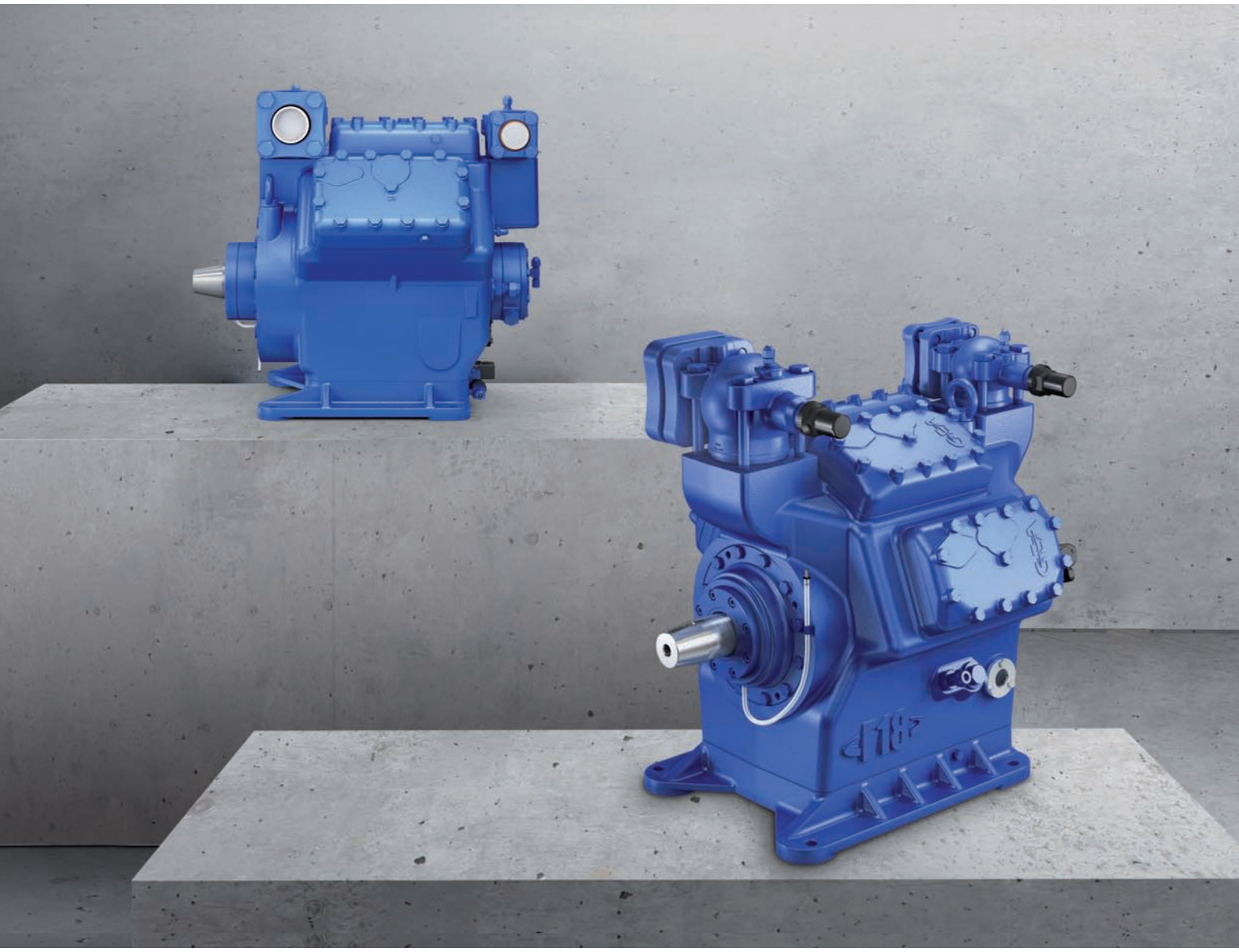


Bock Open Type Compressors F

The full range of open type compressors and units

Production Program

Semi-hermetic compressors HG (HA)

The 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
- CO_2 compressors subcritical
- CO_2 compressors transcritcal
- R134a compressors
- R407C compressors
- R410A compressors
- ATEX compressors
- HC compressors
- Aluminium compressors
- 2-pole compressors
- Two-stage compressors
- Duplex compressors
- Compressor units with receiver
- Condenser units air-cooled

