Product overview
Motors and drive systems

Industrial drive technology 2017-07

ebmpapst

The engineer's choice

GREEN TECH

About ebm-papst.

As technological leader for ventilation and drive engineering, ebm-papst is in demand as an engineering partner in many industries. With over 15,000 different products, we provide the right solution for just about any challenge. Our fans and drives are reliable, quiet and energy-efficient.

Six reasons that make us the ideal partner:

Our systems expertise.
You want the best solution for every project. The interrelationships between ventilation and drive engineering must thus be considered as a whole. And that's what we do – with **motor technology** that sets standards, sophisticated **electronics** and **aerodynamic designs** – all from a single source and perfectly matched. These system solutions release unique synergies worldwide. And in particular – they relieve you of a lot of work, so that you can concentrate on your core competency.

The ebm-papst spirit of invention.
In addition to our wide range of products, we are always able to develop customized solutions for you. A diversified team of 600 engineers and technicians works at our three locations in Germany: Mulfingen, Landshut and St. Georgen. Contact us to discuss your next project.

Our lead in technology.
As pioneer and trail-blazer for developing highly efficient EC technology, we are way ahead of other motor manufacturers. Almost all our products are also available with GreenTech EC technology. The list of benefits is long: higher efficiency, maintenance-free, longer service life, sound reduction, intelligent control characteristics and unrivalled energy efficiency with savings of up to 80 % compared to conventional AC technology. Let our technology be your competitive advantage as you lead in your industry.

Closeness to our customers.
ebm-papst has 25 production locations worldwide (including facilities in Germany, China and the USA), together with 49 sales offices, each of which has a dense network of sales representatives. You will always have a local contact, someone who speaks your language and knows your market.

Our standard of quality.
Of course you can rely on the highest standards of quality with our products. Our quality management is uncompromising, at every step in every process. This is underscored by our certification according to international standards including DIN EN ISO 9001, TS declaration of conformity and DIN EN ISO 14001.

Our sustainable approach.
Assuming responsibility for the environment, for our employees and for society is an integral part of our corporate philosophy. We develop products with an eye to maximum environmental compatibility, in particular resource-preserving production methods. We promote environmental awareness among our young staff and are actively involved in sports, culture and education. That's what makes us a leading company – and an ideal partner for you.

Our success story to becoming market leader and technological innovator.

1963 Elektrobau Mulfingen **GmbH & Co. KG founded by** Gerhard Sturm and Heinz Ziehl.

1965 Development of the first compact fan in the field of EC/DC technology.

1966 The ebm-papst success story started to take off with the release of the new 68 motor.

1972 The first foreign subsidiary was founded in Sweden.

1988 Gerhard Sturm receives the German Cross of Merit.

1990 The sixty millionth external rotor fan was produced.

1992 Acquisition of **PAPST Motoren GmbH** in St. Georgen.

1997 Purchase of the **Landshut** plant (mvl).

2003 Change of name to **ebm-papst**.

2007 Introduction of the gearhead **"EtaCrown®"**.

2010 **GreenTech** – our symbol for energy-efficiency and resource conservation.

