GEA Bock CO_2 Compressors

Semi-hermetic Compressors for the Refrigerant R744

Production Program

Semi-hermetic compressors HG (HA)

The GEA Bock HG (Hermetic Gas-cooled) range of semi-hermetic compressors offers traditional suction gas-cooled compressor state of the art technology. These compressors of the highest quality standard excel in their running comfort, easy maintenance, efficiency and reliability. Suitable as standard for conventional or chlorine-free HFC refrigerants.
The HA (Hermetic Air-cooled) range, specially engineered by GEA Bock, is available for deep-freezing applications, in particular for use with the refrigerants R22 and R404A.

- Single-stage
- CO2 compressors subcritical
- CO2 compressors transcritical
- R134a compressors
- R407C compressors
- ATEX compressors
- HC compressors
- Aluminium compressors
- 2-pole compressors
- Two-stage compressors
- Compressor units with receiver
- Condenser units air-cooled

Vehicle compressors FK

GEA Bock vehicle compressors of the FK range are the result of many years of experience in the domain of mobile cooling systems.
The unsurpassed light, compact, robust design and wide r.p.m. range are only some of the outstanding features of this unique product range of two, four and six cylinder compressors.
A wide variety of designs can be tailored to suit individual requirements.
The so-called K version is a special innovation with a reliable valve plate system for maximum requirements in bus and coach air-conditioning systems.

- Compressors for bus and train air-conditioning
- Compressors for transport refrigeration and other applications

Open type compressors F

The F model series provides modern open type compressors for separate drive systems (using V belts or direct couplings). Load transfer through a V pair.
Virtually all drive capacity requirements can be met.
Very compact compressor design, robust and easy to handle. Oil pump lubrication as standard.

- F compressors
- F NH3 compressors
- Compressor units for direct drive
- NH3 Compressor units for direct drive

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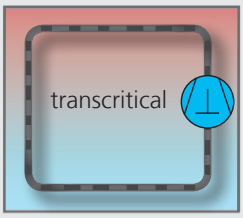
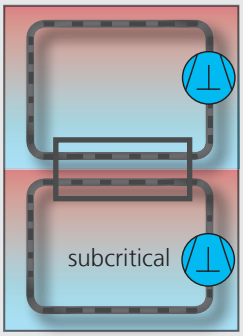
CO_2 system examples



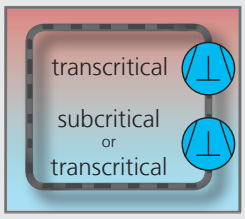
Single-stage applications

Single-stage transcritical CO_2 applications are used in the field of medium temperature refrigeration. They can be operated very efficiently, if the high pressure is operated in the subcritical range over a long period. Using the high-pressure side, it is appropriate to use the application in the transcritical range also in combination with refrigeration, due to a big temperature glide and a relatively high discharge end temperature for specific heat pumps and the heat recovery.
Transcritical GEA Bock CO_2 compressors are used.



Cascade application

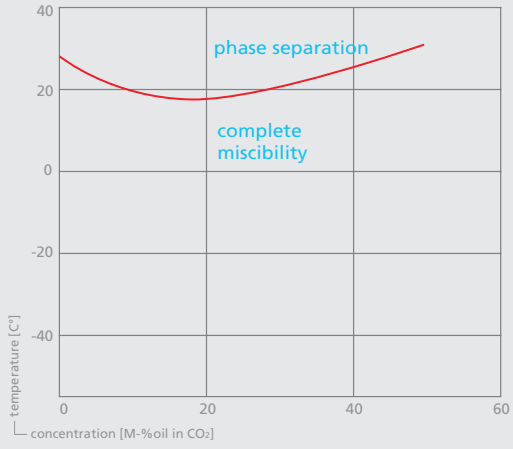
In a cascade system, different refrigerants are used in an application. They are combined in two refrigerating circuits that are separated from each other. A solution with CO_2 in low temperature refrigeration is very interesting due to economic reasons and the perspective of efficiency. The high temperature stage is used as a condenser in the CO_2 application. Here it is possible to use different refrigerants like hydrocarbons, ammonia and also HFCs like R134a.
Subcritical GEA Bock CO_2 compressors are used in the low temperature stage. In the high temperature range there is a wide product portfolio of GEA Bock compressors available for the use of different refrigerants.



Booster applications

Regarding applications with CO_2 in low and medium temperature refrigeration, so-called Booster systems are used. High pressure of low temperature compressor is discharged directly to the suction side of the second compressor stage. Different plant constructions of these Booster applications are used for example in supermarket applications.
Transcritical and subcritical GEA Bock CO_2 compressors are used.

Oil



The compressors are equipped with GEA Bock C85E, a special oil filling, which is available directly from GEA Bock. This is a synthetic ester oil with high thermal load resistance, allowing good mixing solubility with CO_2. It possesses a special additive, which protects the compressors against wear, even when subjected to extreme loads, such as those which exist in CO_2 systems. This oil can be used both in transcritical and subcritical systems.


GEA
Frickenhausen
Germany
Typ :
Nr. :
Connection for
oil level regulator

GEA Bock CO_2 compressors subcritical

CO_2 Compressors (subcritical)

The refrigerant R744

Our solutions are customer-oriented and user-friendly, because they are low-priced, energy-efficient, long-lasting and tailored to your individual needs.

Based on our current semi-hermetic product range, with its outstanding advantages and features, as well as our established basic range of CO_2 compressors, an optimized, downward extended capacity stage is now available for subcritical CO_2 applications.
Especially suited to supermarket refrigeration applications and industrial refrigeration.
Max. permissible operating pressure up to 55 bar at the high pressure side and 40 bar at the low pressure side.

Special features
GEA Bock compressors are of extremely high quality and robust. Additionally, the drive, valve plates and seals of our compressors have been optimized with regard to the natural refrigerant R744. Further motor adjustments ensure broader operating limits and highest efficiency. The compressors therefore convince through their long life-time, sustainability and highest reliability.

The refrigerant CO_2
Within refrigeration technology, carbon dioxide (CO_2) is known by the name R744 and has a long history.
It is a colourless gas which liquefies under pressure and has a slightly acidic smell and taste. Carbon dioxide has no ozone depletion potential (ODP = 0) and a negligible direct effect on global warming (GWP = 1) when used as a refrigerant in closed systems.
It is not combustible, is chemically inactive and heavier than air. Carbon dioxide has a narcotic and asphyxiating effect on humans only at higher concentrations.
Carbon dioxide is available naturally in large quantities.

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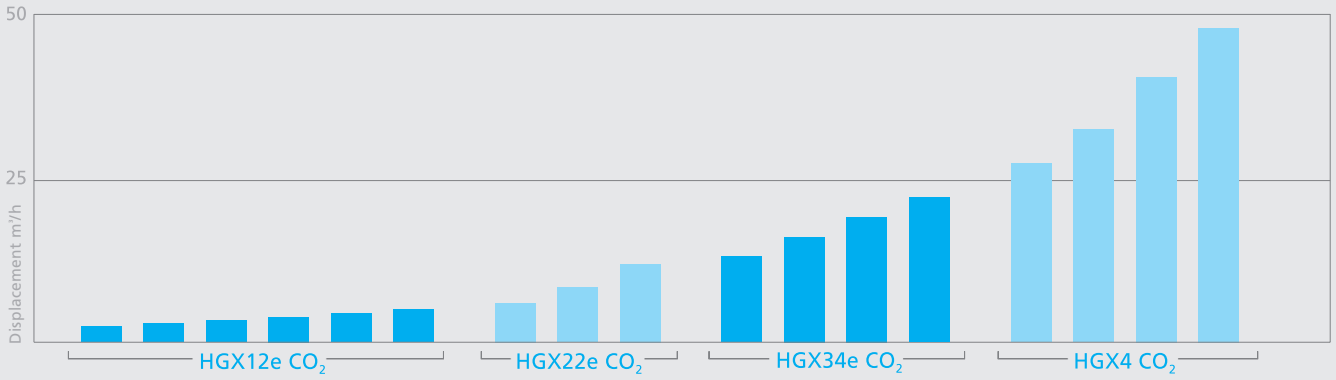
The current program

...4 model sizes with 17 capacity stages from 1,6 to 48,2 m³/h (50 Hz)



Type key

HGX34e/255-4S CO_2

- CO_2 Version [5]
- Motor variant [4]
- Number of poles
- Swept volume
- Series [3]
- Number of cylinders
- Size
- Ester oil filling [2]
- Series [1]

[1] HG = Compressor Hermetic Gas-cooled (suction gas-cooled)
[2] X = Special Ester oil for CO_2
[3] e = Additional declaration for e-series compressors
[4] S = More powerful motor
[5] CO_2 design for subcritical applications

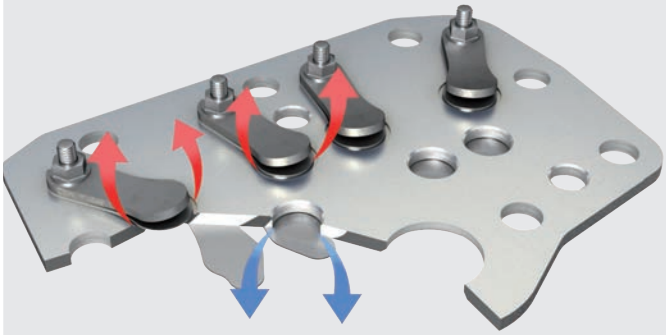
e-Series

With technical optimizations we continuously improve the energy consumption of our compressors. The compressors of the e-series set a new standard when it comes to motor-efficiency, gas flow and efficiency of the valve system. All this results in a higher refrigerating capacity of the compressor at a lower drive power. In addition, the limits of applications were extended to a condensing temperature of 15°C and an evaporation temperature of -15°C.

Wear-resistant durable driving gear

- Solid construction and design
- Low friction sleeve bearings
- Aluminium piston with two ring assembly

Valve plate construction for safe operation



- Valve design, tried and trusted all over the world, with onesided fixed finger reed valves, suction and pressure side
- Valve made out of high quality, impact resistant spring steel

Quiet with low vibrations

- Large dimensioned crankshaft area
- Dynamic mass balance
- High volume pressure area to dampen pulsations
- 4 cylinder construction from 19 m³/h

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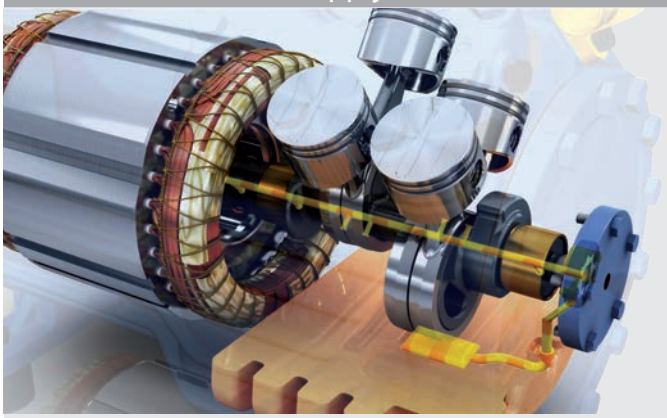
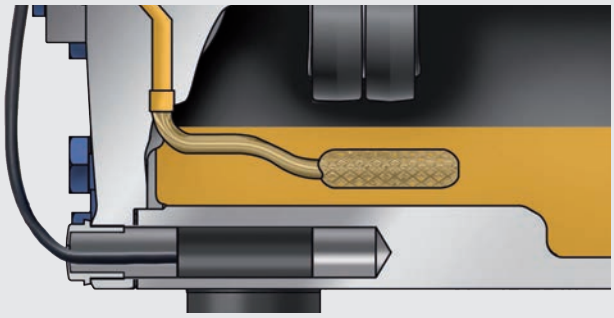
Reliable and safe oil supply

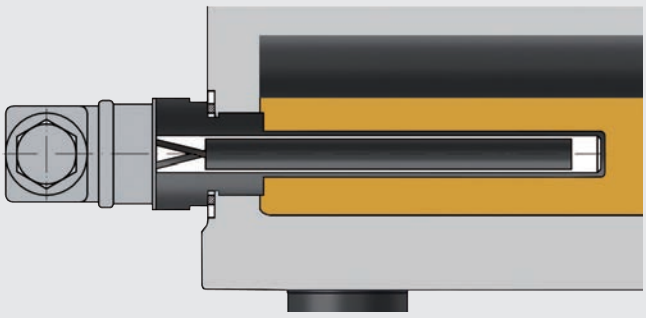


- Classic lubricant circuit with an oil pump independent of the rotating direction
- High volume oil sump
- Special oil charge for CO_2: GEA Bock C85E, directly available from GEA Bock

Oil sump heater (accessories)

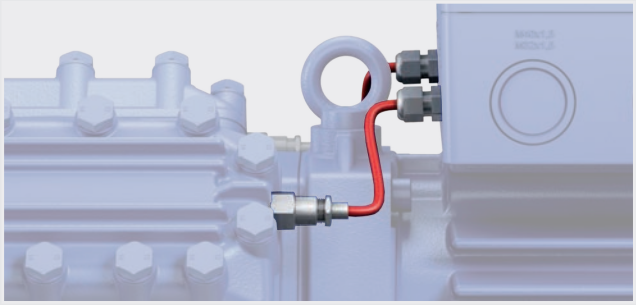


- for HGX12e, HGX22e and HGX34e
- PTC heater, self-regulating version, installation in housing bore
- Replacement possible without opening the refrigerating circuit



- for HGX4
- Design with immersion sleeve
- Replacement possible without opening the refrigerating circuit

Thermal protection thermostat (accessories)



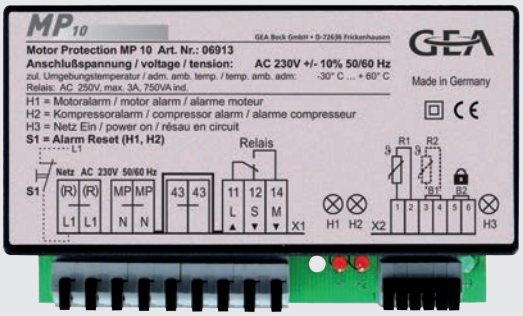
Pressure gas temperature monitoring, PTC sensor direct connection to the MP10 motor protection

Economic capacity control (accessories)

Continuously variable speed control using EFC
(Electronic Frequency Control)
optional for HGX12e, HGX22e, HGX34e

- compact installation on compressor and connected ready for use
- up to 25% lower energy consumption
- Further information is available online at www.gea.com

MP10 electronic motor protection (series)



- Temperature monitoring with PTC sensors and optical status indication
- Discharge gas temperature sensor (option)
- Further information is available online at www.gea.com

Start unloader using ESS (accessories)

Electronic **S**oft **S**tart

- Optional for HGX22e, HGX34e and HGX4
- Soft compressor start from zero to nominal speed, time controlled and monitored
- No standard unloaded start required
- IP20 unit for control cabinet installation (included loose)
- Further information is available online at www.gea.com

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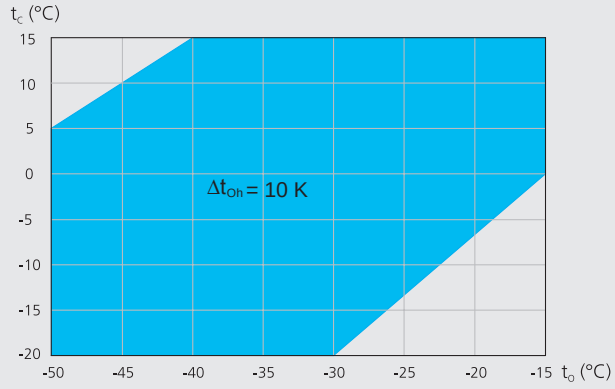
CO_2 Operating limits

HGX12e CO_2, HGX22e CO_2, HGX34e CO_2



Unlimited application range

t_o Evaporating temperature (°C)

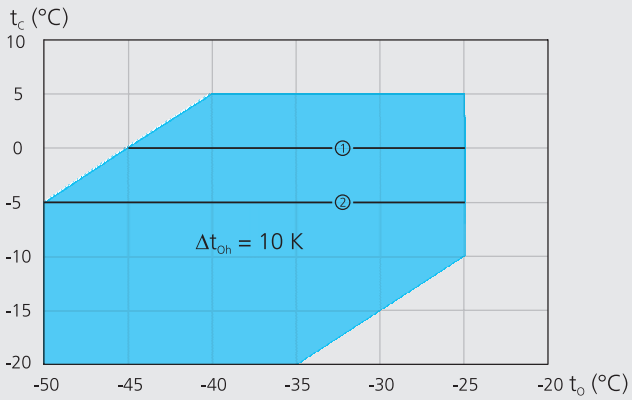
t_c Condensing temperature (°C)

Δt_{oh} Suction gas superheat (K)

Max. permissible operating pressure (LP/HP)[1)]
for HGX12, HGX22 und HGX34: 40/55 bar

[1)] LP = low pressure HP = high pressure

HGX4... CO_2



① **HGX4/385-4 CO_2, HGX4/465-4 CO_2**
Max. condensing temperature
t_c = 0 °C

② **HGX4/555-4 CO_2**
Max. condensing temperature
t_c = -5 °C

Max. permissible operating pressure (LP/HP)[1)]
for HGX4: 27/55 bar

CO_2 Notes

Operating limits

Compressor operation is possible within the limits shown on the application diagrams. Please note the coloured areas. Compressor application limits should not be chosen for design purposes or continuous operation.

Restrictions to the operating limits may occur when using the EFC (Electronic Frequency Control). Further information is available online at www.gea.com and in the GEA Bock VAP-software program.

Performance data

The performance data for CO_2 are based on 10 K suction gas superheat without liquid subcooling, at **50 Hz power supply frequency.** These are preliminary values as no uniform reference data are available. Besides which the influence of the oil part on refrigeration performance is largely unknown. **Variations cannot be excluded.**

Conversion factor for 60 Hz = 1,2

Performance data for other operating points, see GEA Bock software

Performance data

CO_2			Performance data								50 Hz
Type	Cond. temp. °C		Cooling capacity $\dot{Q}_o$ [W]					Power consumption P_e [kW]			
			Evaporating temperature °C								
			-15	-20	-25	-30	-35	-40	-45	-50	
HGX12e/20-4 S CO_2	-20	Q				4320	3510	2810	2200	1670	
		P				0,37	0,44	0,49	0,50	0,49	
	-15	Q				4010	3250	2570	1990	1480	
		P				0,49	0,54	0,57	0,56	0,52	
	-10	Q			4530	3710	2980	2340	1780	1290	
		P			0,54	0,60	0,64	0,64	0,61	0,55	
	-5	Q		5070	4190	3400	2710	2100	1570	1110	
		P		0,59	0,67	0,71	0,72	0,70	0,65	0,58	
	0	Q	5610	4680	3840	3100	2450	1870	1370	929	
		P	0,65	0,74	0,79	0,81	0,80	0,76	0,69	0,60	
	5	Q	5170	4290	3500	2800	2190	1650	1180	759	
		P	0,82	0,88	0,91	0,91	0,88	0,82	0,73	0,62	
	10	Q	4730	3900	3160	2510	1940	1430	983		
		P	0,98	1,02	1,02	1,00	0,95	0,87	0,77		
	15	Q	4290	3510	2830	2220	1690	1220			
		P	1,13	1,15	1,14	1,10	1,03	0,93			
HGX12e/30-4 S CO_2	-20	Q				6870	5550	4390	3400	2560	
		P				0,61	0,74	0,82	0,84	0,81	
	-15	Q				6390	5120	4020	3080	2270	
		P				0,81	0,90	0,94	0,92	0,86	
	-10	Q			7280	5900	4700	3650	2750	1980	
		P			0,88	0,98	1,03	1,04	0,99	0,90	
	-5	Q		8220	6730	5420	4280	3290	2440	1700	
		P		0,95	1,07	1,14	1,16	1,13	1,05	0,93	
	0	Q	9180	7580	6170	4940	3860	2930	2120	1430	
		P	1,03	1,17	1,26	1,29	1,28	1,21	1,10	0,95	
	5	Q	8450	6950	5620	4460	3450	2580	1820	1170	
		P	1,28	1,39	1,44	1,43	1,38	1,29	1,15	0,97	
	10	Q	7730	6320	5080	4000	3050	2240	1530		
		P	1,52	1,59	1,60	1,57	1,49	1,36	1,19		
	15	Q	7020	5700	4540	3530	2660	1900			
		P	1,75	1,78	1,77	1,70	1,59	1,43			
HGX12e/40-4 S CO_2	-20	Q				9750	7900	6290	4890	3700	
		P				0,85	1,02	1,12	1,16	1,12	
	-15	Q				9060	7290	5750	4420	3280	
		P				1,12	1,25	1,30	1,28	1,20	
	-10	Q			10300	8370	6690	5230	3960	2860	
		P			1,22	1,37	1,45	1,45	1,39	1,26	
	-5	Q		11600	9500	7680	6090	4700	3500	2460	
		P		1,34	1,51	1,61	1,64	1,59	1,48	1,31	
	0	Q	12900	10700	8720	7000	5500	4190	3050	2070	
		P	1,47	1,67	1,79	1,83	1,81	1,72	1,56	1,35	
	5	Q	11900	9770	7940	6330	4920	3690	2620	1690	
		P	1,83	1,98	2,05	2,04	1,97	1,84	1,64	1,38	
	10	Q	10900	8880	7170	5660	4350	3200	2200		
		P	2,18	2,28	2,30	2,25	2,13	1,95	1,71		
	15	Q	9810	8010	6410	5010	3790	2720			
		P	2,53	2,57	2,55	2,45	2,29	2,07			
HGX12e/50-4 S CO_2	-20	Q				12300	9960	7950	6200	4700	
		P				1,03	1,25	1,38	1,42	1,38	
	-15	Q				11400	9190	7270	5600	4170	
		P				1,38	1,54	1,60	1,58	1,48	
	-10	Q			12900	10600	8430	6600	5010	3650	
		P			1,52	1,71	1,80	1,80	1,72	1,56	
	-5	Q		14500	11900	9650	7670	5940	4440	3140	
		P		1,67	1,89	2,01	2,04	1,99	1,85	1,63	
	0	Q	16100	13400	11000	8780	6920	5290	3870	2650	
		P	1,84	2,09	2,24	2,30	2,27	2,16	1,96	1,69	
	5	Q	14800	12200	9930	7930	6180	4650	3320	2170	
		P	2,31	2,49	2,58	2,58	2,49	2,32	2,07	1,74	
	10	Q	13500	11100	8950	7090	5450	4030	2790		
		P	2,77	2,89	2,92	2,85	2,70	2,48	2,17		
	15	Q	12200	9960	7990	6260	4750	3430			
		P	3,23	3,28	3,25	3,12	2,92	2,63			

