19069	63,1	264	57	387	3456	930	720	800	1028	2228		864	1728	16	42	35	25
	4.3.56.6	55,6	37,0		30301	66,8	194	42	363	3756	830	920	700	1128	2228		939	1878	16	42	35	27,5
	6.3.56.6	73,0	48,7	34,1	28932	66,8	290	62	441	3756	930	920	800	1128	2228		939	1878	22	54	35	27,5
	8.3.56.6	85,4	57,2	40,0	27774	66,8	387	83	522	3756	1030	920	900	1128	2228		939	1878	22	54	35	27,5
	4.3.63.6	71,1	47,5		37682	70,6	264	57	488	4056	845	1120	700	1228	2428		1014	2028	22	54	35	27,5
	6.3.63.6	94,0	63,0	45,1	36390	70,6	396	85	589	4056	945	1120	800	1228	2428		1014	2028	22	54	35	27,5
	8.3.63.6	110,5	74,4	51,2	35150	70,6	528	113	692	4056	1045	1120	900	1228	2428		1014	2028	22	54	35	27,5

* = Sound pressure indication (LpA) at 3 m distance each air cooler (+/- 2 dB(A)), free field conditions, according EN13487
** = Air throw see remark page 5
For moisture carry over see remark pag 5
Capacities and air volumes with 60 Hz fans on request or in our GPC selection program available.

Goedhart VCI Drawing





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GEA Group is a global mechanical engineering company with multi-billion euro sales and operations in more than 50 countries. Founded in 1881 the company is one of the largest providers of innovative equipment and process technology. GEA Group is listed in the STOXX Europe 600 Index.

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