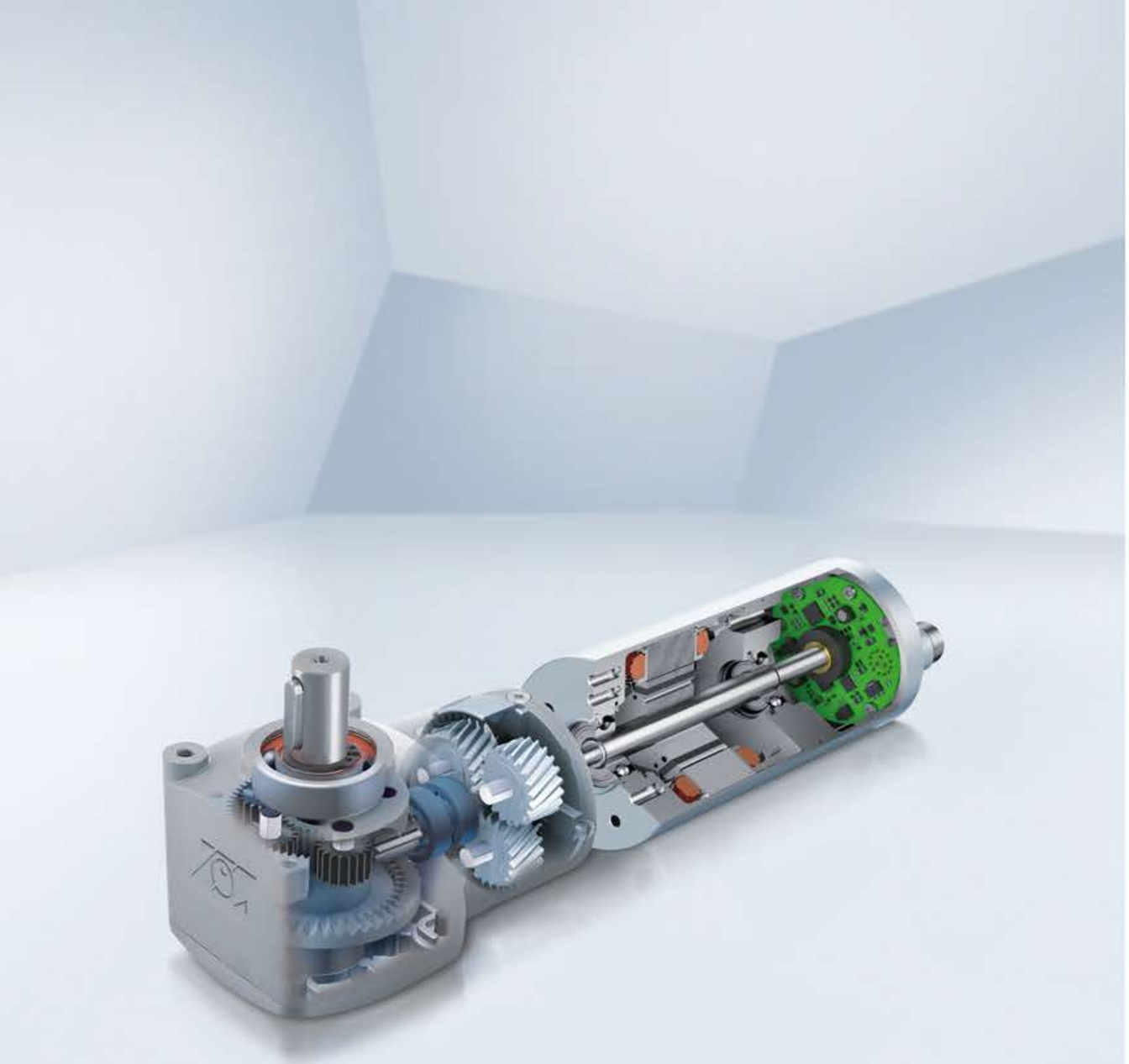
2012 Introduction of a new generation control electronics **(K4)** for BLDC motors.

2013 ebm-papst acquires the gear specialist **Zeitlauf**, and wins the **German Sustainability Award**.

2014 Launch of the BLDC intenal rotor motor, **ECI 80**.

2015 Introduction of the overload-capable planetary gear **"Optimax 63"**.

2016 Expansion of electronics manufacturing by the new production facility at St. Georgen Hagenmoos.



Modular drive systems.
Motors with integrated logic and power electronics – optional gearhead, encoder and brake.

Drive technology catalog.

