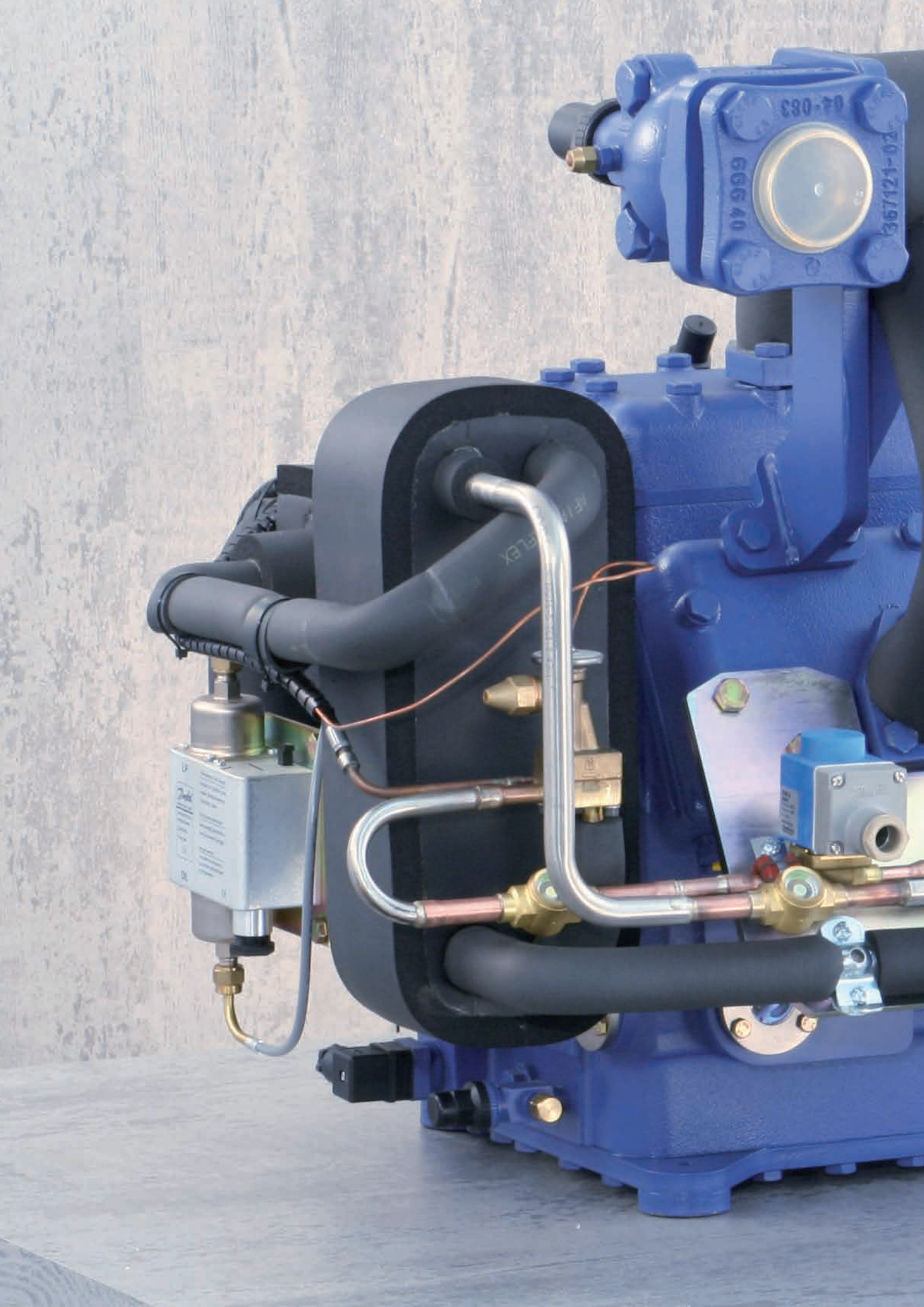


Two-stage semi-hermetic GEA Bock compressors

A two-stage variant based on the GEA Bock HG semi-hermetic 6 cylinder range is available for extended use in the domain of deep-freezing.

The two stage system consists of:
- Liquid subcooler
- Reinjection valve
- Solenoid valve
- Sight glass
- Filter drier

Special features:

- 6 cylinder design
- LP/HP stage ratio 2:1
- 2 stage operation with liquid subcooler
- Reinjection valve adapted to refrigerant and application
- Extremely reliable and economic compressor design

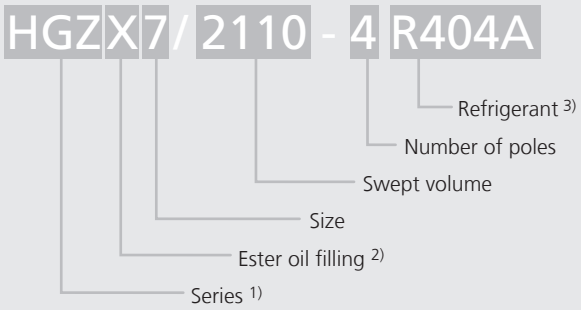
Further information on the HG7 basic compressor see chapter "Single-stage semi-hermetic GEA Bock compressors" from page 28.

