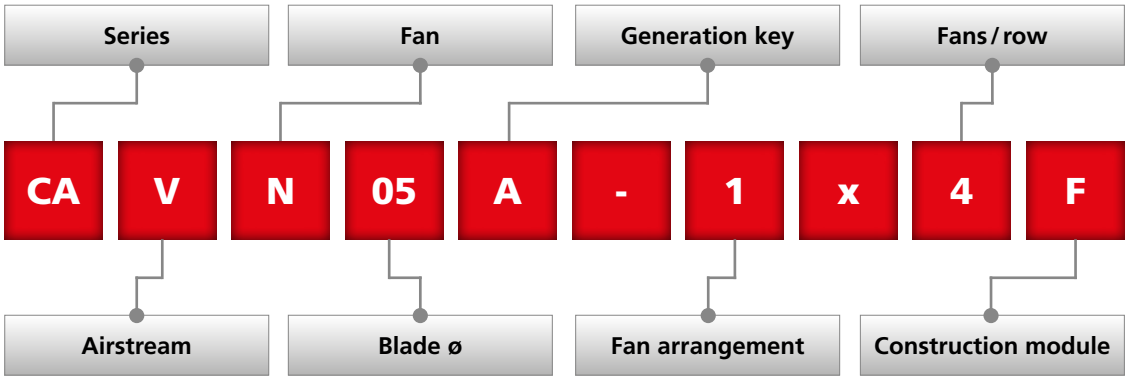
GEA Küba Red Line

Condensers & Dry Coolers

Reliable. Efficient. Silent.

Construction

Nomenclature



Series:
CA = Frigen
GA = Glykol
NA = NH_3

Airstream:
V = vertical
H = horizontal

Fan:
N = normal
L = quiet
S = very quiet

Blade ø:
05 = 500 mm
06 = 650 mm
08 = 800 mm
09 = 910 mm
10 = 1,000 mm

Generation key:
A, B, C, ...

Fan arrangement:
1 = 1-range
2 = 2-range

Fans/row:
1 = 1 fan/row
2 = 2 fans/row
3 = 3 fans/row
4 = 4 fans/row
5 = 5 fans/row
6 = 6 fans/row
7 = 7 fans/row

Construction module:
F, G = 1,100 mm
H, I = 1,450 mm
A = 1,400 mm
B = 1,700 mm
C = 2,000 mm
D = 2,300 mm

Application

- **Nominal capacity:**
  R404A CA. from 11 to 1,041 kW at Δt=15K (t_{L1} = 25°C, t_c = 40°C)
- **Suitable refrigerants:**
  Frigene (e.g. R134a, R404A, R407C, R507, etc.)
  Calculation see section "Capacity" and in acc. with EDP
  Calculation in acc. with GEA Küba selection software.
- All 828 types are designed for **external installation**.
- **Possible fields of application:**
  - Industrial plants
  - Supermarkets
  - Cold rooms

  The low noise level of the S models allows installation in **noise-sensitive areas** such as:
  - Office complexes
  - Hospitals
  - Residential areas

Sound pressure levels

The sound pressure level L_{PA} indicated is the mean measurement area sound pressure level computed from Sound Power Level L_{WA} upon the parallel piped measuring surface squared around the condenser (reference square) at a distance of 10 m and finishing off upon the reflecting level. The sound pressure levels L_{PA} indicated are for external installations above a reflecting level.
The sound pressure level will increase if reflecting bordering surfaces other than reflecting installation surface exist. Acoustic power is measured using the enveloping surface method in accordance with EN 13487 and/or DIN EN ISO 3741 or DIN EN ISO 3744.
The total acoustic power level is calculated by adding up the total acoustic pressure levels on the sectional measuring surfaces (DIN EN 13487).

Start-up, switching and control noise is ignored. Beat frequencies of up to 3 dB (A) may occur in apparatus with several fans.