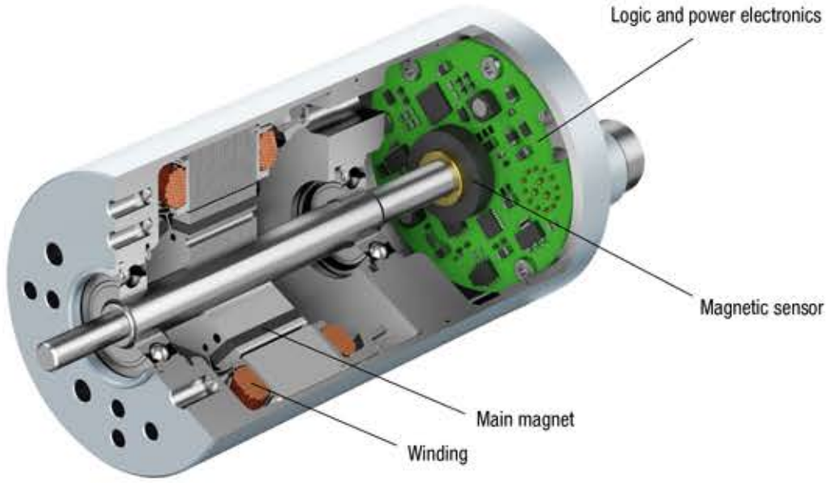
Brushless internal rotor motors – ECI.

Key figures

- 3-phase, electronically commutated internal rotor motor with high-performance magnet
- Power range between 30 and 750 watts
- High power density realized in a compact design
- High overload capacity
- Long service life
- Very quiet operation
- Detection of rotor position via Hall sensors
- Customer-specific winding layouts
- Winding insulation as per insulation class E
- Protection class IP 54 as per EN 60 034-5: up to IP 65
- Various motor types which can be combined with planetary and crown gearheads
- Optional integrated control electronics
- Optional encoder and brake modules

Approvals

- Support with the accreditation of products in different economic areas and markets
- As an experienced and competent partner we would be happy to support you
- Possible approvals include CE, CCC, UL, CSA, EAC
- Additional approvals on request



Overview of ECI motors.

Brushless internal rotor motors ECI		ECI-42.20-K1	ECI-42.40-K1	ECI-63.20-K1	ECI-63.40-K1	ECI-63.60-K1	ECI-63.20-K3/4/5	ECI-63.40-K3/4/5	ECI-63.60-K3/4/5	ECI-80.20-K1	ECI-80.40-K1	ECI-80.60-K1
U_N	V DC	24	24	24	24	24	24	24		24	24	
		48	48	48	48	48	48	48	48	48	48	48
M_N	mNm	110	220	360	670	880	425	600	850	700	1 200	1 800
P	W	46.0	92.0	150	280	370	178	251	356	293	503	754
n_N	rpm	4 000	4 000	4 000	4 000	4 000	4 000	4 000	4 000	4 000	4 000	4 000
L	mm	94.0	114	106	126	146	112	132	152	96.0	116	136
d	mm	42.0	42.0	63.0	63.0	63.0	63.0	63.0	63.0	80.0	80.0	80.0
Control electronics (integrated)												
K1 (Hall sensor system)		•	○	•	•	○				•	•	•
K3 (speed)							•	○	○			
K4 (position)							•	○	○			
K5 (CANopen)							•	•	•			
Control electronics (external)												
VTD-XX.XX-K3 (speed)		•	•	•	•	•						
VTD-XX.XX-K4S (position)		•	•	•	•	•				•	•	•
VTD-60.13-K5SB (CANopen)		•	•	•	•	•						
VTD-60.35-K5SB (CANopen)				•	•	•				•	•	•
Gearheads (from page 12)												
NoiselessPlus 42 (planetary gearhead)		•	○									
NoiselessPlus 63 (planetary gearhead)				•	○	○	•	○	○			
Performax® 42 (planetary gearhead)		•	○									
Performax® 63 (planetary gearhead)				•	○	○	•	○	○			
Performax®Plus 42 (planetary gearhead)		•	○									
Performax®Plus 63 (planetary gearhead)				•	○	○	•	○	○	•	•	•
Optimax 63 (planetary gearhead)				•	•	•	•	•	•	•	•	•
EtaCrown® 52 (crown gearhead)		•	○									
EtaCrown® 75 (crown gearhead)				•	○	○	•	○	○			
EtaCrown®Plus 42 (crown gearhead)		•	○									
EtaCrown®Plus 63 (crown gearhead)				•	○	○	•	○	○			
Brakes (from page 16)												
BFK (spring-applied)		•	○	•	○	○	•	•	•			
Encoder systems (from page 16)												
HEDS 5500/512 (incremental)		•	○	•	○	○				•	•	•
Subject to alterations		• Standard type		○ Preferred type: ready to ship in 48 hours								

With our **preferred type** products, we offer a selection of motors and gear motors which are available and ready to ship within 48 hours. Preferred type products can be ordered with a maximum order quantity of 20 products per order.