Available models

for refrigerants R404A, R410A, R507, R22

Type	Displacement (50 Hz) LP / HP
HGZX7/1620-4 R404A/R507 HGZX7/1620-4 R410A HGZ7/1620-4 R22	93,70 m³/h / 46,90 m³/h
HGZX7/1860-4 R404A/R507 HGZX7/1860-4 R410A HGZ7/1860-4 R22	107,60 m³/h / 53,80 m³/h
HGZX7/2110-4 R404A/R507 HGZX7/2110-4 R410A HGZ7/2110-4 R22	122,40 m³/h / 61,20 m³/h

Type key



1) HGZ = Hermetic Gas-Cooled (suction gas-cooled), two-stage
2) X = Ester oil filling (HFC refrigerants R404A,R410A)
3) Possible refrigerants are R404A, R410A, R22

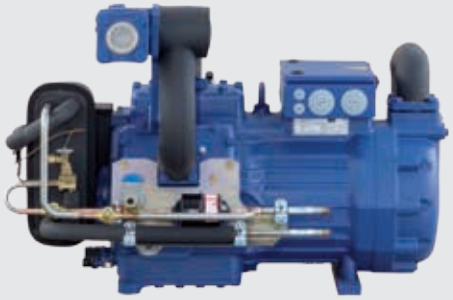
The two possible designs of the HGZ7:

Design: everything enclosed separately

Medium-pressure mixed line mounted on the compressor and insulated, liquid subcooler, expansion valve, solenoid valve, two sight glasses, filter drier everything enclosed separately for individual, external mounting.

Design: mounted directly to the compressor

Liquid subcooler, expansion valve, solenoid valve, two sight glasses, filter dryer mounted directly to the compressor, lined and insulated.



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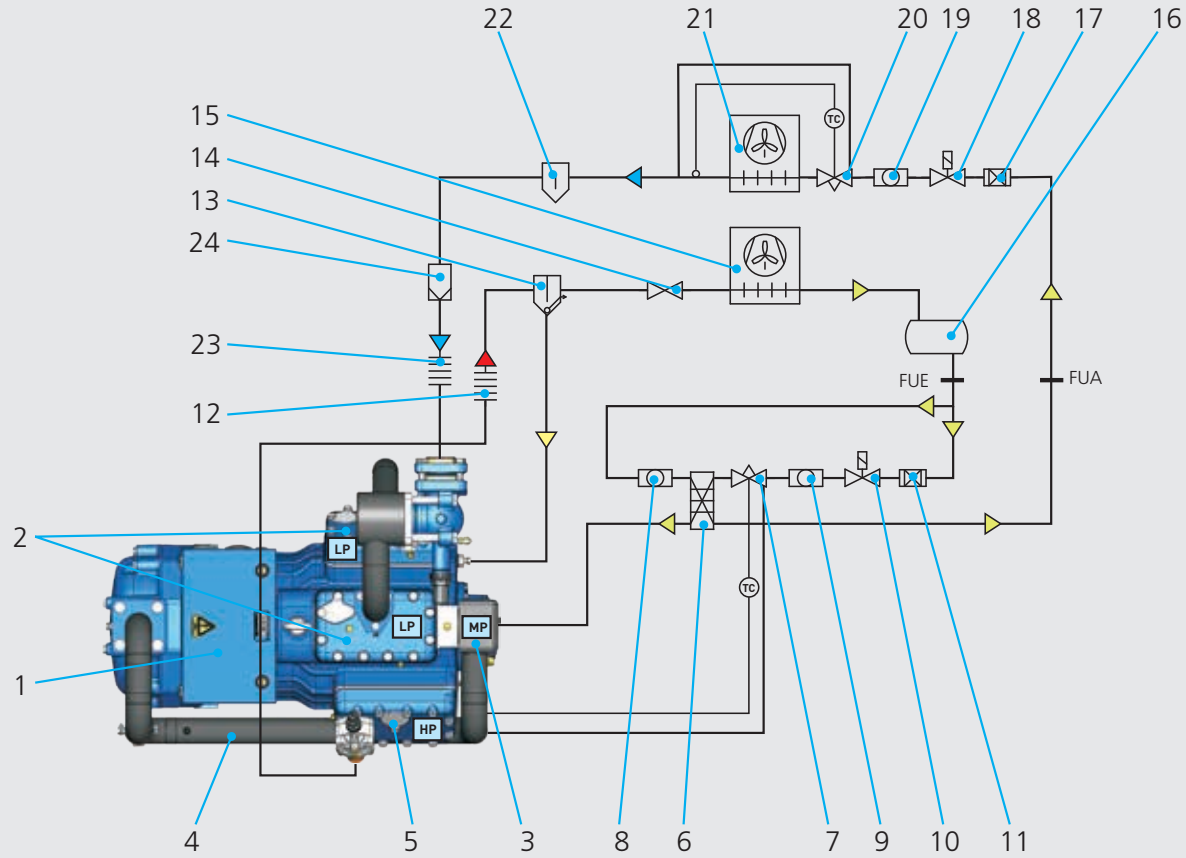
Refrigeration circuit with two-stage compressor
Schematic diagram