Relating to 10 K suction gas superheat
without liquid subcooling

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CO_2			Performance data								50 Hz
Type	Cond. temp. °C		Cooling capacity $\dot{Q}_o$ [W]					Power consumption P_e [kW]			
			Evaporating temperature °C								
			-15	-20	-25	-30	-35	-40	-45	-50
HGX12e/60-4 S CO_2	-20	Q				14700	12000	9560	7540	5810
		P				1,28	1,49	1,62	1,67	1,65
	-15	Q				13700	11100	8800	6880	5240
		P				1,65	1,82	1,89	1,89	1,83
	-10	Q			15400	12600	10200	8060	6240	4680
		P			1,81	2,02	2,13	2,15	2,10	1,99
	-5	Q		17300	14300	11600	9310	7330	5620	4150
		P		1,96	2,23	2,38	2,44	2,40	2,29	2,13
	0	Q	19100	15900	13100	10700	8480	6620	5020	3640
		P	2,11	2,45	2,65	2,74	2,73	2,63	2,46	2,24
	5	Q	17600	14600	12000	9660	7660	5930	4430	3150
		P	2,66	2,93	3,07	3,09	3,01	2,85	2,62	2,33
	10	Q	16100	13300	10900	8720	6870	5260	3870	
		P	3,22	3,42	3,48	3,43	3,29	3,05	2,75	
	15	Q	14600	12100	9760	7800	6090	4610		
		P	3,78	3,90	3,89	3,77	3,55	3,24		
HGX12e/75-4 S CO_2	-20	Q				17300	14200	11400	9020	6990
		P				1,48	1,72	1,87	1,92	1,91
	-15	Q				16100	13100	10500	8230	6300
		P				1,92	2,11	2,19	2,19	2,13
	-10	Q			18100	14900	12100	9600	7470	5630
		P			2,11	2,36	2,49	2,51	2,45	2,32
	-5	Q		20200	16800	13700	11100	8730	6720	4990
		P		2,30	2,62	2,80	2,86	2,81	2,69	2,49
	0	Q	22300	18600	15400	12600	10100	7880	6000	4370
		P	2,49	2,88	3,13	3,23	3,22	3,10	2,91	2,64
	5	Q	20500	17100	14100	11500	9090	7060	5300	3780
		P	3,16	3,47	3,64	3,67	3,57	3,38	3,10	2,76
	10	Q	18800	15600	12800	10300	8140	6270	4640	
		P	3,84	4,07	4,15	4,09	3,92	3,64	3,28	
	15	Q	17000	14100	11500	9200	7220	5500		
		P	4,53	4,68	4,66	4,52	4,25	3,89		

Relating to 10 K suction gas superheat
without liquid subcooling

Performance data

CO_2			Performance data								50 Hz
Type	Cond. temp. °C		Cooling capacity $\dot{Q}_o$ [W]					Power consumption P_e [kW]			
			Evaporating temperature °C								
			-15	-20	-25	-30	-35	-40	-45	-50
HGX22e/85-4 S CO_2	-20	Q				20300	16700	13500	10800	8450
		P				1,74	1,98	2,13	2,19	2,14
	-15	Q				19000	15600	12600	9950	7710
		P				2,19	2,39	2,49	2,49	2,40
	-10	Q			21500	17800	14500	11600	9120	6980
		P			2,44	2,67	2,81	2,85	2,80	2,64
	-5	Q		24100	20100	16500	13400	10700	8300	6270
		P		2,72	2,98	3,15	3,23	3,21	3,09	2,87
	0	Q	26700	22400	18600	15300	12300	9710	7490	5560
		P	3,05	3,33	3,53	3,63	3,64	3,55	3,36	3,07
	5	Q	24800	20700	17100	14000	11200	8770	6680	4860
		P	3,75	3,96	4,08	4,11	4,05	3,88	3,61	3,24
	10	Q	22800	19000	15700	12700	10100	7830	5870	
		P	4,44	4,58	4,62	4,58	4,43	4,18	3,83	
	15	Q	20900	17300	14200	11400	8990	6890		
		P	5,14	5,19	5,15	5,02	4,78	4,45		
HGX22e/105-4 S CO_2	-20	Q				24900	20500	16600	13300	10400
		P				2,09	2,38	2,57	2,64	2,58
	-15	Q				23400	19100	15500	12300	9470
		P				2,65	2,88	3,01	3,01	2,89
	-10	Q			26400	21800	17800	14300	11200	8560
		P			2,94	3,23	3,40	3,45	3,39	3,19
	-5	Q		29500	24600	20200	16400	13100	10200	7680
		P		3,29	3,61	3,82	3,92	3,89	3,75	3,47
	0	Q	32700	27400	22800	18700	15100	11900	9160	6800
		P	3,70	4,05	4,29	4,42	4,43	4,32	4,09	3,72
	5	Q	30300	25300	21000	17100	13700	10800	8160	5940
		P	4,56	4,82	4,97	5,01	4,93	4,72	4,39	3,93
	10	Q	27900	23200	19100	15500	12400	9570	7170	
		P	5,42	5,59	5,65	5,59	5,40	5,10	4,66	
	15	Q	25500	21100	17300	14000	11000	8420		
		P	6,29	6,36	6,31	6,14	5,85	5,43		
HGX22e/130-4 S CO_2	-20	Q				30500	25100	20400	16300	12800
		P				2,51	2,88	3,11	3,19	3,12
	-15	Q				28600	23400	18900	15000	11700
		P				3,21	3,50	3,65	3,66	3,51
	-10	Q			32300	26700	21800	17500	13800	10600
		P			3,57	3,92	4,14	4,20	4,12	3,88
	-5	Q		36000	30000	24700	20100	16000	12500	9430
		P		4,00	4,40	4,66	4,78	4,75	4,57	4,22
	0	Q	39900	33500	27800	22800	18400	14600	11300	8370
		P	4,51	4,94	5,24	5,40	5,41	5,28	4,98	4,53
	5	Q	36900	30900	25600	20900	16800	13200	10100	7330
		P	5,58	5,90	6,09	6,13	6,03	5,78	5,37	4,79
	10	Q	34000	28300	23300	19000	15100	11800	8830	
		P	6,66	6,87	6,93	6,86	6,63	6,25	5,70	
	15	Q	31000	25700	21100	17000	13500	10400		
		P	7,75	7,83	7,76	7,55	7,19	6,66		

Relating to 10 K suction gas superheat
without liquid subcooling

Performance data

CO_2	Performance data								50 Hz
Type	Cond. temp. °C		Cooling capacity $\dot{Q}_o$ [W]				Power consumption P_e [kW]			
			Evaporating temperature °C							
			-15	-20	-25	-30	-35	-40	-45	-50
HGX34e/145-4 S CO_2	-20	Q				34400	28000	22500	17800	13800
		P				2,72	3,17	3,45	3,56	3,56
	-15	Q				32200	26100	20900	16400	12600
		P				3,58	3,92	4,09	4,11	4,00
	-10	Q			36600	30000	24200	19200	15000	11500
		P			4,00	4,42	4,65	4,71	4,62	4,40
	-5	Q		41200	34000	27700	22300	17600	13600	10300
		P		4,43	4,96	5,26	5,37	5,30	5,10	4,77
	0	Q	45700	38100	31300	25400	20300	15900	12300	9160
		P	4,88	5,52	5,91	6,08	6,06	5,87	5,54	5,10
	5	Q	42100	34900	28600	23100	18300	14300	10900	8090
		P	6,11	6,60	6,85	6,88	6,73	6,41	5,95	5,38
	10	Q	38400	31700	25800	20700	16400	12700	9580	
		P	7,34	7,68	7,78	7,67	7,37	6,92	6,32	
	15	Q	34600	28400	23000	18300	14400	11100		
		P	8,57	8,75	8,70	8,44	7,99	7,39		
HGX34e/170-4 S CO_2	-20	Q				40600	33100	26600	21100	16400
		P				3,13	3,66	3,98	4,12	4,11
	-15	Q				38100	30900	24800	19500	15100
		P				4,14	4,54	4,74	4,76	4,63
	-10	Q			43300	35500	28700	22800	17900	13700
		P			4,63	5,14	5,41	5,47	5,36	5,11
	-5	Q		48600	40200	32800	26400	20900	16300	12400
		P		5,14	5,76	6,12	6,25	6,17	5,93	5,55
	0	Q	54000	45000	37000	30100	24100	19000	14700	11100
		P	5,67	6,43	6,89	7,09	7,07	6,85	6,46	5,93
	5	Q	49700	41200	33800	27400	21800	17100	13100	9760
		P	7,13	7,72	8,01	8,05	7,86	7,48	6,94	6,27
	10	Q	45300	37400	30500	24600	19500	15200	11600	
		P	8,60	9,00	9,12	8,99	8,63	8,09	7,39	
	15	Q	40900	33600	27200	21800	17200	13300		
		P	10,00	10,20	10,20	9,91	9,38	8,66		
HGX34e/210-4 S CO_2	-20	Q				50400	41000	32900	26000	20200
		P				3,79	4,45	4,84	5,02	5,01
	-15	Q				47100	38200	30500	24000	18500
		P				5,04	5,55	5,79	5,82	5,66
	-10	Q			53500	43800	35400	28100	21900	16800
		P			5,65	6,29	6,63	6,71	6,57	6,26
	-5	Q		60000	49600	40400	32500	25700	19900	15100
		P		6,29	7,08	7,53	7,68	7,59	7,28	6,80
	0	Q	66600	55400	45600	37000	29600	23200	17900	13500
		P	6,96	7,91	8,50	8,75	8,72	8,44	7,95	7,29
	5	Q	61100	50700	41500	33500	26600	20800	15900	11900
		P	8,81	9,54	9,92	9,97	9,73	9,25	8,56	7,71
	10	Q	55600	45800	37400	30000	23700	18400	14000	
		P	10,60	11,10	11,30	11,10	10,70	10,00	9,12	
	15	Q	50000	41000	33200	26500	20800	16100		
		P	12,50	12,80	12,70	12,30	11,60	10,70		
HGX34e/255-4 S CO_2	-20	Q				61900	50400	40500	32100	25000
		P				4,60	5,39	5,87	6,08	6,08
	-15	Q				57900	47000	37600	29600	22900
		P				6,11	6,73	7,03	7,06	6,88
	-10	Q			65700	53800	43500	34600	27100	20800
		P			6,85	7,62	8,04	8,14	7,99	7,61
	-5	Q		73600	60800	49600	39900	31600	24600	18800
		P		7,62	8,57	9,12	9,32	9,22	8,85	8,27
	0	Q	81500	67800	55900	45400	36400	28700	22200	16800
		P	8,43	9,59	10,30	10,60	10,50	10,20	9,66	8,85
	5	Q	74800	62000	50800	41100	32800	25700	19800	14900
		P	10,60	11,60	12,00	12,10	11,80	11,20	10,40	9,35
	10	Q	67900	56100	45800	36900	29200	22800	17500	
		P	13,00	13,60	13,80	13,60	13,00	12,20	11,10	
	15	Q	61000	50100	40700	32600	25700	20000		
		P	15,40	15,70	15,60	15,10	14,20	13,10		

Relating to 10 K suction gas superheat
without liquid subcooling

Performance data

CO_2			Performance data						50 Hz
Type	Cond. temp. °C		Cooling capacity $\dot{Q}_o$ [W]				Power consumption P_e [kW]		
			Evaporating temperature °C						
			-25	-30	-35	-40	-45	-50	
HGX4/310-4 CO_2	-20	Q			58400	47900	38700	30800	
		P			8,12	8,15	8,01	7,70	
	-15	Q		66300	54800	44700	35800	28300	
		P		9,30	9,36	9,25	8,99	8,57	
	-10	Q	74500	62200	51100	41400	32900	25700	
		P	10,60	10,70	10,60	10,40	10,00	9,49	
	-5	Q	69700	57800	47200	37900	29900	23100	
		P	12,30	12,20	12,00	11,60	11,10	10,40	
	0	Q	64600	53300	43200	34400	26800		
		P	14,10	13,80	13,50	13,00	12,30		
	5	Q	59300	48600	39100	30800			
		P	16,00	15,60	15,10	14,50			
HGX4/385-4 CO_2	-20	Q			72600	59400	47900	38000	
		P			10,00	10,00	9,92	9,55	
	-15	Q		82200	67900	55200	44200	34800	
		P		11,40	11,50	11,40	11,00	10,50	
	-10	Q	92000	76800	63100	51000	40500	31700	
		P	13,30	13,40	13,20	12,90	12,40	11,80	
	-5	Q	85700	71200	58200	46800	36900	28600	
		P	15,30	15,20	14,90	14,40	13,80	12,90	
	0	Q	79300	65500	53300	42500	33300		
		P	16,90	16,60	16,10	15,50	14,70		
	5	Q							
		P							
HGX4/465-4 CO_2	-20	Q			87600	71700	57800	46000	
		P			12,00	12,00	11,90	11,60	
	-15	Q		99100	81900	66700	53400	42100	
		P		13,80	13,90	13,80	13,40	12,90	
	-10	Q	111000	92500	76100	61600	49000	38300	
		P	15,90	16,10	16,00	15,60	15,10	14,20	
	-5	Q	104000	85800	70200	56400	44600	34600	
		P	18,40	18,40	18,10	17,60	16,70	15,60	
	0	Q	95500	78900	64200	51300	40200		
		P	21,00	20,80	20,30	19,50	18,30		
	5	Q							
		P							
HGX4/555-4 CO_2	-20	Q			105000	85700	69000	54500	
		P			14,40	14,40	14,20	13,70	
	-15	Q		119000	97700	79500	63600	50000	
		P		16,50	16,60	16,40	15,90	15,20	
	-10	Q	133000	111000	90600	73400	58500	45600	
		P	19,10	19,20	19,10	18,60	17,90	16,90	
	-5	Q	124000	103000	83600	67400	53400	41300	
		P	22,00	21,90	21,50	20,80	19,90	18,70	
	0	Q							
		P							
	5	Q							
		P							

Relating to 10 K suction gas superheat
without liquid subcooling

CO_2 Type	Number of cylinders	Displacement 50 / 60 Hz (1450 / 1740 rpm)	Electrical data				Weight	Connections ⑤		Oil charge
			Voltage ①	Max. working current ②	Max. power consumption ②	Starting current (rotor locked) ②		Discharge line DV	Suction line SV	
		m³/h		A	kW	A	kg	mm I inch	mm I inch	Ltr.
				Δ / Y		Δ / Y				
HGX12e/20-4 S CO_2	2	1,6 / 1,9	③	4,0 / 2,3	1,2	24 / 14	49	12 I 1/2	16 I 5/8	0,8
HGX12e/30-4 S CO_2	2	2,6 / 3,1	③	6,0 / 3,5	1,8	40 / 23	49	12 I 1/2	16 I 5/8	0,8
HGX12e/40-4 S CO_2	2	3,6 / 4,3	③	8,3 / 4,8	2,6	40 / 23	50	12 I 1/2	16 I 5/8	0,8
HGX12e/50-4 S CO_2	2	4,5 / 5,4	③	9,7 / 5,6	3,3	43 / 25	50	12 I 1/2	16 I 5/8	0,8
HGX12e/60-4 S CO_2	2	5,4 / 6,5	③	12,5 / 7,2	3,9	71 / 41	54	12 I 1/2	16 I 5/8	0,8
HGX12e/75-4 S CO_2	2	6,4 / 7,7	③	14,3 / 8,2	4,7	71 / 41	54	12 I 1/2	16 I 5/8	0,8
HGX22e/85-4 S CO_2	2	7,5 / 9,0	③	15,6 / 9,0	5,2	111 / 64	79	16 I 5/8	22 I 7/8	1,0
HGX22e/105-4 S CO_2	2	9,2 / 11,0	③	18,5 / 10,7	6,4	111 / 64	83	16 I 5/8	22 I 7/8	1,0
HGX22e/130-4 S CO_2	2	11,2 / 13,4	③	22,3 / 12,9	7,8	111 / 64	85	16 I 5/8	22 I 7/8	1,0
HGX34e/145-4 S CO_2	4	12,7 / 15,2	③	26,3 / 15,2	8,8	169 / 98	101	22 I 7/8	28 I 1 1/8	1,3
HGX34e/170-4 CO_2	4	14,9 / 17,9	③	30,1 / 17,4	10,3	169 / 98	101	22 I 7/8	28 I 1 1/8	1,3
HGX34e/210-4 S CO_2	4	18,4 / 22,0	③	36,7 / 21,2	12,8	169 / 98	102	22 I 7/8	28 I 1 1/8	1,3
HGX34e/255-4 CO_2	4	22,3 / 26,7	③	44,8 / 25,9	15,8	178 / 103	104	22 I 7/8	28 I 1 1/8	1,3
				* PW 1+2		*PW1 / PW 1+2				
HGX4/310-4 CO_2	4	27,1 / 32,5	④	27,2	16,0	82 / 107	152	22 I 7/8	28 I 1 1/8	2,7
HGX4/385-4 CO_2	4	33,5 / 40,2	④	28,7	16,9	82 / 107	151	22 I 7/8	28 I 1 1/8	2,7
HGX4/465-4 CO_2	4	40,5 / 48,6	④	36,5	21,0	107 / 140	154	28 I 1 1/8	35 I 1 3/8	2,7
HGX4/555-4 CO_2	4	48,2 / 57,8	④	38,2	22,0	107 / 140	157	28 I 1 1/8	35 I 1 3/8	2,7

* PW = Part Winding, motors for part winding start 1 = 1. part winding 2 = 2. part winding

Explanations:

① Tolerance (± 10%) relates to the mean value of the voltage range. Other voltages and current types on request.

② - The specifications for max. power consumption apply for 50 Hz operation. For 60 Hz operation, the specifications have to be multiplied by the factor 1.2.
The max. working current remains unchanged.
- Take account of the max. operating current / max. power consumption when designing contactors, leads and fuses. Switches: service category AC3

③ 220-240 V Δ / 380-420 V Y - 3 - 50 Hz
265-290 V Δ / 440-480 V Y - 3 - 60 Hz

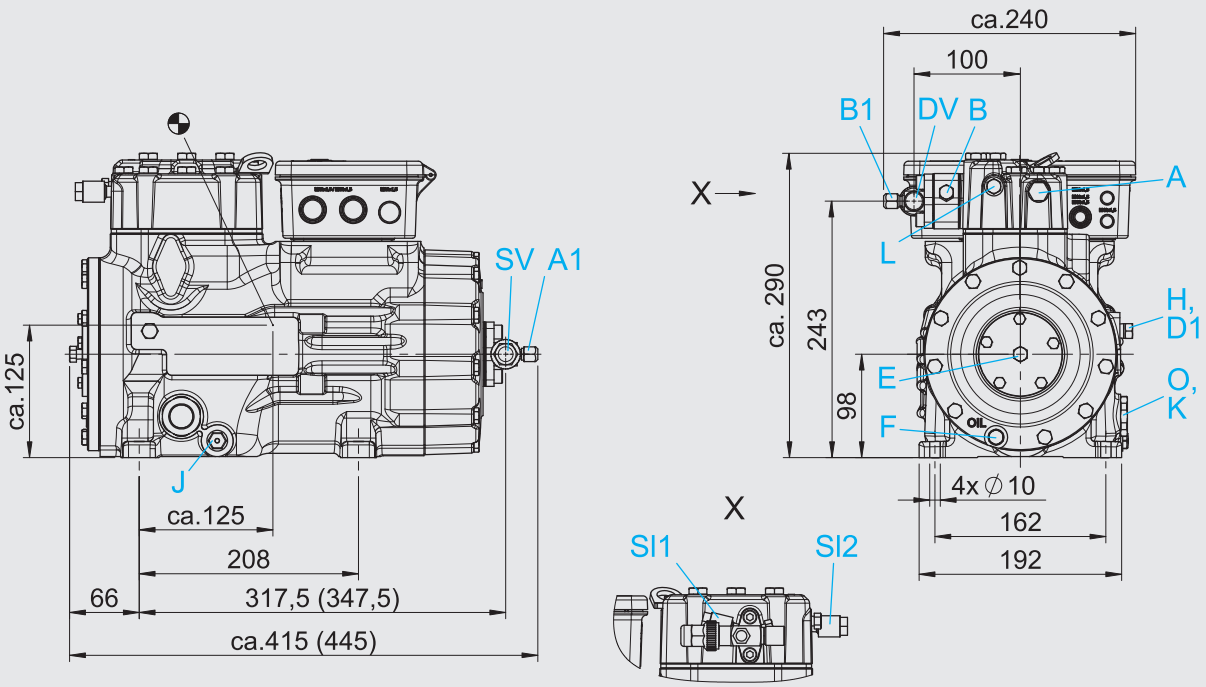
④ 380-420 V Y/YY - 3 - 50 Hz PW
440-480 V Y/YY - 3 - 60 Hz PW
PW = Part Winding, motors for part winding start
(no start unloaders required)
- Winding ratio: 66% / 33%
- Designs for Y/Δ on request

⑤ For soldering connections

Dimensions and connections

HGX12e CO_2

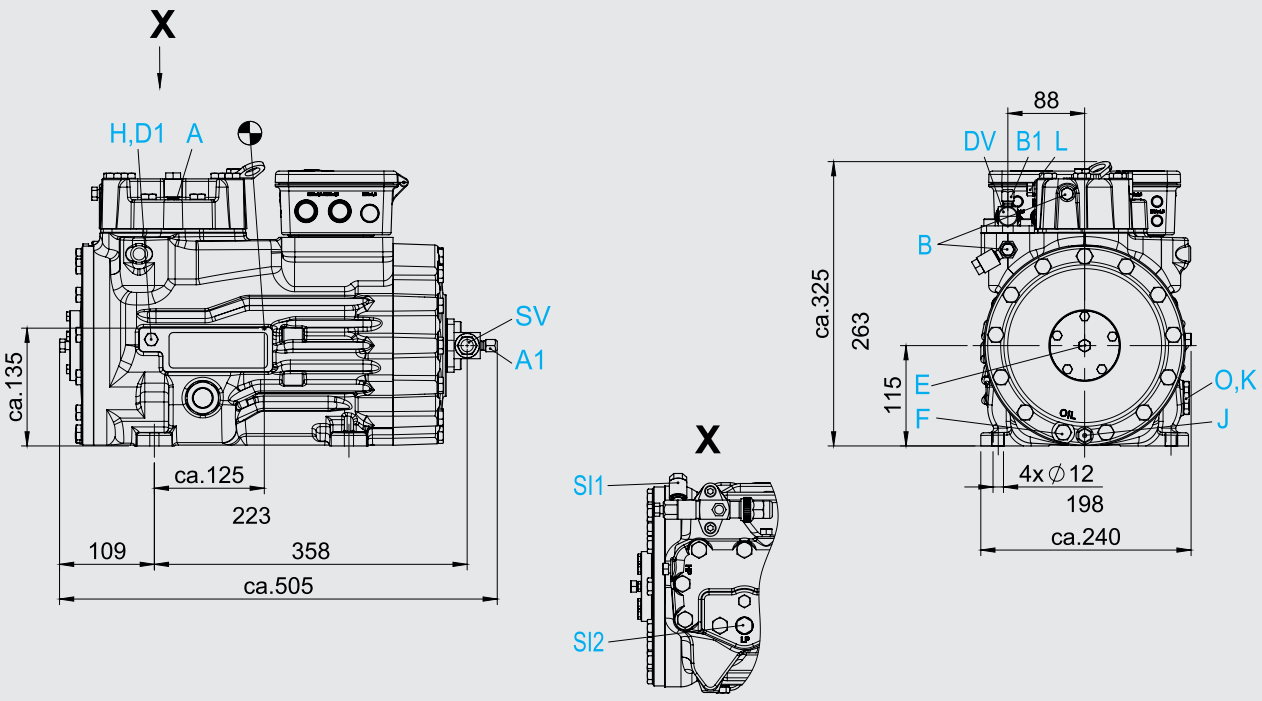
HGX12e/20-4 S CO_2
HGX12e/30-4 S CO_2
HGX12e/40-4 S CO_2
HGX12e/50-4 S CO_2
HGX12e/60-4 S CO_2
HGX12e/75-4 S CO_2



