



## **Semi-hermetic Bock Compressors**

Single-stage and Two-stage Reciprocating Compressors HG (HA)

° In touch with our customers

## GEA Refrigeration Technologies: Your partner for low temperatures

GEA Refrigeration Technologies, part of the internationally active GEA Group, is a synonym for industrial refrigeration technology. Since the end of the 19th century, it has been our business to cool processes and products, and to control the temperature of goods in transport. You will find our solutions in the food and beverage sector; in the petrochemical, chemical, and pharmaceutical industries; on fishing ships; in natural gas liquefaction; in infrastructure facilities; and in ice factories. We are also at the top with know-how when it comes to refrigeration at leisure facilities. After all, we have been excited about refrigeration for decades now. As a result, our staff enthusiastically goes about its development and production projects – to include preventive and remedial maintenance of your refrigeration systems.

This enthusiasm is highly apparent in the daily work of all companies in our Segment. Whether it's complete systems or individual valves: we have the experience in every section of our company to optimally design, manufacture, and install refrigeration systems. And to take full advantage of this experience, we not only carry out development in our own company: we also manufacture, assemble, and test the core components. A chain is, after all, only as strong as its weakest link: and this also applies equally well to refrigeration technology, cooling processes, and cooling chains.

This makes it all the more important that you have a partner – in GEA Refrigeration Technologies – that has learned to master refrigeration from A to Z. And all of this since 1896, when Willem Grasso founded his refrigeration division. From this history of GEA Refrigeration Technologies, you will profit in the form of technical expertise and top sector know-how.

But we all live in the present and think about the future. We ponder a future in which more and more processes need energy around the world, and fewer natural resources are available. As a result, we have taken it as our goal to create solutions that are not only long-life and cost-effective, but also energy-saving and environment-protecting. We feel obligated to sustainability in many respects. Our objective is to produce longlife and material-saving products over the long run – as well as products that use environmentally benign refrigerants. And we aim to produce efficiently. But our responsibility does not end at the factory gate. As a result, we take great pains to ensure that our systems are energy-efficient and that they protect the climate. With GEA Refrigeration Technologies, you can also count on optimal economy: saving energy indeed means reducing money spent for energy. At the same time, you protect the environment. Thanks to our refrigeration technology, your processes will run more economically and more ecologically. To maintain our standard of living and to assure quality of life for future generations as well.

Our claim of combining economy with saving natural resources is reflected in all components of our company, such as the following: compressors, chillers, heat pumps, ice machines, fittings and valves, control systems, and many, many more. You can find proof of the above throughout the world. Our international corporate network – and above all our reference projects – are spread all over the globe.







## GEA Bock - More than a compressor

Over 75 years ago, when the refrigeration and air-conditioning industry was still in its infancy, our company's founder, Wilhelm Bock, had a vision: he wanted to build first-class and reliable refrigeration machines. In the following decades Bock developed into one of the world's leading manufacturers of refrigeration and air-conditioning compressors.

Today, GEA Bock offers as part of GEA Refrigeration Technologies the right compressor for all fields of commercial-, industrial-, rail-, bus- and transport refrigeration.

That GEA Bock places the highest demands on compressors for energy efficiency shows our EFC system. For many years we offer with the EFC system a solution to reduce the energy consumption by 25 %.

In this brochure we present you our current program of single-stage and two-stage semi-hermetic Bock compressors.

Be inspired. By our new products, our established product series and the entire passion that goes into each of our products.



## 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<sub>2</sub> compressors subcritical
- ° CO<sub>2</sub> compressors transcritical
- ° 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.

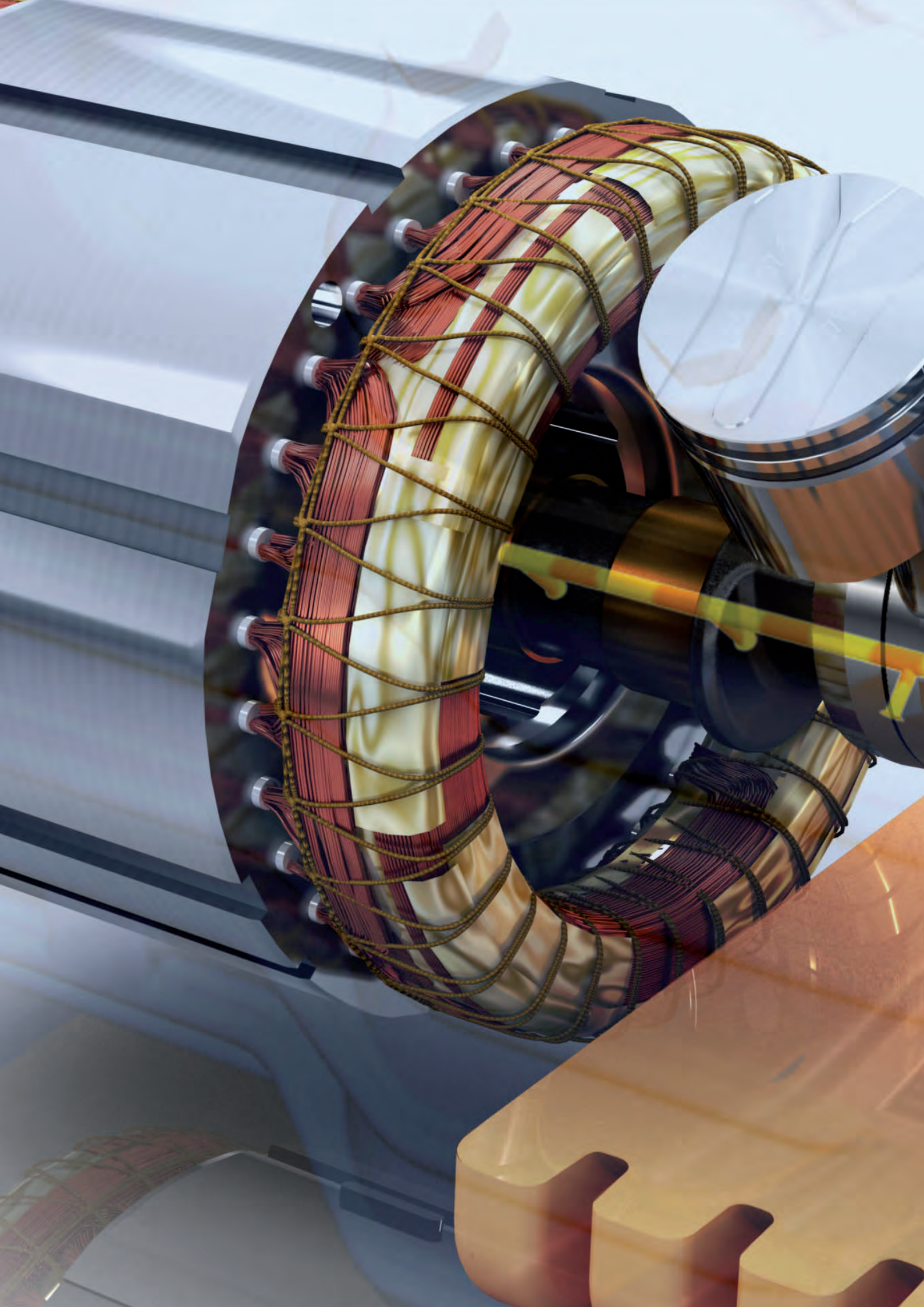
Virtually all drive capacity requirements can be met.

Very compact compressor design, robust and easy to handle. Oil pump lubrication as standard.