With **standard type** products, we refer to a wide range of motors and gear motors which can be ordered using the stated order numbers with standard delivery times.

Further products for your project requirements are available **on request.** These products are generally available but cannot be ordered by means of an allocated material number. We reserve the right to make changes to the necessary order numbers after technical and economic evaluation of the requirement.

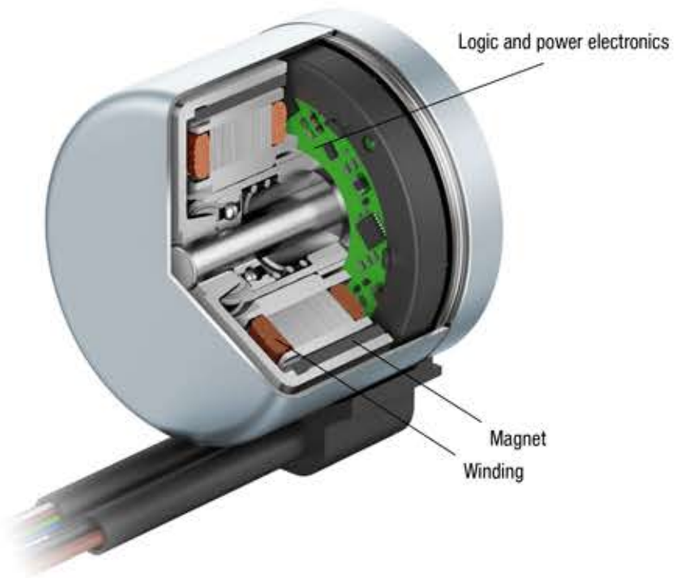
Brushless external rotor motors – VD/VDC.

Key figures

- 3-phase, electronically commutated external rotor motor
- Output range between 5 and 125 watts
- High power density realized in a compact design
- Very quiet operation across the entire speed range
- High overload capacity
- Very high power density
- Rigid speed/torque curve
- Extremely wide speed control range
- Robust housing and bearings
- Protection class IP 54 as per EN 60 034-5: up to IP 65
- Various motor types which can be combined with planetary, crown and spur gearheads

Approvals

- Support with the accreditation of products in different economic areas and markets
- As an experienced and competent partner we would be happy to support you
- Possible approvals include CE, CCC, UL, CSA, EAC
- Additional approvals on request



Overview of VD/VDC motors.

Brushless external rotor motors VD/VDC		VD-25.07	VD-35.06	VD-43.10	VD-54.14	VD-49.15	VDC-43.10	VDC-54.14	VDC-49.15	VDC-49.15	VDC-49.15
U_N	V DC	24	24	24	24	24	24	24	24	24	48
M_N	mNm	8.00	20.0	54.0	150	235	45.0	130	150	235	300
P	W	5.00	8.00	21.0	57.0	110	18.8	47.6	63.0	100	125
n_N	rpm	6 000	3 700	3 700	3 700	4 500	4 000	3 500	4 000	4 000	4 000
l	mm	23.6	29.3	40.8	43.3	52.0	40.0	42.0	52.0	52.0	52.0
d	mm	32.0	44.0	52.8	68.4	63.0	52.8	68.3	63.0	63.0	63.0
Control electronics (integrated)											
K1 (Hall sensor system)		•	•	•	•	•					
K3 (speed)							•	•	•		
K4 (position)										○	○
Control electronics (external)											
VTD-XX.XX-K3		•	•	•	•	•					
VTD-XX.XX-K4S					•	•					
VTD-60.13-K5 SB				•	•	•					
Gearheads (from page 12)											
NoiselessPlus 63 (planetary gearhead)						•					
Performax® 63 (planetary gearhead)						•				•	•
Performax®Plus 63 (planetary gearhead)						•				○	○
EtaCrown® 75 (crown gearhead)						•				•	•
EtaCrown®Plus 63 (crown gearhead)						•				•	•
Compactline 90 (spur gearhead)					•			•			
Compactline 91 (spur gearhead)				•	•	•	•	•	•	•	•
Compactline 92 (spur gearhead)					•			•			
Flatline 85 (spur gearhead)					•	•		•	•	•	•
Subject to alterations		• Standard type					○ Preferred type: ready to ship in 48 hours				