Explanations

1 Compressor
2 Cylinder LP-stage
3 Intermediate pressure chamber MP
4 Intermediate pressure line MP
5 Cylinder HP-stage
6 Subcooler*
7 Reinjection valve*
8 Sight glass 1*
9 Sight glass 2*
10 Solenoid valve*
11 Filter drier*
12 Vibration damper, pressure line
13 Oil separator
14 Non-return valve
15 Condenser
16 Refrigerant receiver
17 Filter drier
18 Solenoid valve
19 Sight glass
20 Expansion valve (evaporator)
21 Evaporator
22 Liquid separator
23 Vibration damper, suction line
24 Filter suction line

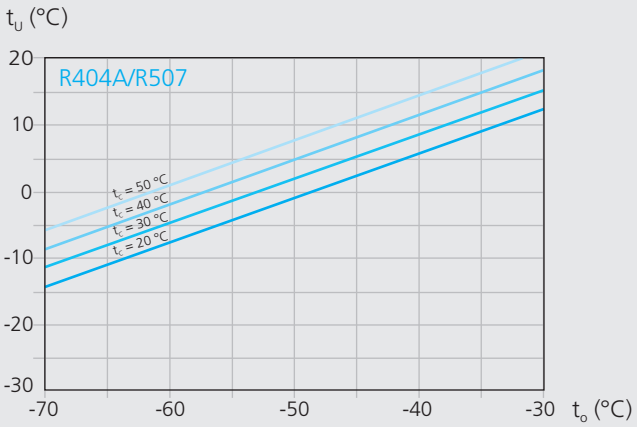
LP = Low pressure
MP = Medium pressure
HP = High pressure
FUE = Liquid subcooler, inlet
FUA = Liquid subcooler, outlet

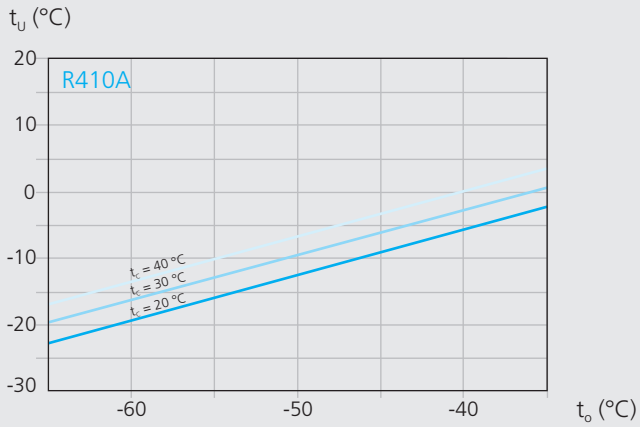
* Components for subcooling system not supplied as standard

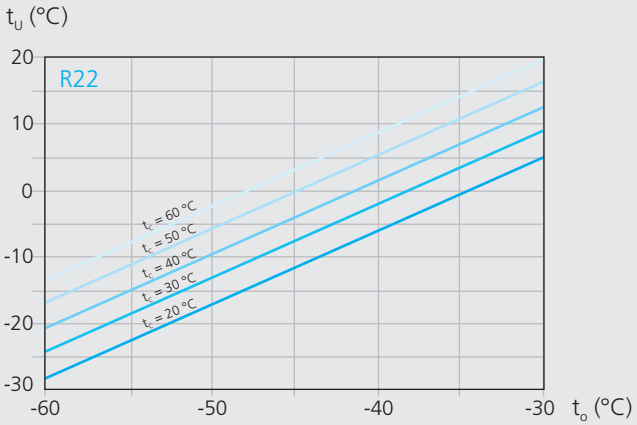
Subcooling temperature

Defined with the help of the diagram by approximately calculating the subcooling temperature arising in the relevant operating conditions (to/tc).

Subcooling temperature calculation diagram for the intermediate cooler outlet







t_U = Subcooling temperature at the intermediate cooler outlet (FUA)