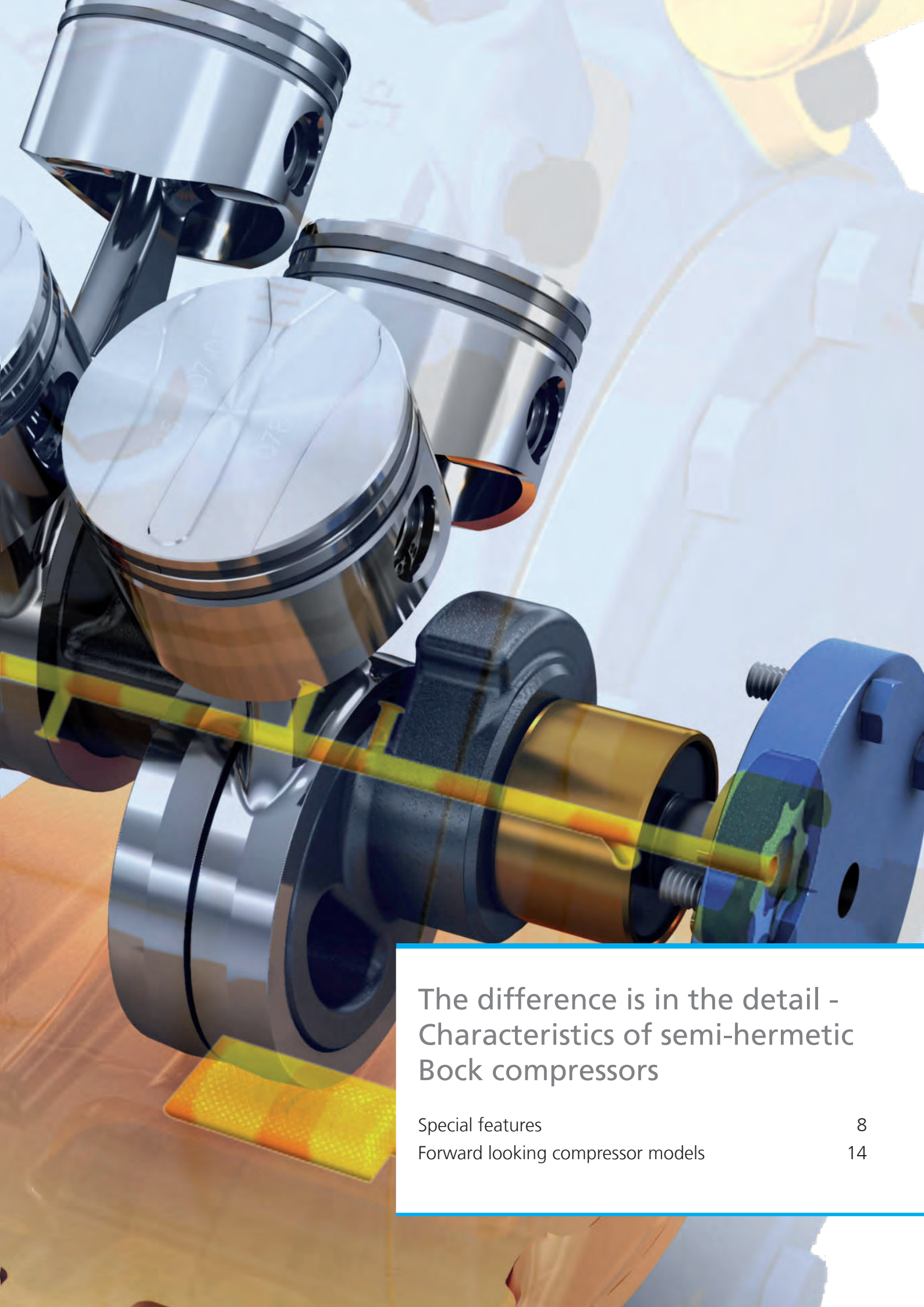
- ° Single-stage compressors
- ° NH<sub>3</sub> compressors
- ° Compressor units for direct drive
- ° NH<sub>3</sub> Compressor units for direct drive











## The difference is in the detail - Characteristics of semi-hermetic Bock compressors

Special features

8

Forward looking compressor models

14

**Universal**

- e.g. R134a, R404A, R507, R407C, R22
- One compressor design for all standard refrigerants.
- For air-conditioning applications, normal refrigeration and deep-freezing
- Maximum allowed operating pressure (HP): 28 bar

**High refrigeration capacity combined with minimum power requirement**

- Optimized gas flow
- Efficient service valves
- Minimum clearance volume
- Powerful economic drive motors

**Wide range of applications without additional cooling**

Deep-freezing range with R404A, R507 also available with suction gas cooling (HG version)

**Stable valve plate design**

- Universally proven valve design with intake and discharge finger reed valves clamped on one side
- Valve made of high quality impact-resistant spring steel

**Replaceable motors**

The compressors can be repaired in the field as the drive motor can be exchanged.

**Economic capacity control**

- Cylinder cover incorporating a connection for capacity control
- Possible control stages:
  - 4 cylinder: 50 %
  - 6 cylinder: 33 % / 66 %
  - 8 cylinder: 25 % / 50 % / 75 %
- Continuously variable speed control (25 - 70 Hz) using an external frequency converter EFC/EFCe. See separate brochure "Bock semi-hermetic compressors - Electronic Controls".

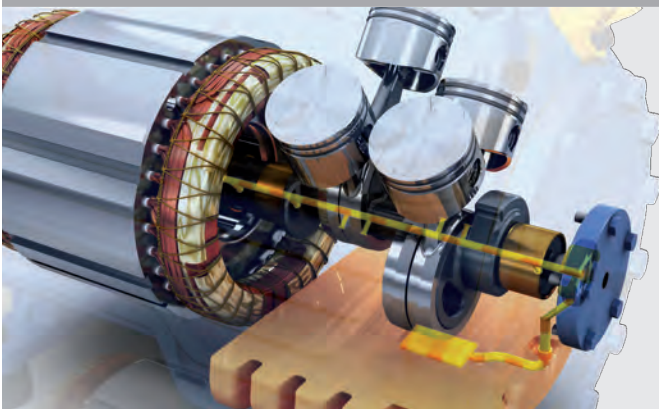
**Minimum space requirement**

Particularly low installation height and width

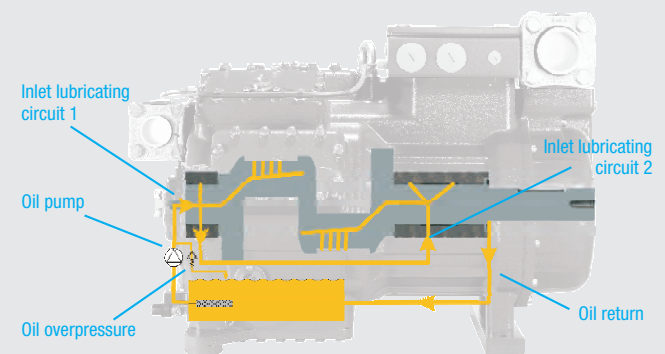
**Quiet and low vibration**

- Generously dimensioned crank mechanism
- Optimized mass balance
- Large volume pressure section for pulsation absorption
- 4 cylinder design from as little as 19 m³/h

**Safe, reliable oil supply**



- 4 and 6 cylinder with a conventional single circuit lubricating system
- Lubricating system incorporating an oil pump
- Large volume oil sump