Dimensions in ( ) = HGX12e/60-4 S CO_2, HGX12e/75-4 S CO_2

HGX22e CO_2

HGX22e/85-4 S CO_2
HGX22e/105-4 S CO_2
HGX22e/130-4 S CO_2



Dimensions in mm
[1] SV 90° rotatable
Centre of gravity

- Connections see page 22
- Dimensions for anti-vibration pad see page 20

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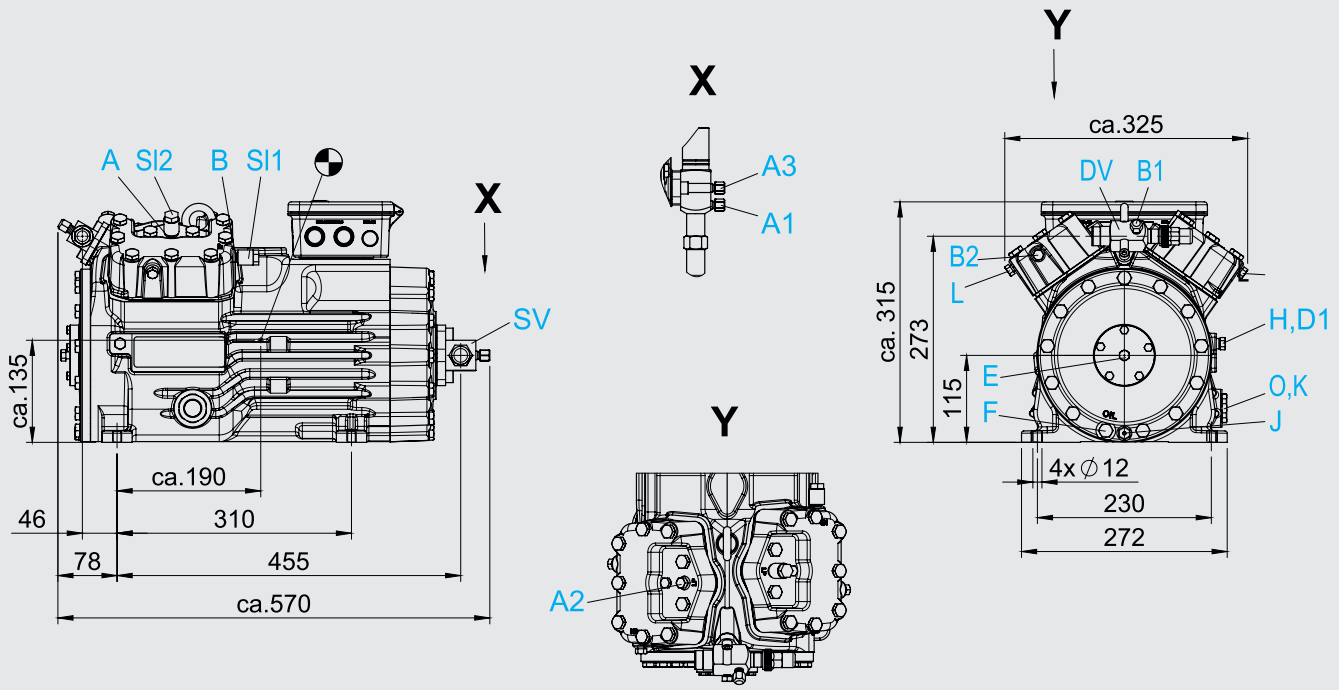
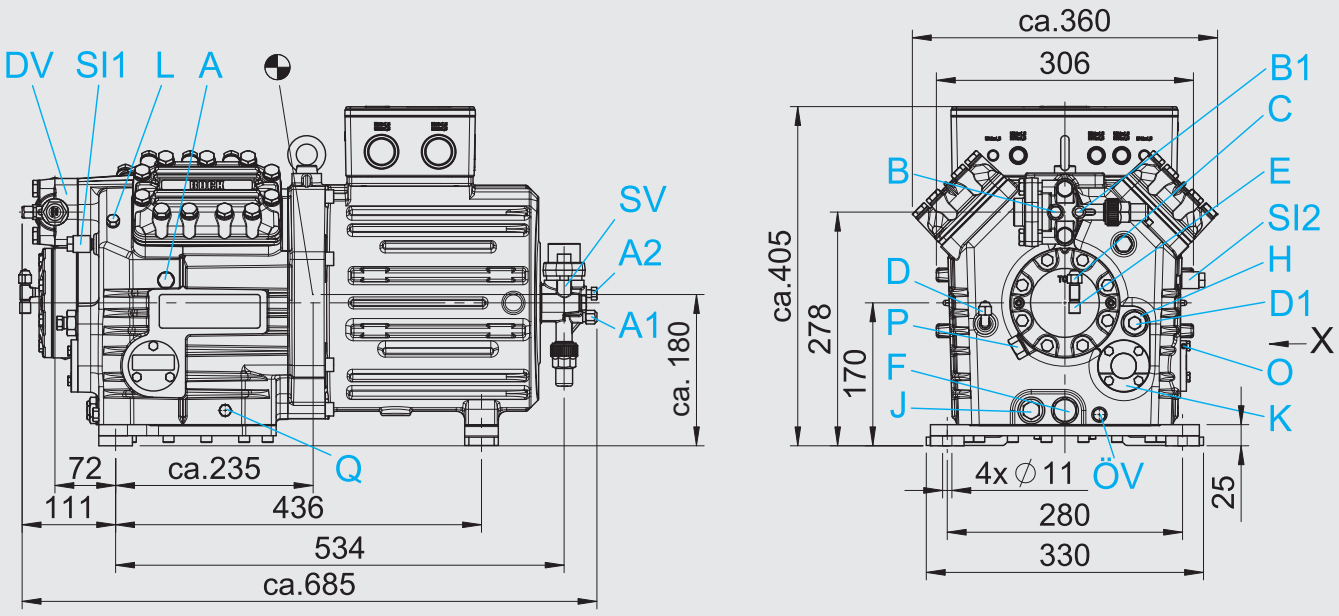
HGX34e CO_2

HGX34e/145-4 S CO_2 HGX34e/210-4 S CO_2
HGX34e/170-4 S CO_2 HGX34e/255-4 S CO_2



HGX4 CO_2

HGX4/310-4 CO_2 HGX4/465-4 CO_2
HGX4/385-4 CO_2 HGX4/555-4 CO_2



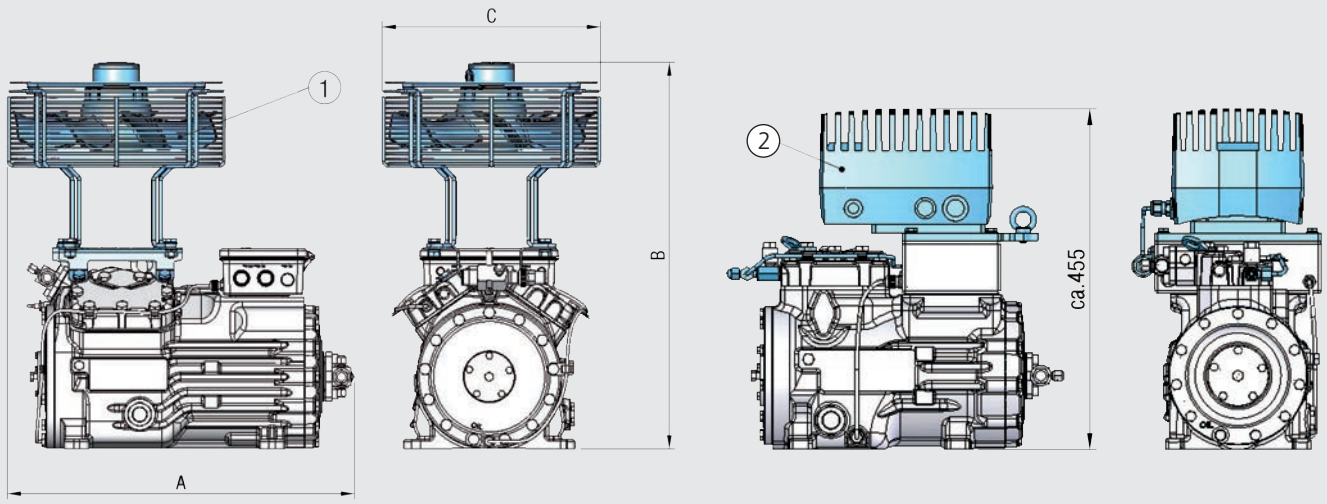
Dimensions in mm
[1] SV 90° rotatable
Centre of gravity

- Connections see page 22
- Dimensions for anti-vibration pad see page 20
- Dimensions for view X see page 21

Dimensions and connections

Dimensions with accessories

HGX12e CO_2 | HGX22e CO_2 | HGX34e CO_2



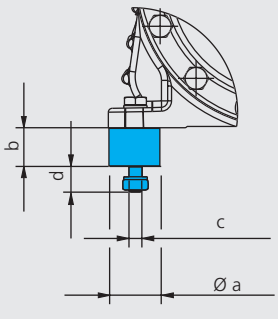
① Additional fan ② EFC Electronic Frequency Control

Type	A mm	B mm	C mm
HGX12e CO_2	ca. 465 / (ca. 495)	ca. 520	ca. 315
HGX22e CO_2	ca. 550	ca. 600	ca. 350
HGX34e CO_2	ca. 550	ca. 625	ca. 350

Dimensions in ( ) for HGX12e/60-4 S CO_2, HGX12e/75-4 S CO_2

Dimensions for anti-vibration pad

Type	Ø a mm	b mm	c mm	d mm
HGX12e CO_2	30	30	M8	20
HGX22e CO_2	40	30	M10	20
HGX34e CO_2	40	30	M10	20
HGX4 CO_2	40	30	M10	20



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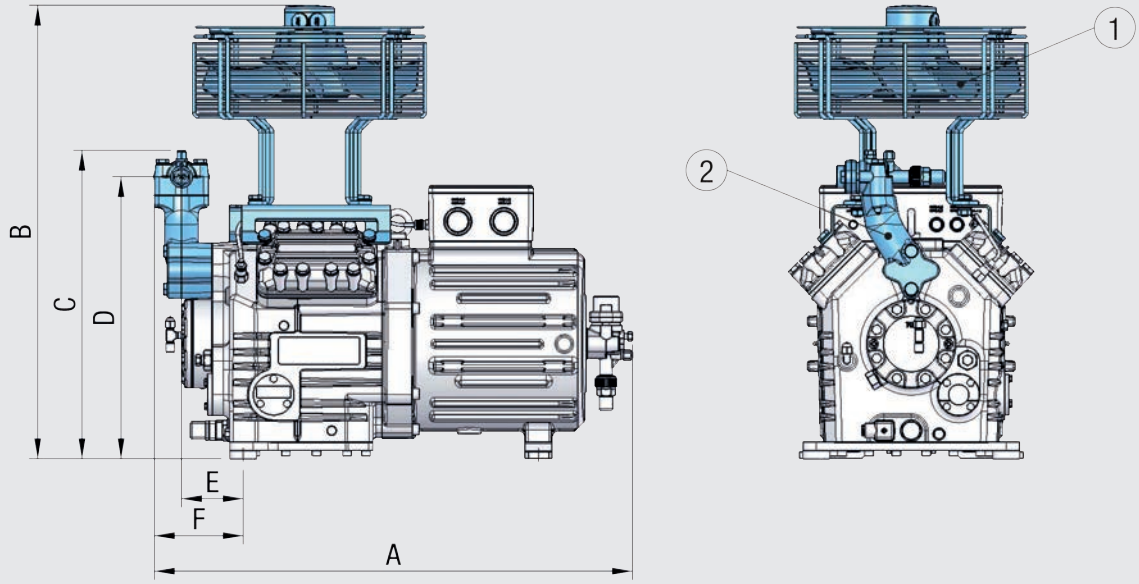
Dimensions and connections

Dimensions with accessories

HGX4 CO_2



① Additional fan ② Intermediate adapter for discharge line valve

Type	A mm	B mm	C mm	D mm	E mm	F mm
HGX4 CO_2	ca. 705	ca. 680	ca. 455	416	91	131

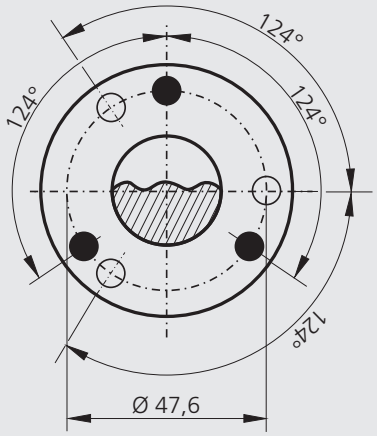
View X

Possibility to connect to oil level regulator

HGX4... CO_2

● Three-hole connection for oil level regulator make ESK, AC+R, CARLY (3x M6, 10 deep)

○ Three-hole connection for oil level regulator make TRAXOIL (3 x M6 x 10 deep)



Dimensions in mm

Dimensions and connections

Connections		HGX12e CO_2	HGX22e CO_2	HGX34e CO_2	HGX4 CO_2
SV DV	Suction line Discharge line	please refer to Technical data page 17			
A	Connection suction side, not lockable	1/8 " NPTF 1)	1/8 " NPTF 1)	1/8 " NPTF 1)	1/8 " NPTF 1)
A1	Connection suction side, lockable	7/16 " UNF	7/16 " UNF	7/16 " UNF	7/16 " UNF
A2	Connection suction side, not lockable	-	-	1/8 " NPTF	1/8 " NPTF
B	Connection discharge side, not lockable	1/8 " NPTF	1/8 " NPTF	1/8 " NPTF 1)	1/8 " NPTF
B1	Connection discharge side, lockable	7/16 " UNF	7/16 " UNF	7/16 " UNF	7/16 " UNF
C	Connection oil pressure safety switch OIL	-	-	-	7/16 " UNF
D	Connection oil pressure safety switch LP	-	-	-	7/16 " UNF
D1	Connection oil return from oil separator	1/4 " NPTF	1/4 " NPTF	1/4 " NPTF	1/4 " NPTF
E	Connection oil pressure gauge	1/8 " NPTF	1/8 " NPTF	1/8 " NPTF	1/8 " NPTF
F	Oil drain	M 8	M 10	M 10	M 22 x 1,5
H	Oil charge plug	1/4 " NPTF	1/4 " NPTF	1/4 " NPTF	M 22 x 1,5
J	Connection oil sump heater	Ø 15 mm	3/8 " NPTF	3/8 " NPTF	M 22 x 1,5
K	Sight glass	1 1/8" - 18 UNEF	1 1/8" - 18 UNEF	1 1/8" - 18 UNEF	4 hole M 6
L	Connection thermal protection thermostat	1/8 " NPTF	1/8 " NPTF	1/8 " NPTF	1/8 " NPTF
O	Connection oil level regulator	1 1/8" - 18 UNEF	1 1/8" - 18 UNEF	1 1/8" - 18 UNEF	①
SI1	Decompression valve HP	1/8 " NPTF	1/8 " NPTF	1/8 " NPTF	1/8 " NPTF
SI2	Decompression valve LP	1/8 " NPTF	1/8 " NPTF	1/8 " NPTF	1/8 " NPTF
ÖV	Connection oil service valve	-	-	-	1/4 " NPTF
P	Connection oil differential pressure sensor	-	-	-	M 20 x 1,5
Q	Connection oil temperature sensor	-	-	-	1/8 " NPTF

① Dimensions see view X

1) Only possible with additional adapter.

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Scope of supply

Scope of supply	HGX12e CO_2	HGX22e CO_2	HGX34e CO_2	HGX4 CO_2
Semi-hermetic two cylinder reciprocating compressor with drive motor for direct start 220-240 V Δ / 380-420 V Y - 3 - 50 Hz 265-290 V Δ / 440-480 V Y - 3 - 60 Hz Single-section compressor housing with hermetically integrated electric motor	●	●		
Semi-hermetic four cylinder reciprocating compressor with drive motor for direct start 220-240 V Δ / 380-420 V Y - 3 - 50 Hz 265-290 V Δ / 440-480 V Y - 3 - 60 Hz Single-section compressor housing with hermetically integrated electric motor			●	
Semi-hermetic four cylinder reciprocating compressor with drive motor for part winding start 380-420 V Y/YY - 3 - 50 Hz 440-480 V Y/YY - 3 - 60 Hz Motor unit flanged onto the compressor housing				●
Winding protection with PTC resistor sensors and electronic motor protection unit MP10	●	●	●	●
Oil pump	●	●	●	●
Oil pump cover with screwed connection for differential oil pressure sensor (Δp-switch Kriwan make)				●
Connection possibility of oil level controllers makes ESK, AC+R or CARLY	● [1)]	● [1)]	● [1)]	●
Connection possibility of oil level controller make Traxoil	● [1)]	● [1)]	● [1)]	● [1)]
Oil charge: GEA Bock C85E	●	●	●	●
Sight glass	●	●	●	●
Decompression valve for HP and LP side	●	●	●	●
Suction and discharge line valve	●	●	●	●
Inert gas charge	●	●	●	●
4 anti-vibration pads enclosed	●	●	●	●

[1)] Only possible with additional adapter

ⓘ Oil sump heater is necessary due to the high CO_2 solubility in the oil.

Accessories

Accessories	HGX12e CO_2	HGX22e CO_2	HGX34e CO_2	HGX4 CO_2
① Start unloader by means of a ESS (Electronic Soft Start) IP20 (connection clamps IP00) for installation in switch cabinet		●	●	●
② Continuously variable speed control by means of a EFC (Electronic Frequency Control), compactly built onto compressor and connected ready-to-operate HGX12e: IP65 HGX22e/HGX34e: IP54	●	●	●	
③ Thermal protection thermostat (PTC sensor)	●	●	●	●
④ Oil sump heater 110-240 V - 1 - 50/60 Hz, 50-120 W PTC heater, self regulating	●	●	●	
Oil sump heater 230 V - 1 - 50/60 Hz, 80 W				●
Compressor oil GEA Bock C85E as 1 liter refill unit	●	●	●	●
⑤ Oil differential pressure sensor (Δp-switch Fabrikat make) 220-240 V - 1 - 50/60 Hz				●
⑥ Oil service valve				●
⑦ GEA Bock Compressor Management BCM2000 including oil pressure control, oil temperature control (NTC), thermal protection thermostat (PTC) per cylinder cover (only possible ex works)				●
⑧ Water-cooled cylinder covers				●
See water resistant water-cooled cylinder covers				●
⑨ Additional fan 220-240 V - 1 - 50/60 Hz, 72/68 W, IP44 enclosed	●			
Additional fan 230 V Δ / 400 V Y - 3 - 50 Hz, 120 W, 230-265 V Δ / 400-460 V Y - 3 - 60 Hz, 190 W, IP54 enclosed		● [1)]	● [1)]	● [1)]
⑩ Intermediate adapter for discharge line valve				●
Adapter for decompression valve	●	●	●	●

[1)] Voltage range ± 10%
Special voltage and/or frequency (on request)

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Accessories

ESS Electronic Soft Start

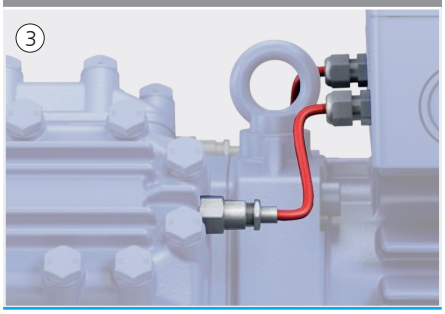
1

EFC Electronic Frequency Control

2

Thermal protection thermostat

3

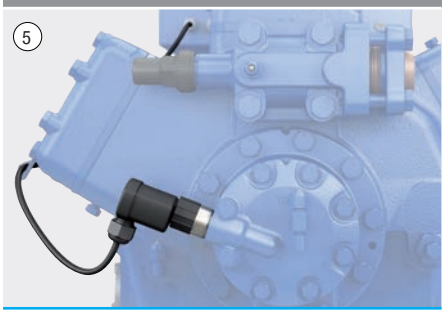


Oil sump heater

4

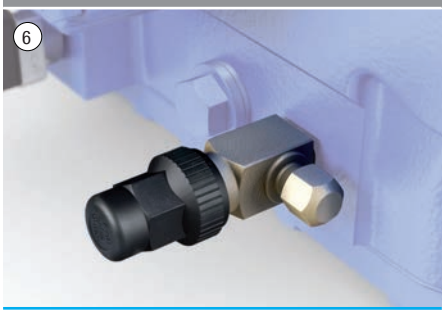
Oil differential pressure sensor

5



Oil service valve

6



Compressor Management BCM2000

7

Water-cooled cylinder covers

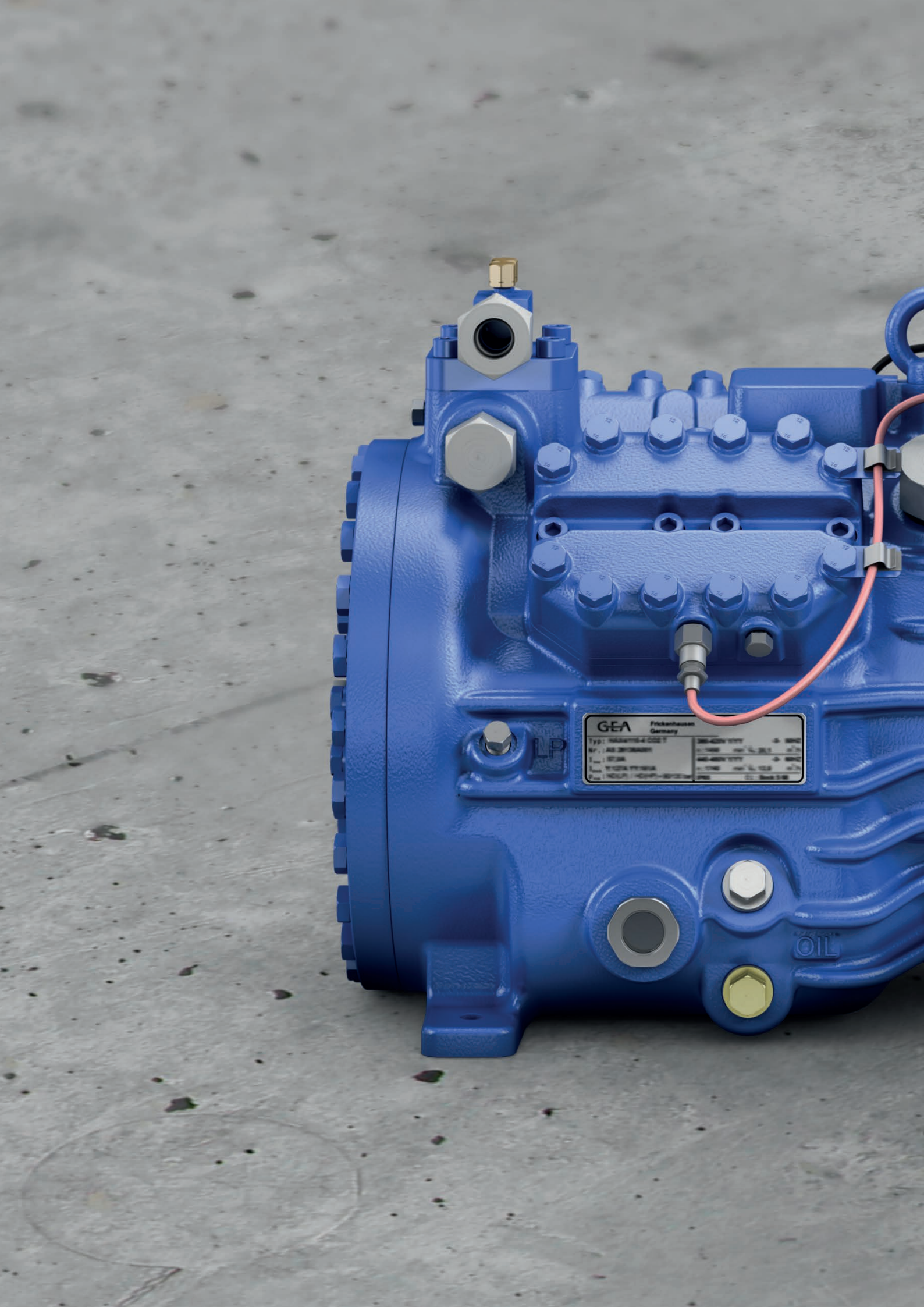
8

Additional fan

9

Intermediate adapter for discharge line valve

10


GEA
Frickenhausen
Germany
LP
OIL

GEA Bock CO_2 compressors transcritical

CO_2 Compressors (transcritical)

The refrigerant CO_2

Our solutions are sustainable: The natural refrigerant R744 sets new standards with regard to environmental aspects and security issues. GEA Bock CO2 compressors contribute to a sustainable development.