t_O = Evaporation temperature

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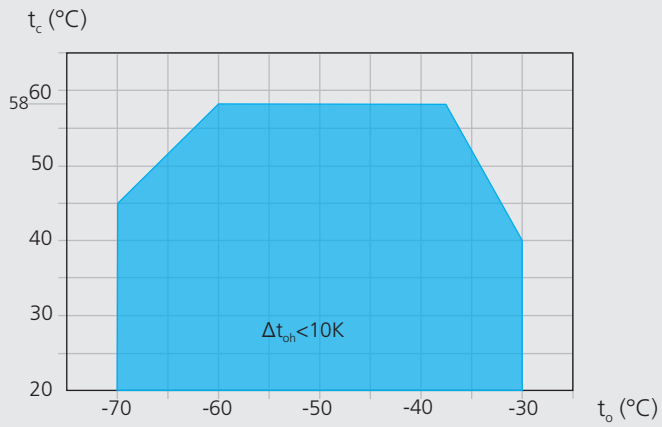
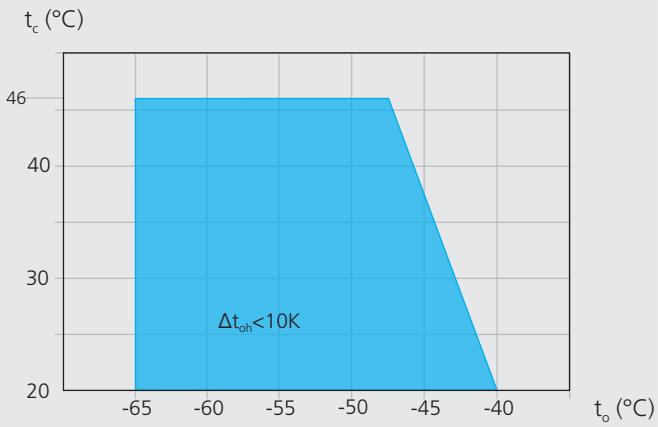
Operating limits

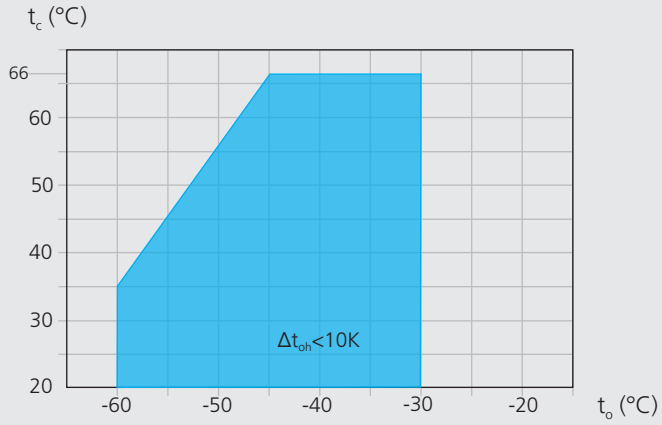
R404A/R507



R410A



R22



Application range

t_O Evaporating temperature (°C)
t_C Condensing temperature (°C)
Δt_{Oh} Suction gas superheat (K)

Max. permissible operating pressure (LP/MP/HP)[1]: 19/19/28 bar

[1] LP = low pressure MP = medium pressure HP = high pressure

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.

Performance data

The stated performance values are based on **10 K suction gas superheat with liquid subcooling, operating at 50 Hz.**

Performance data were compiled for R404A and R507.
The base values are the data for R404A.

Conversion factor für 60 Hz = 1,2

Performance data for other operating points, see GEA Bock software

Performance data

R404A/R507 — Performance data — 50 Hz

Type	Cond. temp. °C		Cooling capacity $\dot{Q}_o$ [W] / Power consumption P_e [kW]								
			Evaporating temperature °C								
			-30	-35	-40	-45	-50	-55	-60	-65	-70
HGZX7/1620-4	30	Q	34869	28471	23098	18628	14936	11899	9394	7296	5482
		P	21,17	19,41	17,63	15,84	14,05	12,31	10,61	8,99	7,46
	40	Q	33437	27315	22181	17910	14380	11467	9047	6997	5192
		P	23,42	21,42	19,40	17,39	15,41	13,48	11,61	9,84	8,17
	50	Q		25860	20950	16866	13484	10680	8332	6315	
		P		23,49	21,24	19,02	16,84	14,72	12,68	10,75	
HGZX7/1860-4	30	Q	40042	32694	26525	21391	17152	13665	10787	8378	6294
		P	24,31	22,29	20,24	18,18	16,14	14,13	12,19	10,32	8,56
	40	Q	38397	31367	25471	20567	16514	13169	10390	8035	5962
		P	26,90	24,60	22,28	19,97	17,70	15,48	13,34	11,30	9,38
	50	Q		29696	24057	19367	15484	12265	9568	7252	
		P		26,98	24,39	21,84	19,33	16,90	14,56	12,35	
HGZX7/2110-4	30	Q	45550	37191	30173	24334	19511	15544	12271	9530	7160
		P	27,66	25,36	23,03	20,69	18,36	16,08	13,86	11,74	9,74
	40	Q	43679	35681	28974	23396	18785	14980	11819	9140	6782
		P	30,60	27,98	25,34	22,72	20,13	17,61	15,17	12,85	10,67
	50	Q		33780	27366	22031	17614	13952	10884	8249	
		P		30,69	27,75	24,84	21,99	19,23	16,57	14,04	

R410A — Performance data — 50 Hz

Type	Cond. temp. °C		Cooling capacity $\dot{Q}_o$ [W] / Power consumption P_e [kW]						
			Evaporating temperature °C						
			-35	-40	-45	-50	-55	-60	-65
HGZX7/1620-4	30	Q			25354	19967	15285	11396	8385
		P			22,89	20,80	18,67	16,43	14,00
	50	Q				19131	14630	10868	7930
		P				22,87	20,63	18,25	15,68
HGZX7/1860-4	30	Q			29182	22859	17530	13136	9614
		P			26,28	23,89	21,44	18,87	16,08
	50	Q				21959	16774	12508	9101
		P				26,26	23,68	20,96	18,00
HGZX7/2110-4	30	Q			33195	26003	19941	14943	10937
		P			29,90	27,17	24,39	21,46	18,29
	50	Q				24980	19082	14229	10352
		P				29,87	26,94	23,84	20,48