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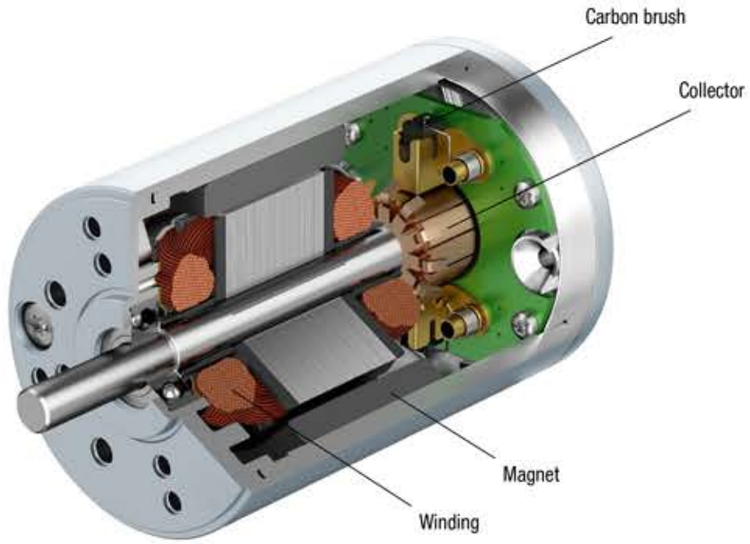
Brushed internal rotor motors – BCI.

Key figures

- DC motor with permanent magnets
- Power range between 13 and 93 watts
- High power density realized in a compact design
- High overload capacity
- Highly efficient
- Mechanical commutation through a multi-piece collector
- Customer-specific winding layout
- Winding insulation as per insulation class B
- Protection class IP 40, optionally higher
- Various motor types which can be combined with planetary, crown and spur gearheads
- Optional encoder and brake modules

Approvals

- Support with the accreditation of products in different economic areas and markets
- As an experienced and competent partner we would be happy to support you
- Possible approvals include CE, CCC, UL, CSA, EAC or other certification marks



Overview of BCI motors.

Brushed internal rotor motors BCI		BCI-42.25	BCI-42.40	BCI-52.30	BCI-52.60	BCI-63.25	BCI-63.55
U_N	V DC	24	24	24	24	24	24
M_N	mNm	38.0	57.0	100	170	140	270
P	W	13.0	19.0	38.0	55.0	46.0	93.0
n_N	rpm	3 900	3 600	4 200	3 500	3 600	3 600
l	mm	70.0	85.0	95.0	125	95.0	125
d	mm	42.0	42.0	52.0	52.0	63.0	63.0
Gearheads (from page 12)							
Performax® 42 (planetary gearhead)		•	○				
Performax® 52 (planetary gearhead)				•	○		
Performax® 63 (planetary gearhead)						•	○
EtaCrown® 52 (crown gearhead)		•	○				
EtaCrown® 75 (crown gearhead)						•	○
EtaCrown®Plus 42 (crown gearhead)		•	○				
EtaCrown®Plus 63 (crown gearhead)						•	○
Compactline 90 (spur gearhead)		•	•				
Compactline 91 (spur gearhead)						•	•
Compactline 92 (spur gearhead)						•	•
Flatline 78 (spur gearhead)		•					
Flatline 85 (spur gearhead)						•	•
Brakes (from page 16)							
BFK (spring-applied)		•	○	•	○	•	○
Encoder systems (from page 16)							
PMG 2-2/2-12 (magnetical)		•	○	•	○	•	○
HEDS 5500/512 (optical, incremental)		•	○	•	○	•	○
Subject to alterations		• Standard type	○ Preferred type: ready to ship in 48 hours				