Vehicle compressors FK

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 unique 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

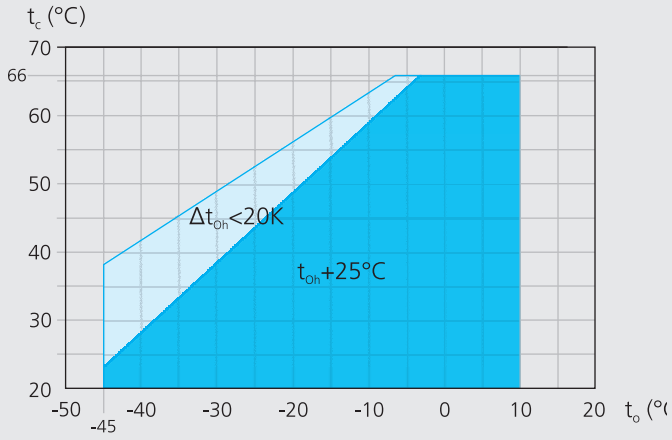
Open type compressors F

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.

- Single-stage compressors
- NH_3 compressors
- Compressor units for direct drive
- NH_3 compressor units for direct drive

R22 Operating limits

F2, F3, F4, F5, F14, F16, F18



Unlimited application range

Supplementary cooling or reduced suction gas temperature

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

Maximum permissible operating pressure (LP/HP)[1]: 19/28 bar

[1] LP = low pressure HP = high pressure

R22 Notes

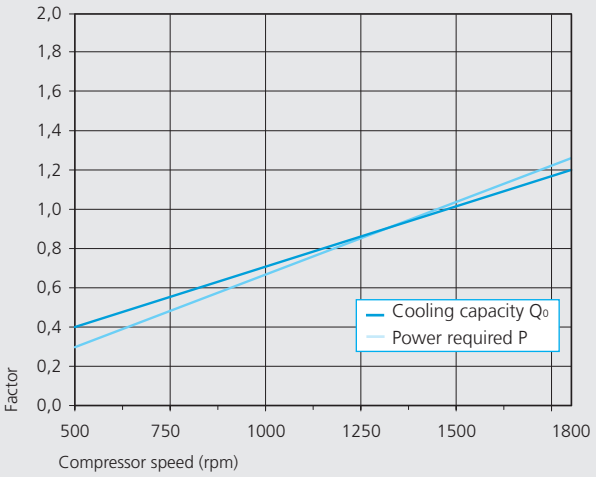
Operating limits

Compressor operation is possible within the examples in the diagram showing the limitations of use. The meaning of the surfaces marked in colour are to be observed. Limiting areas should not be selected for layout or continuous operating points.

Performance data

Performance specifications for R22 are based on 25°C suction gas temperatures without liquid subcooling. (Exception: F18 = 20 °C suction gas temperature). Compressor speed 1450 rpm.
The values can be stated to judge the overall performance at other speed with the help of the calculation factors below.

For additional technical data for other operating points see GEA Bock software.