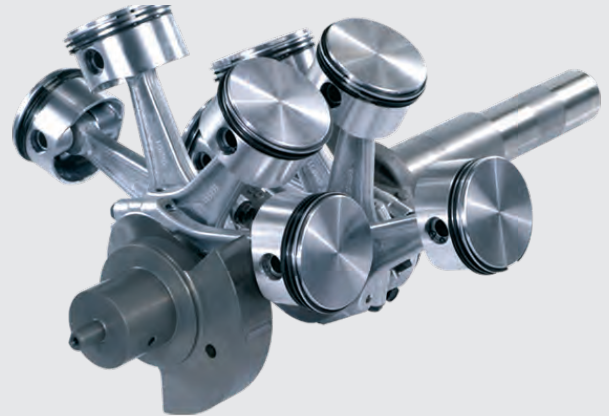
- 8 cylinder compressor with a dual circuit lubricating system (two oil circuits), each of the two main bearings supplied as the first lubrication point
- Oil pump lubrication independent of direction of rotation
- Connection possibility for oil pressure monitoring  $\Delta p$ -oil differential pressure sensor
- Large volume oil sump
- Direct coupling option for oil level regulator as standard



Wear-resistant durable driving gear



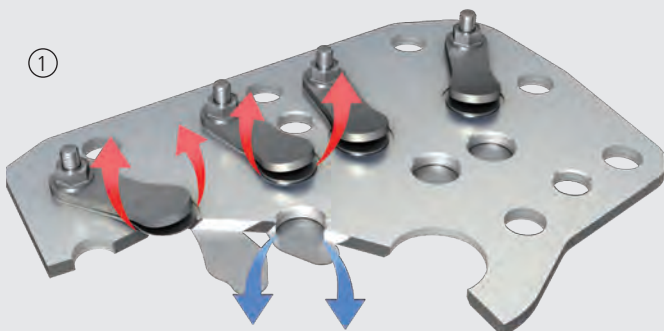
- 2 and 4 cylinder compressor HG(HA)12 to HG(HA)34
- Solid construction and design
- Low friction sleeve bearings
- Aluminium pistons with two ring assembly



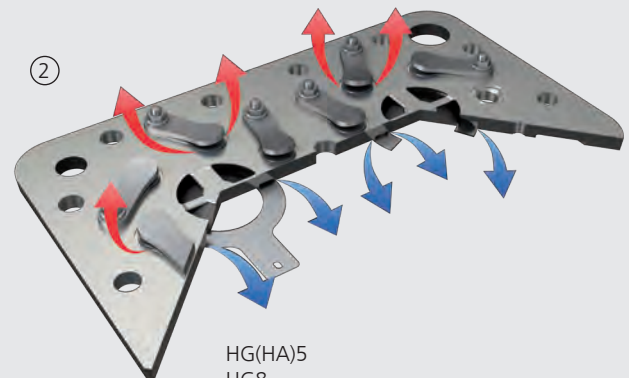
- 4 and 6 and 8 cylinder compressor HG(HA)4 to HG8
- Solid construction and design
- Surface-hardened crankshaft
- Low friction sleeve bearings
- Aluminium pistons with triple ring assembly, hard-chromium plated sealing ring, HG(HA)4 with double ring assembly
- Aluminium connecting rod with high resistance piston bolt bearings starting HG(HA)5

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Solid construction and design



HG(HA)12-34  
HG(HA)4



HG(HA)5  
HG8

- Valve made of high quality impact-resistant spring steel
- Concentric reed valve on the suction side ② finger reed valve ①



Variable suction line valve position (HG)

4 cylinder

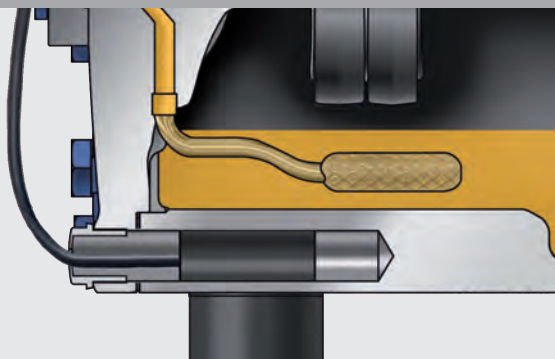


8 cylinder

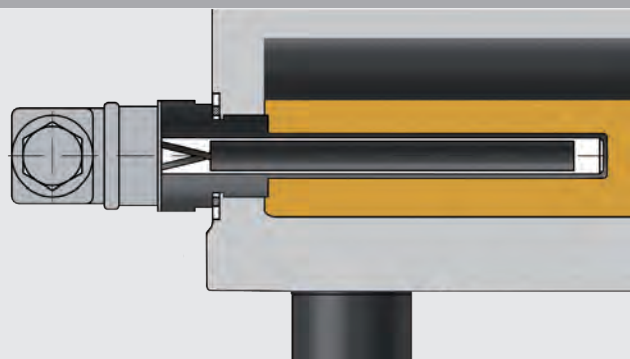


- Shutoff valve rotates through 90° (2 and 4 cylinder) suction cover rotates through 90° (8 cylinder)
- Flexible location for suction line connection

Oil sump heater

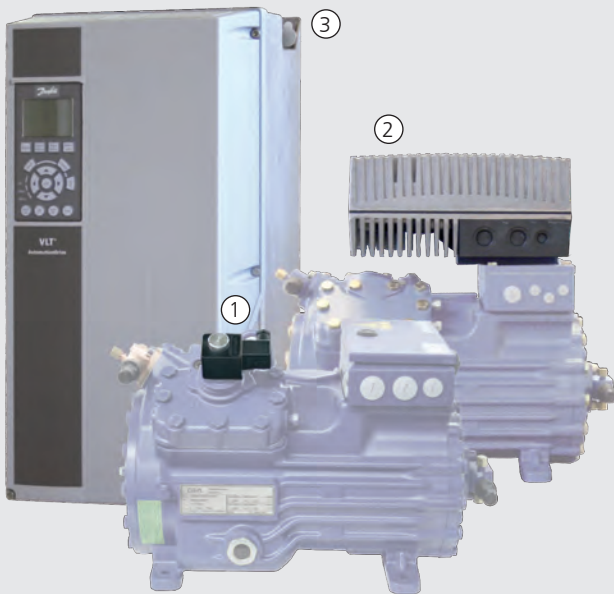


- Optional in 2 and 4 cylinder compressors HG(HA)12 up to HG(HA)34
- PTC heater, self-regulating
- Replacement without opening the refrigeration circuit



- Standard in 4 and 6 and 8 cylinder compressors HG(HA)4 up to HG8
- Immersion case design
- Replacement possible without opening the refrigerating circuit

Economic capacity control (option)



Via capacity regulator ①

Cylinder cover incorporating a connection for capacity control

Possible control stages:

- 4 cylinder: 50 %,
- 6 cylinder: 33 % / 66 %,
- 8 cylinder: 25 % / 50 % / 75 %

Via frequency converter

Continuously variable speed control using the Bock EFC / EFCe (Electronic Frequency Control)

- Up to 25% less power consumption
- EFC ② Continuously variable speed control directly mounted on the compressor HG(HA)12 to HG(HA)34
- EFCe ③ Continuously variable speed control for individual set-up HG4 to HG8, HA on request
- Further information see separate brochure "Bock semi-hermetic compressors - Electronic Controls".