R22			Performance data						50 Hz
Type	Cond. temp. °C		Cooling capacity $\dot{Q}_o$ [W]					Power consumption P_e [kW]	
			Evaporating temperature °C						
			-30	-35	-40	-45	-50	-55	-60
HGZ7/1620-4	30	Q	29711	24214	19448	15365	11921	9070	6765
		P	18,26	16,81	15,40	14,03	12,70	11,41	10,16
	40	Q	29059	23630	18930	14914	11537	8753	
		P	20,23	18,52	16,86	15,23	13,64	12,10	
	50	Q	28355	22992	18360	14411	11100		
		P	22,30	20,33	18,41	16,53	14,69		
	60	Q	27598	22302	17736	13854			
		P	24,47	22,25	20,07	17,93			
HGZ7/1860-4	30	Q	30088	27881	22408	17669	13664	10393	7855
		P	20,97	19,31	17,69	16,11	14,58	13,10	11,67
	40	Q	33296	27181	21800	17153	13240	10061	
		P	23,23	21,27	19,36	17,49	15,67	13,89	
	50	Q	32434	26411	21122	16567	12746		
		P	25,60	23,35	21,14	18,98	16,68		
	60	Q	31503	25572	20375	15912			
		P	28,09	25,54	23,04	20,59			
HGZ7/2110-4	30	Q	38811	31632	25406	20072	15573	11848	8837
		P	23,86	21,96	20,12	18,33	16,59	14,91	13,27
	40	Q	37960	30868	24729	19483	15071	11433	
		P	26,43	24,20	22,02	19,89	17,82	15,80	
	50	Q	37040	30035	23984	18825	14500		
		P	29,13	26,56	24,05	21,59	19,18		
	60	Q	36050	29133	23169	18097			
		P	31,96	29,06	26,21	23,42			

Performance data 50 Hz relative to 10 K suction gas superheat with liquid subcooling

Technical data

HGZ Type	Number of cylinders	Displacement 50 Hz (1450 rpm) LP	Displacement 50 Hz (1450 rpm) HP	Displacement 60 Hz (1740 rpm) LP	Displacement 60 Hz (1740 rpm) HP	Electrical data Voltage ①	Electrical data Max. working current ②	Electrical data Max. power consumption ②	Electrical data Starting current (rotor locked) ②	Weight	Oil charge
		m³/h		m³/h			A	kW	A	kg	Ltr.
							* PW 1+2		* PW1 / PW 1+2		
HGZX7/1620-4 R404A HGZX7/1620-4 R410A HGZ7/1620-4 R22	6	93,70	46,90	112,50	56,20	③	50	27,0	185 / 278	294	4,5
HGZX7/1860-4 R404A HGZX7/1860-4 R410A HGZ7/1860-4 R22	6	107,60	53,80	129,10	64,60	③	55	30,0	185 / 278	291	4,5
HGZX7/2110-4 R404A HGZX7/2110-4 R410A HGZ7/2110-4 R22	6	122,40	61,20	146,90	73,50	③	65	36,0	191 / 286	289	4,5

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

LP = low pressure
HP = high pressure

Oil sump heater 230V -1- 50/60 Hz 140 W (option)
Permanently set version, installation in immersion sleeve

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 Δ/ YYY - 3 - 50 Hz PW
440-480 V Δ/ YYY - 3 - 60 Hz PW
PW = Part Winding, motors for part winding start (no start unloaders required)
Winding ratios: 60% / 40%