Since the beginning of the 1990's, GEA Bock, together with leading institutes and manufacturers, has concerned itself with the development of compressors for the transcritical CO_2 process. In the past years, CO_2 compressors by GEA Bock could be established in many areas of application.

The current program of transcritical CO_2 compressors was now extended by the 4-cylinder model HGX34 /290 CO_2 T and the 6-cylinder model HGX46/440 CO_2 T. A program from 6,2 to 38,2 m^3/h is now available.

Special features

GEA Bock compressors are of extremely high quality and robust. Additionally, the drive, valve plates and seals of our compressors have been optimized with regard to the natural refrigerant R744. Further motor adjustments ensure broader operating limits and highest efficiency. The compressors therefore convince through their long life-time, sustainability and highest reliability.

The refrigerant CO_2

Within refrigeration technology, carbon dioxide (CO_2) is known by the name R744 and has a long history.

It is a colourless gas which

liquefies under pressure and has a slightly acidic smell and taste.

Carbon dioxide has no ozone depletion potential (ODP=0) and a negligible direct effect on global warming (GWP = 1) when used as a refrigerant in closed systems.

It is not combustible, is chemically inactive and heavier than air. Carbon dioxide has a narcotic and asphyxiating effect on humans only at higher concentrations.

As carbon dioxide is less energy efficient than other refrigerants, recently work has particularly concentrated on optimising plant technology for specific applications. Carbon dioxide is available naturally in large quantities.

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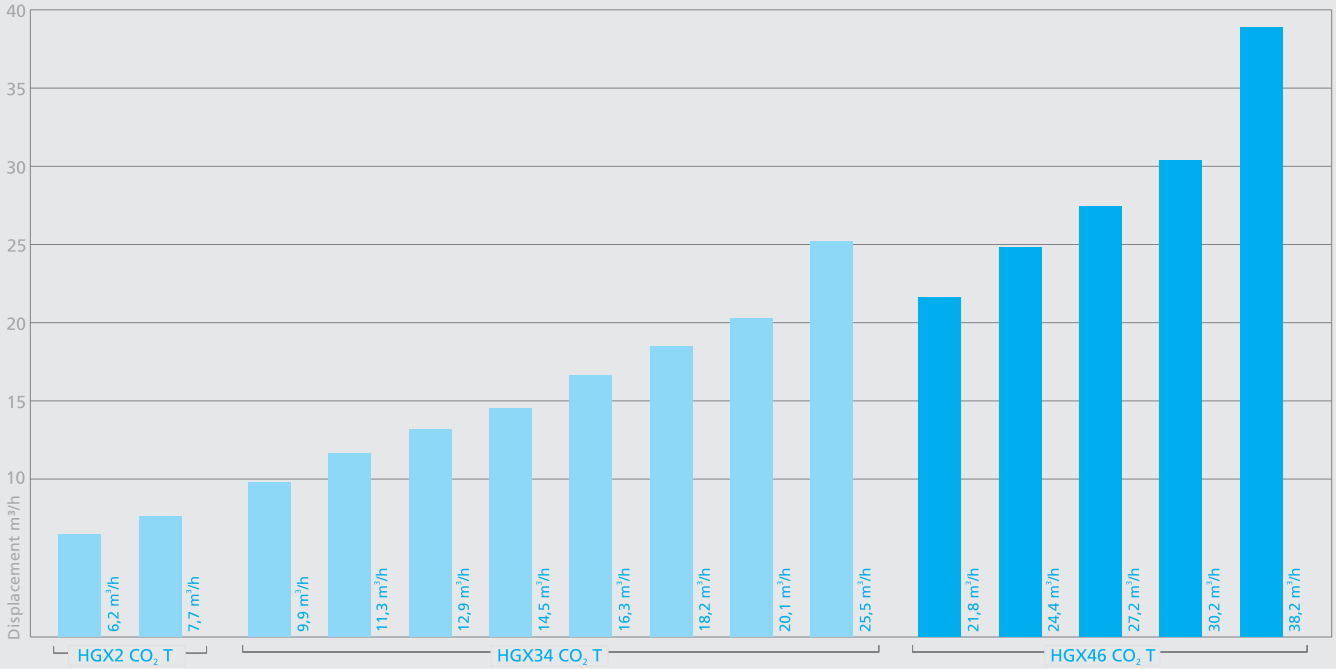
The current program

...3 model sizes with 15 capacity stages from 6,2 to 38,2 m³/h (50 Hz)



Type key

HGX34/210-4ML CO_2 T

- T – Transcritical
- CO_2 – CO_2 Version
- ML – Compressor variant [3]
- 4 – Number of poles
- 210 – Swept volume
- 34 – Number of cylinders
- 46 – Size
- X – Ester oil-filling [2]
- HG – Series [1]

[1] HG = Hermetic Gas-cooled (suction gas-cooled)

[2] X = Spezial ester oil for CO_2

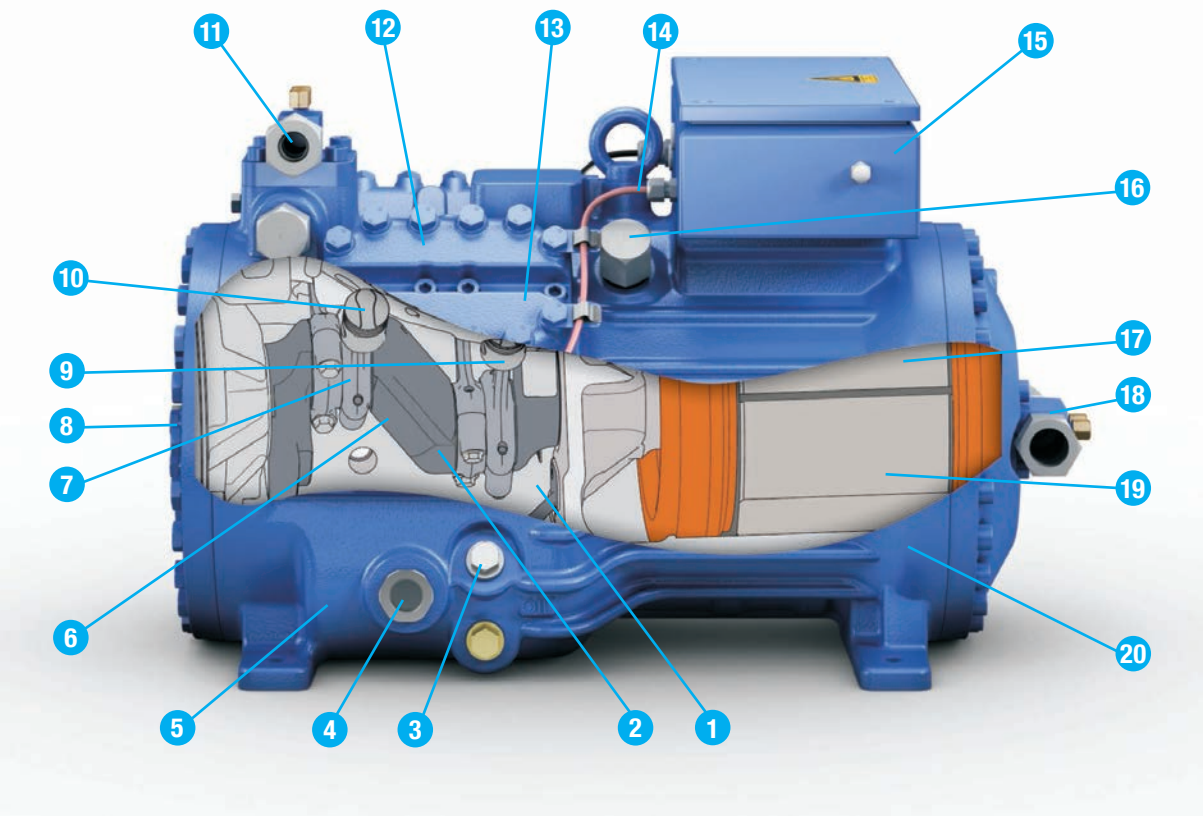
[3] ML = Normal cooling and deep freezing at low and medium evaporation temperatures

S = For frequency regulation and extended limits of application

SH = For heat pumps and at high evaporating temperatures, different oil charge

Important information

- Transcritical CO_2 applications are still in the development phase
- They require a completely new kind of system and control
- They are not a general solution for the substitution of F-gases
- We specifically point out that all information in this brochure has been made based on our current level of knowledge and may change due to further development. Legal claims regarding the accuracy of the information cannot be made at any time and are hereby excluded.



Designed for CO_2 - built for the future

GEA Bock HG34 CO_2 T

a compressor packed with more than 15 years of CO_2 compressor experience.

1. Low oil throw through a calmed lubrication circuit, minimum oil foaming and oil mist
2. Oil supply of bearings through forced lubrication and optimal oil circulation
3. Prevention against oil overfilling
4. Calmed oil level for precise and safe indication of oil level in the sight glass
5. Oil sump heater
6. Tempered crankshaft with robust main bearing and optimised mass balance for highest running comfort
7. Weight-optimized connecting rod for highest running comfort
8. Reliable and safe oil supply with pump lubrication
9. Piston rings in triple assembly
10. Special coating at the piston for minimum wear and high emergency running properties, piston heads with grooving of the suction reed valves outline for minimum clearance volume
11. Flexible connection options depending on the application (accessories)
12. Highest efficiency due to thermal separations at the cylinder cover and in the compressor housing, thereby reduction of superheating on the suction side
13. Valve system with optimized flow and channels in the housing ensure lowest pressure drops and highest efficiency
14. Thermal protection thermostat for pressure gas temperature monitoring (accessories)
15. GEA Bock MP10 electronic motor protection, especially easy to operate because of status indicators
16. Pressure relief valve for HP and LP side
17. Suction gas cooled, variable speed control of motor by frequency converter (ML and S = 20-70 Hz, SH= 25-70 Hz)
18. Flexible connection options depending on the application (accessories)
19. Winding protection with PTC resistor sensors
20. High-strength spheroidal cast iron housing for maximum operating pressures on the low pressure- and high pressure side

In addition, the GEA Bock characteristic features also apply to compressors of the type HG34 CO_2 T.

- Easy maintenance
- Large application area, subcritical and transcritical operation possible

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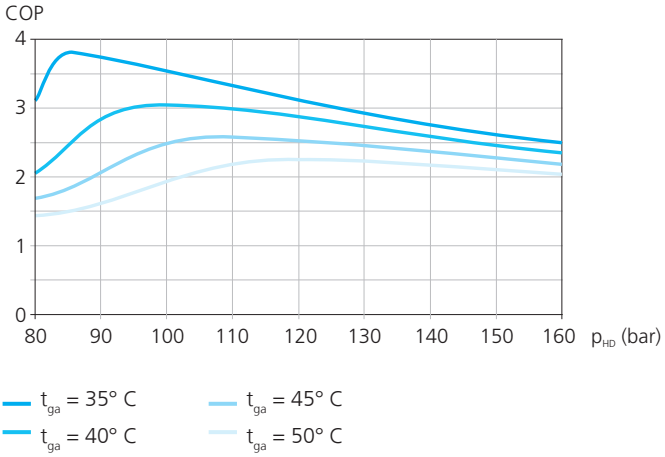
Special features CO_2 transcritical

Based on the high CO2 pressure and the low temperature of the critical point of 31°C (74 bar), transcritical operating conditions occur at higher temperatures at the heat exchanger. In this case, in comparison to subcritical applications, the refrigerant CO2 can no longer be condensed. In this case, the refrigerant gas is desuperheated in a gas cooler. The temperature and the pressure are dependent on each other, compared to the subcritical operation.

A special feature in these operating points is the necessary regulation of the high pressure at the so-called optimal high pressure. In doing this, the greatest possible enthalpy difference at the evaporator and the lowest possible power consumption of the compressor should be reached. In this way, the maximum coefficient of performance (COP) of the system is achieved. An additional valve with intelligent control after the high-pressure heat exchanger is needed for this in the system.

For additional technical data see GEA Bock software.



t_{ga} = Gas cooler outlet temperature

Limit conditions: isentrope compression

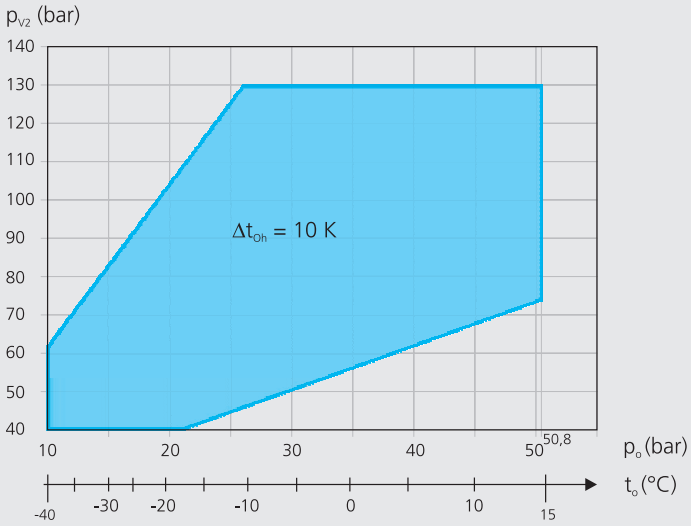
Evaporation pressure = 40 bar with internal heat exchanger

Compressor types

	ML-Version	For medium and low temperature applications at low and medium evaporating temperatures, oil charge C85E
	S-Version	For frequency control and extended application range, equipped with more powerful drive motor, oil charge C85E
	SH-Version	For heat pumps and at high evaporating temperatures, equipped with more powerful drive motor, oil charge C150E

CO_2 Operating limits

HGX2 CO_2 T



Unlimited application range

t_O Evaporating temperature (°C)

Δt_{Oh} Suction gas superheat (K)

p_o Suction pressure (bar)

p_{V2} Discharge end pressure (bar)

Max. permissible operating pressure (LP/HP)[1]: 100/150 bar

[1] LP = low pressure HP = high pressure

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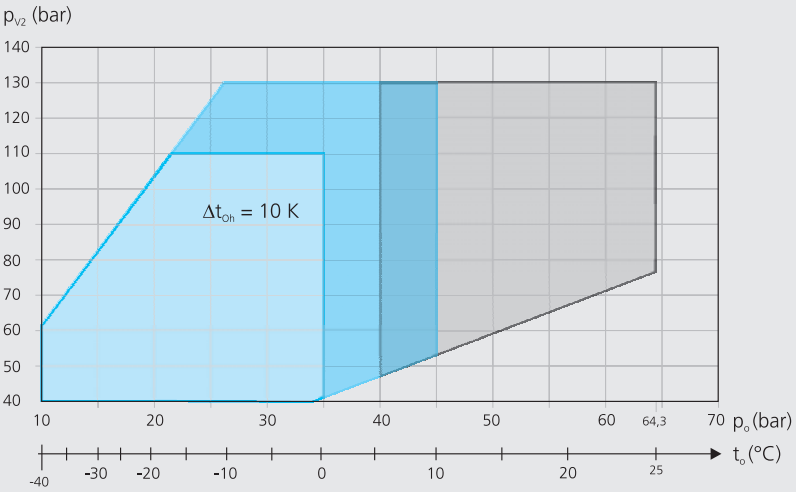
Operating limits

CO_2 Operating limits

HGX34 CO_2 T, HGX46 CO_2 T



Compressor type ML

Compressor type S

Compressor type SH

t_O Evaporating temperature (°C)

Δt_{Oh} Suction gas superheat (K)

p_o Suction pressure (bar)

p_{V2} Discharge end pressure (bar)

Max. permissible operating pressure (LP/HP)[1]: 100/150 bar

[1] LP = low pressure HP = high pressure

CO_2 Notes

Operating limits

Compressor operation is possible within the limits shown on the application diagrams. Compressor application limits should not be chosen for design purposes or continuous operation.
Evaporation temperatures < 5°C (40 bar) with the compressor type SH on request!

Restrictions to the operating limits may occur when using a frequency converter. Further information is available online at www.gea.com and in the GEA Bock VAP-software program.

Performance data

The performance data for CO_2 are based on 10 K suctiongas superheating at **50 Hz mains frequency.**
In case of subcritical operating conditions, no liquid subcooling takes place. The performance data for transcritical operating conditions are specified close to the "optimal high pressure". The optimal high pressure is thereby related to an ideal cyclic process.

Conversion factor for 60 Hz = 1,2

Performance data for other operating points, see GEA Bock software

CO_2	Performance data											50 Hz
Type			Cooling capacity $\dot{Q}_o$ [W]									Power consumption P_e [kW]
			Evaporating temperature °C									
			15	10	5	0	-5	-10	-15	-20	-25	-30	-35	-40
HGX2/70-4 CO_2 T	t_c °C		SUBCRITICAL											
	10	Q							18600	15200	12300	9600	7300	5270
		P							4,02	4,19	4,25	4,19	4,04	3,79
	15	Q					24400	20400	16900	13700	10900	8460	6310	4420
		P					4,03	4,37	4,57	4,65	4,62	4,49	4,26	3,95
	20	Q				26100	22000	18300	15100	12200	9550	7300	5330	3580
		P				4,37	4,75	4,99	5,10	5,09	4,98	4,77	4,46	4,07
	25	Q			27100	23000	19300	16000	13100	10500	8130	6110	4330	
		P			4,77	5,18	5,45	5,59	5,60	5,51	5,31	5,01	4,63	
	30	Q		25500	21900	18500	15500	12800	10400	8220	6320	4650		
		P		5,23	5,67	5,97	6,13	6,17	6,09	5,91	5,62	5,24		
HGX2/70-4 CO_2 T	t_{ga} °C		TRANSCRITICAL											
	30	p_{V2}	75	75	75	75	75	75	75	75	75	75		
		Q	32000	27600	23600	20000	16700	13800	11200	8810	6750	4930		
		P	5,03	5,58	5,98	6,24	6,36	6,37	6,26	6,04	5,72	5,31		
	35	p_{V2}	85	85	85	90	90	90	90	90	90	80		
		Q	27700	23900	20500	18200	15100	12400	9850	7660	5720	2860		
		P	6,28	6,70	6,97	7,50	7,45	7,29	7,02	6,66	6,20	5,44		
	40	p_{V2}	100	100	100	100	105	105	105	100	90			
		Q	26000	22400	19100	16100	13700	11100	8750	6570	4010			
		P	7,94	8,17	8,27	8,25	8,42	8,12	7,73	7,05	6,20			
	45	p_{V2}	110	110	115	115	115	120	115	100				
		Q	23100	19900	17600	14800	12200	9990	7690	4870				
		P	8,95	9,08	9,49	9,33	9,07	9,01	8,24	7,05				
	50	p_{V2}	125	125	130	130	130	130	115					
		Q	21500	18600	16300	13600	11200	8910	6220					
		P	10,40	10,40	10,70	10,40	10,10	9,69	8,24					

Subcritical performance data 50 Hz

Relative to 10 K suction gas superheat without liquid subcooling

Transcritical performance data 50 Hz

Relative to 10 K suction gas superheat

The performance data are indicated at a high pressure level, which is close to an optimal high pressure level. Optimal high pressure is thereby related to an ideal cyclic process

t_c = Condensing temperature

t_{ga} = Gas cooler outlet temperature

p_{V2} = Pressure at the compressor outlet [bar]

Optimal high pressure is outside of the operating limits. Performance data are indicated at maximum possible high pressure.

CO_2	Performance data											50 Hz
Type			Cooling capacity $\dot{Q}_o$ [W]									Power consumption P_e [kW]
			Evaporating temperature °C									
			15	10	5	0	-5	-10	-15	-20	-25	-30	-35	-40
HGX2/90-4 CO_2 T	t_c °C		SUBCRITICAL											
	10	Q							23600	19400	15800	12600	9760	7280
		P							5,21	5,34	5,35	5,25	5,04	4,71
	15	Q					30800	25800	21500	17600	14200	11200	8560	6240
		P					5,39	5,69	5,87	5,93	5,87	5,69	5,39	4,98
	20	Q				32900	27800	23300	19300	15700	12600	9760	7330	5190
		P				5,85	6,21	6,44	6,54	6,51	6,37	6,10	5,72	5,21
	25	Q			34100	29100	24600	20500	16800	13600	10800	8240	6050	
		P			6,37	6,78	7,05	7,19	7,20	7,09	6,85	6,48	5,99	
	30	Q		32200	27700	23600	19900	16500	13500	10800	8400	6330		
		P		6,98	7,43	7,74	7,92	7,96	7,86	7,64	7,29	6,80		
HGX2/90-4 CO_2 T	t_{ga} °C		TRANSCRITICAL											
	30	p_{V2}	75	75	75	75	75	75	75	75	75	75		
		Q	40400	35000	30000	25500	21400	17700	14500	11600	8990	6720		
		P	6,83	7,39	7,80	8,08	8,22	8,22	8,09	7,82	7,42	6,90		
	35	p_{V2}	85	85	85	90	90	90	90	90	90	80		
		Q	35200	30400	26100	23300	19400	16000	12800	10100	7600	3900		
		P	8,31	8,75	9,04	9,70	9,64	9,42	9,07	8,58	7,94	7,03		
	40	p_{V2}	100	100	100	100	105	105	105	100	90			
		Q	33200	28700	24400	20600	17600	14300	11300	8560	5330			
		P	10,30	10,60	10,70	10,60	10,70	10,30	9,75	8,90	7,94			
	45	p_{V2}	110	110	115	115	115	120	115	100				
		Q	29500	25400	22500	18900	15500	12700	9800	6340				
		P	11,60	11,70	12,10	11,80	11,40	10,90	10,00	8,90				
	50	p_{V2}	125	125	130	130	130	130	115					
		Q	27500	23700	20600	17200	14000	11200	7930					
		P	13,40	13,30	13,30	12,80	12,10	11,20	10,00					

Subcritical performance data 50 Hz

Relative to 10 K suction gas superheat without liquid subcooling

Transcritical performance data 50 Hz

Relative to 10 K suction gas superheat

The performance data are indicated at a high pressure level, which is close to an optimal high pressure level. Optimal high pressure is thereby related to an ideal cyclic process

t_c = Condensing temperature

t_{ga} = Gas cooler outlet temperature

p_{V2} = Pressure at the compressor outlet [bar]

Optimal high pressure is outside of the operating limits. Performance data are indicated at maximum possible high pressure.