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Electric switch box



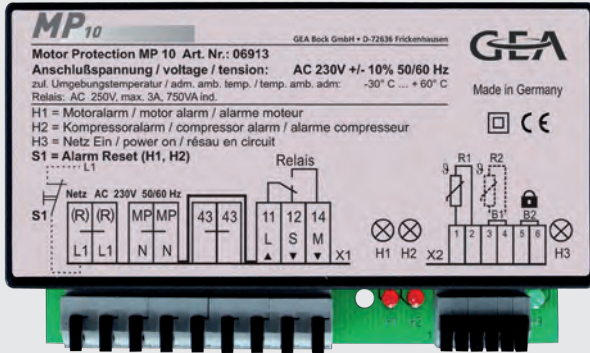
- Robust aluminium construction
- Easy electrical installation due to large internal volume
- Terminal block with cables in glass seal model
- Hinged and removable lifting cover ① with a single quick fastener ②
- Terminal strip for add-on components
- Protection system: IP66



- Easy electrical installation due to large internal volume
- Terminal block with cables in glass seal model
- Hinged lifting cover with a single quick fastener (6 cylinder), ①
- Cover with simple snap closure (8 cylinder) ②
- Insulation between terminal studs
- Inspection window for compressor monitoring (8 cylinder)
- Protection system: 4 cylinder IP65; 6 and 8 cylinder IP54

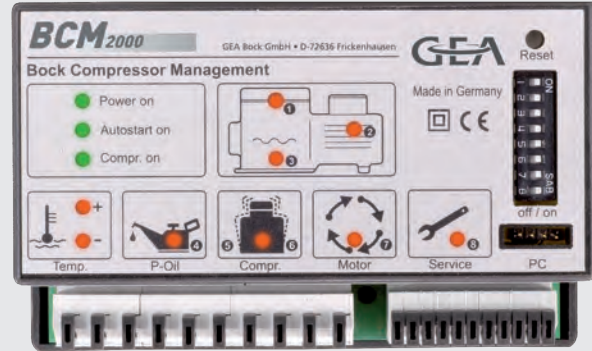


Bock MP10 Electronic Motor Protection



- Standard with all 2, 4 and 6 cylinder compressors
- Temperature monitoring with PTC sensors and optical status indicators
- Discharge gas temperature sensor (option)
- Further information see separate brochure "Bock semi-hermetic compressors - Electronic Controls".

Bock Compressor Management BCM2000



- Innovative and advanced compressor management system
- Standard with 8 cylinder compressors (optional for 4- and 6 cylinder compressors)
- Further information see separate brochure "Bock semi-hermetic compressors - Electronic Controls".

Start unloader with the  
Bock ESS (option)



(Electronic Soft Start)

- Optional for HG22 and HG34
- Continuous compressor start-up to nominal speed
- No need for conventional start unloaders
- IP20 unit for installation in switch cabinet (supplied loose)
- Further information see separate brochure  
"Bock semi-hermetic compressors - Electronic Controls".

Single phase AC operation with  
Bock ESP (option)



(Electronic Single Phase)

- Standard three phase AC compressor can be used on a single phase supply
- No start-up or operating condensers or relays required
- Unit designed for installation in switch cabinet
- Further information see separate brochure  
"Bock semi-hermetic compressors - Electronic Controls".

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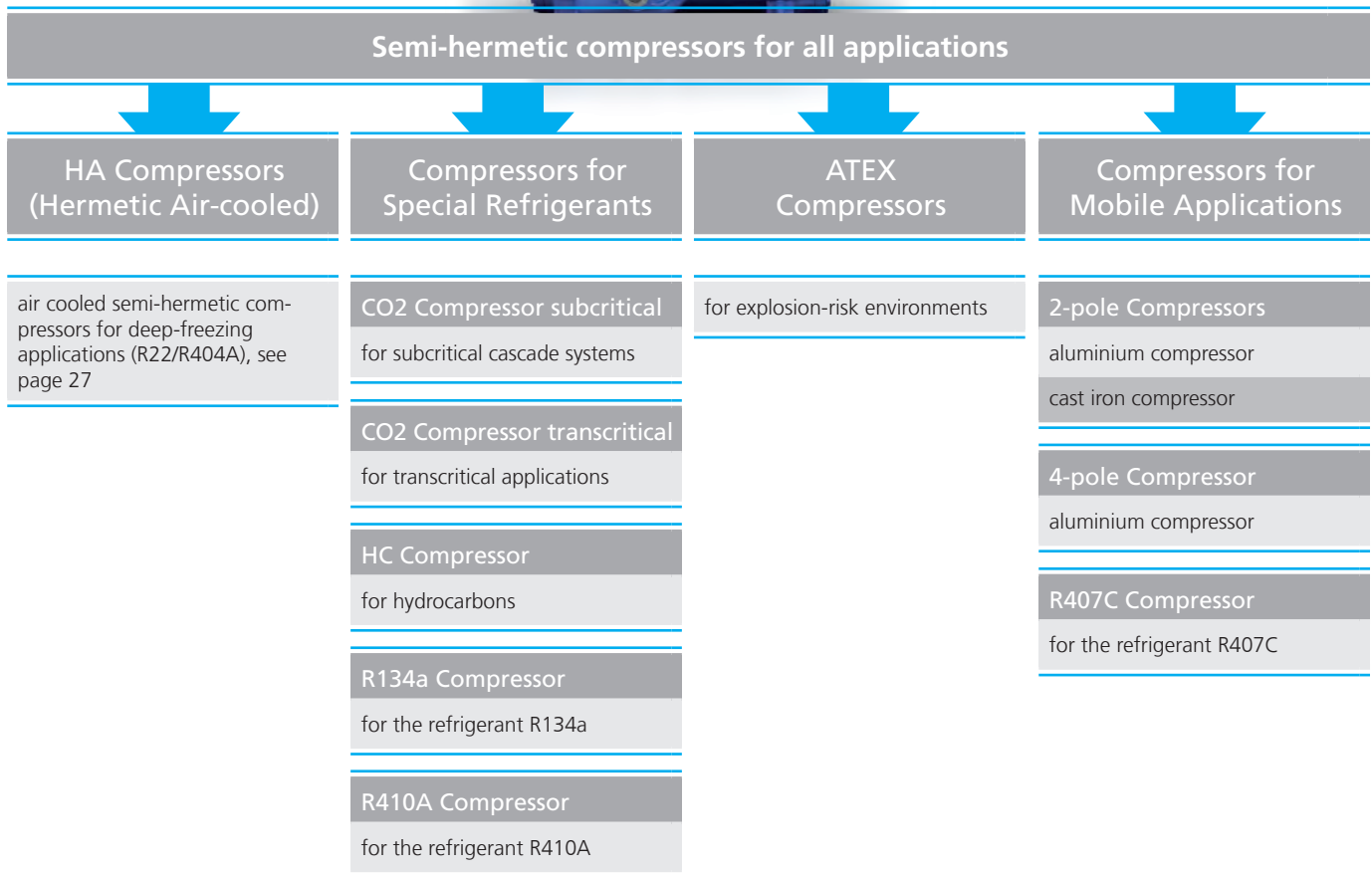
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Bock offers a choice of interesting compressor versions in the established semi-hermetic range for current market trends such as alternative refrigerants, deep-freezing or EX protection.



Available versions	HG12	HG22	HG34	HG4	HG5	HG6	HG7	HG8
HA compressors	●	●	●	●	●	●		
CO <sub>2</sub> compressors subcritical	●	●	●	●				
CO <sub>2</sub> compressors transcritical			●					
HC compressors	●	●	●	●	●	●	●	●
R134a compressors				●	●	●	●	
R410A compressors	●	●	●	●				
ATEX compressors	●	●	●	●	●	●		
2-pole compressors aluminium			●					
2-pole compressors cast iron			●					
4-pole compressors aluminium		●	●					
R407C compressors			●					

## HA System Hermetic Air-cooled

Semi-hermetic air-cooled compressors for deep-freezing (R22/R404A)

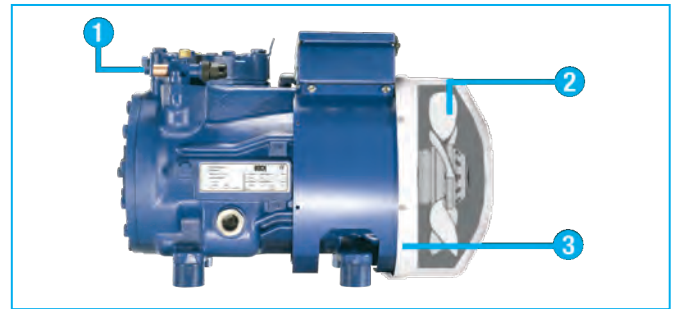
Available for all 2 and 4 cylinder versions.