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R22	Performance data										1.450 rpm
Type	Cond. temp. °C		Cooling capacity $\dot{Q}_o$ [W] Evaporating temperature °C								Power consumption P [kW]		
			10	5	0	-5	-10	-15	-20	-25	-30	-35	-40
F2	30	Q	12420	10492	8792	7303	6007	4889	3932	3118	2431	1854	1370
		P	1,48	1,59	1,63	1,63	1,59	1,51	1,42	1,31	1,20	1,09	1,00
	40	Q	11359	9565	7987	6610	5415	4386	3507	2760	2129	1597	1147
		P	2,04	2,07	2,04	1,98	1,88	1,76	1,63	1,49	1,36	1,24	1,15
	50	Q	10263	8608	7157	5895	4805	3871	3074	2398			
		P	2,57	2,52	2,43	2,30	2,15	1,99	1,83	1,67			
F3	30	Q	24080	20342	17046	14158	11646	9479	7622	6044	4712	3593	2656
		P	2,87	3,08	3,16	3,16	3,08	2,93	2,75	2,54	2,33	2,12	1,94
	40	Q	22022	18543	15485	12814	10497	8503	6798	5350	4127	3095	2223
		P	3,96	4,01	3,96	3,83	3,64	3,41	3,16	2,89	2,64	2,41	2,23
	50	Q	19897	16687	13875	11429	9316	7503	5959	4649			
		P	4,99	4,89	4,71	4,46	4,18	3,86	3,54	3,23			
F4	30	Q	48161	40685	34091	28316	23293	18957	15244	12088	9424	7187	5312
		P	5,75	6,15	6,33	6,32	6,15	5,87	5,50	5,08	4,65	4,24	3,88
	40	Q	44044	37087	30970	25627	20994	17005	13596	10700	8253	6191	4446
		P	7,92	8,01	7,92	7,66	7,29	6,82	6,31	5,78	5,28	4,82	4,46
	50	Q	39795	33374	27750	22858	18632	15006	11917	9299			
		P	9,98	9,77	9,41	8,93	8,35	7,73	7,08	6,46			
F5	30	Q	87555	73963	61977	51477	42345	34463	27712	21975	17132	13065	9656
		P	10,45	11,18	11,51	11,49	11,19	10,67	10,00	9,24	8,46	7,71	7,06
	40	Q	80069	67422	56302	46589	38166	30915	24716	19452	15004	11254	8084
		P	14,40	14,57	14,39	13,93	13,25	12,41	11,48	10,52	9,59	8,76	8,10
	50	Q	72345	60673	50449	41554	33871	27281	21665	16905			
		P	18,14	17,77	17,11	16,23	15,18	14,05	12,88	11,74			
F14/1166	30	Q	120460	101761	85270	70824	58260	47416	38128	30234	23571	17976	13286
		P	14,38	15,39	15,83	15,80	15,39	14,68	13,76	12,71	11,63	10,61	9,72
	40	Q	110163	92762	77462	64100	52511	42534	34006	26763	20644	15484	11121
		P	19,82	20,05	19,80	19,16	18,22	17,07	15,79	14,47	13,20	12,06	11,14
	50	Q	99536	83477	69410	57173	46602	37535	29808	23259			
		P	24,96	24,45	23,54	22,32	20,89	19,33	17,72	16,15			
F14/1366	30	Q	141369	119424	100070	83117	68372	55646	44746	35482	27662	21096	15592
		P	16,88	18,06	18,58	18,55	18,06	17,23	16,15	14,92	13,65	12,45	11,40
	40	Q	129284	108863	90907	75225	61625	49917	39908	31409	24227	18172	13052
		P	23,26	23,53	23,24	22,49	21,39	20,03	18,53	16,98	15,49	14,15	13,08
	50	Q	116813	97966	81458	67096	54690	44049	34982	27296			
		P	29,29	28,69	27,62	26,20	24,52	22,68	20,79	18,96			
F16/1751	30	Q	180811	152743	127990	106306	87448	71171	57230	45381	35380	26982	19942
		P	21,58	23,09	23,76	23,72	23,10	22,03	20,65	19,08	17,46	15,92	14,59
	40	Q	165353	139235	116270	96212	78818	63843	51042	40171	30986	23241	16693
		P	29,74	30,09	29,72	28,76	27,35	25,62	23,70	21,72	19,81	18,10	16,73
	50	Q	149402	125297	104183	85815	69948	56338	44741	34911			
		P	37,46	36,69	35,33	33,51	31,36	29,01	26,60	24,25			
F16/2051	30	Q	211935	179036	150022	124606	102501	83422	67081	53193	41470	31626	23375
		P	25,30	27,07	27,85	27,80	27,08	25,83	24,21	22,37	20,47	18,66	17,10
	40	Q	193817	163203	136285	112775	92386	74833	59829	47086	36320	27242	19567
		P	34,86	35,27	34,83	33,71	32,06	30,03	27,78	25,45	23,22	21,21	19,61
	50	Q	175120	146867	122118	100588	81990	66037	52443	40921			
		P	43,91	43,01	41,41	39,28	36,76	34,00	31,17	28,42			

Based on 25 °C suction gas temperature
without liquid subcooling

Supplementary cooling or reduced suction gas temp.

