



Compact.  
Complete.  
eWheel.

# eWheel: Your wheel drive for automated guided vehicles (AGV)

As part of Breuell & Hilgenfeldt GmbH and as a system partner of the company ebm-papst, the b-drives team has over 10 years' experience in the design, control and application of electric drives. We have been supplying optimally customised drive systems to numerous customers in the mechanical engineering industry and intralogistics. The eWheel was specially developed by b-drives as a wheel drive system for automated guided vehicles.

**With the eWheel from b-drives, your transport systems can bring even large payloads safely to their destination, even in very tight spaces.**

The eWheel is the most compact system on the market for this purpose and easily adapts itself to your design ideas

thanks to its flexible modular system. But that's not all: despite its small size, the eWheel proves impressive with a very high power density and high efficiency. This results in high vehicle availability.

The b-drives assembly concept ensures convenient changing of the wheels. The wheel can be changed in a few seconds by loosening just three screws. Behind the gear-box-wheel unit, a modern BLDC motor with a redundant feedback system ensures drive safety. The overload capacity comes into its own during vehicle acceleration and when negotiating inclines. And the best part is that our innovative wheel drive is the cost benchmark for AGV drive systems is the cost benchmark for AGV drive systems.

## Complete.

### Control electronics

Double axis controller  
Power supply voltage up to 60 V  
Peak current up to 60 A

### Bus interfaces

CANopen  EtherCAT 

### Functional Safety

Up to SIL3 / PL e

### Wheel

Planetary gearbox with  $i = 11 / i = 20 / i = 30$   
Three different wheel diameters  
Application-specific wheel materials possible

### BLDC-Motor

Sizes S / M / L / XL  
Parking brake with emergency stop function

### Redundant feedback

High-resolution incremental encoder  
Hall sensors

## Compact.

### Lowest construction length

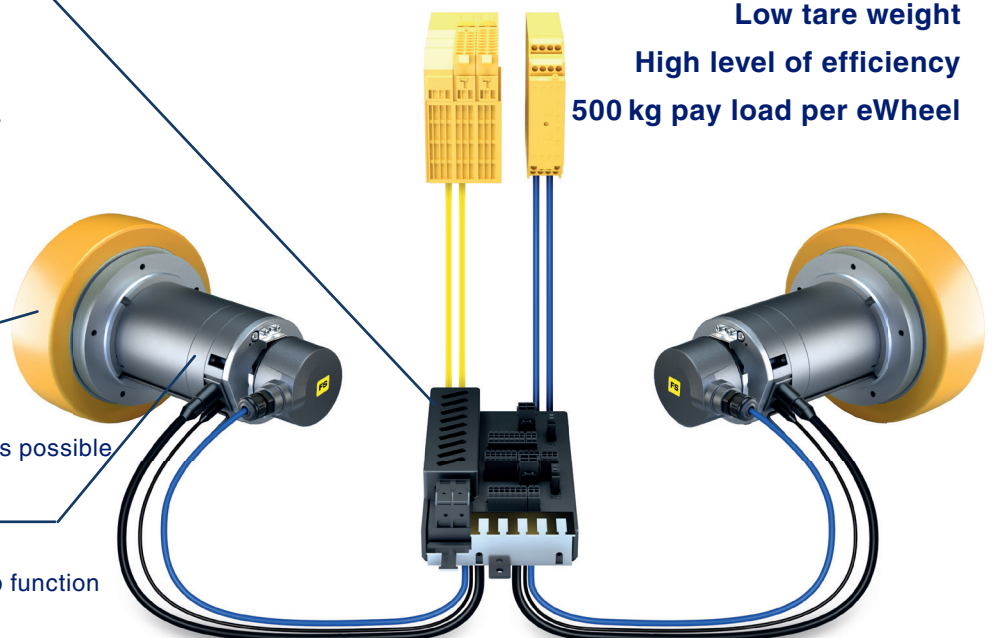
High overload

High power density

Low tare weight

High level of efficiency

500 kg payload per eWheel



**Are your requirements not listed?** Don't hesitate to contact us!

We will check your requests for feasibility!