Increasingly high specifications are being set for all suction gascooled semi-hermetic compressors for deep-freezing applications.

Compressors rapidly reach their temperature limits due to the rise in temperature of the suction gas caused by the drive motor. The refrigeration capacity also diminishes. But not in Bock HA compressors.

The unique "Bock HA principle" prevents this. The drive motor is air-cooled and compressor suction is direct. The suction gas is not heated by the motor, but is fed directly to the compressor without being diverted through the motor. The motor is cooled by a compact integrated ventilation unit. Its precise airflow cools not only the motor but also the compressor and especially the cylinder heads.

A semi-hermetic compressor with the advantages of an open type.

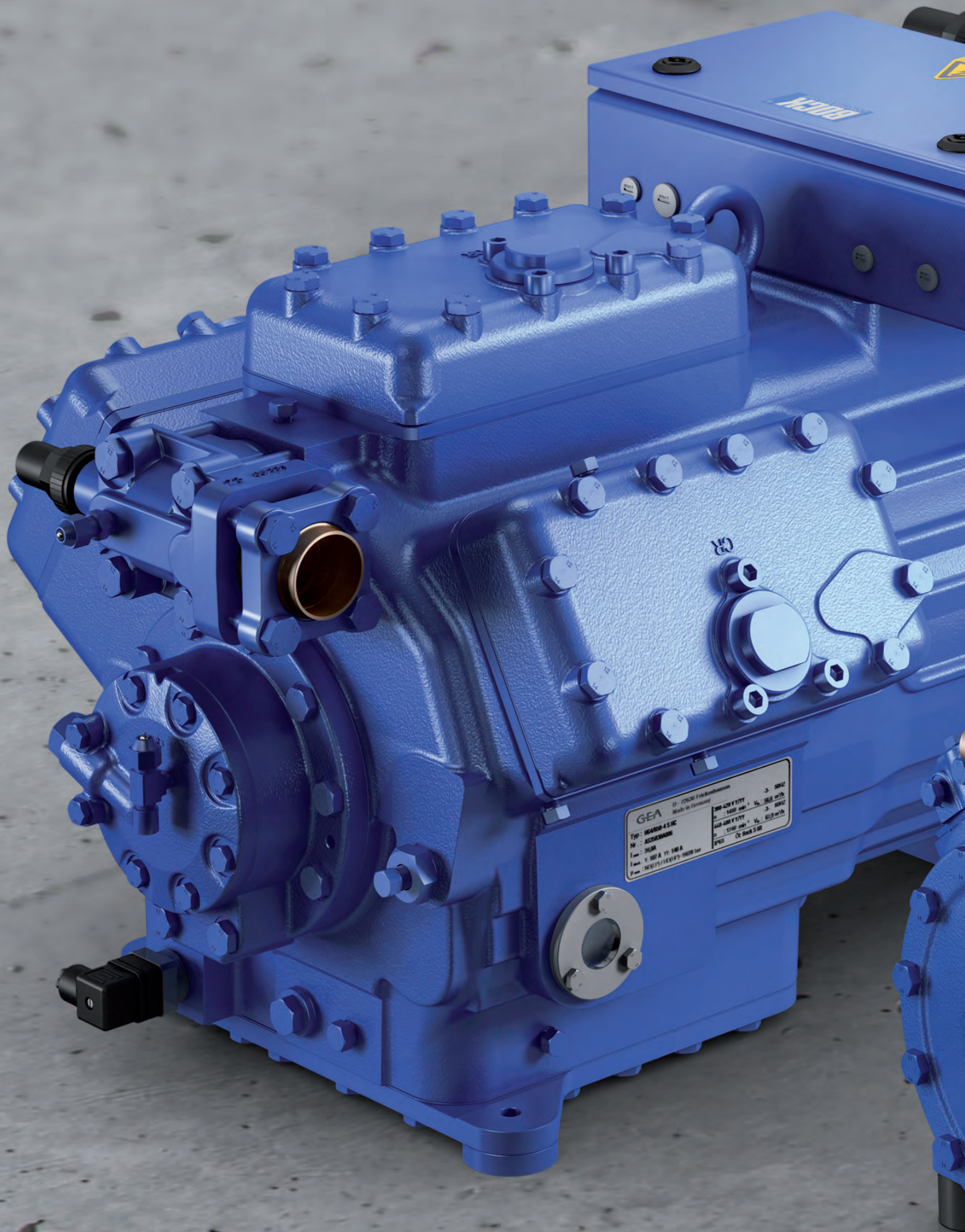


- ① Suction gas is fed directly into the compressor
- ② The motor is cooled by an integrated ventilation unit
- ③ Cool air is directed over the motor through an air duct hood

This results in a reduced discharge gas temperature and therefore an extended range of applications combined with improved capacity (deep-freezing - e.g. R22, R404A). In addition, the compressor is separate from the motor, which is a particular advantage in the event of a motor burn-out.