R22	Performance data				
Type	t_o / t_c °C		Cooling capacity $\dot{Q}_o$ [W] n [U/rpm]		Power consumption P [kW]
			700	1450	1800
F18/2735	-35 / 40	Q	17000	36000	43500
		P	9,70	20,70	27,20
	-10 / 45	Q	59400	124000	153000
		P	19,40	44,40	55,20
	5 / 50	Q	102000	210000	260000
		P	24,60	57,00	74,60
F18/3235	-35 / 40	Q	21000	44000	54700
		P	12,20	25,70	32,90
	-10 / 45	Q	71900	149000	181000
		P	23,20	53,00	65,20
	5 / 50	Q	120000	249000	301000
		P	28,80	66,50	84,00

Based on 20 °C suction gas temperature
without liquid subcooling

The performance data for the F18 is preliminary data!

t_o = Evaporating temperature

t_c = Condensing temperature

Technical data

F Type	Number of cylinders	Displacement (1.450/1.740 rpm)	Weight ②	Connections ①		Oil charge	Speed range
				Discharge line DV	Suction line SV		
		m³/h	kg	mm I inch	mm I inch	Ltr.	rpm
F2	2	10,5 / 12,6	18	16 I 5/8	16 I 5/8	0,8	960 - 1800
F3	2	20,3 / 24,3	28	22 I 7/8	28 I 1 1/8	1,5	960 - 1800
F4	4	40,5 / 48,6	51	28 I 1 1/8	35 I 1 3/8	2,6	500 - 1800
F5	4	73,7 / 88,4	85	35 I 1 3/8	2 x 35 I 2 x 1 3/8	3,8	500 - 1800
F14/1166	4	101,5 / 121,7	149	42 I 1 5/8	54 I 2 1/8	3,8	700 - 1800
F14/1366	4	119,0 / 142,8	149	42 I 1 5/8	54 I 2 1/8	3,8	700 - 1800
F16/1751	6	152,2 / 182,6	175	42 I 1 5/8	54 I 2 1/8	5,0	700 - 1800
F16/2051	6	178,4 / 214,1	175	42 I 1 5/8	54 I 2 1/8	5,0	700 - 1800
F18/2735	8	238,0 / 285,0	270	54 I 2 1/8	76 I 3 1/8	10,0	700 - 1800
F18/3235	8	281,0 / 338,0	270	54 I 2 1/8	76 I 3 1/8	10,0	700 - 1800