→ **Contact**

# Flexible modular system

eWheel	Unit	S	M	L	XL
Overall length	mm	109	199	219	238
Maximum speed	m / s	0,7 – 3,0	1,0 – 3,7		
Maximum torque	Nm	29 – 100	24 – 66	35 – 97	53 – 100
Nominal voltage	V	24 / 48			48
Motor protection class	–	IP00	IP54		
Wheel protection class	–	IP69			
Wheel diameter	mm	140 / 160 / 200			
Parking brake with emergency stop function	Nm	1 – 3			
Redundant feedback with Hall sensors and incremental encoder	–	✓			
Payload per wheel	kg	500			
Wheel material	–	Vulkollan® 92° Shore A			
Options		✓			
Functional safety STO PL e	–	✓			
Safety encoder attachment	–	x	✓		
Application specific wheel material		✓			
Attachment to the vehicle		from the vehicle exterior/interior or above the drive using a mounting bracket			

## Functional safety for automated guided vehicles

In normal operation, the eWheel's BLCD motor brakes dynamically, thus feeding energy back into the battery or into other consumers. For safety-related emergency braking, the eWheel is equipped with a mechanical parking brake with emergency stop function.

The brake torque is correspondingly increased by the gearbox, so that the vehicle comes to a safe halt even in unfavourable operating situations. We can adapt the nominal brake torque to your application.

### For functional safety in electronic terms, the eWheel offers:

#### Solution with STO

The double axis controller is equipped with STO according to PL e. This means that the torque of two drives can be switched off via a safe channel (for example from a safety PLC). Of course, it is possible to activate the parking brakes together with the STO.

#### Redundant feedback system for SLS and SDI

The motors have two independent feedback systems each as standard:

1. Hall sensors for commutation
2. High-resolution incremental encoder for control

By comparing both signals using an appropriate electronic system, the rotation speed can be determined in a functionally safe manner

#### Solution with SLS and SDI using safety encoder

As a further option, we can mount a safety encoder on the eWheel. The possible design types are sine-cosine encoders, TTL or HTL incremental encoders. These signals can be evaluated in corresponding modules of the safety PLC.

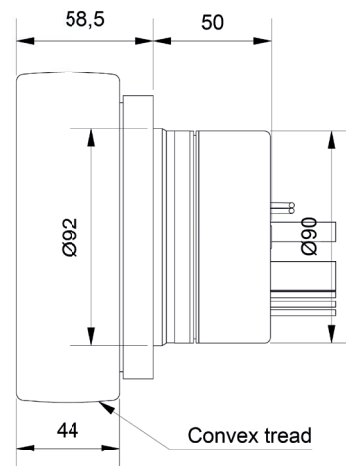
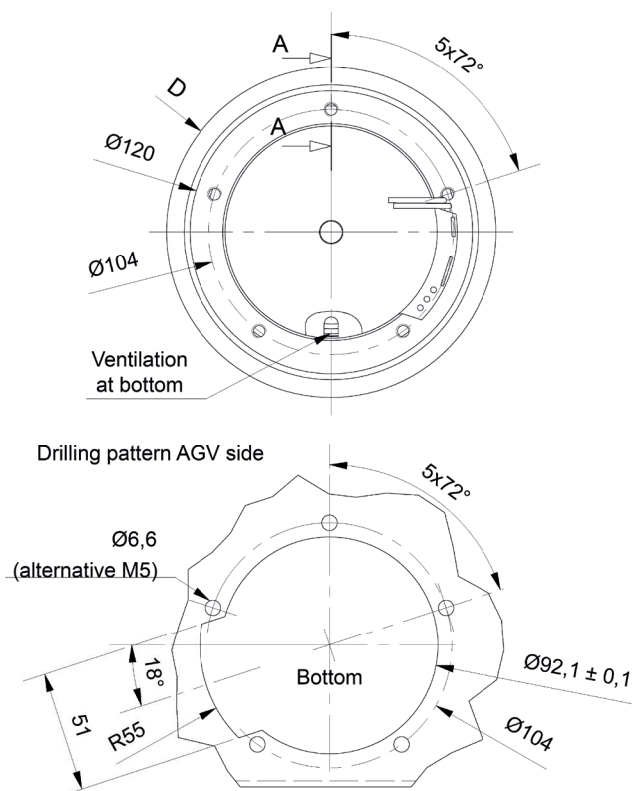
#### Solution with SLS and SDI with Siemens MicroDrive-PDC

Optionally, the eWheel can be equipped with motors that are compatible with the MicroDrive-PLC by Siemens. By using the PLC-F series by Siemens, a large number of safety functions are automatically available via PROFI-safe.