CO_2 Performance data 50 Hz

Cooling capacity $\dot{Q}_o$ [W] — Power consumption P_e [kW]

Evaporating temperature °C

HGX34/110-4 SH CO_2 T

t_c °C		25	20	15	10	5
	SUBCRITICAL					
10	Q					
	P					
15	Q					
	P					
20	Q					
	P					
25	Q					45600
	P					7,90
30	Q				42600	36500
	P				8,38	9,06
t_{ga} °C		TRANSCRITICAL				
30	p_{V2}	90	85	75	75	75
	Q	74400	64500	53400	46100	39400
	P	8,85	8,75	7,88	8,87	9,50
35	p_{V2}	90	85	85	85	85
	Q	63600	52500	45800	39500	33700
	P	8,85	8,75	9,76	10,50	11,00
40	p_{V2}	95	95	100	100	100
	Q	51500	45400	42400	36600	31200
	P	9,95	10,80	12,50	13,10	13,20
45	p_{V2}	110	110	110	110	115
	Q	48500	42800	37300	32200	28600
	P	13,20	13,80	14,30	14,70	15,30
50	p_{V2}	120	120	125	125	130
	Q	42600	37700	34600	29900	26400
	P	15,20	15,70	16,90	16,90	17,20

HGX34/110-4 ML CO_2 T

t_c °C		0	-5	-10	-15	-20	-25	-30	-35	-40
	SUBCRITICAL									
10	Q				31700	26500	22000	18000	14400	11400
	P				6,01	6,27	6,38	6,35	6,17	5,85
15	Q		40500	34500	29100	24300	20000	16300	13000	10100
	P		6,14	6,59	6,89	7,05	7,06	6,93	6,65	6,22
20	Q	42900	36800	31200	26200	21800	18000	14500	11500	8870
	P	6,77	7,26	7,60	7,79	7,84	7,74	7,49	7,10	6,56
25	Q	38000	32500	27500	23100	19200	15700	12700	9930	
	P	8,03	8,40	8,63	8,70	8,63	8,41	8,04	7,52	
30	Q	30800	26400	22300	18700	15500	12600	10100		
	P	9,34	9,58	9,67	9,61	9,41	9,05	8,54		
t_{ga} °C		TRANSCRITICAL								
30	p_{V2}	75	75	75	75	75	75	75		
	Q	33400	28500	24100	20200	16700	13600	10900		
	P	9,79	9,99	10,00	9,93	9,67	9,26	8,71		
35	p_{V2}	90	90	90	90	90	85			
	Q	30700	26200	22100	18400	15200	11700			
	P	11,90	11,90	11,70	11,30	10,80	9,92			
40	p_{V2}	100	105	105	105	100	85			
	Q	27300	24100	20300	16900	13400	5840			
	P	13,30	13,60	13,10	12,50	11,40	9,92			
45	p_{V2}	110	110	110	110	100				
	Q	24300	20700	17500	14500	9910				
	P	14,40	14,10	13,50	12,80	11,40				
50	p_{V2}	110	110	110	110	100				
	Q	18600	15900	13400	11100	6390				
	P	14,40	14,10	13,50	12,80	11,40				

HGX34/110-4 S CO_2 T

t_c °C		25	20	15	10	5
	SUBCRITICAL					
10	Q					
	P					
15	Q					
	P					
20	Q					
	P					
25	Q					45000
	P					7,49
30	Q				42200	36500
	P				8,30	8,90
t_{ga} °C		TRANSCRITICAL				
30	p_{V2}				75	75
	Q				45800	39500
	P				8,84	9,39
35	p_{V2}				85	85
	Q				39500	34100
	P				10,60	11,00
40	p_{V2}				100	100
	Q				36800	31800
	P				13,00	13,10
45	p_{V2}				110	115
	Q				32500	29200
	P				14,50	15,10
50	p_{V2}				125	130
	Q				30000	26700
	P				16,50	16,80

HGX34/110-4 S CO_2 T

t_c °C		0	-5	-10	-15	-20	-25	-30	-35	-40
	SUBCRITICAL									
10	Q				31500	26200	21600	17600	14100	11100
	P				6,07	6,30	6,40	6,36	6,19	5,92
15	Q		40900	34600	29000	24100	19800	16100	12900	10100
	P		6,20	6,65	6,93	7,06	7,06	6,92	6,66	6,29
20	Q	43600	37100	31400	26300	21800	17900	14500	11600	9010
	P	6,80	7,30	7,63	7,80	7,83	7,71	7,47	7,10	6,63
25	Q	38600	32900	27700	23200	19200	15700	12700	10100	
	P	8,04	8,42	8,63	8,68	8,59	8,35	7,99	7,52	
30	Q	31300	26600	22400	18700	15400	12600	10200		
	P	9,31	9,56	9,64	9,56	9,34	8,98	8,50		
t_{ga} °C		TRANSCRITICAL								
30	p_{V2}	75	75	75	75	75	75	75		
	Q	33800	28700	24200	20200	16700	13700	11000		
	P	9,76	9,95	9,98	9,86	9,59	9,19	8,66		
35	p_{V2}	90	90	90	90	90	90	80		
	Q	30900	26300	22100	18500	15200	12300	6570		
	P	11,80	11,80	11,60	11,20	10,70	10,10	8,92		
40	p_{V2}	100	105	105	105	100	90			
	Q	27300	23900	20100	16700	13300	8620			
	P	13,10	13,40	13,00	12,40	11,40	10,10			
45	p_{V2}	115	115	120	115	100				
	Q	25100	21300	18300	14800	9850				
	P	14,80	14,40	14,20	13,10	11,40				
50	p_{V2}	130	130	130	115	100				
	Q	22900	19400	16300	12000	6360				
	P	16,40	15,70	14,90	13,10	11,40				

Subcritical performance data 50 Hz

Relative to 10 K suction gas superheat without liquid subcooling

Transcritical performance data 50 Hz

Relative to 10 K suction gas superheat

The performance data are indicated at a high pressure level, which is close to an optimal high pressure level. Optimal high pressure is thereby related to an ideal cyclic process.

t_c = Condensing temperature

t_{ga} = Gas cooler outlet temperature

p_{V2} = Pressure at the compressor outlet [bar]

Optimal high pressure is outside of the operating limits. Performance data are indicated at minimum or maximum possible high pressure.

96219-10.2014-Gb Subject to change without notice

CO_2 — Performance data — 50 Hz

		Cooling capacity $\dot{Q}_o$ [W]													Power consumption P_e [kW]
		Evaporating temperature °C													
		HGX34/130-4 SH CO_2 T					HGX34/130-4 ML CO_2 T								
		25	20	15	10	5	0	-5	-10	-15	-20	-25	-30	-35	-40
t_c °C		SUBCRITICAL													
10	Q									36100	30200	25000	20400	16400	12900
	P									6,85	7,12	7,23	7,18	6,99	6,66
15	Q							46100	39200	33000	27600	22700	18500	14800	11500
	P							7,01	7,52	7,85	8,00	8,00	7,83	7,53	7,09
20	Q						48800	41800	35500	29800	24800	20400	16500	13100	10100
	P						7,70	8,28	8,67	8,87	8,90	8,77	8,49	8,06	7,50
25	Q					48800	43200	36900	31300	26300	21800	17800	14300	11300	
	P					8,98	9,16	9,60	9,85	9,92	9,81	9,55	9,13	8,56	
30	Q				47300	40400	35000	29900	25300	21200	17500	14300	11400		
	P				9,53	10,30	10,60	10,90	11,00	10,90	10,70	10,30	9,73		
t_{ga} °C		TRANSCRITICAL													
30	p_{V2}	90	85	75	75	75	75	75	75	75	75	75	75		
	Q	84200	73000	59800	51500	44000	37900	32400	27400	22900	18900	15400	12300		
	P	10,00	9,96	8,95	10,00	10,80	11,20	11,40	11,40	11,30	11,00	10,50	9,93		
35	p_{V2}	90	85	85	85	85	90	90	90	90	90	85			
	Q	71900	59400	51900	44900	38400	34800	29700	25000	20900	17200	13200			
	P	10,00	9,96	11,10	12,00	12,50	13,70	13,70	13,40	13,00	12,40	11,30			
40	p_{V2}	95	95	100	100	100	100	105	105	105	100	85			
	Q	58400	51600	48200	41600	35600	30900	27200	22900	19100	15200	6610			
	P	11,30	12,30	14,30	15,00	15,20	15,20	15,50	15,00	14,30	13,10	11,30			
45	p_{V2}	110	110	110	110	115	110	110	110	110	100				
	Q	54900	48400	42300	36500	32300	27500	23400	19700	16400	11300				
	P	15,10	15,80	16,40	16,90	17,60	16,60	16,10	15,40	14,60	13,10				
50	p_{V2}	120	120	125	125	130	110	110	110	110	100				
	Q	48200	42600	39000	33600	29600	21000	17900	15100	12600	7230				
	P	117,50	18,00	19,40	19,50	19,80	16,60	16,10	15,40	14,60	13,10				
		HGX34/130-4 S CO_2 T													
t_c °C		SUBCRITICAL													
10	Q									36000	29900	24600	20000	16100	12700
	P									6,87	7,14	7,25	7,20	7,02	6,70
15	Q							46600	39400	33000	27400	22500	18300	14600	11500
	P							7,03	7,54	7,86	8,01	8,00	7,85	7,55	7,12
20	Q						49700	42300	35700	29800	24700	20300	16400	13100	10300
	P						7,72	8,29	8,67	8,86	8,89	8,76	8,48	8,06	7,51
25	Q					51200	43900	37300	31500	26300	21700	17800	14400	11400	
	P					8,51	9,14	9,57	9,81	9,87	9,76	9,50	9,08	8,53	
30	Q				48000	41500	35600	30200	25500	21200	17500	14300	11500		
	P				9,43	10,10	10,60	10,80	10,90	10,80	10,60	10,20	9,66		
t_{ga} °C		TRANSCRITICAL													
30	p_{V2}				75	75	75	75	75	75	75	75	75		
	Q				52100	44900	38400	32600	27500	22900	19000	15500	12500		
	P				10,00	10,60	11,10	11,30	11,30	11,20	10,90	10,40	9,85		
35	p_{V2}				85	85	90	90	90	90	90	90	80		
	Q				44900	38800	35100	29800	25100	20900	17200	14000	7440		
	P				12,10	12,50	13,50	13,50	13,20	12,80	12,20	11,50	10,10		
40	p_{V2}				100	100	100	105	105	105	100	90			
	Q				41800	36100	30900	27100	22800	18900	15100	9760			
	P				14,90	15,00	15,00	15,40	14,90	14,20	13,00	11,50			
45	p_{V2}				110	115	115	115	120	115	100				
	Q				36800	33100	28400	24100	20600	16700	11200				
	P				16,60	17,30	17,00	16,50	16,30	15,00	13,00				
50	p_{V2}				125	130	130	130	130	115	100				
	Q				34000	30200	25900	22000	18400	13600	7190				
	P				19,00	19,40	18,80	18,10	17,10	15,00	13,00				

Subcritical performance data 50 Hz

Relative to 10 K suction gas superheat without liquid subcooling

Transcritical performance data 50 Hz

Relative to 10 K suction gas superheat

The performance data are indicated at a high pressure level, which is close to an optimal high pressure level. Optimal high pressure is thereby related to an ideal cyclic process.

t_c = Condensing temperature

t_{ga} = Gas cooler outlet temperature

p_{V2} = Pressure at the compressor outlet [bar]

Optimal high pressure is outside of the operating limits. Performance data are indicated at minimum or maximum possible high pressure.

CO_2 Performance data 50 Hz

Cooling capacity $\dot{Q}_o$ [W] — Power consumption P_e [kW]

Evaporating temperature °C

HGX34/150-4 SH CO_2 T

t_c °C		25	20	15	10	5	0	-5	-10	-15	-20	-25	-30	-35	-40
		SUBCRITICAL													
10	Q						67100	57000	48000	40100	33100	27100	21900	17500	13700
	P						5,36	6,47	7,32	7,90	8,25	8,37	8,28	7,99	7,52
15	Q					72500	61700	52300	44000	36700	30300	24800	20000	15900	12400
	P					6,02	7,03	7,97	8,64	9,07	9,26	9,24	9,01	8,60	8,01
20	Q				76600	65700	55900	47400	39900	33200	27400	22300	18000	14300	11100
	P				6,53	7,83	8,73	9,47	9,97	10,20	10,20	10,00	9,73	9,18	8,47
25	Q			78400	67600	58000	49400	41900	35200	29300	24100	19600	15800	12500	
	P			7,12	8,56	9,68	10,40	10,90	11,20	11,30	11,20	10,90	10,40	9,74	
30	Q		72600	63200	54600	47000	40100	34000	28600	23800	19600	15900	12800		
	P		7,82	9,40	10,60	11,50	12,10	12,40	12,60	12,50	12,20	11,70	11,00		
		TRANSCRITICAL													
30	p_{V2}	80	70	75	75	75	75	75	75	75	75	75	75		
	Q	94500	24400	68600	59300	50900	43400	36800	30900	25700	21100	17200	13800		
	P	8,44	7,16	10,20	11,30	12,20	12,70	13,00	13,00	12,90	12,50	12,00	11,30		
35	p_{V2}	85	85	85	85	85	90	90	90	90	90	85			
	Q	77900	68300	59400	51400	44200	39800	33700	28300	23500	19300	14900			
	P	9,98	11,50	12,80	13,70	14,40	15,50	15,40	15,10	14,70	14,10	12,80			
40	p_{V2}	95	95	100	100	100	100	105	105	105	100	85			
	Q	67700	59500	55700	48100	41300	35100	30700	25700	21400	17000	7430			
	P	12,80	14,20	16,40	17,10	17,30	17,20	17,60	17,00	16,30	15,00	12,80			
45	p_{V2}	110	110	110	110	115	110	110	110	110	100				
	Q	64200	56400	49200	42600	38100	31000	26300	22100	18300	12600				
	P	16,90	18,00	18,70	19,10	20,10	18,70	18,30	17,60	16,90	15,00				
50	p_{V2}	120	120	125	125	130	110	110	110	110	100				
	Q	56500	49900	45600	39500	34900	23600	20100	16900	14100	8120				
	P	19,50	20,40	22,00	22,10	22,70	18,70	18,30	17,60	16,90	15,00				

HGX34/150-4 S CO_2 T

t_c °C															
		SUBCRITICAL													
10	Q						67300	57100	48100	40200	33200	27200	22000	17600	13700
	P						5,40	6,51	7,36	7,96	8,31	8,44	8,35	8,05	7,56
15	Q					72400	61900	52500	44100	36800	30400	24800	20000	15900	12400
	P					5,87	7,06	8,00	8,68	9,11	9,32	9,31	9,08	8,66	8,05
20	Q				76300	65700	56100	47600	40000	33300	27400	22300	18000	14300	11100
	P				6,49	7,75	8,75	9,49	9,99	10,20	10,30	10,10	9,79	9,24	8,52
25	Q				67500	58100	49700	42000	35300	29300	24100	19600	15800	12500	
	P				8,60	9,65	10,40	10,90	11,30	11,40	11,20	10,90	10,40	9,79	
30	Q				54700	47200	40300	34100	28600	23800	19500	15900	12800		
	P				10,70	11,50	12,10	12,40	12,60	12,50	12,20	11,70	11,10		
		TRANSCRITICAL													
30	p_{V2}				75	75	75	75	75	75	75	75	75		
	Q				59400	51100	43600	36800	30900	25700	21100	17200	13800		
	P				11,40	12,20	12,70	13,00	13,00	12,90	12,50	12,00	11,30		
35	p_{V2}				85	85	90	90	90	90	90	90	80		
	Q				51500	44300	40000	33800	28400	23500	19400	15700	8300		
	P				13,80	14,30	15,40	15,40	15,10	14,60	14,00	13,20	11,70		
40	p_{V2}				100	100	100	105	105	105	100	90			
	Q				48200	41500	35400	30900	25900	21600	17200	11100			
	P				17,00	17,10	17,10	17,40	16,90	16,20	14,90	13,20			
45	p_{V2}				110	115	115	115	120	115	100				
	Q				42600	38100	32600	27600	23700	19300	12700				
	P				19,00	19,70	19,30	18,70	18,60	17,20	14,90				
50	p_{V2}				125	130	130	130	130	115	100				
	Q				39300	34800	29800	25300	21300	15600	8190				
	P				21,60	22,00	21,40	20,60	19,70	17,20	14,90				

Subcritical performance data 50 Hz

Relative to 10 K suction gas superheat without liquid subcooling

Transcritical performance data 50 Hz

Relative to 10 K suction gas superheat

The performance data are indicated at a high pressure level, which is close to an optimal high pressure level. Optimal high pressure is thereby related to an ideal cyclic process.

t_c = Condensing temperature

t_{ga} = Gas cooler outlet temperature

p_{V2} = Pressure at the compressor outlet [bar]

Optimal high pressure is outside of the operating limits. Performance data are indicated at minimum or maximum possible high pressure.

CO_2 — Performance data — 50 Hz

Cooling capacity $\dot{Q}_o$ [W] — Power consumption P_e [kW]

Evaporating temperature °C

HGX34/170-4 SH CO_2 T

t_c °C		25	20	15	10	5
SUBCRITICAL						
10	Q					
	P					
15	Q					
	P					
20	Q					
	P					
25	Q					67700
	P					11,20
30	Q				62700	53900
	P				12,00	13,10
TRANSCRITICAL						
30	p_{V2}	90	85	75	75	75
	Q	108000	93500	78200	67600	58000
	P	12,80	12,80	11,40	12,80	13,80
35	p_{V2}	90	85	85	85	85
	Q	91800	76200	66400	57500	49400
	P	12,80	12,80	14,30	15,40	16,20
40	p_{V2}	95	95	100	100	100
	Q	74200	65500	61100	52800	45300
	P	14,50	15,90	18,40	19,10	19,50
45	p_{V2}	110	110	110	110	115
	Q	70000	61700	53700	46400	41400
	P	19,30	20,30	21,00	21,50	22,60
50	p_{V2}	120	120	125	125	130
	Q	62000	54700	50000	43100	38100
	P	22,40	23,10	24,80	24,80	25,50

HGX34/170-4 ML CO_2 T

t_c °C		0	-5	-10	-15	-20	-25	-30	-35	-40
SUBCRITICAL										
10	Q				46200	38600	32000	26100	21000	16500
	P				8,73	9,09	9,23	9,16	8,92	8,50
15	Q		59000	50200	42300	35300	29100	23600	18900	14700
	P		8,91	9,58	10,00	10,20	10,20	10,00	9,61	9,04
20	Q	62400	53400	45400	38100	31700	26100	21100	16700	12900
	P	9,81	10,50	11,00	11,30	11,30	11,10	10,80	10,20	9,56
25	Q	55200	47200	40000	33600	27800	22800	18300	14400	
	P	11,60	12,20	12,50	12,60	12,50	12,10	11,60	10,90	
30	Q	44700	38300	32400	27100	22400	18300	14600		
	P	13,60	13,90	14,00	13,90	13,60	13,10	12,30		
TRANSCRITICAL										
30	p_{V2}	75	75	75	75	75	75	75		
	Q	48400	41400	35000	29300	24200	19700	15700		
	P	14,30	14,50	14,60	14,40	14,00	13,40	12,60		
35	p_{V2}	90	90	90	90	90	85			
	Q	44400	37900	32000	26700	21900	16900			
	P	17,50	17,40	17,10	16,50	15,80	14,40			
40	p_{V2}	100	105	105	105	100	85			
	Q	39400	34700	29300	24300	19400	8450			
	P	19,50	20,00	19,30	18,30	16,80	14,40			
45	p_{V2}	110	110	110	110	100				
	Q	35100	29900	25200	21000	14400				
	P	21,30	20,70	19,90	18,90	16,80				
50	p_{V2}	110	110	110	110	100				
	Q	26800	22900	19300	16100	9240				
	P	21,30	20,70	19,90	18,90	16,80				

HGX34/170-4 S CO_2 T

t_c °C		0	-5	-10	-15	-20	-25	-30	-35	-40
SUBCRITICAL										
10	Q				46000	38200	31500	25600	20500	16200
	P				8,77	9,12	9,26	9,20	8,96	8,55
15	Q		59700	50500	42300	35100	28800	23400	18700	14700
	P		8,97	9,63	10,00	10,20	10,20	10,00	9,65	9,10
20	Q	63700	54200	45700	38300	31700	26000	21100	16800	13200
	P	9,86	10,60	11,00	11,30	11,30	11,20	10,80	10,30	9,60
25	Q	56300	47900	40300	33700	27900	22800	18400	14700	
	P	11,70	12,20	12,50	12,60	12,50	12,10	11,60	10,90	
30	Q	45600	38800	32600	27200	22500	18300	14700		
	P	13,60	13,90	14,00	13,90	13,60	13,10	12,30		
TRANSCRITICAL										
30	p_{V2}	75	75	75	75	75	75	75		
	Q	49200	41800	35200	29400	24300	19900	16000		
	P	14,20	14,50	14,60	14,40	14,00	13,40	12,60		
35	p_{V2}	90	90	90	90	90	90	80		
	Q	44900	38100	32100	26800	22100	17900	9540		
	P	17,40	17,30	17,00	16,50	15,70	14,80	13,00		
40	p_{V2}	105	105	105	105	100	90			
	Q	39600	34700	29200	24200	19300	12600			
	P	19,30	19,70	19,10	18,20	16,70	14,80			
45	p_{V2}	115	115	120	115	100				
	Q	36300	30800	26400	21400	14300				
	P	21,80	21,20	20,90	19,20	16,70				
50	p_{V2}	130	130	130	115	100				
	Q	33200	28100	23500	17400	9220				
	P	24,20	23,20	22,00	19,20	16,70				

Subcritical performance data 50 Hz

Relative to 10 K suction gas superheat without liquid subcooling

Transcritical performance data 50 Hz

Relative to 10 K suction gas superheat

The performance data are indicated at a high pressure level, which is close to an optimal high pressure level. Optimal high pressure is thereby related to an ideal cyclic process.

t_c = Condensing temperature

t_{ga} = Gas cooler outlet temperature

p_{V2} = Pressure at the compressor outlet [bar]

Optimal high pressure is outside of the operating limits. Performance data are indicated at minimum or maximum possible high pressure.

CO_2 — Performance data — 50 Hz

Cooling capacity $\dot{Q}_o$ [W] — Power consumption P_e [kW]

Evaporating temperature °C

t_c °C		HGX34/190-4 SH CO_2 T 25	20	15	10	5	HGX34/190-4 ML CO_2 T 0	-5	-10	-15	-20	-25	-30	-35	-40
		SUBCRITICAL													
10	Q									51100	42800	35400	29000	23300	18300
	P									9,79	10,20	10,40	10,30	10,10	9,62
15	Q							65400	55600	46900	39100	32300	26300	21000	16400
	P							9,97	10,70	11,20	11,50	11,50	11,30	10,80	10,20
20	Q						69300	59300	50400	42300	35200	28900	23400	18600	14300
	P						10,90	11,80	12,40	12,70	12,70	12,60	12,20	11,60	10,80
25	Q					75900	61400	52500	44500	37300	30900	25300	20300	16000	
	P					12,80	13,00	13,70	14,00	14,20	14,00	13,70	13,10	12,30	
30	Q				70300	60600	49800	42600	36000	30100	24900	20200	16100		
	P				13,60	14,80	15,20	15,60	15,70	15,70	15,30	14,80	14,00		
t_{ga} °C		TRANSCRITICAL													
30	p_{V2}	90	85	75	75	75	75	75	75	75	75	75	75		
	Q	122000	106000	87600	76000	65400	54000	46000	38900	32500	26800	21800	17300		
	P	14,40	14,40	12,80	14,40	15,60	15,90	16,20	16,30	16,20	15,80	15,10	14,30		
35	p_{V2}	90	85	85	85	85	90	90	90	90	90	85			
	Q	104000	85800	75000	65000	55900	49600	42200	35500	29500	24200	18600			
	P	14,40	14,40	16,00	17,30	18,10	19,50	19,40	19,10	18,60	17,80	16,30			
40	p_{V2}	95	95	100	100	100	100	105	105	105	100	85			
	Q	84000	74300	69600	60000	51400	44000	38600	32300	26700	21200	9290			
	P	16,20	17,80	20,60	21,40	21,90	21,60	22,20	21,60	20,70	19,10	16,30			
45	p_{V2}	110	110	110	110	115	110	110	110	110	100				
	Q	79600	70200	61300	52900	46900	39000	33100	27700	22900	15700				
	P	21,70	22,80	23,60	24,10	25,40	23,60	23,10	22,40	21,40	19,10				
50	p_{V2}	120	120	125	125	130	110	110	110	110	100				
	Q	70300	62100	56700	48900	43100	29800	25300	21300	17600	10100				
	P	25,10	25,90	27,70	27,80	28,50	23,60	23,10	22,40	21,40	19,10				

HGX34/190-4 S CO_2 T

t_c °C		SUBCRITICAL													
10	Q									51200	42500	35000	28600	22900	18000
	P									9,88	10,30	10,40	10,40	10,10	9,68
15	Q							66800	56200	47000	39000	32000	26100	20900	16300
	P							10,00	10,80	11,30	11,50	11,50	11,30	10,90	10,30
20	Q						71500	60500	50800	42400	35100	28800	23400	18700	14500
	P						10,90	11,80	12,40	12,70	12,80	12,60	12,20	11,60	10,80
25	Q					74100	63100	53300	44800	37300	30800	25200	20400	16200	
	P					12,10	13,10	13,70	14,10	14,20	14,10	13,70	13,10	12,30	
30	Q				69700	59800	50900	43100	36100	30000	24700	20200	16200		
	P				13,40	14,40	15,20	15,60	15,80	15,70	15,30	14,70	14,00		
t_{ga} °C		TRANSCRITICAL													
30	p_{V2}				75	75	75	75	75	75	75	75	75		
	Q				74800	64300	54900	46500	39200	32700	27000	22000	17600		
	P				14,30	15,30	15,90	16,30	16,40	16,20	15,70	15,10	14,30		
35	p_{V2}				85	85	90	90	90	90	90	90	80		
	Q				564500	55500	50100	42400	35600	29600	24400	19700	10500		
	P				17,30	18,00	19,50	19,40	19,10	18,50	17,80	16,80	14,80		
40	p_{V2}				100	100	100	105	105	105	100	90			
	Q				60100	51700	44100	38500	32200	26700	21300	13800			
	P				21,30	21,60	21,50	22,10	21,50	20,60	18,90	16,80			
45	p_{V2}				110	115	115	115	120	115	100				
	Q				53000	47300	40400	34100	29100	23600	15800				
	P				23,70	24,80	24,40	23,80	23,60	21,80	18,90				
50	p_{V2}				125	130	130	130	130	115	100				
	Q				48800	43100	36700	31000	25900	19100	10200				
	P				27,00	27,70	27,00	26,10	25,00	21,80	18,90				

Subcritical performance data 50 Hz

Relative to 10 K suction gas superheat without liquid subcooling

Transcritical performance data 50 Hz

Relative to 10 K suction gas superheat

The performance data are indicated at a high pressure level, which is close to an optimal high pressure level. Optimal high pressure is thereby related to an ideal cyclic process.

t_c = Condensing temperature

t_{ga} = Gas cooler outlet temperature

p_{V2} = Pressure at the compressor outlet [bar]

Optimal high pressure is outside of the operating limits. Performance data are indicated at minimum or maximum possible high pressure.