① for soldering connections

② as standard

Oil sump heater: 230 V – 1 – 50/60 Hz

F2: 40 W

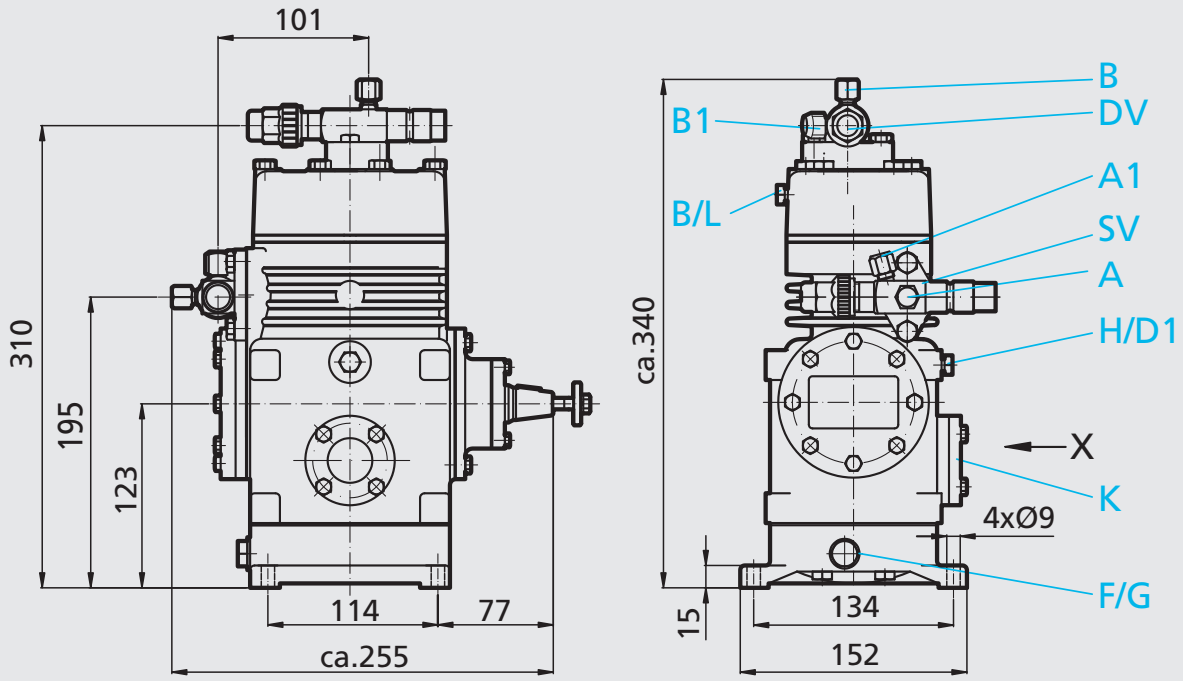
F3: 60 W

F4, F5: 80 W

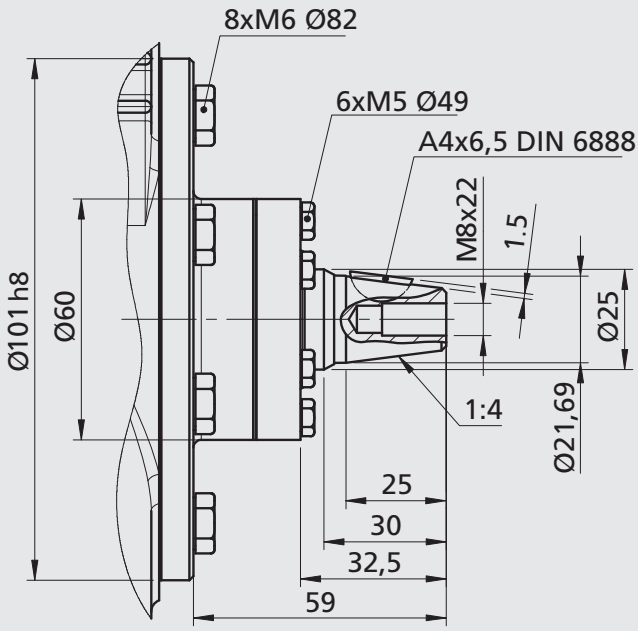
F14, F16: 140 W

F18: 200 W

F2



Shaft end



Dimensions in mm

- Connections see page 33
- Dimensions for view X see page 32

Dimensions and connections

Connections		F2	F3	F4	F5	F14	F16	F18
SV DV	Suction line Discharge line	please refer to technical data page 24						
A	Connection suction side, not lockable	7/16 " UNF	1/8 " NPTF	1/8 " NPTF	1/8 " NPTF	1/8 " NPTF	1/8 " NPTF	1/8 " NPTF
A1	Connection suction side, lockable	7/16 " UNF	7/16 " UNF	7/16 " UNF	7/16 " UNF	7/16 " UNF	7/16 " UNF	7/16 " UNF
B	Connection discharge side, not lockable	1/8 " NPTF	1/8 " NPTF	1/8 " NPTF	1/8 " NPTF	1/8 " NPTF	1/8 " NPTF	1/8 " NPTF
B1	Connection discharge side, lockable	7/16 " UNF	7/16 " UNF	7/16 " UNF	7/16 " UNF	7/16 " UNF	7/16 " UNF	7/16 " UNF
B2	Connection discharge side, not lockable	-	-	-	-	7/16 " UNF	7/16 " UNF	7/16 " UNF
C	Connection oil pressure safety switch OIL	-	1/8 " NPTF	7/16 " UNF	7/16 " UNF	7/16 " UNF	7/16 " UNF	7/16 " UNF
D	Connection oil pressure safety switch LP	-	1/8 " NPTF	7/16 " UNF	7/16 " UNF	7/16 " UNF	7/16 " UNF	7/16 " UNF
D1	Connection oil return from oil separator	1/8 " NPTF	1/8 " NPTF	1/8 " NPTF	1/8 " NPTF	5/8 " UNF	5/8 " UNF	5/8 " UNF
E	Connection oil pressure gauge	-	1/8 " NPTF	7/16 " UNF	7/16 " UNF	7/16 " UNF	7/16 " UNF	7/16 " UNF
F	Oil drain	R 3/8 "	M 22 x 1,5	M 22 x 1,5	M 22 x 1,5	M 26 x 1,5	M 26 x 1,5	M 26 x 1,5
G	Oil sump heater plug	R 3/8 "	M 22 x 1,5	-	-	-	-	-
H	Oil charge plug	1/8 " NPTF	1/8 " NPTF	M 22 x 1,5	M 22 x 1,5	M 22 x 1,5	M 22 x 1,5	M 22 x 1,5
J	Connection oil sump heater	-	-	-	-	-	-	M 22 x 1,5