Power: Δt, R134a, R22, R404A, R407A, R407C, R507

Calculation of Condenser capacity

The condenser capacity is based on a temperature difference Δt = 15 K between the air inlet temperature t_{L1} at the condenser (t_{L1} = 25°C) and the condensing temperature t_C at the condenser inlet (t_C = 40°C) with R404A and is valid only for the standard version.

$$Q_{C(N)} = \frac{Q_C}{F_1 \times F_2 \times F_3}$$

$Q_{C(N)}$ = Nominal capacity condenser (at Δt = 15K, R404A)
Q_C = Condenser capacity
F_1 = Correction factor for refrigerant
F_2 = Correction factor for temperature difference
F_3 = Correction factor for height above sea level

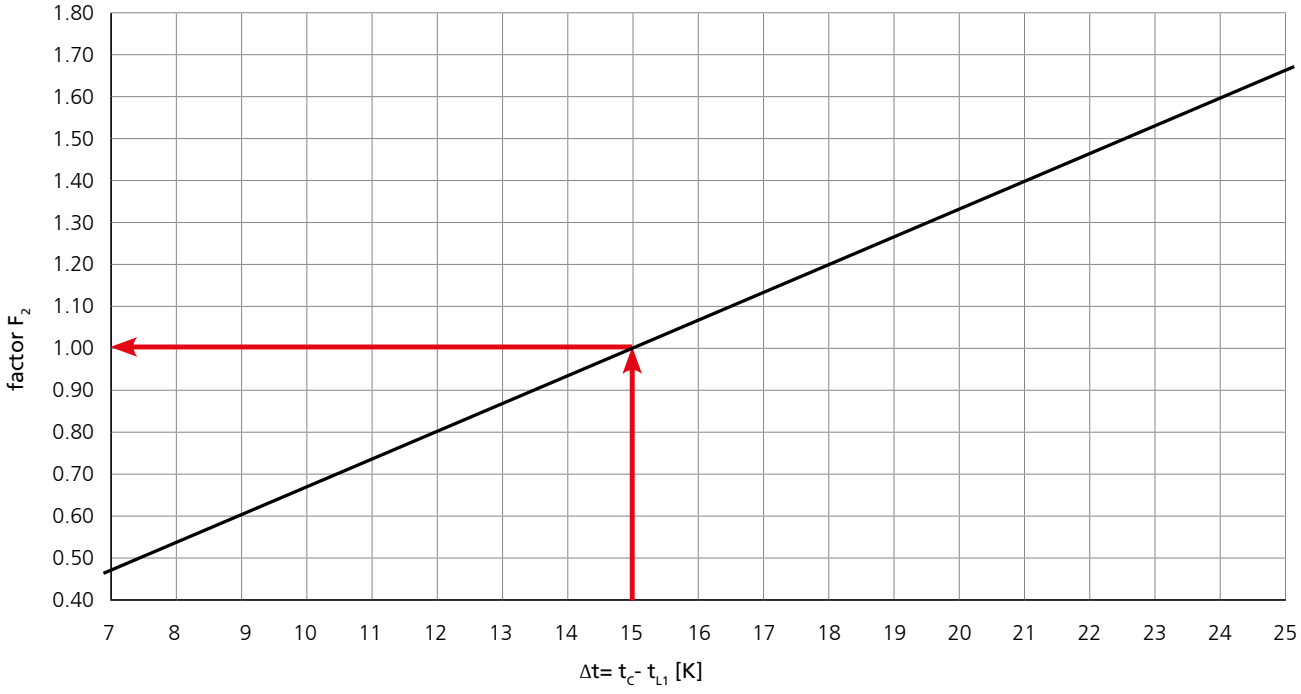
Correction factor for refrigerant (factor F_1)

R 134a	F_1 = 0.93	R 407A	F_1 = 0.83
R 22	F_1 = 0.96	R 407C	F_1 = 0.87
R 404A	F_1 = 1.00	R 507	F_1 = 1.00

Correction factor for height above sea level (factor F_3)

0 ft above sea level F3 = 1.00	4,921 ft above sea level F3 = 0.87
1,640 ft above sea level F3 = 0.96	6,562 ft above sea level F3 = 0.83
3,281 ft above sea level F3 = 0.91	8,202 ft above sea level F3 = 0.80

Correction factor for temperature difference (factor F_2)



t_C = Condensing temperature
t_{L1} = Air inlet temperature

For Δt between 7 K and 25 K:
Capacity at Δt = catalogue capacity * Δt / 15

Fans

Standard construction

CA. 05 - 06
- 400V±10% 3, 50 Hz with speed reduction Δ-Y-change-over
- Protection: IP 54
- Range of application: -30° C bis +60° C