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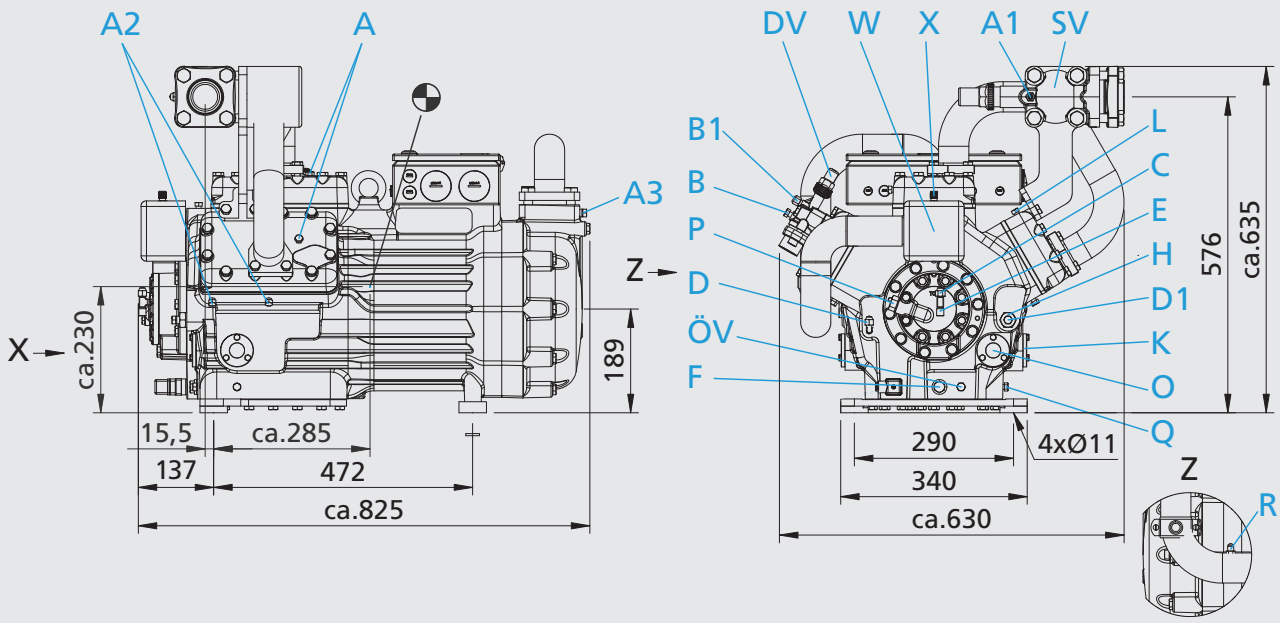
Dimensions and connections

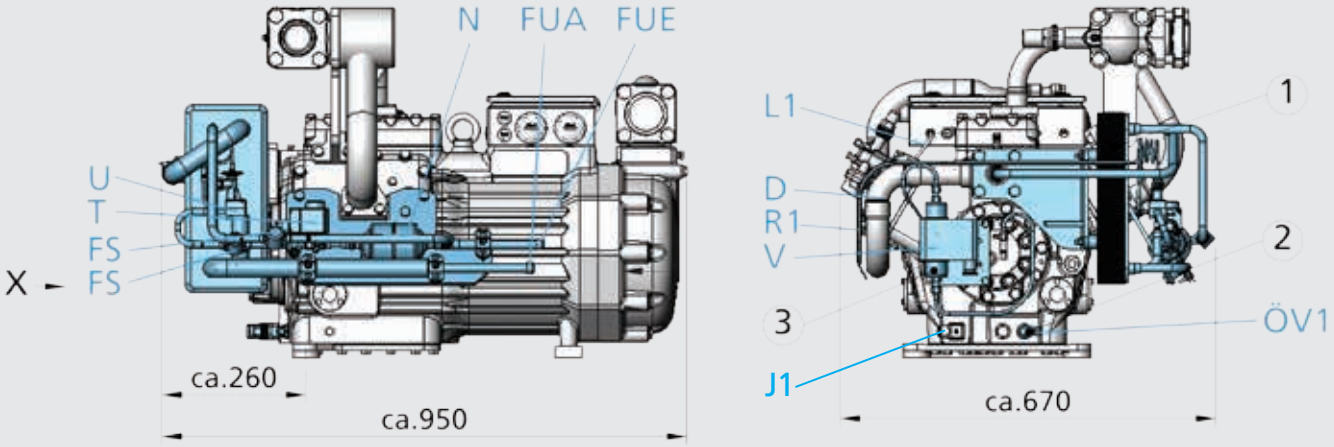
HGZ7 - Series

Liquid subcooler with accessories supplied separately



HGZ7 - Option

Liquid subcooler with complete accessories directly mounted onto the compressor



① Liquid subcooler with accessories ② Oil service valve ③ Oil pressure safety switch

Dimensions in mm
Centre of gravity

- Connections see page 80
- Rigid fixing without anti-vibration pad
- Dimensions for view X see page 81

Dimensions and connections

Connections		
DV	Discharge line	Ø 35 mm / 1 3/8 "
SV	Suction line	Ø 54 mm / 2 1/8 "
FUE	Liquid subcooler IN	Ø 16 mm - 5/8 "
FUA	Liquid subcooler OUT	Ø 16 mm - 5/8 "
A	Connection suction side, not lockable	1/8 " NPTF
A1	Connection suction side, lockable	7/16 " UNF
A2	Connection intermediate pressure, not lockable	1/8 " NPTF
A3	Connection intermediate pressure, not lockable	1/4 " NPTF
B	Connection discharge side, not lockable	1/8 " NPTF
B1	Connection discharge side, lockable	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
E	Connection oil pressure gauge	7/16 " UNF
F	Oil drain	M 22 x 1,5
FS	Sight glass Liquid line	Ø 12 mm
H	Oil charge plug	M 22 x 1,5