J1	Oil sump heater	- [1]	- [1]	M 22 x 1,5	M 22 x 1,5	M 22 x 1,5	M 22 x 1,5	-
K	Sight glass	4 hole M 6	4 hole M 6	4 hole M 6	4 hole M 6	4 hole M 6 [2]	4 hole M 6 [2]	3 hole M 6
L	Connection thermal protection thermostat	1/8 " NPTF	1/8 " NPTF	1/8 " NPTF	1/8 " NPTF	1/8 " NPTF	1/8 " NPTF	1/8 " NPTF
ÖV	Connection oil service valve	-	-	-	-	-	-	7/16 " UNF
ÖV1	Oil service valve	-	-	-	-	7/16 " UNF	7/16 " UNF	-
P	Connection oil pressure differential sensor	-	-	-	-	M 20 x 1,5	M 20 x 1,5	M22 x 1,5
Q1	Connection oil temperature sensor	-	-	-	-	-	-	1/8 " NPTF

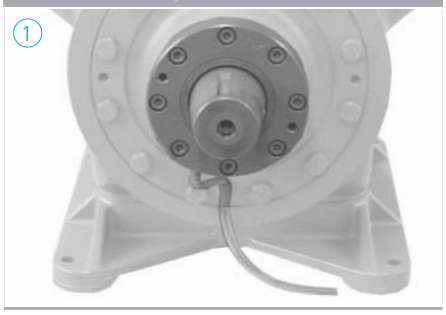
[1] Oil sump heater optional

[2] Second sightglass can be attached,
Positioning view Y (optional, available only as original equipment)

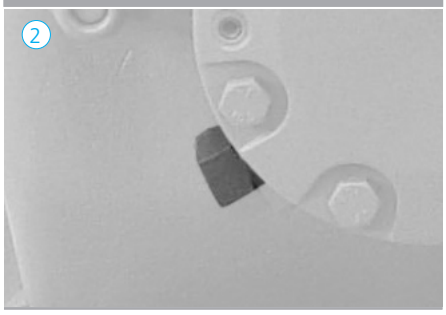
Scope of supply

Scope of supply	F2	F3	F4	F5	F14	F16
Open type compressor with suction and discharge shut-off valves	●	●	●	●	●	●
Two cylinder, cylinder arrangement in row	●	●				
Four cylinder, cylinder arrangement in V			●	●	●	
Six cylinder, cylinder arrangement in W						●
Seat front bearing flange	●	●	●	●	●	●
① Integrated oil collection system for the shaft seal, Design with piece of tube for controlled oil drain option					●	●
② Oil pump cover with screw-in option for oil pressure differential sensor (Δp-switch by Kriwan)					●	●
Direct connection possibility for oil level regulators make ESK, AC+R or CARLY					●	●
Oil sump heater 230 V - 1 - 50/60 Hz, 80 W			●	●		
Oil sump heater 230 V - 1 - 50/60 Hz, 140 W					●	●
③ Oil service valve					●	●
Oil charge: F: FUCHS Reniso SP 46 FX: FUCHS Reniso Triton SE 55	●	●	●	●	●	●
Sight glass	●	●	●	●	●	●
Decompression valve			●	●		
Decompression valve for each cylinder cover					●	●
Inert gas charge	●	●	●	●	●	●