CA. 08 - 10
- 400V±10% 3, 50 Hz with speed reduction Δ-Y-change-over
- Protection: IP 54
- Range of application: -30° C bis +60° C

Module	Fan	Fan blade Ø	N°. Pols	Label data						Operating values per fan					
				n [min^{-1}]		P [W]		I [A]		n [min^{-1}]		P [W]		I [A]	
				Δ	Y	Δ	Y	Δ	Y	Δ	Y	Δ	Y	Δ	Y
05-	N	500	4	1,330	940	830	550	1.5	1.0	1,360	1,060	680	490	1.3	0.9
	L		4	1,300	1,025	770	490	1.7	0.8	1,320	1,060	660	430	1.6	0.8
	S		6	870	590	290	150	0.7	0.4	900	640	240	140	0.6	0.3
06-	N	650	4	1,380	1,160	2,000	1,450	3.9	2.5	1,400	1,190	1,850	1,390	3.8	2.3
	L		6	950	850	720	530	2.8	1.2	950	870	680	500	2.8	1.1
	S		8	710	630	350	240	1.7	0.6	710	640	340	220	1.6	0.6
08-	N	800	6	890	690	1,800	1,150	3.8	2.2	910	730	1,770	1,210	3.9	2.2
	L		6	900	690	1,400	940	2.7	1.7	890	640	1,380	830	2.8	1.6
	S		12	450	370	270	170	0.8	0.4	450	360	290	180	0.8	0.4
09-	N	900	6	840	660	2,500	1,600	5.0	2.7	850	660	2,850	1,750	5.6	3.0
	L		6	840	630	1,850	1,050	3.8	1.9	860	660	1,650	990	3.6	1.8
	S		8	660	500	900	540	2.1	1.1	670	530	840	530	2.2	1.1
10-	N	1000	6	820	620	2,700	1,600	5.3	2.8	850	650	2,520	1,550	5.1	2.7
	L		8	690	570	1,550	1,150	3.3	2.0	700	590	1,380	1,050	3.2	1.9
	S		10	560	480	940	660	2.9	1.4	570	500	860	600	2.9	1.3

- Fans are rated for continuous operation S1.
  Fan motors have to be operated for at least two hours per month.
- Other motors will change performance and Sound Pressure Levels quoted.
- Operation with frequency converter only possible with sinusoidal filter on all phases.
- According to nameplate, the motors are designed for continuous operation (S1 or S2). This defines the operating conditions and switching frequency pursuant to the DIN EN 60034-1 standard.

Fans

Speed actuator and control operation

Speed control by decrease of the effective voltage

Single-phase and three-phase motors can be speed controlled via voltage reduction. During partial speed, substantial losses occur in the rotor, since slip power is transformed into heat. The voltage decrease can be accomplished by a transformer or by phase control.

When using phase control, the voltage has a greater harmonic content, resulting in additional losses and causing additional heat in the motor.

Depending on installation conditions, the noise level may increase with electronic speed control by voltage reduction through phase angle control. The current may furthermore be higher than given on the nameplate.

Speed control by frequency converters

The standard AC fans are suitable for operation with frequency converters within 30 - 100% of rated motor frequency.
For reduction of peak voltages, speed voltage increase and motor noise (at reduced speed) manufacturers of frequency converters recommend the use of all pole sinus filters.

Axial fans are suited for operation by frequency converters provided the following points are observed:

Sinus filters to ensure sinusoidal supply voltage between phases and between phase and protective earth, as offered by some converter manufacturers, must be fitted between frequency converter and motor.

du/dt filters (also called motor or damping filters) must not be used instead of sinus filters.

When using sinus filters it may be unnecessary to use screened motor supply cables, metal terminal boxes and a second earth wire connection on the motor.

If the operational leakage current of 3.5 mA is exceeded, the earthing requirements as set out in DIN VDE 0160/5.88, Section 6.5.2.1, must be complied with.

Manufacturers instructions must be observed!