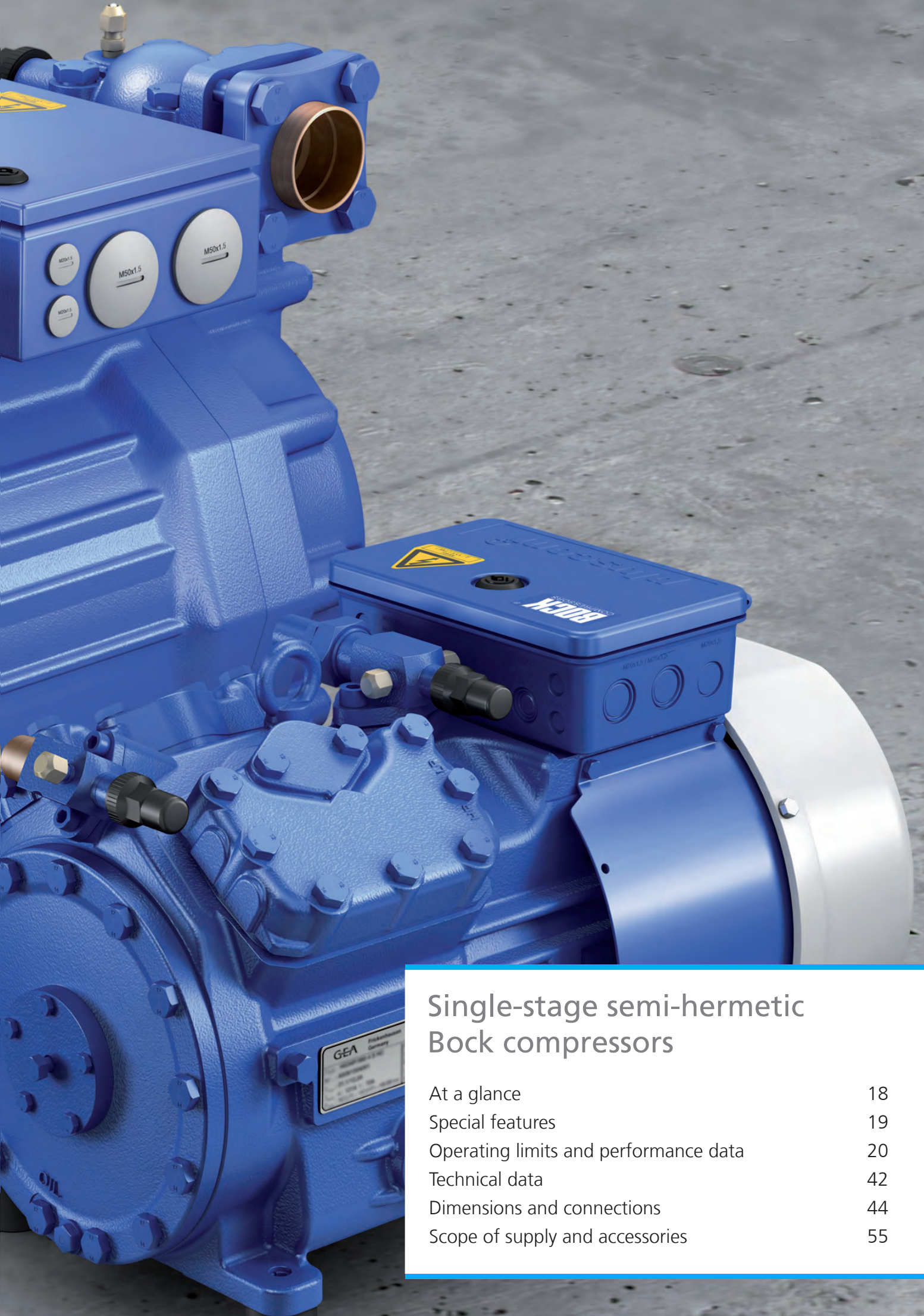




D: 70200 Fischenhausen  
GEA  
Typ: MGA400-45 HC  
Nr.: ACC000000  
Tenn: 00000  
Tenn: 0 100 A 11 100 A  
Pmax: 1000/1000/1000 bar

3000 420 V/1771	3 - 000V
1500 840 V/1771	Va: 360 m³/h
600 1680 V/1771	3 - 000V
150 3360 V/1771	Va: 900 m³/h
EPDS	Öz Beck & Co





## Single-stage semi-hermetic Bock compressors

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Scope of supply and accessories	55



The Bock semi-hermetic compressor program provides a full performance range of innovative and modern compressor designs in 2, 4, 6 and 8 cylinder constructions. The ideal solution for any kind of application.

**HG (Hermetic Gas-cooled)**

Conventional suction gas-cooled compressor design

**HA (Hermetic Air-cooled)**

Special Bock design for deep-freezing (R22/R404A) with an air-cooled motor and direct suction at the cylinder.

**All the compressors display the same particularly remarkable features:**

- Outstanding running comfort
- High efficiency and reliability to the highest quality standard
- Easy maintenance, e.g. interchangeable motors
- Oil pump lubrication
- Bock MP10 electronic motor protection, especially easy to operate with LED status indicators
- Suitable for conventional and chlorine-free HFC refrigerants

**Available versions:**

The Bock semi-hermetic program provides the following product variants:

- Single-stage HG (HA) compressors
- Two-stage HGZ compressors
- Duplex DHG (DHA) compressors
- SHG (SHA) compressor units with receiver
- SHG (SHA) condenser units air-cooled

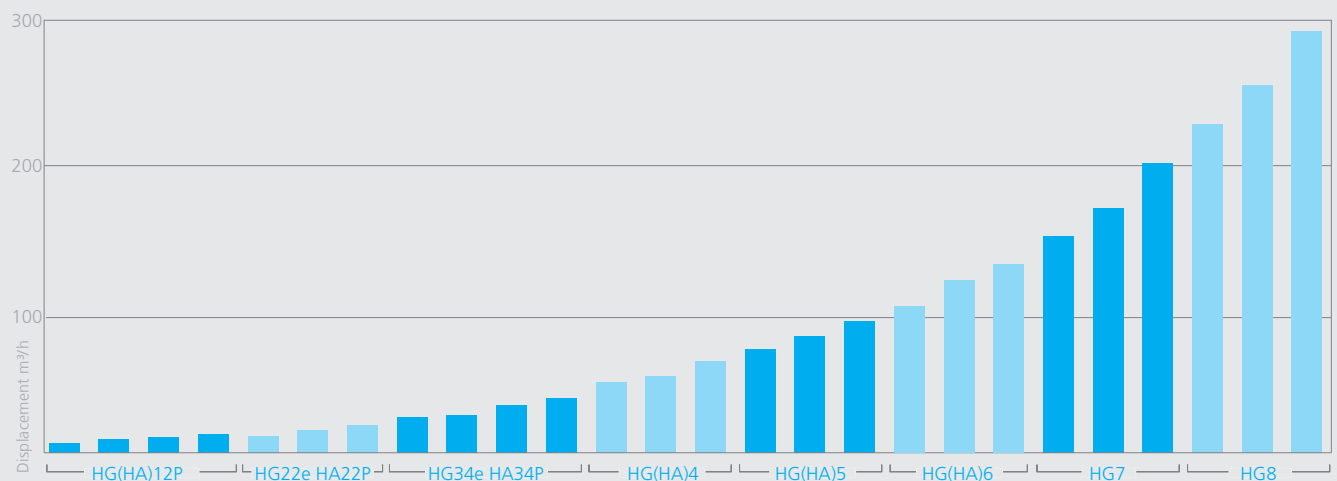
**Forward looking compressor models**

Bock offers a choice of interesting compressor versions in the established semi-hermetic range for current market trends such as alternative refrigerants, deep-freezing or EX protection.

- **HA (Hermetic Air-cooled)**, air-cooled compressors for deep-freezing applications
- **CO<sub>2</sub> Compressors (subcritical)**, for subcritical cascade systems
- **CO<sub>2</sub> Compressors (transcritical)**, for transcritical CO<sub>2</sub> applications
- **R410A Compressors**, for the refrigerant R410A
- **ATEX (ATmospheres EXplosibles)**, for explosion-risk environments

The current program

...8 model sizes with 26 capacity stages from 5,4 to 279,8 m<sup>3</sup>/h (50 Hz)

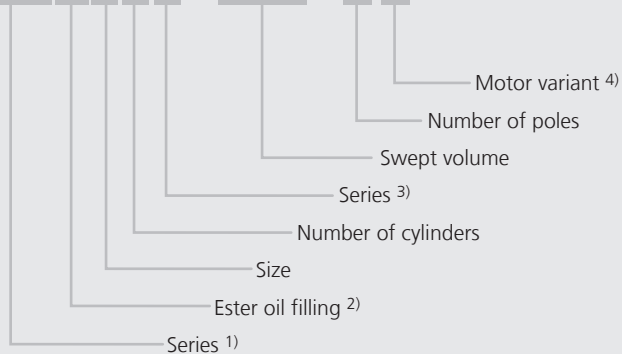




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Type key

HGX34e / 215 - 4S



- 1) HG = Hermetic Gas-Cooled (suction gas-cooled)  
HA = Hermetic Air-Cooled (for deep-freezing)
- 2) X = Ester oil filling  
(HFC refrigerants e.g. R134a, R404A, R507, R407C)
- 3) e = Additional declaration for e-series compressors  
P = Additional declaration for Pluscom compressors
- 4) S = More powerful motor e.g. air-conditioning applications