96219-10.2014-Gb Subject to change without notice

CO_2 — Performance data — 50 Hz

Cooling capacity $\dot{Q}_o$ [W] — Power consumption P_e [kW]

Evaporating temperature °C

HGX34/210-4 SH CO_2 T

t_c °C		25	20	15	10	5
	SUBCRITICAL					
10	Q					
	P					
15	Q					104000
	P					8,27
20	Q				110000	94400
	P				9,03	10,70
25	Q			113000	97500	83800
	P			9,93	11,80	13,30
30	Q		105000	91300	79200	68200
	P		11,00	13,10	14,70	15,90
t_{ga} °C		TRANSKRITISCH				
30	p_{V2}	80	70	75	75	75
	Q	137000	35200	99500	85900	73700
	P	12,00	10,10	14,20	15,70	16,90
35	p_{V2}	85	85	85	85	85
	Q	113000	99100	86400	74700	64100
	P	14,20	16,30	17,90	19,10	19,90
40	p_{V2}	95	95	100	100	100
	Q	97900	86500	81100	70100	60100
	P	18,30	20,10	23,10	23,80	24,10
45	p_{V2}	110	110	110	110	115
	Q	92900	82000	71600	62000	55200
	P	24,20	25,50	26,30	26,70	28,00
50	p_{V2}	120	120	125	125	130
	Q	81600	72300	66000	57100	50100
	P	27,90	28,90	30,90	30,90	31,60

HGX34/210-4 ML CO_2 T

t_c °C		0	-5	-10	-15	-20	-25	-30	-35	-40
10	Q	95800	81400	68600	57400	47600	39100	31900	25700	20500
	P	7,53	8,92	9,97	10,60	11,10	11,20	11,10	10,80	10,40
15	Q	88200	74900	63000	52700	43600	35800	29100	23400	18600
	P	9,77	10,90	11,80	12,30	12,50	12,50	12,20	11,80	11,10
20	Q	80100	67900	57200	47700	39400	32300	26300	21100	16800
	P	12,00	13,00	13,60	14,00	14,00	13,80	13,30	12,60	11,80
25	Q	70900	60100	50500	42100	34800	28500	23100	18500	
	P	14,40	15,10	15,60	15,70	15,50	15,00	14,30	13,50	
30	Q	57600	48800	41000	34100	28200	23000	18600		
	P	16,80	17,30	17,50	17,30	16,90	16,20	15,30		
t_{ga} °C										
30	p_{V2}	75	75	75	75	75	75	75		
	Q	62400	52800	44300	36900	30400	24900	20100		
	P	17,70	18,10	18,20	17,90	17,40	16,60	15,60		
35	p_{V2}	90	90	90	90	90	85			
	Q	57200	48300	40500	33700	27700	21500			
	P	21,80	21,70	21,40	20,70	19,70	17,90			
40	p_{V2}	100	105	105	105	100	85			
	Q	50500	44000	36800	30500	24400	10800			
	P	24,30	25,00	24,20	23,00	21,00	17,90			
45	p_{V2}	110	110	110	110	100				
	Q	44600	37700	31500	26200	18100				
	P	26,70	26,00	25,00	23,70	21,00				
50	p_{V2}	110	110	110	110	100				
	Q	34100	28800	24200	20100	11700				
	P	26,70	26,00	25,00	23,70	21,00				

HGX34/210-4 S CO_2 T

t_c °C		0	-5	-10	-15	-20	-25	-30	-35	-40
10	Q	96400	82100	69300	58100	48300	39700	32300	26000	20500
	P	7,56	8,97	10,00	10,70	11,20	11,30	11,20	10,90	10,40
15	Q	88800	75500	63700	53300	44200	36300	29500	23600	18600
	P	8,24	9,81	11,00	11,80	12,40	12,60	12,60	12,30	11,80	11,10
20	Q	94200	80700	68600	57800	48300	39900	32700	26500	21200	16700
	P	10,70	12,10	13,00	13,70	14,00	14,00	13,80	13,40	12,70	11,80
25	Q	96700	83500	71400	60700	51100	42600	35200	28800	23300	18600
	P	11,90	13,30	14,40	15,10	15,50	15,60	15,50	15,00	14,40	13,50
30	Q	78400	67700	58000	49300	41400	34500	28500	23300	18800	
	P	14,80	16,00	16,80	17,30	17,40	17,30	16,90	16,20	15,30	
t_{ga} °C		TRANSCRITICAL								
30	p_{V2}	75	75	75	75	75	75	75		
	Q	85200	73400	62700	53200	44700	37300	30800	25200	20300	
	P	15,80	16,90	17,60	18,00	18,10	17,80	17,30	16,60	15,60	
35	p_{V2}	85	85	90	90	90	90	90	80		
	Q	73800	63700	57600	48800	41000	34100	28100	23000	12300	
	P	19,20	20,00	21,60	21,60	21,20	20,50	19,60	18,40	16,20	
40	p_{V2}	100	100	100	105	105	105	100	90		
	Q	69100	59500	50900	44500	37300	31100	24900	16100		
	P	23,90	24,20	24,10	24,70	23,90	22,80	20,80	18,40		
45	p_{V2}	110	115	115	115	120	115	100			
	Q	61000	54600	46700	39500	34000	27700	18400			
	P	26,80	28,00	27,50	26,60	26,40	24,20	20,80			
50	p_{V2}	125	130	130	130	130	115	100			
	Q	56100	49700	42400	36000	30300	22400	11900			
	P	30,90	31,70	30,70	29,50	28,00	24,20	20,80			

Subcritical performance data 50 Hz

Relative to 10 K suction gas superheat without liquid subcooling

Transcritical performance data 50 Hz

Relative to 10 K suction gas superheat

The performance data are indicated at a high pressure level, which is close to an optimal high pressure level. Optimal high pressure is thereby related to an ideal cyclic process.

t_c = Condensing temperature

t_{ga} = Gas cooler outlet temperature

p_{V2} = Pressure at the compressor outlet [bar]

Optimal high pressure is outside of the operating limits. Performance data are indicated at minimum or maximum possible high pressure.

CO_2 Performance data 50 Hz

Cooling capacity $\dot{Q}_o$ [W] — Power consumption P_e [kW]

Evaporating temperature °C

HGX34/230-4 SH CO_2 T

t_c °C		25	20	15	10	5
	SUBCRITICAL					
10	Q					
	P					
15	Q					
	P					
20	Q					
	P					
25	Q					94200
	P					15,90
30	Q				87200	74900
	P				16,80	18,40
t_{ga} °C		TRANSCRITICAL				
30	p_{V2}	90	85	75	75	75
	Q	150000	131000	109000	94100	80700
	P	17,80	17,90	15,90	17,90	19,40
35	p_{V2}	90	85	85	85	85
	Q	128000	106000	92500	80000	68700
	P	17,80	17,90	19,90	21,40	22,50
40	p_{V2}	95	95	100	100	100
	Q	104000	91200	85100	73500	63100
	P	20,20	22,20	25,60	26,60	27,20
45	p_{V2}	110	110	110	110	115
	Q	97500	85900	74900	64700	57700
	P	26,90	28,30	29,30	29,90	31,50
50	p_{V2}	120	120	125	125	130
	Q	86300	76200	69800	60100	53200
	P	31,10	32,10	34,40	34,40	35,30

HGX34/230-4 ML CO_2 T

t_c °C		0	-5	-10	-15	-20	-25	-30	-35	-40
	SUBCRITICAL									
10	Q				64000	53600	44400	36300	29200	23000
	P				12,10	12,70	12,90	12,80	12,30	11,60
15	Q		81700	69500	58600	49000	40400	32900	26300	20600
	P		12,40	13,30	14,00	14,30	14,30	13,90	13,30	12,30
20	Q	86500	74100	62900	53000	44100	36300	29400	23400	18100
	P	13,70	14,70	15,40	15,80	15,80	15,60	15,00	14,20	13,00
25	Q	76500	65500	55500	46600	38700	31700	25600	20200	
	P	16,20	17,00	17,40	17,50	17,40	16,90	16,10	14,90	
30	Q	62100	53100	45000	37700	31200	25500	20400		
	P	18,80	19,30	19,40	19,30	18,80	18,00	17,00		
t_{ga} °C		TRANSCRITICAL								
30	p_{V2}	75	75	75	75	75	75	75		
	Q	67200	57400	48600	40700	33700	27500	22000		
	P	19,80	20,10	20,10	19,90	19,30	18,40	17,30		
35	p_{V2}	90	90	90	90	90	85			
	Q	61800	52700	44500	37100	30600	23600			
	P	24,20	23,90	23,40	22,60	21,60	19,60			
40	p_{V2}	100	105	105	105	100	85			
	Q	54800	48300	40700	33900	27000	11800			
	P	26,90	27,50	26,50	25,20	22,90	19,60			
45	p_{V2}	110	110	110	110	100				
	Q	48800	41600	35000	29200	20000				
	P	29,60	28,70	27,50	26,00	22,90				
50	p_{V2}	110	110	110	110	100				
	Q	37200	31800	26800	22400	12900				
	P	29,60	28,70	27,50	26,00	22,90				

HGX34/230-4 S CO_2 T

t_c °C		25	20	15	10	5
	SUBCRITICAL					
10	Q					
	P					
15	Q					
	P					
20	Q					
	P					
25	Q					89200
	P					15,30
30	Q				83300	72500
	P				17,00	18,20
t_{ga} °C		TRANSCRITICAL				
30	p_{V2}				75	75
	Q				90700	78600
	P				18,10	19,30
35	p_{V2}				85	85
	Q				78900	68400
	P				21,80	22,60
40	p_{V2}				100	100
	Q				74400	64400
	P				26,80	27,10
45	p_{V2}				110	115
	Q				66100	59700
	P				29,80	31,00
50	p_{V2}				125	130
	Q				61700	55100
	P				34,10	34,80

HGX34/230-4 S CO_2 T

t_c °C		0	-5	-10	-15	-20	-25	-30	-35	-40
	SUBCRITICAL									
10	Q				63900	53500	44400	36300	29300	23100
	P				12,20	12,60	12,80	12,70	12,30	11,60
15	Q		81700	69500	58600	49000	40500	33000	26400	20600
	P		12,50	13,40	14,00	14,30	14,20	13,90	13,30	12,40
20	Q	86700	74200	63000	53000	44200	36300	29400	23400	18100
	P	13,80	14,90	15,50	15,90	15,90	15,60	15,00	14,20	13,10
25	Q	76900	65700	55700	46700	38800	31800	25600	20200	
	P	16,40	17,20	17,60	17,70	17,50	16,90	16,10	15,00	
30	Q	62500	53400	45200	37800	31300	25500	20400		
	P	19,10	19,60	19,70	19,50	19,00	18,20	17,10		
t_{ga} °C		TRANSCRITICAL								
30	p_{V2}	75	75	75	75	75	75	75		
	Q	67600	57700	48800	40800	33700	27500	21900		
	P	20,00	20,40	20,40	20,10	19,50	18,60	17,40		
35	p_{V2}	90	90	90	90	90	90	80		
	Q	62300	53000	44600	37200	30500	24700	13100		
	P	24,40	24,20	23,70	22,90	21,80	20,40	17,90		
40	p_{V2}	100	105	105	105	100	90			
	Q	55300	48600	40800	33800	26800	17300			
	P	26,90	27,50	26,50	25,30	23,10	20,40			
45	p_{V2}	115	115	120	115	100				
	Q	51200	43400	37300	30100	19900				
	P	30,40	29,50	29,10	26,70	23,10				
50	p_{V2}	130	130	130	115	100				
	Q	47200	40000	33400	24400	12900				
	P	33,80	32,40	30,80	26,70	23,10				

Subcritical performance data 50 Hz

Relative to 10 K suction gas superheat without liquid subcooling

Transcritical performance data 50 Hz

Relative to 10 K suction gas superheat

The performance data are indicated at a high pressure level, which is close to an optimal high pressure level. Optimal high pressure is thereby related to an ideal cyclic process.

t_c = Condensing temperature

t_{ga} = Gas cooler outlet temperature

p_{V2} = Pressure at the compressor outlet [bar]

Optimal high pressure is outside of the operating limits. Performance data are indicated at minimum or maximum possible high pressure.

96219-10.2014-Gb Subject to change without notice

CO_2 — Performance data — 50 Hz

Cooling capacity $\dot{Q}_o$ [W] — Power consumption P_e [kW]

Evaporating temperature °C

HGX34/290-4 SH CO_2 T

t_c °C		25	20	15	10	5
		SUBCRITICAL				
10	Q					
	P					
15	Q					143000
	P					11,90
20	Q				150000	130000
	P				13,00	15,90
25	Q			153000	134000	116000
	P			14,30	17,40	19,80
30	Q		141000	124000	109000	94200
	P		15,80	19,30	21,90	23,70
t_{ga} °C		TRANSCRITICAL				
30	p_{V2}	80	70	75	75	75
	Q	183000	47400	136000	118000	102000
	P	17,10	14,30	21,00	23,40	25,10
35	p_{V2}	85	85	85	85	85
	Q	151000	134000	118000	103000	88800
	P	20,60	24,00	26,60	28,30	29,40
40	p_{V2}	95	95	100	100	100
	Q	133000	118000	112000	97000	83600
	P	26,80	29,60	33,80	34,70	35,00
45	p_{V2}	110	110	110	110	115
	Q	127000	113000	99000	86200	77300
	P	35,30	37,10	38,20	38,60	40,00
50	p_{V2}	120	120	125	125	130
	Q	112000	100000	92200	80200	70900
	P	40,40	41,70	44,30	44,10	45,00

HGX34/290-4 ML CO_2 T

t_c °C		0	-5	-10	-15	-20	-25	-30	-35	-40
10	Q	133000	114000	96300	81000	67500	55800	45600	36800	29300
	P	10,80	13,00	14,60	15,70	16,40	16,60	16,40	15,80	14,90
15	Q	123000	105000	88600	74400	61900	51000	41600	33500	26500
	P	14,40	16,20	17,40	18,10	18,40	18,30	17,80	17,00	15,90
20	Q	112000	94900	80300	67300	55900	46000	37400	30000	23700
	P	17,90	19,30	20,10	20,50	20,40	20,00	19,20	18,10	16,80
25	Q	98600	84000	70900	59400	49300	40400	32800	26200	
	P	21,40	22,30	22,80	22,80	22,40	21,60	20,50	19,20	
30	Q	80000	68100	57500	48100	39800	32600	26400		
	P	24,80	25,30	25,30	24,90	24,20	23,10	21,80		
t_{ga} °C										
30	p_{V2}	75	75	75	75	75	75	75		
	Q	86500	73600	62100	51900	43000	35200	28400		
	P	26,00	26,30	26,20	25,70	24,80	23,70	22,20		
35	p_{V2}	90	90	90	90	90	85			
	Q	79200	67200	56600	47200	39000	30200			
	P	31,40	31,00	30,30	29,20	27,80	25,40			
40	p_{V2}	100	105	105	105	100	85			
	Q	69700	60900	51200	42600	34200	15200			
	P	34,70	35,30	34,10	32,60	29,80	25,40			
45	p_{V2}	110	110	110	110	100				
	Q	61400	52100	43800	36400	25300				
	P	37,80	36,80	35,40	33,80	29,80				
50	p_{V2}	110	110	110	110	100				
	Q	46800	39900	33600	27900	16400				
	P	37,80	36,80	35,40	33,80	29,80				

HGX34/290-4 S CO_2 T

t_c °C		10	5	0	-5	-10	-15	-20	-25	-30	-35	-40
		SUBCRITICAL										
10	Q			133000	114000	97100	82100	69000	57300	47100	38100	30100
	P			10,90	13,20	14,80	15,80	16,30	16,50	16,20	15,70	15,10
15	Q		143000	123000	106000	89500	75500	63200	52400	42800	34400	26900
	P		11,90	14,50	16,30	17,50	18,20	18,40	18,20	17,70	17,00	16,10
20	Q	150000	130000	112000	95800	81300	68400	57100	47100	38300	30500	23600
	P	13,00	15,90	18,00	19,40	20,20	20,50	20,40	19,80	19,10	18,10	17,00
25	Q	134000	116000	99500	85000	72000	60400	50200	41100	33200	26200	
	P	17,40	19,80	21,40	22,40	22,80	22,70	22,30	21,40	20,40	19,20	
30	Q	109000	94200	81100	69200	58400	48900	40400	32900	26300		
	P	21,90	23,70	24,90	25,40	25,40	24,90	24,10	23,00	21,70		
t_{ga} °C												
30	p_{V2}	75	75	75	75	75	75	75	75	75		
	Q	118000	102000	87500	74600	63000	52800	43700	35500	28300		
	P	23,40	25,10	26,00	26,40	26,20	25,70	24,70	23,50	22,10		
35	p_{V2}	85	85	90	90	90	90	90	90	80		
	Q	103000	88800	80700	68500	57600	47800	39100	31400	16800		
	P	28,30	29,40	31,50	31,10	30,30	29,10	27,60	26,00	22,80		
40	p_{V2}	100	100	100	105	105	105	100	90			
	Q	97000	83600	71500	62500	52200	43000	34000	22000			
	P	34,70	35,00	34,70	35,20	33,80	32,20	29,40	26,00			
45	p_{V2}	110	115	115	115	120	115	100				
	Q	86200	77300	65900	55500	47100	37800	25200				
	P	38,60	40,00	39,10	37,80	37,50	34,30	29,40				
50	p_{V2}	125	130	130	130	130	115	100				
	Q	80200	70900	60200	50500	41700	30600	16300				
	P	44,10	45,00	43,70	42,00	40,10	34,30	29,40				

Subcritical performance data 50 Hz

Relative to 10 K suction gas superheat without liquid subcooling

Transcritical performance data 50 Hz

Relative to 10 K suction gas superheat

The performance data are indicated at a high pressure level, which is close to an optimal high pressure level. Optimal high pressure is thereby related to an ideal cyclic process.

t_c = Condensing temperature

t_{ga} = Gas cooler outlet temperature

p_{V2} = Pressure at the compressor outlet [bar]

Optimal high pressure is outside of the operating limits. Performance data are indicated at minimum or maximum possible high pressure.

CO_2 Performance data 50 Hz

Cooling capacity $\dot{Q}_o$ [W] — Power consumption P_e [kW]

Evaporating temperature °C

HGX46/250-4 SH CO_2 T

t_c °C		25	20	15	10	5	0	-5	-10	-15	-20	-25	-30	-35	-40
	SUBCRITICAL														
10	Q									69100	57400	47100	38300	30600	23900
	P									13,00	13,50	13,80	13,70	13,40	12,70
15	Q							89800	75800	63400	52500	43100	34900	27800	21600
	P							13,30	14,30	15,00	15,30	15,30	15,00	14,50	13,60
20	Q						95700	81400	68600	57300	47400	38800	31300	24900	19200
	P						14,80	15,80	16,60	17,00	17,10	16,80	16,30	15,50	14,50
25	Q					98900	84600	71900	60600	50600	41800	34100	27500	21700	
	P					16,30	17,60	18,40	18,80	19,00	18,80	18,30	17,60	16,60	
30	Q				93500	80200	68500	58300	49100	41000	33900	27600	22200		
	P				17,90	19,30	20,50	21,00	21,20	21,00	20,60	19,80	18,80		
t_{ga} °C	TRANSCRITICAL														
30	p_{V2}	90	85	75	75	75	75	75	75	75	75	75	75		
	Q	165000	143000	118000	102000	86900	74200	63000	53100	44300	36500	29800	24000		
	P	18,80	19,30	17,10	19,00	20,40	21,50	21,90	21,90	21,70	21,20	20,30	19,20		
35	p_{V2}	90	85	85	85	85	90	90	90	90	90	85			
	Q	141000	117000	102000	87900	75300	67900	57600	48400	40200	33100	25600			
	P	18,80	19,30	21,50	23,00	24,00	26,40	26,20	25,70	25,00	23,90	21,90			
40	p_{V2}	95	95	100	100	100	100	105	105	105	100	85			
	Q	115000	102000	95100	82200	70300	60000	52400	43900	36500	29100	12900			
	P	21,30	23,90	27,70	28,60	29,00	29,30	30,00	29,00	27,80	25,50	21,90			
45	p_{V2}	110	110	110	110	115	110	110	110	110	100				
	Q	109000	95900	83900	72500	64400	53100	45000	37700	31300	21600				
	P	28,50	30,40	31,60	32,10	33,60	32,00	31,20	30,10	28,70	25,50				
50	p_{V2}	120	120	125	125	130	110	110	110	110	100				
	Q	95100	84600	77300	66800	58500	40500	34400	28900	24000	13900				
	P	33,00	34,50	37,10	37,00	37,80	32,00	31,20	30,10	28,70	25,50				

HGX46/250-4 S CO_2 T

t_c °C															
	SUBCRITICAL														
10	Q									69200	57500	47300	38400	30700	24000
	P									13,20	13,70	13,90	13,80	13,50	12,90
15	Q							90100	76000	63600	52700	43200	35000	27900	21600
	P							13,50	14,50	15,10	15,40	15,40	15,10	14,50	13,80
20	Q						96200	81700	68800	57500	47600	39000	31500	25000	19300
	P						14,70	15,90	16,60	17,00	17,10	16,80	16,30	15,60	14,60
25	Q					99400	85100	72200	60800	50800	42000	34300	27600	21800	
	P					16,20	17,50	18,40	18,90	19,00	18,80	18,30	17,60	16,60	
30	Q				93100	80500	68900	58500	49300	41100	33900	27700	22200		
	P				17,90	19,30	20,30	20,90	21,10	21,00	20,50	19,80	18,80		
t_{ga} °C	TRANSCRITICAL														
30	p_{V2}				75	75	75	75	75	75	75	75	75		
	Q				102000	87200	74600	63300	53200	44400	36700	30000	24100		
	P				19,10	20,40	21,30	21,80	21,90	21,70	21,10	20,30	19,20		
35	p_{V2}				85	85	90	90	90	90	90	90	80		
	Q				87700	75600	68300	57800	48600	40400	33300	27100	14500		
	P				23,20	24,10	26,20	26,10	25,70	24,90	23,90	22,50	19,80		
40	p_{V2}				100	100	100	105	105	105	100	90			
	Q				82100	70600	60300	52700	44100	36600	29200	19000			
	P				28,80	29,10	29,10	29,90	28,90	27,70	25,40	22,50			
45	p_{V2}				110	115	115	115	120	115	100				
	Q				72600	65000	55400	46800	40100	32500	21700				
	P				32,20	33,60	33,10	32,10	31,70	29,20	25,40				
50	p_{V2}				125	130	130	130	130	115	100				
	Q				67200	59500	50700	42700	35700	26300	14000				
	P				36,90	37,70	36,60	35,10	33,30	29,20	25,40				

Subcritical performance data 50 Hz

Relative to 10 K suction gas superheat without liquid subcooling

Transcritical performance data 50 Hz

Relative to 10 K suction gas superheat

The performance data are indicated at a high pressure level, which is close to an optimal high pressure level. Optimal high pressure is thereby related to an ideal cyclic process.

t_c = Condensing temperature

t_{ga} = Gas cooler outlet temperature

p_{V2} = Pressure at the compressor outlet [bar]

Optimal high pressure is outside of the operating limits. Performance data are indicated at minimum or maximum possible high pressure.