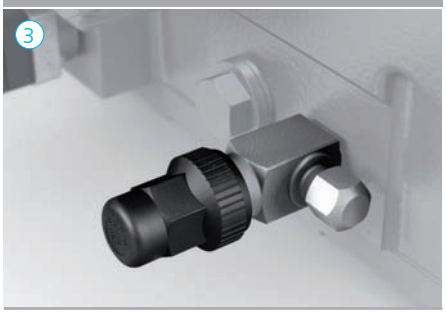
Oil collection system for shaft seal



Screw-in option for oil differential pressure switch



Oil service valve



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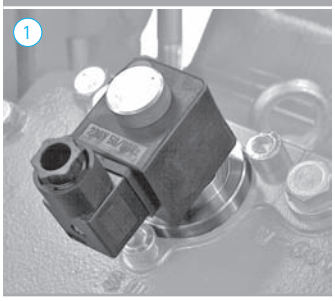
Accessories

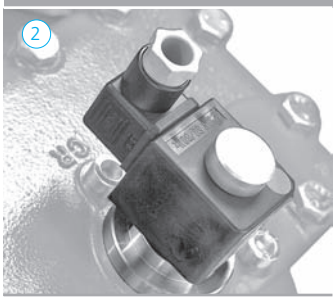
Accessories	F2	F3	F4	F5	F14	F16
① Start unloader 230 V - 1 - 50/60 Hz, IP65, without check valve, including thermal protection thermostat (bimetal sensor)		●	●	●	●	●
② Capacity regulator 230 V - 1 - 50/60 Hz, IP65 1 Capacity regulator = 50 % residual capacity			●	●	●	
Capacity regulator 230 V - 1 - 50/60 Hz, IP65 1-2 Capacity regulator = 66/33 % residual capacity						●
③ Compressor flywheel	●	●	●	●	●	●
④ Shaft coupling for direct drive [1]	●	●	●	●	●	●
⑤ Oil pressure safety switch MP 54 230 V - 1 - 50/60 Hz, IP 20, incl. mounting		●	●	●	●	●
Oil pressure differential sensor (Δp-switch by Kriwan) 220-240 V - 1 - 50/60 Hz					●	●
⑥ Oil sump heater 230 V - 1 - 50/60 Hz, IP 65	●	●				
⑦ Two additional sight glasses (both-sided), positioning view Y [2]					●	●
⑧ Thermal protection thermostat (bimetal-sensor)	●	●	●	●	●	●
⑨ Water-cooled cylinder covers Sea water resistant water-cooling cylinder covers		●	●	●	●	●
⑩ Elevated base plate (oil volume plus 2,5 litres)					●	●

[1] Please state motor Ø and feather key groove dimensions when ordering shafts
[2] Available as original equipment only

Start unloader



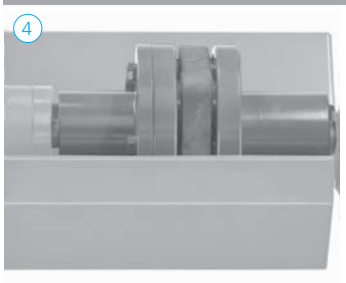
Capacity regulator



Compressor flywheel

F2: Ø 165,2 x SPA
F3: Ø 210,2 x SPA
F4: Ø 210,3 x SPA
F5: Ø 230,4 x SPA
F14: Ø 322 x SPB
F16: Ø 322 x SPB

Shaft coupling



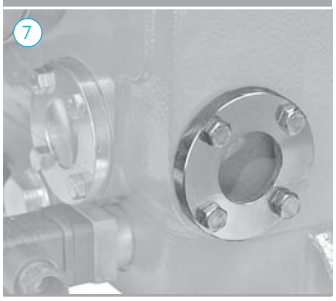
F2: WK 42.44
F3: WK 42.44
F4: WK 70.40
F5: WK 70.40
F14: WK 190.50
F16: WK 190.60

Oil pressure safety switch

Oil sump heater

F2: 40 Watt
F3: 60 Watt

Sight glass



Thermal protection thermostat

Water-cooled cylinder covers

Elevated base plate

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Excellence Passion Integrity Responsibility GEA-versity

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