Motor Protection

A current-dependent motor protection facility (motor circuitbreaker or bimetal tripping device) is not provided and it must be noted that protection by thermocouples TK should be wired.

Thermocouples are temperature-dependent elements which are insulated such that they are embedded in the windings of the motors. They open an electrical contact as soon as the maximum permissible permanent temperature is exceeded. They should be integrated in the control circuit of contactors in such a way, that in case of failure no automatic reactivation occurs.

Thermocouples fulfil the conditions for protecting devices with electric motor drive (IEC VDE 0730) against overloading.

Sound Data

Sound Power Levels

The A-grade total sound power level L_{WA} has been determined by way of sound measurements in accordance with DIN EN ISO 3744 for one fan.

DIN EN ISO 3744 describes the measuring method with precision class 2 with a standard deviation (acoustic power) of ≤ 2dB.

Sound Pressure Level for several fans at nominal speed rating

Fans per condenser	**2**	**3**	**4**	**5**	**6**	**8**	**10**	**12**	**14**
Increase L_{PA} [dB(A)]	+3	+5	+6	+7	+8	+9	+10	+11	+11

Sound Power Level for one fan at nominal speed rating

Module	Fan	Fan blade Ø	Sound Power Level L_{WA}		Sound Power Level L_{WA} [dB(A)] at Octave band centre frequnecy f [Hz], A-rated																	
					63 Hz		125 Hz		250 Hz		500 Hz		1 kHz		2 kHz		4 kHz		8 kHz		16 kHz	
			Δ	Y	Δ	Y	Δ	Y	Δ	Y	Δ	Y	Δ	Y	Δ	Y	Δ	Y	Δ	Y	Δ	Y
05-	N	500	83	77	49	45	71	64	72	66	76	70	79	72	77	72	72	64	62	53	50	39
	L		82	76	49	44	70	63	71	66	75	69	78	72	76	69	71	64	61	53	48	39
	S		72	63	43	48	59	50	63	56	65	58	68	57	65	54	59	46	49	35	36	27
06-	N	650	94	90	54	52	74	69	85	81	86	82	89	85	89	85	86	81	75	69	63	58
	L		84	82	50	48	63	61	75	73	76	74	80	77	79	77	73	70	62	59	52	49
	S		77	74	48	46	64	62	67	64	69	66	72	70	71	68	63	59	53	50	43	40
08-	N	800	85	78	56	60	71	64	75	69	78	72	81	74	77	71	72	65	64	57	53	46
	L		86	78	56	56	70	64	75	65	78	71	81	73	80	73	77	68	68	58	57	47
	S		65	60	44	41	53	48	56	54	60	53	60	54	57	50	49	42	41	35	31	27
09-	N	900	92	85	64	59	74	71	81	74	84	77	87	81	87	80	83	75	75	65	62	53
	L		85	78	56	56	71	65	78	69	79	72	81	73	77	69	72	65	66	58	55	45
	S		79	72	59	50	66	60	71	65	71	65	74	66	70	63	66	59	59	50	46	36
10-	N	1000	87	80	62	54	75	72	80	72	82	74	82	74	79	70	74	65	67	59	55	45
	L		82	77	58	53	73	70	75	72	76	71	76	71	71	66	66	61	60	54	46	40
	S		76	72	55	60	68	64	68	64	70	66	70	66	66	62	60	56	54	48	39	34

Sound pressure correction values L_{PA} for other distances

For other distances, the change in sound pressure measured with the enveloping surface method depends on the dimensions of the equipment.

The sound pressure level L_{PA} can be calculated exactly using the GEA KÜBA Selection Software.