Connections		
J1	Oil sump heater	M 22 x 1,5
K	Sight glass	3 hole M 6
L	Connection thermal protection thermostat	1/8 " NPTF
L1	Thermal protection thermostat	1/8 " NPTF
N	Filter drier	Ø 12 mm
O	Connection oil level regulator	①
ÖV	Connection oil service valve	1/4 " NPTF 1)
ÖV1	Oil service valve	7/16 " UNF
P	Connection oil pressure differential sensor	M 20 x 1,5
Q	Connection oil temperature sensor	1/8 " NPTF 1)
R	Connection equalizer for injection valve	7/16 " UNF
R1	Equalizer for injection valve	Ø 6 mm
T	Solenoid valve	Ø 12 mm
U	Reinjection valve - dependent on refrigerant	Ø 12 mm
V	Oil pressure safety switch MP 54	-
W	Connection refrigerant injection	M 22 x 1,5
X	Connection for Schrader valve for intermediate pressure manometer	7/16 " UNF

① Dimensions see view X see page 81

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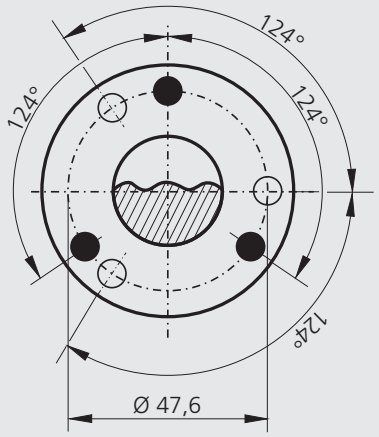
Dimensions and connections

View X

Possibility to connect to oil level regulator

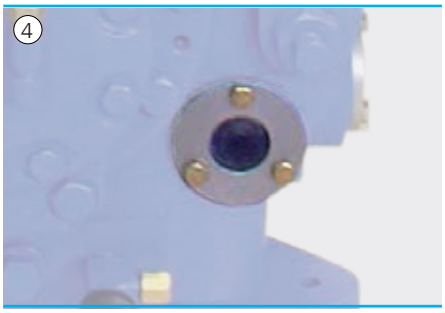
● Three-hole connection for oil level regulator
make ESK, AC+R, CARLY (3x M6, 10 deep)



Dimensions in mm

Scope of supply

Scope of supply
Semi-hermetic six cylinder reciprocating compressor with drive motor for part winding start 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
Cylinder design in W form, LP/HP stage ratio 2:1
① Intermediate pressure line mounted and insulated
② Winding protection with PTC sensors and MP10 electronic motor protection
Oil pump
③ Oil pump cover with screw connection for oil differential pressure sensor (Δp switch Kriwan make)
④ Direct connection possibility for oil level regulators ESK, AC+R or CARLY
Oil charge: HGZ: FUCHS Reniso SP46 HGZX: FUCHS Reniso Triton SE55
⑤ Three sight glasses
Decompression valve
⑥ Suction and ⑦ discharge line shut off valve
Inert gas charge
4 anti-vibration pads enclosed



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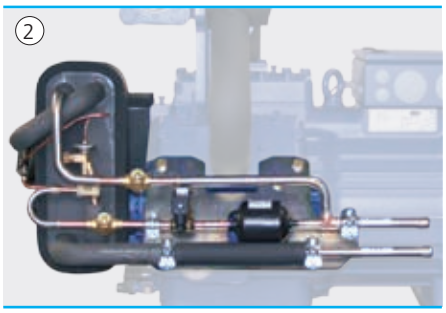
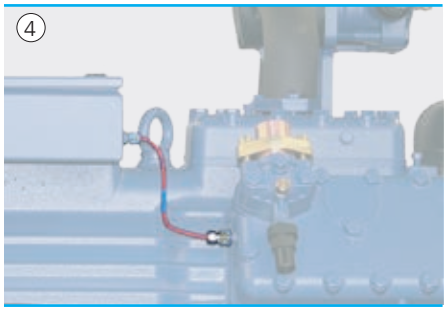
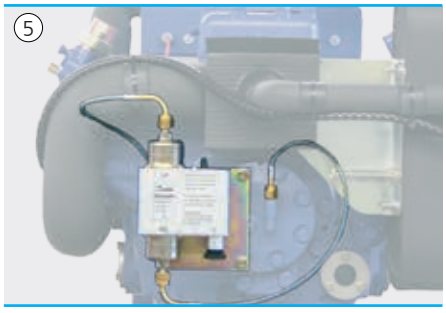
Accessories