R404A/R507		Performance data											50 Hz	
Type	Cond. temp. °C	Q	Cooling capacity $\dot{Q}_o$ [W]										Power consumption $P_e$ [kW]	
			Evaporating temperature °C											
			7,5	5	0	-5	-10	-15	-20	-25	-30	-35	-40	-45
HGX4/555-4 <sup>1)</sup> HGX4/555-4 S <sup>1)</sup>	30	P	59014	54222	45450	37853	31129	25259	20184	15848	12194	9164	6702	4751
		P	11,52	11,34	10,89	10,34	9,72	8,99	8,19	7,34	6,47	5,59	4,73	3,93
	40	P	50452	46260	38616	32112	26279	21212	16857	13155	10050	7484	5401	3743
		P	13,64	13,29	12,51	11,84	10,88	9,86	8,81	7,74	6,69	5,67	4,72	3,85
	50	P	41937	38348	31838	26484	21544	17286	13653	10589	8036	5938	4236	
		P	15,53	15,01	13,93	13,14	11,87	10,58	9,30	8,04	6,83	5,70	4,66	
HAX4/555-4	30	P							21842	17569	13875	10713	8037	5799
		P							8,84	7,84	6,87	5,93	5,01	4,12
	40	P							18374	14675	11488	8766	6461	4528
		P							9,46	8,27	7,14	6,04	4,99	3,98
	50	P							15013	11894	9220	6944	5018	3396
		P							9,95	8,60	7,31	6,08	4,90	3,78
HGX4/650-4 <sup>1)</sup> HGX4/650-4 S <sup>1)</sup>	30	P	70903	65224	54821	44444	36811	30119	24302	19297	15039	11465	8510	6110
		P	14,57	14,19	13,41	12,51	11,70	10,80	9,84	8,84	7,82	6,80	5,80	4,85
	40	P	60855	55879	46795	37928	31232	25384	20322	15982	12298	9208	6647	4550
		P	16,80	16,29	15,22	14,30	13,15	11,94	10,70	9,45	8,21	7,01	5,86	4,79
	50	P	50791	46523	38768	31303	25565	20586	16302	12650	9564	6980	4835	
		P	19,05	18,38	17,02	15,79	14,31	12,81	11,31	9,83	8,39	7,02	5,73	
HAX4/650-4	30	P							24978	20136	15945	12352	9304	6747
		P							9,71	8,62	7,57	6,54	5,55	4,57
	40	P							21012	16819	13202	10107	7480	5268
		P							10,39	9,10	7,86	6,67	5,53	4,42
	50	P							17167	13632	10596	8006	5809	3951
		P							10,93	9,46	8,05	6,71	5,43	4,20
HGX5/725-4 <sup>1)</sup> HGX5/725-4 S <sup>1)</sup>	30	P	76254	70105	58815	48024	39230	31558	24934	19288	14546	10636	7486	5024
		P	13,31	13,28	13,03	12,99	12,20	11,23	10,13	8,94	7,70	6,47	5,28	4,19
	40	P	64689	59328	49517	40164	32541	25933	20266	15468	11467	8191	5568	3525
		P	16,28	16,01	15,29	14,87	13,61	12,22	10,76	9,25	7,76	6,32	4,98	3,78
	50	P	53354	48782	40450	32498	26053	20515	15811	11869	8617	5982	3892	
		P	19,02	18,49	17,29	16,31	14,61	12,84	11,04	9,26	7,55	5,94	4,48	
HAX5/725-4	30	P							26886	21437	16746	12756	9409	6644
		P							10,67	9,42	8,19	7,01	5,86	4,75
	40	P							22619	17905	13864	10437	7565	5189
		P							11,41	9,93	8,51	7,15	5,84	4,60
	50	P							18487	14513	11125	8265	5874	3892
		P							12,01	10,33	8,72	7,19	5,74	4,37
HGX5/830-4 <sup>1)</sup> HGX5/830-4 S <sup>1)</sup>	30	P	86623	79925	67508	54430	44830	36400	29056	22717	17300	12722	8900	5752
		P	15,69	15,61	15,23	14,69	13,90	12,93	11,80	10,55	9,21	7,82	6,41	5,01
	40	P	74069	68151	57216	45580	37311	30078	23798	18389	13769	9854	6561	3809
		P	19,30	18,89	17,91	16,93	15,69	14,28	12,75	11,13	9,45	7,74	6,04	4,38
	50	P	61445	56332	46927	37034	30091	24051	18831	14348	10520	7263	4496	
		P	22,39	21,68	20,13	18,88	17,17	15,33	13,38	11,38	9,34	7,30	5,29	
HAX5/830-4	30	P							30392	24266	19003	14530	10772	7655
		P							12,06	10,65	9,29	7,96	6,67	5,43
	40	P							25602	20281	15733	11882	8654	5976
		P							12,90	11,24	9,65	8,12	6,65	5,25
	50	P									12641	9414	6718	4480
		P									9,88	8,16	6,53	4,99
HGX5/945-4 <sup>1)</sup> HGX5/945-4 S <sup>1)</sup>	30	P	99975	91955	77277	63293	52168	42473	34090	26900	20783	15620	11291	7678
		P	18,52	18,31	17,73	17,40	16,27	15,04	13,74	12,35	10,90	9,38	7,80	6,18
	40	P	84751	77834	65213	52881	43552	35430	28395	22327	17107	12617	8737	5347
		P	22,17	21,71	20,66	19,84	18,30	16,69	14,99	13,23	11,40	9,52	7,59	5,61
	50	P	69440	63623	53056	42757	35145	28515	22748	17723	13321	9424	5912	
		P	25,81	25,08	23,50	22,12	20,15	18,09	15,97	13,78	11,54	9,25	6,91	
HAX5/945-4	30	P							27994	21989	16866	12548	8959	
		P							12,27	10,72	9,21	7,74	6,32	
	40	P									18205	13799	10088	6997
		P									11,13	9,39	7,71	6,11
	50	P									10929	7834	5248	
		P									9,44	7,57	5,81	
HGX5/1080-4 <sup>1)</sup> HGX5/1080-4 S <sup>1)</sup>	30	P	113675	104548	87811	72501	59869	48801	39180	30889	23810	17826	12819	8672
		P	22,05	21,89	21,27	20,82	19,21	17,56	15,88	14,16	12,40	10,60	8,76	6,86
	40	P	96893	88944	74420	61734	50695	41062	32716	25541	19419	14233	9866	6200
		P	26,74	26,17	24,80	23,74	21,61	19,46	17,30	15,13	12,94	10,72	8,49	6,22
	50	P	80355	73583	61270	51086	41654	33468	26411	20366	15214	10840	7125	
		P	30,79	29,85	27,79	26,12	23,48	20,85	18,23	15,62	13,01	10,40	7,78	
HAX5/1080-4	30	P							41973	33574	26360	20224	15061	10763
		P							16,66	14,73	12,86	11,05	9,29	7,58
	40	P							28072	21828	16539	12098	8401	
		P							15,55	13,36	11,27	9,26	7,33	
	50	P									17547	13107	9392	6297
		P									13,68	11,32	9,09	6,97

1  
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Relating to 20 °C suction gas temp. without liquid subcooling

<sup>1)</sup> Compressors (R404A) are ASERCOM certified



Motor version -S- (more powerful motor)

Supplementary cooling or reduced suction gas temp.