Ø	Number	Distance [in m]	1	2	3	4	5	7	10	15	20	30	50
500	1 to 2 motors	**ΔL_{PA} [in dB (A)]**	+16	+12	+9	+7	+5	+3	0	-3	-6	-9	-14
500	3 to 6 motors	**ΔL_{PA} [in dB (A)]**	+15	+11	+9	+7	+5	+3	0	-3	-6	-9	-13
650	1 to 2 motors	**ΔL_{PA} [in dB (A)]**	+16	+12	+9	+7	+5	+3	0	-3	-6	-9	-13
650	3 to 6 motors	**ΔL_{PA} [in dB (A)]**	+14	+11	+9	+7	+5	+3	0	-3	-6	-9	-13
800	1 to 2 motors	**ΔL_{PA} [in dB (A)]**	+15	+11	+9	+7	+5	+3	0	-3	-6	-9	-13
800	3 to 10 motors	**ΔL_{PA} [in dB (A)]**	+13	+10	+8	+6	+5	+3	0	-3	-5	-9	-13
910	1 to 2 motors	**ΔL_{PA} [in dB (A)]**	+15	+11	+9	+7	+5	+3	0	-3	-6	-9	-13
910	3 to 10 motors	**ΔL_{PA} [in dB (A)]**	+13	+10	+8	+6	+5	+3	0	-3	-5	-9	-13
1,000	1 to 2 motors	**ΔL_{PA} [in dB (A)]**	+14	+11	+8	+7	+5	+3	0	-3	-6	-9	-13
1,000	3 to 10 motors	**ΔL_{PA} [in dB (A)]**	+13	+10	+8	+6	+5	+3	0	-3	-5	-9	-13

The stated correction values ΔL_{PA} are approximate values.

Selection table 2-range (N + L)

CAV / H N ..- 1x ..

Type	Nominal capacity Q_c		Airflow		Sound pressure L_{PA}=10 m	
	[kW]		[m³/h]		[dB(A)]	
CA.	Δ	Y	Δ	Y	Δ	Y
N05A-2x1F	38.7	32.5	12,830	9,880	55	48
N05A-2x1G	50.1	40.4	12,040	9,280	55	48
N05A-2x2F	78.1	65.7	25,660	19,760	57	50
N05A-2x2G	100.9	81.4	24,070	18,560	57	50
N05A-2x3F	117.3	98.8	38,480	29,650	58	51
N05A-2x3G	151.6	117.4	36,110	27,840	58	51
N06A-2x1F	71.5	64.8	29,300	24,630	66	62
N06A-2x1G	95.9	83.6	25,390	21,190	65	61
N06A-2x1H	82.1	74.4	30,860	26,340	66	62
N06A-2x1I	107.9	97.2	27,340	23,910	65	61
N06A-2x2F	143.8	130.1	58,600	49,260	68	64
N06A-2x2G	192.2	167.5	50,790	42,380	67	63
N06A-2x2H	166.5	151.2	61,720	52,680	68	64
N06A-2x2I	217.1	195.3	54,690	47,830	67	63
N06A-2x3F	214.5	194.5	87,890	73,880	69	65
N06A-2x3G	288.8	251.8	76,180	63,570	68	64
N06A-2x3H	250.0	226.9	92,570	79,020	69	65
N06A-2x3I	325.8	293.1	82,030	71,740	68	64
N08A-2x1A	127.6	105.3	33,000	25,790	54	49
N08A-2x1B	142.5	115.3	36,200	27,700	54	49
N08A-2x1C	153.4	124.6	37,790	29,250	54	49
N08A-2x2A	255.4	210.7	66,000	51,580	56	51
N08A-2x2B	287.8	232.6	72,390	55,390	56	51
N08A-2x2C	306.9	249.3	75,580	58,510	56	51
N08A-2x3A	383.2	316.2	99,010	77,380	59	54
N08A-2x3B	431.9	348.9	108,590	83,090	59	54
N08A-2x3C	463.1	376.3	113,380	87,760	59	54
N08A-2x4A	512.8	423.6	132,010	103,170	60	56
N08A-2x4B	570.0	461.2	144,780	110,780	59	55
N08A-2x4C	613.8	498.6	151,170	117,020	59	55
N08A-2x5A	635.1	524.4	165,010	128,960	60	56
N08A-2x5B	717.5	579.7	180,980	138,480	60	56
N08A-2x5C	771.1	625.9	188,960	146,270	60	56
N08A-2x6A	766.6	632.4	198,010	154,750	61	57
N08A-2x6B	864.0	698.0	217,180	166,180	61	57
N08A-2x7A	993.1	817.7	264,540	204,780	62	58

CAV / H L ..- 1x ..