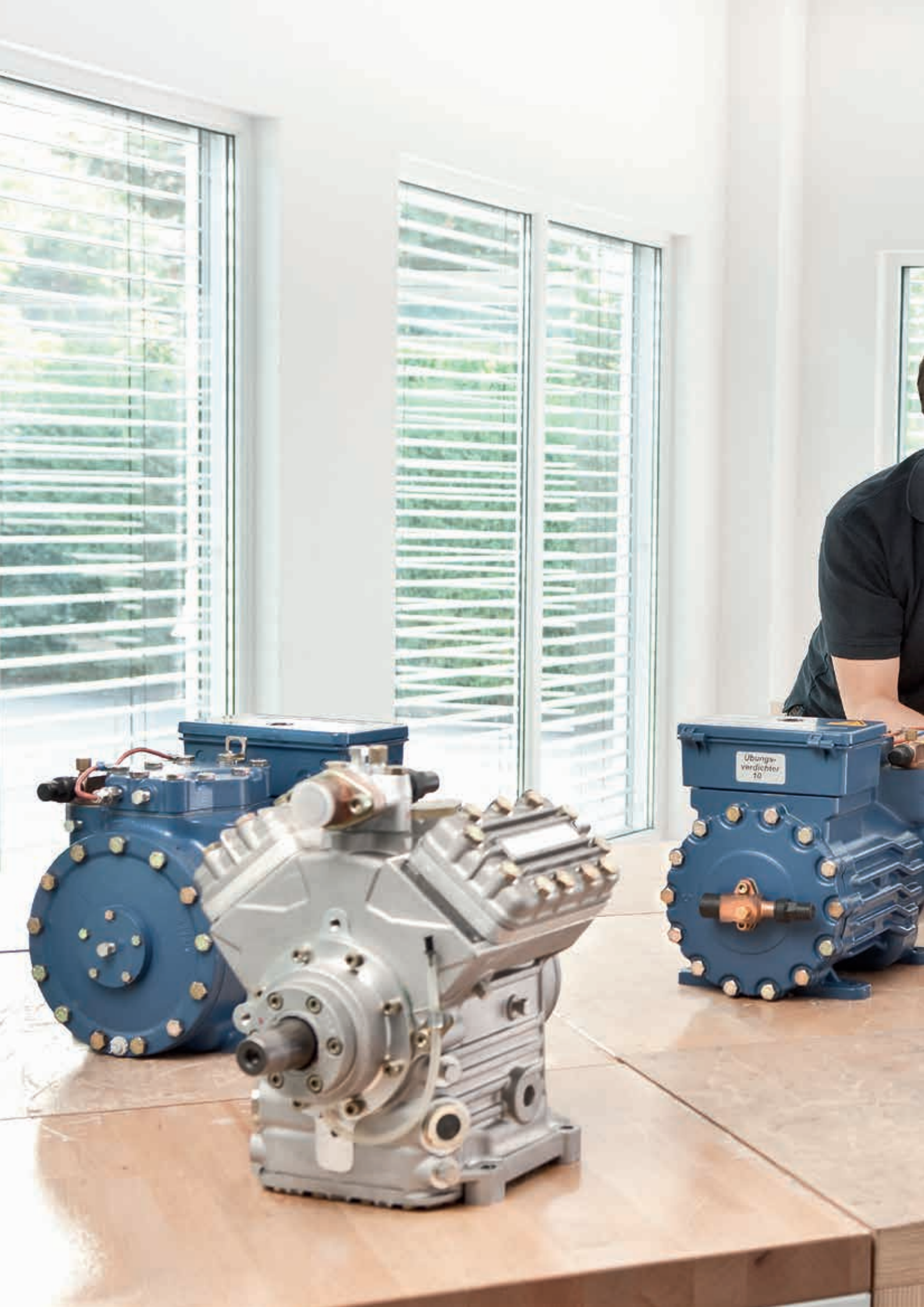
Accessories
① Liquid subcooler, reinjection valve, solenoid valve 230 V - 1 - 50/60 Hz, two sight glasses, filter drier, supplied separately for individual, external installation. Assembly is for the function of the compressor mandatory.
② Liquid subcooler, reinjection valve, solenoid valve 230 V - 1 - 50/60 Hz, two sight glasses, filter drier, directly mounted onto the compressor, fully assembled and insulated with pipes ready for connection
③ Oil sump heater 220-240 V - 1 - 50/60 Hz, 140 W
④ Thermal protection thermostat (PTC sensor) 230 V - 1 - 50/60 Hz
⑤ Oil pressure safety switch MP 54, 230 V - 1 - 50/60 Hz, IP20 [1)]
⑥ Oil differential pressure sensor (Δp-switch Kriwan make) 220-240 V - 1 - 50/60 Hz [1)]
⑦ Oil service valve
⑧ GEA Bock Compressor Management BCM2000 including oil pressure control (Δp-switch Kriwan make) ⑥, oil temperature control (NTC), thermal protection thermostat (PTC) per cylinder cover ④
Special voltage and/or frequency (on request)

[1)] enclosed package








Übungs-
verdichter
10

Service - Made by GEA Bock

Because you're never done learning - GEA Bock training and workshops on compressors

Many years ago, GEA Bock intensified its commitment in the area of customer training.
And so we offer a comprehensive array of attractive training events, from two-day practitioners' workshops in Frickenhausen to afterwork workshops throughout Germany. Regardless of the type of training you are interested in.

Three things are characteristic of all GEA Bock training:
- The captivating way that the training director Peter Spies carries out the events
- The strong practice orientation of the training events, and
- The fact that all training events from GEA Bock are offered as a free service

Overview of training events offered:

- GEA Bock Practitioners' Workshop
- Training tailored to your individual needs
- Training for your entire staff
- Training on your premises

For additional questions or advice, please contact our training director:

Peter Spies
Telephone +49 70 22 / 94 54-157
Fax +49 70 22 / 94 54-137
Email: Peter.Spies@gea.com

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Service - Made by GEA Bock

We live our values.

Excellence • Passion • Integrity • Responsibility • GEA-versity

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

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