HG	Number of cylinders	Displacement 50 / 60 Hz (1450/1740 rpm)	Electrical data				Weight	Connections ⑥		Oil charge
			Voltage	Max. working current	Max. power consumption	Starting current (rotor locked)		Discharge line DV	Suction line SV	
Type		m³/h		A	kW	A	kg	mm l inch	mm l inch	Ltr.
HG12P/60-4 S	2	5,40 / 6,40	③	6,8 / 3,9	2,2	40 / 23	48,0	12   1/2	16   5/8	0,8
HG12P/75-4	2	6,70 / 8,10	③	7,1 / 4,1	2,3	40 / 23	48,0	12   1/2	16   5/8	0,8
HG12P/75-4 S	2	6,70 / 8,10	③	8,0 / 4,6	2,6	43 / 25	49,0	12   1/2	16   5/8	0,8
HG12P/90-4	2	8,00 / 9,60	③	8,5 / 4,9	2,8	43 / 25	49,0	12   1/2	16   5/8	0,8
HG12P/90-4 S	2	8,00 / 9,60	③	8,8 / 5,1	2,9	45 / 26	49,0	12   1/2	16   5/8	0,8
HG12P/110-4	2	9,40 / 11,30	③	9,2 / 5,3	3,1	43 / 25	49,0	12   1/2	16   5/8	0,8
HG12P/110-4 S	2	9,40 / 11,30	③	10,6 / 6,1	3,6	45 / 26	49,0	12   1/2	16   5/8	0,8
HG22e/125-4	2	11,10 / 13,30	③	9,3 / 5,4	3,0	69 / 40	74,0	16   5/8	22   7/8	1,0
HG22e/125-4 S	2	11,10 / 13,30	③	10,8 / 6,2	3,6	69 / 40	74,0	16   5/8	22   7/8	1,0
HG22e/160-4	2	13,70 / 16,40	③	11,1 / 6,4	3,7	69 / 40	74,0	16   5/8	22   7/8	1,0
HG22e/160-4 S	2	13,70 / 16,40	③	13,1 / 7,6	4,4	87 / 50	76,0	16   5/8	22   7/8	1,0
HG22e/190-4	2	16,50 / 19,80	③	13,8 / 8,0	4,8	69 / 40	74,0	16   5/8	22   7/8	1,0
HG22e/190-4 S	2	16,50 / 19,80	③	16,2 / 9,4	5,6	87 / 50	75,0	16   5/8	22   7/8	1,0
HG34e/215-4	4	18,80 / 22,60	③	14,0 / 8,1	4,8	87 / 50	92,0	22   7/8	28   1 1/8	1,3
HG34e/215-4 S	4	18,80 / 22,60	③	18,3 / 10,5	6,0	132 / 76	97,0	22   7/8	28   1 1/8	1,3
HG34e/255-4	4	22,10 / 26,60	③	17,0 / 9,8	6,0	87 / 50	91,0	22   7/8	28   1 1/8	1,3
HG34e/255-4 S	4	22,10 / 26,60	③	21,1 / 12,2	7,2	132 / 76	96,0	22   7/8	28   1 1/8	1,3
HG34e/315-4	4	27,30 / 32,80	③	21,1 / 12,2	7,4	111 / 64	94,0	22   7/8	28   1 1/8	1,3
HG34e/315-4 S	4	27,30 / 32,80	③	25,5 / 14,7	8,9	132 / 76	97,0	22   7/8	28   1 1/8	1,3
HG34e/380-4	4	33,10 / 39,70	③	26,1 / 15,1	9,3	111 / 64	93,0	22   7/8	28   1 1/8	1,3
HG34e/380-4 S	4	33,10 / 39,70	③	31,2 / 18,0	11,1	132 / 76	96,0	22   7/8	28   1 1/8	1,3
				*PW 1+2		*PW1 / PW 1+2				
HG4/465-4	4	40,50 / 48,60	④	18	11,0	57 / 75	148	28 / 1 1/8	35 / 1 3/8	2,7
HG4/465-4 S	4	40,50 / 48,60	④	27	13,0	82 / 107	151	28 / 1 1/8	35 / 1 3/8	2,7
HG4/555-4	4	48,20 / 57,80	④	27	12,9	82 / 107	150	28 / 1 1/8	35 / 1 3/8	2,7
<b>HG4/555-4 S</b>	<b>4</b>	<b>48,20 / 57,80</b>	<b>④</b>	<b>34</b>	<b>15,2</b>	<b>107 / 140</b>	<b>153</b>	<b>28 / 1 1/8</b>	<b>35 / 1 3/8</b>	<b>2,7</b>
HG4/650-4	4	56,60 / 67,90	④	27	15,7	82 / 107	152	28 / 1 1/8	42 / 1 5/8	2,7
HG4/650-4 S	4	56,60 / 67,90	④	34	18,4	107 / 140	155	28 / 1 1/8	42 / 1 5/8	2,7
HG5/725-4	4	62,90 / 75,50	④	33	16,5	82 / 107	198	28 / 1 1/8	42 / 1 5/8	3,6
HG5/725-4 S	4	62,90 / 75,50	④	37	19,4	107 / 140	201	28 / 1 1/8	42 / 1 5/8	3,6
HG5/830-4	4	72,20 / 86,70	④	33	18,9	82 / 107	197	28 / 1 1/8	42 / 1 5/8	3,6
HG5/830-4 S	4	72,20 / 86,70	④	49	22,3	126 / 160	203	28 / 1 1/8	42 / 1 5/8	3,6
HG5/945-4	4	82,20 / 98,60	④	37	22,6	107 / 140	201	35 / 1 3/8	54 / 2 1/8	3,6
HG5/945-4 S	4	82,20 / 98,60	④	49	28,6	126 / 160	205	35 / 1 3/8	54 / 2 1/8	3,6
HG6/1080-4	4	93,70 / 112,40	④	47	26,3	149 / 189	218	35 / 1 3/8	54 / 2 1/8	3,6
HG6/1080-4 S	4	93,70 / 112,40	④	57	31,0	172 / 212	223	35 / 1 3/8	54 / 2 1/8	3,6
HG6/1240-4	4	107,60 / 129,10	④	57	30,5	172 / 212	222	35 / 1 3/8	54 / 2 1/8	3,6
HG6/1240-4 S	4	107,60 / 129,10	④	71	36,0	204 / 250	224	35 / 1 3/8	54 / 2 1/8	3,6
HG6/1410-4	4	122,40 / 146,90	④	57	35,6	172 / 212	219	35 / 1 3/8	54 / 2 1/8	3,6
HG6/1410-4 S	4	122,40 / 146,90	④	71	42,6	204 / 250	222	35 / 1 3/8	54 / 2 1/8	3,6
HG7/1620-4	6	140,60 / 168,80	⑤	76	38,7	223 / 340	278	42 / 1 5/8	54 / 2 1/8	4,5
HG7/1620-4 S	6	140,60 / 168,80	⑤	83	46,3	268 / 373	299	42 / 1 5/8	54 / 2 1/8	4,5
HG7/1860-4	6	161,40 / 193,70	⑤	83	44,6	268 / 373	296	42 / 1 5/8	54 / 2 1/8	4,5
HG7/1860-4 S	6	161,40 / 193,70	⑤	98	53,3	343 / 494	292	42 / 1 5/8	54 / 2 1/8	4,5
HG7/2110-4	6	183,60 / 220,30	⑤	98	51,2	343 / 494	289	42 / 1 5/8	64 / 2 5/8	4,5
HG7/2110-4 S	6	183,60 / 220,30	⑤	115	60,5	344 / 500	297	42 / 1 5/8	64 / 2 5/8	4,5
HG8/2470-4	8	214,30 / 257,10	⑤	102	60,0	274 / 301	432	54 / 2 1/8	76 / 3 1/8	9,0
HG8/2470-4 S	8	214,30 / 257,10	⑤	155	72,5	475 / 551	432	54 / 2 1/8	76 / 3 1/8	9,0
HG8/2830-4	8	245,90 / 295,10	⑤	155	77,5	475 / 551	429	54 / 2 1/8	76 / 3 1/8	9,0
HG8/2830-4 S	8	245,90 / 295,10	⑤	170	84,5	520 / 605	449	54 / 2 1/8	76 / 3 1/8	9,0
HG8/3220-4	8	279,80 / 335,80	⑤	155	78,3	475 / 551	423	54 / 2 1/8	76 / 3 1/8	9,0
HG8/3220-4 S	8	279,80 / 335,80	⑤	170	94,2	520 / 605	443	54 / 2 1/8	76 / 3 1/8	9,0