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In the gearbox product range, we offer three types of transmission technologies. These include planetary gearing, crown gearhead units and spur gears, all individually adapted to the requirements of the customer according to the modular principle. Deciding which of these technologies will render the best results for the respective application, ultimately depends on the application itself.

Characteristics of the individual transmission technologies:

Planetary gearheads
- Higher reduction ratios within first and second stage
- Very quiet operation
- Extremely high performance
- Compact design
- No offset axle
- Comprehensive range of products with three model types
  - Noiseless Plus – unique quiet operation
  - Performax® – extreme performance
  - Optimax – robust and long lifetime

Crown gearheads
- Outstanding efficiency
- Large reduction ratio range
- No self-locking
- Highest power density
- No offset axle
- Two different model ranges
  - EtaCrown®
  - EtaCrown®Plus

Spur gearheads
- Highest power density
- Flat, compact design
- Large reduction ratio range
- High radial loads permitted
- Good price/performance ratio
- Two different model ranges
  - Flatline
  - Compactline

Gearheads*			Noiseless Plus 42	Noiseless Plus 63	Performax® 42	Performax® 52	Performax® 63	Performax®Plus 42	Performax®Plus 63	Optimax 63
No. of stages										
1	Torque (M_N)	Nm	**Up to 2.8**	**Up to 10.5**	**Up to 1.2**	**Up to 3.0**	**Up to 6.9**	**Up to 2.6**	**Up to 11.9**	**Up to 5.4**
	Reduction ratio	i	4.30 6.00 11.0 21.0	4.30 6.00 11.0 21.0	3.20 5.00 9.00 17.0	3.20 5.00 9.00 17.0	5.00 9.00 17.0	5.00	3.20 5.00 9.00 17.0	3.00 5.00 9.00
2	Torque (M_N)	Nm	**Up to 4.1**	**Up to 9.4**	**Up to 5.6**	**Up to 14.9**	**Up to 37.3**	**Up to 12.1**	**Up to 64**	**Up to 24.3**
	Reduction ratio	i	26.0 47.6 66.0 121 231	26.0 47.0 66.0 121	21.3 30.0 38.3 54.0 72.3 102 204	21.3 30.0 38.3 54.0 72.3 102 204	21.25 30.0 38.25 54.0 72.25 102 204	30.0	21.3 30.0 38.3 54.0 72.3 102 204	9.00 15.0 25.0 45.0
Combinations possible with										
ECI motors										
ECI-42			•		•			•		
ECI-63				•			•		•	•
ECI-80									•	•
VD/VDC motors										
VD/VDC-43.10										
VD/VDC-54.14										
VD/VDC-49.15				•			•		•	
BCI motors										
BCI-42					•					
BCI-52						•				
BCI-63							•			
Subject to change										

* This overview of the gear units displays all possible reduction ratios. To check compatibility of the required reduction ratio with the desired motor, please refer to our catalog or our website, or inquire with us directly.

Crown gearheads.

Gearheads*			EtaCrown® 52	EtaCrown® 75	EtaCrown® Plus 42	EtaCrown® Plus 63
No. of stages						
	Torque (M_N)	Nm	**Up to 10**	**Up to 10**	**Up to 40**	**Up to 40**
1	Reduction ratio	i	4.10 6.70 10.1	4.10 6.70 10.1		
	Torque (M_N)	Nm	**Up to 10**	**Up to 10**	**Up to 40**	**Up to 40**
2	Reduction ratio	i	21.2 33.3 60.0 113	20.3 33.3 60.0 113		
	Torque (M_N)	Nm	**Up to 10**	**Up to 10**	**Up to 40**	**Up to 40**
3	Reduction ratio	i			54.0 84.8 153 289	54.0 84.8 153 289
Combinations possible with						
ECI motors						
ECI-42			•		•	
ECI-63				•		•
ECI-80						
VD/VDC motors						
VD/VDC-43.10						
VD/VDC-54.14						
VD/VDC-49.15				•		•
BCI motors						
BCI-42			•		•	
BCI-52						
BCI-63				•		•
Subject to change						

* This overview of the gear units displays all possible reduction ratios. To check compatibility of the required reduction ratio with the desired motor, please refer to our catalog or our website, or inquire with us directly.