Type	Nominal capacity Q_c		Airflow		Sound pressure L_{PA}=10 m	
	[kW]		[m³/h]		[dB(A)]	
CA.	Δ	Y	Δ	Y	Δ	Y
L05A-2x1F	38.1	32.9	12,510	10,050	53	47
L05A-2x1G	48.9	40.7	11,680	9,350	53	47
L05A-2x2F	76.9	66.5	25,020	20,100	55	49
L05A-2x2G	98.4	81.8	23,360	18,710	55	49
L05A-2x3F	115.4	99.9	37,540	30,160	56	50
L05A-2x3G	148.0	124.1	35,040	28,060	56	50
L06A-2x1F	56.5	53.1	19,630	17,790	56	54
L06A-2x1G	69.4	63.7	16,720	15,050	55	53
L06A-2x1H	63.4	59.6	20,500	18,700	56	54
L06A-2x1I	80.4	74.0	18,940	17,140	55	53
L06A-2x2F	113.3	106.5	39,270	35,590	58	56
L06A-2x2G	138.8	127.4	33,440	30,100	57	55
L06A-2x2H	128.8	121.1	41,000	37,400	58	56
L06A-2x2I	161.5	148.6	37,870	34,270	57	55
L06A-2x3F	170.0	159.9	58,900	53,380	59	57
L06A-2x3G	208.7	191.5	50,160	45,160	58	56
L06A-2x3H	193.2	181.7	61,500	56,100	59	57
L06A-2x3I	242.4	222.9	56,810	51,410	58	56
L08A-2x1A	121.4	91.8	30,940	21,770	56	49
L08A-2x1B	134.7	102.6	33,690	24,020	56	49
L08A-2x1C	146.8	111.6	35,760	25,660	56	49
L08A-2x2A	243.1	183.7	61,880	43,540	58	51
L08A-2x2B	272.1	206.7	67,380	48,040	58	51
L08A-2x2C	293.6	223.3	71,520	51,310	58	51
L08A-2x3A	364.7	275.6	92,810	65,320	61	54
L08A-2x3B	408.3	310.1	101,060	72,050	61	54
L08A-2x3C	443.2	324.3	107,280	76,970	61	54
L08A-2x4A	488.2	369.2	123,750	87,090	62	56
L08A-2x4B	539.0	410.3	134,750	96,070	61	55
L08A-2x4C	587.3	446.6	143,040	102,620	61	55
L08A-2x5A	604.5	457.4	154,690	108,860	62	56
L08A-2x5B	678.3	515.3	168,440	120,090	62	56
L08A-2x5C	737.7	560.8	178,800	128,280	62	56
L08A-2x6A	729.6	551.3	185,630	130,630	63	57
L08A-2x6B	816.9	620.4	202,130	144,110	63	57
L08A-2x7A	953.2	737.1	250,320	179,590	64	58

CA. N + L

Number of Circuits	Surface	Tube volume	Weight
x	[m²]	[dm³]	[kg]
8	82	13.9	154
16	164	27.5	176
12	164	27.6	283
24	328	53.6	327
16	246	41.0	412
32	492	79.9	478
8	109	19.7	199
16	218	37.4	247
16	143	25.1	238
26	287	49.1	300
16	218	37.6	365
32	435	74.2	456
21	287	50.3	443
43	574	95.9	561
21	327	56.5	537
43	653	106.5	677
32	430	72.8	648
64	861	140.9	832
24	311	53.5	480
36	378	64.0	530
36	445	74.4	580
48	622	102.4	860
48	756	123.4	960
72	889	144.3	1,060
72	933	153.3	1,240
72	1,134	184.8	1,400
72	1,334	216.2	1,590
72	1,245	204.4	1,680
144	1,511	246.1	1,800
144	1,778	288.0	2,100
144	1,556	253.1	2,050
144	1,889	305.5	2,300
144	2,223	361.0	2,490
144	1,867	305.0	2,460
144	2,267	367.9	2,760
144	2,178	354.0	2,870

Continued on next page

Nominal capacity Q_c: R404A; Δt=15K; t_{L1}= 25°C; t_c=40°C
Sound pressure: Enveloping surface method, in acc. with DIN EN ISO 13487
Δ: Valid at high rpm
Y: Valid at low rpm

Container type (CCAV/H) and other designs available in our GEA Küba Select selection program!