96219-10.2014-Gb Subject to change without notice

CO_2 — Performance data — 50 Hz

Cooling capacity $\dot{Q}_o$ [W] — Power consumption P_e [kW]

Evaporating temperature °C

t_c °C		HGX46/280-4 SH CO_2 T 25	20	15	10	5	HGX46/280-4 ML CO_2 T 0	-5	-10	-15	-20	-25	-30	-35	-40
		SUBCRITICAL													
10	Q									77400	64200	52800	42900	34300	26900
	P									14,50	15,10	15,40	15,30	14,90	14,20
15	Q							101000	84800	71000	58800	48300	39100	31200	24300
	P							14,90	16,00	16,70	17,10	17,10	16,80	16,20	15,20
20	Q						107000	91000	76700	64200	53200	43500	35200	27900	21600
	P						16,50	17,70	18,50	19,00	19,10	18,80	18,30	17,40	16,20
25	Q					111000	94500	80400	67800	56600	46800	38300	30900	24400	
	P					18,20	19,70	20,60	21,10	21,30	21,10	20,50	19,70	18,50	
30	Q				105000	89900	76600	65200	55000	45900	37900	31000	24900		
	P				20,00	21,60	23,00	23,50	23,70	23,50	23,00	22,20	21,10		
t_{ga} °C		TRANSCRITICAL													
30	p_{V2}	90	85	75	75	75	75	75	75	75	75	75	75		
	Q	185000	161000	133000	114000	97500	82900	70500	59400	49600	41000	33500	26900		
	P	21,00	21,60	19,20	21,30	22,70	24,10	24,50	24,60	24,30	23,70	22,80	21,50		
35	p_{V2}	90	85	85	85	85	90	90	90	90	90	85			
	Q	158000	131000	115000	98800	84500	75900	64400	54100	45100	37100	28800			
	P	21,00	21,60	24,00	25,70	26,70	29,60	29,40	28,90	28,00	26,80	24,60			
40	p_{V2}	95	95	100	100	100	100	105	105	105	100	85			
	Q	129000	114000	107000	92300	79000	67000	58600	49200	40900	32600	14400			
	P	23,80	26,70	30,90	31,90	32,30	32,90	33,70	32,60	31,20	28,60	24,60			
45	p_{V2}	110	110	110	110	115	110	110	110	110	100				
	Q	122000	108000	94200	81500	72500	59400	50300	42200	35000	24200				
	P	31,70	33,90	35,20	35,80	37,40	35,90	35,00	33,70	32,20	28,60				
50	p_{V2}	120	120	125	125	130	110	110	110	110	100				
	Q	107000	94900	86800	75100	66000	45300	38500	32300	26900	15600				
	P	36,80	38,50	41,30	41,30	42,20	35,90	35,00	33,70	32,20	28,60				

HGX46/280-4 S CO_2 T

t_c °C		SUBCRITICAL													
10	Q									77600	64900	53700	43900	35300	27700
	P									14,60	15,40	15,70	15,60	15,20	14,60
15	Q							99500	84600	71200	59400	49000	39800	31800	24700
	P							14,60	16,00	16,90	17,30	17,30	17,00	16,30	15,40
20	Q						106000	90400	76700	64400	53600	44000	35600	28200	21700
	P						16,00	17,60	18,60	19,10	19,20	19,00	18,30	17,40	16,20
25	Q					109000	93700	80000	67800	56800	47100	38500	30900	24300	
	P					17,60	19,40	20,50	21,20	21,40	21,10	20,50	19,60	18,40	
30	Q				102000	88500	76200	65000	55000	46000	37900	30900	24600		
	P				19,60	21,50	22,80	23,50	23,80	23,60	23,00	22,00	20,80		
t_{ga} °C		TRANSCRITICAL													
30	p_{V2}				75	75	75	75	75	75	75	75	75		
	Q				111000	96000	82500	70300	59400	49600	40900	33300	26500		
	P				21,10	22,80	23,90	24,50	24,70	24,30	23,60	22,60	21,20		
35	p_{V2}				85	85	90	90	90	90	90	90	80		
	Q				96500	83600	76100	64700	54400	45300	37100	29900	15800		
	P				25,90	27,10	29,50	29,40	28,80	27,80	26,50	24,90	21,90		
40	p_{V2}				100	100	100	105	105	105	100	90			
	Q				91000	78800	67600	59400	49800	41200	32600	21000			
	P				32,30	32,80	32,70	33,50	32,30	30,80	28,20	24,90			
45	p_{V2}				110	115	115	115	120	115	100				
	Q				81000	73200	62700	53100	45600	36800	24200				
	P				36,20	37,80	37,10	36,00	35,60	32,70	28,20				
50	p_{V2}				125	130	130	130	130	115	100				
	Q				75800	67700	58000	49100	41000	29800	15600				
	P				41,50	42,40	41,20	39,70	37,70	32,70	28,20				

Subcritical performance data 50 Hz

Relative to 10 K suction gas superheat without liquid subcooling

Transcritical performance data 50 Hz

Relative to 10 K suction gas superheat

The performance data are indicated at a high pressure level, which is close to an optimal high pressure level. Optimal high pressure is thereby related to an ideal cyclic process.

t_c = Condensing temperature

t_{ga} = Gas cooler outlet temperature

p_{V2} = Pressure at the compressor outlet [bar]

Optimal high pressure is outside of the operating limits. Performance data are indicated at minimum or maximum possible high pressure.

CO_2 — Performance data — 50 Hz

Cooling capacity $\dot{Q}_o$ [W] — Power consumption P_e [kW]

Evaporating temperature °C

HGX46/310-4 SH CO_2 T

t_c °C		25	20	15	10	5
	SUBCRITICAL					
10	Q					
	P					
15	Q					
	P					
20	Q					
	P					
25	Q					124000
	P					20,20
30	Q				117000	99900
	P				22,20	24,00
t_{ga} °C		TRANSCRITICAL				
30	p_{V2}	90	85	75	75	75
	Q	205000	179000	147000	127000	109000
	P	23,40	24,00	21,30	23,70	25,30
35	p_{V2}	90	85	85	85	85
	Q	175000	146000	127000	110000	93600
	P	23,40	24,00	26,80	28,60	29,80
40	p_{V2}	95	95	100	100	100
	Q	142000	127000	119000	103000	87100
	P	26,50	29,70	34,50	35,70	36,10
45	p_{V2}	110	110	110	110	115
	Q	135000	120000	105000	90100	79600
	P	35,50	37,90	39,40	40,10	42,00
50	p_{V2}	120	120	125	125	130
	Q	118000	106000	96100	82800	72200
	P	41,20	43,10	46,40	46,30	47,30

HGX46/310-4 ML CO_2 T

t_c °C		0	-5	-10	-15	-20	-25	-30	-35	-40
	SUBCRITICAL									
10	Q				85800	71200	58500	47500	37900	29700
	P				16,20	16,90	17,20	17,10	16,60	15,80
15	Q		112000	94100	78700	65200	53400	43200	34400	26800
	P		16,60	17,80	18,70	19,10	19,10	18,70	18,00	17,00
20	Q	119000	101000	85100	71100	58800	48100	38800	30800	23800
	P	18,40	19,80	20,70	21,20	21,30	21,00	20,40	19,40	18,00
25	Q	105000	89100	75000	62600	51800	42300	34000	26900	
	P	22,00	23,00	23,50	23,70	23,50	22,90	22,00	20,70	
30	Q	84800	72100	60800	50700	41900	34100	27400		
	P	25,60	26,20	26,40	26,30	25,70	24,80	23,50		
t_{ga} °C		TRANSCRITICAL								
30	p_{V2}	75	75	75	75	75	75	75		
	Q	91800	78000	65700	54800	45200	36900	29600		
	P	26,90	27,40	27,40	27,10	26,50	25,40	24,00		
35	p_{V2}	90	90	90	90	90	85			
	Q	83900	71100	59700	49700	40900	31600			
	P	33,10	32,90	32,30	31,30	30,00	27,40			
40	p_{V2}	100	105	105	105	100	85			
	Q	74000	64600	54100	44900	35900	15900			
	P	36,80	37,70	36,40	34,90	32,00	27,40			
45	p_{V2}	110	110	110	110	100				
	Q	65400	55300	46400	38500	26600				
	P	40,30	39,20	37,70	36,00	32,00				
50	p_{V2}	110	110	110	100					
	Q	49900	42300	35500	29500	17200				
	P	40,30	39,20	37,70	36,00	32,00				

HGX46/310-4 S CO_2 T

t_c °C		25	20	15	10	5
	SUBCRITICAL					
10	Q					
	P					
15	Q					
	P					
20	Q					
	P					
25	Q					124000
	P					20,00
30	Q				116000	99800
	P				122,20	24,00
t_{ga} °C		TRANSCRITICAL				
30	p_{V2}				75	75
	Q				126000	109000
	P				23,80	25,50
35	p_{V2}				85	85
	Q				109000	93500
	P				28,90	30,20
40	p_{V2}				100	100
	Q				102000	87200
	P				36,10	36,60
45	p_{V2}				110	115
	Q				89500	80000
	P				40,50	42,40
50	p_{V2}				125	130
	Q				82600	73100
	P				46,60	47,60

HGX46/310-4 S CO_2 T

t_c °C		0	-5	-10	-15	-20	-25	-30	-35	-40
	SUBCRITICAL									
10	Q				86000	71400	58700	47600	38100	29800
	P				16,30	16,90	17,20	17,10	16,60	15,90
15	Q		112000	94300	78900	65400	53600	43400	34600	26900
	P		16,60	17,90	18,70	19,00	19,00	18,60	18,00	17,00
20	Q	120000	102000	85400	71300	59000	48300	39000	30900	23900
	P	18,20	19,70	20,60	21,10	21,20	20,90	20,20	19,30	18,10
25	Q	106000	89500	75300	62900	52000	42500	34200	27000	
	P	21,70	22,80	23,40	23,60	23,40	22,80	21,80	20,60	
30	Q	85500	72600	61100	50900	42100	34300	27600		
	P	25,30	26,10	26,30	26,20	25,60	24,60	23,30		
t_{ga} °C		TRANSCRITICAL								
30	p_{V2}	75	75	75	75	75	75	75		
	Q	92400	78400	65900	55000	45400	37100	29800		
	P	26,60	27,20	27,30	27,00	26,30	25,20	23,80		
35	p_{V2}	90	90	90	90	90	90	80		
	Q	84400	71500	60000	49900	41100	33500	17900		
	P	32,80	32,70	32,20	31,20	29,80	28,10	24,70		
40	p_{V2}	100	105	105	105	100	90			
	Q	74400	64900	54400	45200	36100	23500			
	P	36,50	37,50	36,30	34,70	31,80	28,10			
45	p_{V2}	115	115	120	115	100				
	Q	68200	57600	49300	40000	26800				
	P	41,60	40,40	39,90	36,70	31,80				
50	p_{V2}	130	130	130	115	100				
	Q	62200	52500	43900	32400	17300				
	P	46,20	44,30	42,00	36,70	31,80				

Subcritical performance data 50 Hz

Relative to 10 K suction gas superheat without liquid subcooling

Transcritical performance data 50 Hz

Relative to 10 K suction gas superheat

The performance data are indicated at a high pressure level, which is close to an optimal high pressure level. Optimal high pressure is thereby related to an ideal cyclic process.

t_c = Condensing temperature

t_{ga} = Gas cooler outlet temperature

p_{V2} = Pressure at the compressor outlet [bar]

Optimal high pressure is outside of the operating limits. Performance data are indicated at minimum or maximum possible high pressure.

96219-10.2014-Gb Subject to change without notice

CO_2 — Performance data — 50 Hz

Cooling capacity $\dot{Q}_o$ [W] — Power consumption P_e [kW]

Evaporating temperature °C

t_c °C		HGX46/345-4 SH CO_2 T					HGX46/345-4 ML CO_2 T								
		25	20	15	10	5	0	-5	-10	-15	-20	-25	-30	-35	-40
		SUBCRITICAL													
10	Q						158000	135000	114000	95500	79500	65600	53500	43100	34300
	P						12,80	15,10	16,90	18,10	18,70	18,90	18,70	18,10	17,20
15	Q					171000	146000	124000	105000	87700	72900	60000	48900	39300	31100
	P					14,20	16,70	18,70	20,00	20,80	21,20	21,00	20,50	19,60	18,40
20	Q				181000	156000	132000	113000	94800	79400	65900	54200	44000	35300	27900
	P				15,50	18,60	20,70	22,20	23,20	23,60	23,60	23,10	22,20	21,00	19,50
25	Q			185000	161000	138000	117000	99400	83900	70200	58200	47700	38700	31000	
	P			17,10	20,50	23,00	24,70	25,70	26,30	26,30	25,90	25,10	23,90	22,40	
30	Q		171000	150000	131000	113000	94800	80700	68100	56900	47100	38600	31200		
	P		19,00	22,70	25,50	27,50	28,60	29,30	29,40	29,00	28,20	27,00	25,50		
t_{ga} °C		TRANSCRITICAL													
30	p_{V2}	80	70	75	75	75	75	75	75	75	75	75	75		
	Q	223000	57600	164000	142000	122000	103000	87300	73600	61500	50900	41700	33700		
	P	20,60	17,30	24,60	27,20	29,10	30,00	30,50	30,50	30,00	29,00	27,70	26,10		
35	p_{V2}	85	85	85	85	85	90	90	90	90	90	85			
	Q	184000	163000	142000	123000	106000	94100	79900	67300	56200	46400	36000			
	P	24,40	28,10	30,90	32,90	34,10	36,50	36,20	35,50	34,30	32,80	29,90			
40	p_{V2}	95	95	100	100	100	100	105	105	105	100	85			
	Q	161000	142000	134000	116000	98800	83000	72700	61100	51000	40800	18100			
	P	31,50	34,50	39,40	40,50	40,90	40,30	41,30	40,00	38,30	35,10	29,90			
45	p_{V2}	110	110	110	110	115	110	110	110	110	100				
	Q	153000	135000	118000	102000	91000	73300	62200	52400	43600	30300				
	P	41,20	43,30	44,60	45,10	47,00	44,00	42,90	41,50	39,60	35,10				
50	p_{V2}	120	120	125	125	130	110	110	110	110	100				
	Q	134000	119000	109000	94200	83000	55900	47600	40100	33500	19500				
	P	47,20	48,70	51,90	51,70	52,90	44,00	42,90	41,50	39,60	35,10				

t_c °C		HGX46/345-4 S CO_2 T													
		SUBCRITICAL													
10	Q						158000	135000	114000	95600	79700	65800	53700	43300	34400
	P						13,20	15,50	17,20	18,30	19,00	19,20	19,00	18,40	17,50
15	Q					170000	146000	124000	105000	87900	73100	60200	49000	39400	31200
	P					14,60	17,10	18,90	20,30	21,10	21,40	21,30	20,80	19,90	18,70
20	Q				179000	155000	133000	113000	95200	79700	66100	54300	44100	35400	28000
	P				16,30	18,90	21,00	22,40	23,40	23,80	23,80	23,40	22,50	21,40	19,80
25	Q				159000	137000	118000	99900	84200	70400	58200	47700	38700	31000	
	P				21,10	23,30	24,90	25,90	26,50	26,50	26,20	25,40	24,20	22,70	
30	Q				129000	112000	95500	81200	68400	57100	47200	38600	31200		
	P				25,90	27,60	28,80	29,40	29,60	29,20	28,50	27,30	25,80		
t_{ga} °C		TRANSCRITICAL													
30	p_{V2}				75	75	75	75	75	75	75	75	75		
	Q				140000	121000	104000	87600	73800	61600	50900	41700	33700		
	P				27,60	29,20	30,10	30,60	30,60	30,10	29,20	28,00	26,30		
35	p_{V2}				85	85	90	90	90	90	90	90	80		
	Q				122000	105000	95100	80600	67700	56400	46500	38000	20300		
	P				33,10	34,10	36,60	36,30	35,60	34,40	32,90	31,00	27,20		
40	p_{V2}				100	100	100	105	105	105	100	90			
	Q				115000	98400	84100	73500	61700	51300	41000	26700			
	P				40,40	40,70	40,40	41,30	39,90	38,20	35,00	31,00			
45	p_{V2}				110	115	115	115	120	115	100				
	Q				101000	90400	77200	65300	56000	45600	30400				
	P				44,90	46,70	45,80	44,40	44,10	40,60	35,00				
50	p_{V2}				125	130	130	130	130	115	100				
	Q				93100	82400	70300	59500	49900	36900	19600				
	P				51,30	52,40	51,00	49,20	46,90	40,60	35,00				

Subcritical performance data 50 Hz

Relative to 10 K suction gas superheat without liquid subcooling

Transcritical performance data 50 Hz

Relative to 10 K suction gas superheat

The performance data are indicated at a high pressure level, which is close to an optimal high pressure level. Optimal high pressure is thereby related to an ideal cyclic process.

t_c = Condensing temperature

t_{ga} = Gas cooler outlet temperature

p_{V2} = Pressure at the compressor outlet [bar]

Optimal high pressure is outside of the operating limits. Performance data are indicated at minimum or maximum possible high pressure.

CO_2	Performance data								50 Hz
	Cooling capacity $\dot{Q}_o$ [W]								Power consumption P_e [kW]
	Evaporating temperature °C								
	HGX46/440-4 ML CO_2 T								
	0	-5	-10	-15	-20	-25	-30	-35	-40
t_c °C	SUBCRITICAL								
10	Q 201000	172000	146000	123000	102000	84100	68700	55400	43900
	P 16,90	20,30	22,60	24,10	24,80	24,90	24,40	23,50	22,30
15	Q 185000	158000	134000	113000	93400	76900	62600	50300	39800
	P 22,20	24,90	26,60	27,60	27,80	27,40	26,50	25,30	23,70
20	Q 169000	144000	122000	102000	84400	69300	56300	45100	35500
	P 27,50	29,50	30,60	31,00	30,70	29,90	28,60	27,00	25,20
25	Q 149000	127000	108000	89600	74200	60800	49200	39300	
	P 32,70	34,10	34,60	34,40	33,60	32,30	30,70	28,70	
30	Q 121000	103000	86700	72400	59800	48900	39500		
	P 38,00	38,60	38,50	37,80	36,50	34,80	32,80		
t_{ga} °C	TRANSCRITICAL								
30	p_{V2} 75	75	75	75	75	75	75		
	Q 131000	112000	93500	78000	64400	52700	42500		
	P 39,80	40,20	39,90	38,90	37,50	35,70	33,50		
35	p_{V2} 90	90	90	90	90	85			
	Q 119000	101000	84700	70500	58100	45100			
	P 48,40	47,70	46,50	44,70	42,50	38,60			
40	p_{V2} 100	105	105	105	100	85			
	Q 104000	90400	75800	62900	50500	22600			
	P 53,70	54,70	52,70	50,30	45,90	38,60			
45	p_{V2} 110	110	110	110	100				
	Q 91000	77100	64600	53500	37400				
	P 58,70	57,00	54,80	52,30	45,90				
50	p_{V2} 110	110	110	110	100				
	Q 69400	59000	49500	41000	24200				
	P 58,70	57,00	54,80	52,30	45,90				

Subcritical performance data 50 Hz

Relative to 10 K suction gas superheat without liquid subcooling

Transcritical performance data 50 Hz

Relative to 10 K suction gas superheat

The performance data are indicated at a high pressure level, which is close to an optimal high pressure level. Optimal high pressure is thereby related to an ideal cyclic process.

t_c = Condensing temperature

t_{ga} = Gas cooler outlet temperature

p_{V2} = Pressure at the compressor outlet [bar]

Optimal high pressure is outside of the operating limits. Performance data are indicated at minimum or maximum possible high pressure.