Spur gearheads.

Gearheads*			Compactline 90	Compactline 91	Compactline 92	Flatline 78	Flatline 85
No. of stages							
	Torque (M_N)	Nm	**Up to 15**	**Up to 15**	**Up to 15**	**Up to 30**	**Up to 30**
2	Reduction ratio	i	16.0 18.8 26.8 30.6 32.0	7.80 9.20 11.1 13.1 13.8 22.0 26.4 27.6 38.6	15.5 18.4 22.2 23.1 31.1 32.4 40.1		
	Torque (M_N)	Nm	**Up to 15**	**Up to 15**	**Up to 15**	**Up to 30**	**Up to 30**
3	Reduction ratio	i	37.5 57.8 67.8 79.1 92.7 121.6 142.5	41.3 67.3 117.1 165.8	55.0 70.4 75.6 92.2 142 163 184.4 274.6	38.6 65.2 82.8 140.8	8.20 12.3 18.0 27.6 40.3 64.0 101.8 136.5 189
	Torque (M_N)	Nm	**Up to 15**	**Up to 15**	**Up to 15**	**Up to 30**	**Up to 30**
4	Reduction ratio	i	189.3 222 296 368 432			191.9 252.6	303.6 454 687 1 028.7 1 030
Combinations possible with							
VD/VDC motors							
VD/VDC-43.10			•	•			
VD/VDC-54.14			•	•	•		•
VD/VDC-49.15				•			•
BCI motors							
BCI-42			•			•	
BCI-52							
BCI-63				•	•		•
Subject to change							

* This overview of the gear units displays all possible reduction ratios. To check compatibility of the required reduction ratio with the desired motor, please refer to our catalog or our website, or inquire with us directly.

Electronics (external)

Electronics (integrated)

Control electronics

- Integrated and external moduls to control BLDC motors
- Models with variable-speed operation and analog set value input
- Models for torque- and position-controlled operation
- Models with CANopen bus interface (DS 402-compatible)

Control electronics		K3 (integrated)	K4 (integrated)	K5 (integrated)	VTD-XX.XX-K3	VTD-XX.XX-K4S	VTD-60.13-K5SB	VTD-60.35-K5SB
Bus interface				CANopen			CANopen	CANopen
Nominal voltage	V DC	24/48	24/48	24/48	14 - 28	10 - 30	10 - 60	9 - 60
Speed control		•	•	•	•	•	•	•
Torque control			•	•			•	•
Position control			•	•			•	•

PMG encoder system

HEDS encoder system

Encoder systems

- Magnetic and optical encoder systems
- Encoders run silently and without wear
- When paired with suitable electronics, encoders serve to determine/control speed and control positioning

Encoder systems		PMG 2-12	PMG 2-2	HEDS 5500	PWB AE30
Pulses per revolution	Z	12	2	512	512
Nominal voltage	V DC	24	24	24	24

Braking systems

- Spring-applied braking
- Single-disk brakes with 2 friction contact surfaces
- Braking torque effective in powerless state
- Braking force is eliminated by electromagnetic force

Braking systems		external			integrated
		BFK 457-01	BFK 457-02	BFK 457-03	Brake module ECI 63-K4
Nominal voltage	V DC	24	24	24	24
Nominal output	W	5.00	6.60	9.00	10.0
Brake torque	Nm	0.12	0.25	0.50	1.00
Power-on time	ms	11.0	8.00	12.5	20.0
Power-off time	ms	17.0	17.0	18.0	35.0