CO_2 Type	Number of cylinders	Displacement 50 / 60 Hz (1450 / 1740 rpm)	Electrical data				Weight	Connections ④		Oil charge
			Voltage ①	Max. working current ②	Max. power consumption ②	Starting current (rotor locked) ②		Discharge line DV	Suction line SV ⑤	
		m³/h		A	kW	A	kg	mm	mm	Ltr.
				* PW 1+2		*PW1 / PW 1+2				
HGX2/70-4 CO_2 T	2	6,20 / 7,40	③	18,4	10,9	57 / 75	145	18	22	2,5
HGX2/90-4 CO_2 T	2	7,70 / 9,30	③	23,6	13,9	82 / 107	160	18	22	2,5
								mm I inch	mm I inch	
HGX34/110-4 ML CO_2 T	4	9,90 / 11,80	③	24,6	14,4	115 / 150	194	22 I 7/8	28 I 1 1/8	2,0
HGX34/110-4 S CO_2 T	4	9,90 / 11,80	③	28,6	17,2	133 / 171	197	22 I 7/8	28 I 1 1/8	2,0
HGX34/110-4 SH CO_2 T	4	9,90 / 11,80	③	29,4	17,7	133 / 171	197	22 I 7/8	28 I 1 1/8	2,0
HGX34/130-4 ML CO_2 T	4	11,30 / 13,60	③	28,0	16,6	115 / 150	194	22 I 7/8	28 I 1 1/8	2,0
HGX34/130-4 S CO_2 T	4	11,30 / 13,60	③	32,6	19,7	133 / 171	197	22 I 7/8	28 I 1 1/8	2,0
HGX34/130-4 SH CO_2 T	4	11,30 / 13,60	③	33,5	20,3	133 / 171	197	22 I 7/8	28 I 1 1/8	2,0
HGX34/150-4 ML CO_2 T	4	12,90 / 15,40	③	31,0	18,7	133 / 171	197	22 I 7/8	28 I 1 1/8	2,0
HGX34/150-4 S CO_2 T	4	12,90 / 15,40	③	37,8	22,5	162 / 210	200	22 I 7/8	28 I 1 1/8	2,0
HGX34/150-4 SH CO_2 T	4	12,90 / 15,40	③	38,7	23,1	162 / 210	200	22 I 7/8	28 I 1 1/8	2,0
HGX34/170-4 ML CO_2 T	4	14,50 / 17,40	③	35,2	21,3	133 / 171	196	22 I 7/8	28 I 1 1/8	2,0
HGX34/170-4 S CO_2 T	4	14,50 / 17,40	③	42,2	25,3	162 / 210	209	22 I 7/8	28 I 1 1/8	2,0
HGX34/170-4 SH CO_2 T	4	14,50 / 17,40	③	43,4	26,0	162 / 210	209	22 I 7/8	28 I 1 1/8	2,0
HGX34/190-4 ML CO_2 T	4	16,30 / 19,60	③	39,5	23,6	162 / 210	200	22 I 7/8	28 I 1 1/8	2,0
HGX34/190-4 S CO_2 T	4	16,30 / 19,60	③	47,1	28,1	189 / 246	209	22 I 7/8	28 I 1 1/8	2,0
HGX34/190-4 SH CO_2 T	4	16,30 / 19,60	③	48,5	29,0	189 / 246	209	22 I 7/8	28 I 1 1/8	2,0
HGX34/210-4 ML CO_2 T	4	18,20 / 21,80	③	44,5	26,7	162 / 210	200	22 I 7/8	28 I 1 1/8	2,0
HGX34/210-4 S CO_2 T	4	18,20 / 21,80	③	53,7	32,3	189 / 246	215	22 I 7/8	28 I 1 1/8	2,0
HGX34/210-4 SH CO_2 T	4	18,20 / 21,80	③	53,9	32,4	189 / 246	215	22 I 7/8	28 I 1 1/8	2,0
HGX34/230-4 ML CO_2 T	4	20,10 / 24,10	③	49,4	29,6	189 / 246	209	22 I 7/8	28 I 1 1/8	2,0
HGX34/230-4 S CO_2 T	4	20,10 / 24,10	③	59,3	35,5	231 / 283	222	22 I 7/8	28 I 1 1/8	2,0
HGX34/230-4 SH CO_2 T	4	20,10 / 24,10	③	59,9	35,9	231 / 283	222	22 I 7/8	28 I 1 1/8	2,0
HGX34/290-4 ML CO_2 T	4	25,50 / 30,60	③	63,0	37,8	231 / 283	222	28 I 1 1/8	35 I 1 3/8	2,0
HGX34/290-4 S CO_2 T	4	25,50 / 30,60	③	77,5	46,0	253 / 330	247	28 I 1 1/8	35 I 1 3/8	2,0
HGX34/290-4 SH CO_2 T	4	25,50 / 30,60	③	78,2	46,4	253 / 330	247	28 I 1 1/8	35 I 1 3/8	2,0
HGX46/250-4 ML CO_2 T	6	21,80 / 26,20	③	53,8	32,0	231 / 283	239	22 I 7/8	28 I 1 1/8	2,5
HGX46/250-4 S CO_2 T	6	21,80 / 26,20	③	65,7	38,4	253 / 330	247	22 I 7/8	28 I 1 1/8	2,5
HGX46/250-4 SH CO_2 T	6	21,80 / 26,20	③	66,3	38,8	253 / 330	247	22 I 7/8	28 I 1 1/8	2,5
HGX46/280-4 ML CO_2 T	6	24,40 / 29,30	③	59,9	35,9	231 / 283	247	22 I 7/8	28 I 1 1/8	2,5
HGX46/280-4 S CO_2 T	6	24,40 / 29,30	③	73,1	43,2	253 / 330	247	22 I 7/8	28 I 1 1/8	2,5
HGX46/280-4 SH CO_2 T	6	24,40 / 29,30	③	73,3	43,3	253 / 330	247	22 I 7/8	28 I 1 1/8	2,5
HGX46/310-4 ML CO_2 T	6	27,20 / 32,60	③	67,0	40,3	231 / 283	247	28 I 1 1/8	35 I 1 3/8	2,5
HGX46/310-4 S CO_2 T	6	27,20 / 32,60	③	81,5	48,5	253 / 330	265	28 I 1 1/8	35 I 1 3/8	2,5
HGX46/310-4 SH CO_2 T	6	27,20 / 32,60	③	81,7	48,6	253 / 330	265	28 I 1 1/8	35 I 1 3/8	2,5
HGX46/345-4 ML CO_2 T	6	30,20 / 36,20	③	74,4	44,0	253 / 330	247	28 I 1 1/8	35 I 1 3/8	2,5
HGX46/345-4 S CO_2 T	6	30,20 / 36,20	③	90,9	53,4	289 / 374	265	28 I 1 1/8	35 I 1 3/8	2,5
HGX46/345-4 SH CO_2 T	6	30,20 / 36,20	③	92,3	54,3	289 / 374	265	28 I 1 1/8	35 I 1 3/8	2,5
HGX46/440-4 ML CO_2 T	6	38,20 / 45,80	③	99,3	58,7	289 / 374	265	28 I 1 1/8	35 I 1 3/8	2,5

* PW = Part Winding, motors for part winding start 1 = 1. part winding 2 = 2. part winding

Explanations:

① Tolerance (± 10%) relates to the mean value of the voltage range. Other voltages and current types on request.

② - The specifications for max. power consumption apply for 50 Hz operation. For 60 Hz operation, the specifications have to be multiplied by the factor 1.2.
The max. working current remains unchanged.
- Take account of the max. operating current / max. power consumption when designing contactors, leads and fuses.
Switches: Service category AC3

③ 380-420 V Y/YY - 3 - 50 Hz PW
440-480 V Y/YY - 3 - 60 Hz PW
PW = Part Winding, motors for part winding start (no start unloaders required)
- Winding ratios: 66% / 33%
- Designs for Y/Δ on request

④ Cutting ring for steel pipes

⑤ For soldering connections

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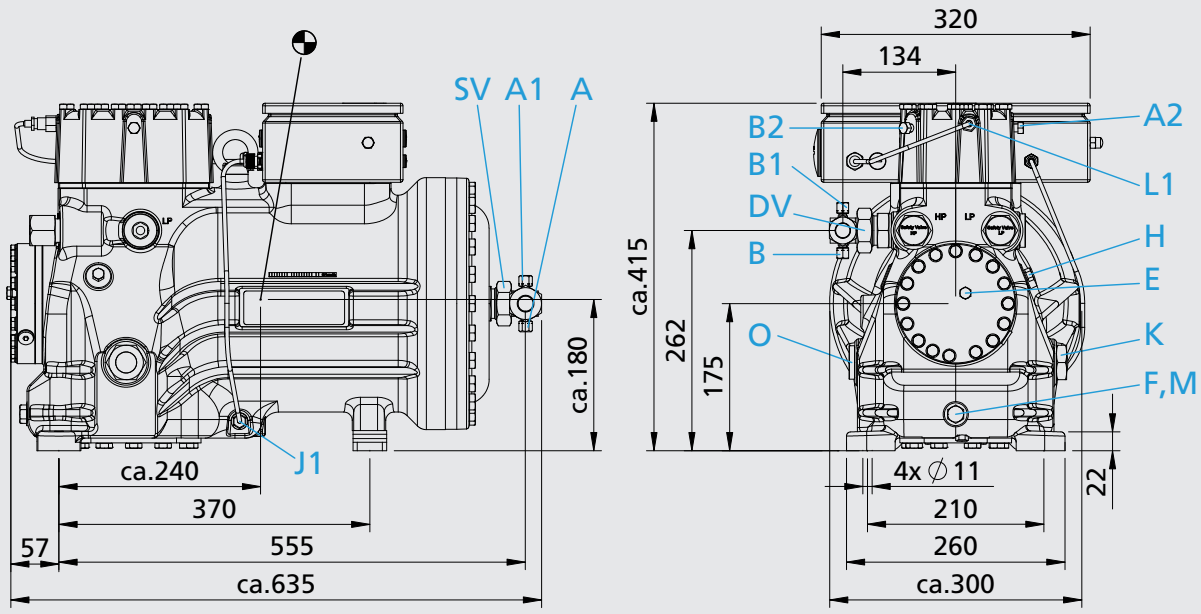
Dimensions and connections

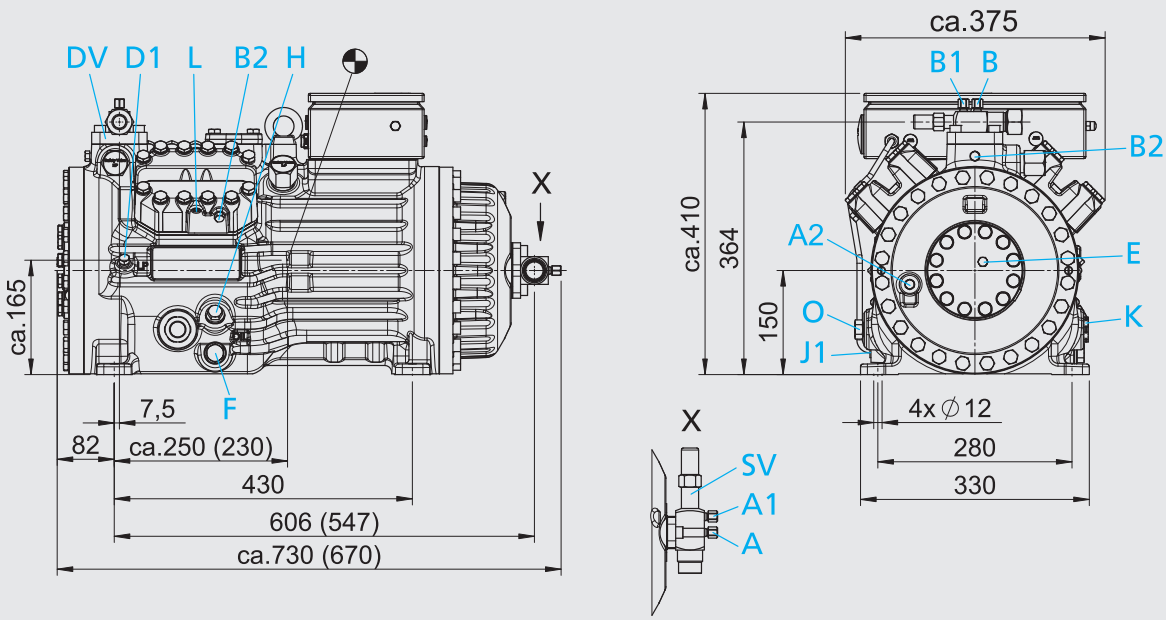
HGX2 CO_2 T

HGX2/70-4 CO_2 T HGX2/90-4 CO_2 T



HGX34 CO_2 T

HGX34/110-4 CO_2 T
HGX34/130-4 CO_2 T
HGX34/150-4 CO_2 T
HGX34/170-4 CO_2 T
HGX34/190-4 CO_2 T
HGX34/210-4 CO_2 T
HGX34/230-4 CO_2 T



Dimensions in ( ) =
HGX34/110-4 ML CO_2 T
HGX34/110-4 S CO_2 T
HGX34/110-4 SH CO_2 T
HGX34/130-4 ML CO_2 T
HGX34/130-4 S CO_2 T
HGX34/130-4 SH CO_2 T
HGX34/150-4 ML CO_2 T
HGX34/170-4 ML CO_2 T

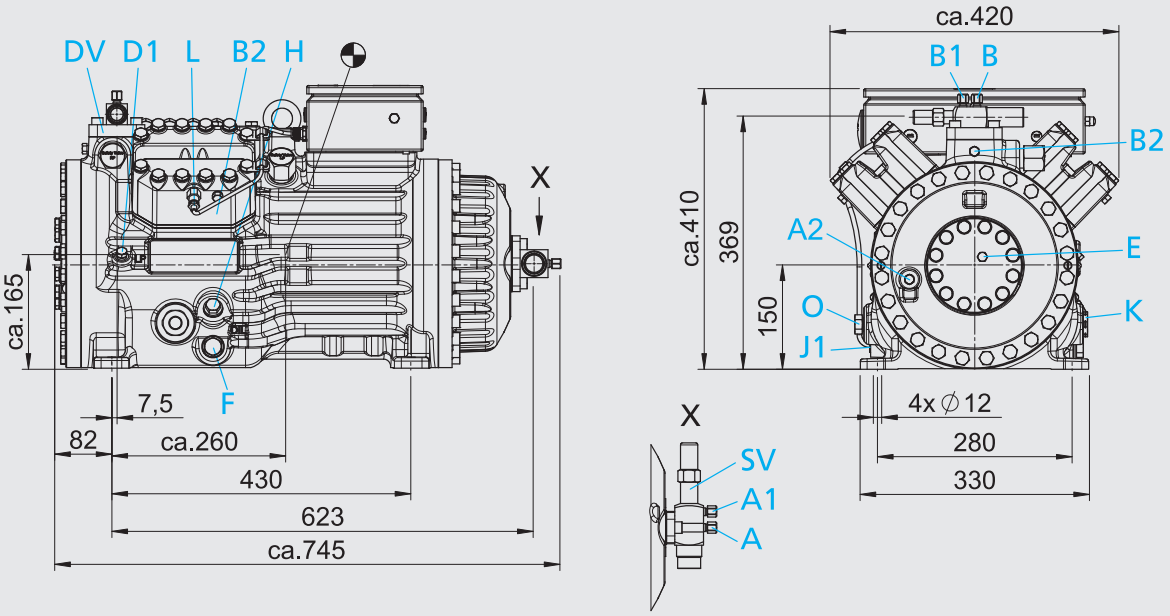
Dimensions in mm
◒ Centre of gravity

- Connections see page 54
- Dimensions for anti-vibration pad see page 54

Dimensions and connections

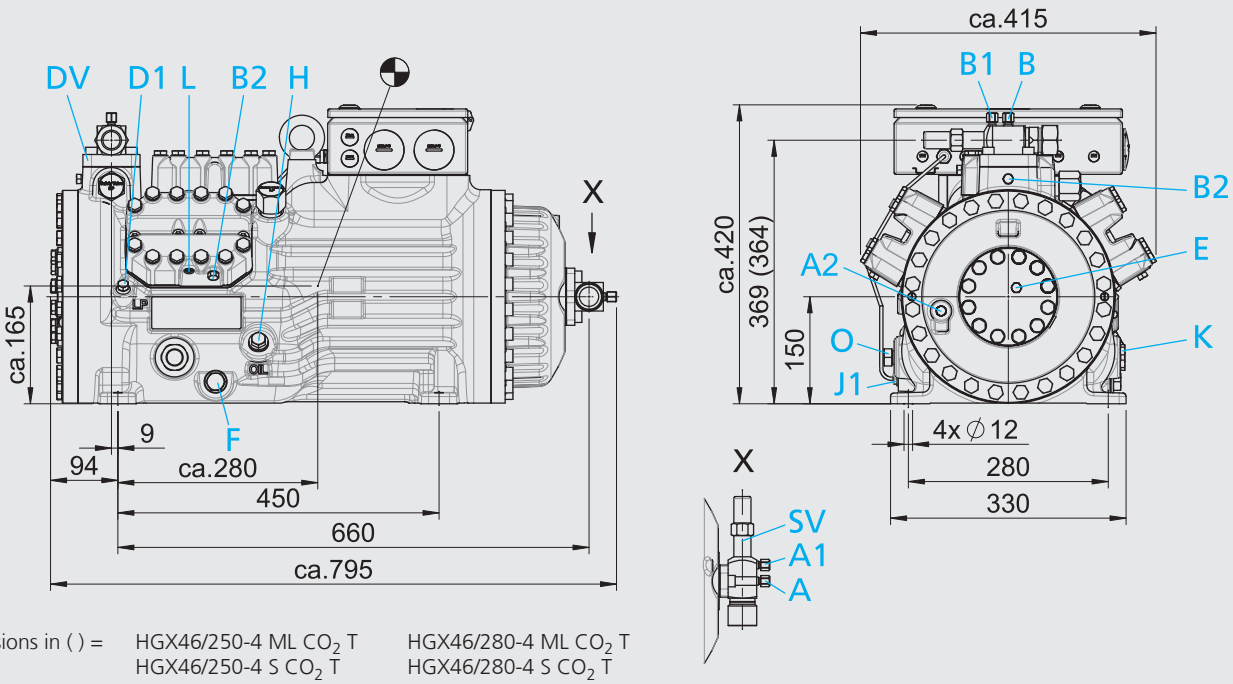
HGX34 CO_2 T

HGX34/290-4 CO_2 T



HGX46 CO_2 T

HGX46/250-4 CO_2 T HGX46/310-4 CO_2 T
HGX46/280-4 CO_2 T HGX46/345-4 CO_2 T



Dimensions in ( ) = HGX46/250-4 ML CO_2 T HGX46/280-4 ML CO_2 T
HGX46/250-4 S CO_2 T HGX46/280-4 S CO_2 T
HGX46/250-4 SH CO_2 T HGX46/280-4 SH CO_2 T

Dimensions in mm
Centre of gravity

- Connections see page 54
- Dimensions for anti-vibration pad see page 54

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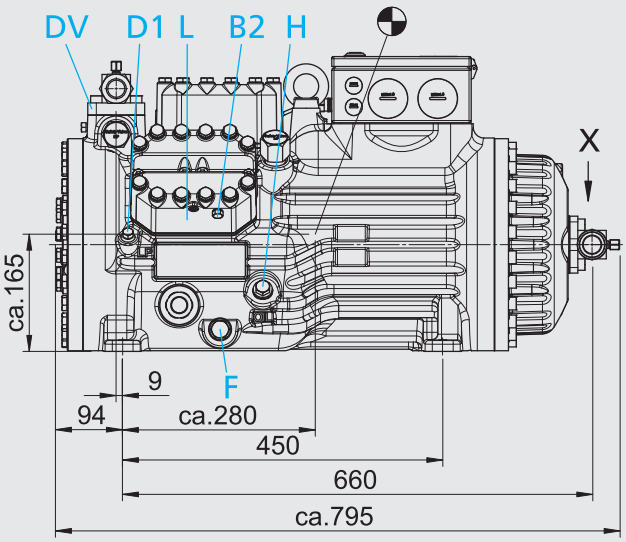
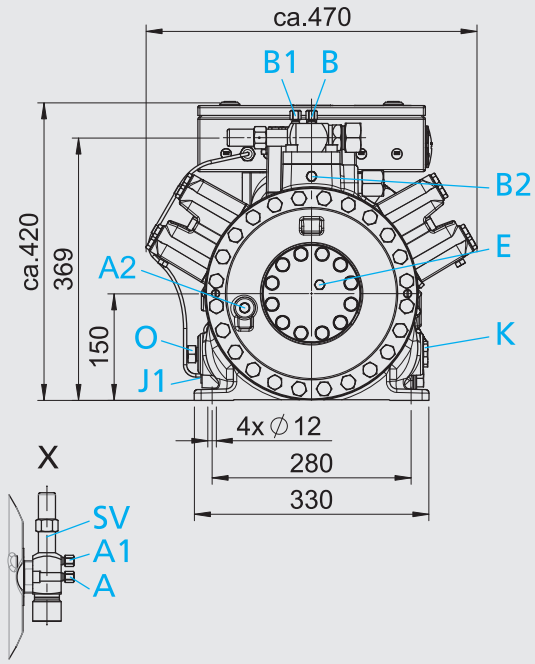
Dimensions and connections

HGX46 CO_2 T



HGX46/440-4 CO_2 T



Dimensions in mm

Centre of gravity

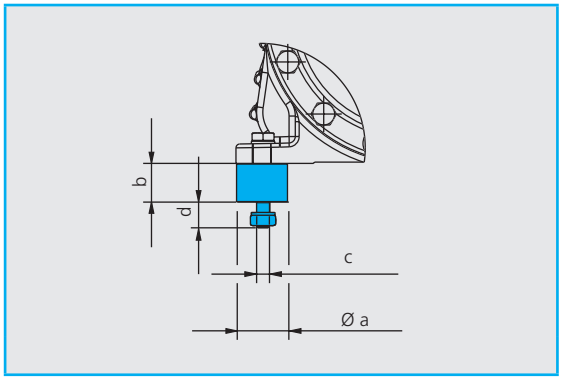
- Connections see page 54
- Dimensions for anti-vibration pad see page 54

Connections

Connections		HGX2 CO_2 T	HGX34 CO_2 T	HGX46 CO_2 T
SV DV	Suction line Discharge line	please refer to Technical data page 49+50		
A	Connection suction side, not lockable	$^{7}/_{16}$ " UNF	$^{7}/_{16}$ " UNF	$^{7}/_{16}$ " UNF
A1	Connection suction side, lockable	$^{7}/_{16}$ " UNF	$^{7}/_{16}$ " UNF	$^{7}/_{16}$ " UNF
A2	Connection suction side, not lockable	$^{1}/_{8}$ " NPTF	-	-
B	Connection discharge side, not lockable	$^{7}/_{16}$ " UNF	$^{7}/_{16}$ " UNF	$^{7}/_{16}$ " UNF
B1	Connection discharge side, lockable	$^{7}/_{16}$ " UNF	$^{7}/_{16}$ " UNF	$^{7}/_{16}$ " UNF
B2	Connection discharge side, not lockable	$^{1}/_{8}$ " NPTF	$^{1}/_{8}$ " NPTF	$^{1}/_{8}$ " NPTF
D1	Connection oil return from oil separator	-	$^{1}/_{4}$ " NPTF	$^{1}/_{4}$ " NPTF
E	Connection oil pressure gauge	$^{1}/_{8}$ " NPTF	$^{1}/_{8}$ " NPTF	$^{1}/_{8}$ " NPTF
F	Oil drain	M22 x 1,5	M26 x 1,5	M26 x 1,5
H	Oil charge plug	$^{1}/_{8}$ " NPTF	M22 x 1,5	M22 x 1,5
J1	Oil sump heater	Ø 15 mm	Ø 15 mm	Ø 15 mm
K	Sight glass	G1"	$1^{1}/_{8}$" - 18 UNEF	$1^{1}/_{8}$" - 18 UNEF
L	Connection thermal protection thermostat	-	$^{1}/_{8}$ " NPTF	$^{1}/_{8}$ " NPTF
L1	Thermal protection thermostat (accessories)	$^{1}/_{8}$ " NPTF	-	-
M	Oil filter	M22 x 1,5	-	-
O	Connection oil level regulator	G1"	$^{1}/_{2}$ " NPTF	$^{1}/_{2}$ " NPTF

Dimensions for anti-vibration pad

Type	Ø a mm	b mm	c mm	d mm
HGX2 CO_2 T	50	30	M10	25
HGX34 CO_2 T	50	30	M10	25
HGX46 CO_2 T	50	30	M10	25



Scope of supply and accessories

Scope of supply	HGX2 CO_2 T	HGX34 CO_2 T	HGX46 CO_2 T
Semi-hermetic two cylinder reciprocating compressor with drive motor for part winding start – 4 pole version 380-420 V Y/YY - 3 - 50 Hz 440-480 V Y/YY - 3 - 60 Hz Single-section compressor housing with hermetically integrated electric motor	●		
Semi-hermetic four cylinder reciprocating compressor with drive motor for part winding start – 4 pole version 380-420 V Y/YY - 3 - 50 Hz 440-480 V Y/YY - 3 - 60 Hz Single-section compressor housing with hermetically integrated electric motor		●	
Semi-hermetic six cylinder reciprocating compressor with drive motor for part winding start – 4 pole version 380-420 V Δ / YYY - 3 - 50 Hz 440-480 V Δ / YYY - 3 - 60 Hz Single-section compressor housing with hermetically integrated electric motor			●
Winding protection with PTC resistor sensors and electronic motor protection unit MP10	●	●	●
Oil pump	●	●	●
Oil sump heater 230 V - 1 - 50/60 Hz, 160 W	●	●	●
Ölfüllung at ML and S: GEA Bock C85E	●	●	●
Ölfüllung at SH: GEA Bock C150E		●	●
Sight glass	●	●	●
Compressor decompression valve suction and discharge line	●	●	●
Inert gas charge	●	●	●
4 anti-vibration pads enclosed	●	●	●

[1] Motor for special voltage and/or frequency (on request)

ⓘ Oil sump heater is necessary due to the high CO_2 solubility in the oil.

Accessories	HGX2 CO_2 T	HGX34 CO_2 T	HGX46 CO_2 T
Thermal protection thermostat (PTC sensor) IP67	●	●	●
Suction line valve with soldering / welding connection	●	●	●
Discharge line valve with soldering / welding connection	●	●	●
Suction line valve with cutting ring connection	●	●	●
Discharge line valve with cutting ring connection	●	●	●
Compressor oil GEA Bock C85E as 1 liter refill unit	●	●	●
Compressor oil GEA Bock C150E as 1 liter refill unit		●	●

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