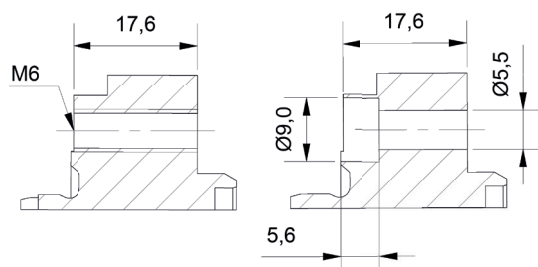
# Size S

- Small motor for extremely compact construction
- Motor without IP protection class
- High-performance external rotor with 11 pole pairs
- Encoder with 1024 increments
- Integrated Hall sensors
- Extremely high overload capacity

Motor Design		S-24V			S-48V		
Gearbox variant		i11	i20	i30	i11	i20	i30
Gear reduction		11,4	20,0	30,0	11,4	20,0	30,0
Nominal voltage [V]		24			48		
Nominal current [ $A_{eff}$ ]		12,1			8,7		
Maximum current [ $A_{eff}$ ]		38			27		
Maximum torque [Nm]		30	54	81	37	68	100
Parking brake torque [Nm]		35	60	90	35	60	90
Payload per wheel[kg]		500			500		
Wheel/motor protection class		IP69/IP00			IP69/IP00		
Maximum speed with wheel-Ø (m/s)	D = 140 mm	1,8	1,0	0,7	2,1	1,2	0,8
	D = 160 mm	2,1	1,2	0,8	2,8	1,4	0,9
	D = 200 mm	2,6	1,5	1,0	3,0	1,7	1,2



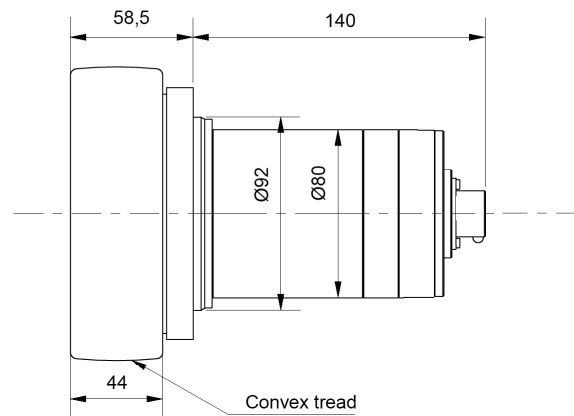
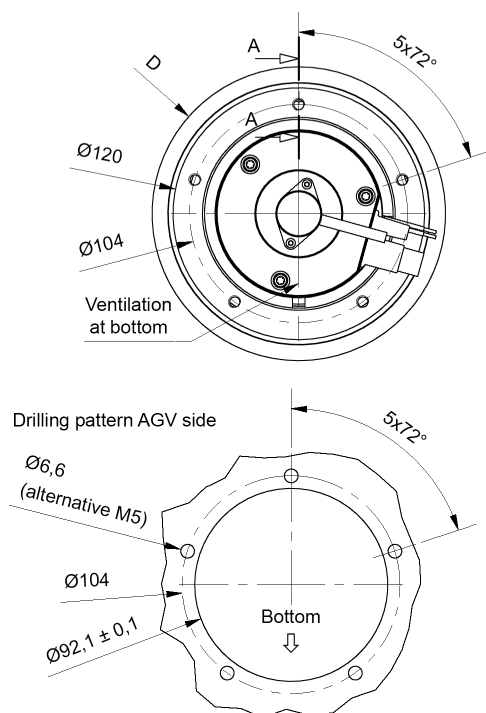
Section AA  
M6, alternative counterbored hole: Cap screw M5 DIN4762



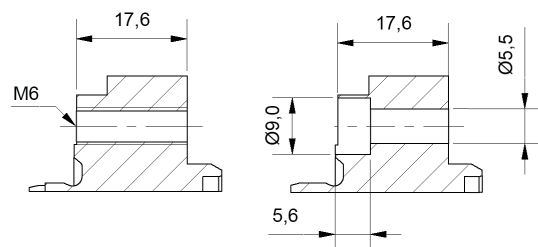
# Size M

- Medium motor for high vehicle speeds
- Motor with IP54
- Dynamic internal rotor with 4 pole pairs
- Encoder with 1024 increments
- Integrated Hall sensors
- Extremely high overload capacity at low moment of inertia

Motor Design		M-24V			M-48V		
Gearbox variant		i11	i20	i30	i11	i20	i30
Gear reduction		11,4	20,0	30,0	11,4	20,0	30,0
Nominal voltage [V]		24			48		
Nominal current [ $A_{eff}$ ]		13,5			7,5		
Maximum current [ $A_{eff}$ ]		40			20		
Maximum torque [Nm]		24	44	66	24	44	66
Parking brake torque [Nm]		35	60	90	35	60	90
Payload per wheel[kg]		500			500		
Wheel/motor protection class		IP69/IP54			IP69/IP54		
Maximum speed with wheel-Ø (m/s)	D = 140mm	2,6	1,5	1,0	2,6	1,5	1,0
	D = 160mm	2,9	1,7	1,1	2,9	1,7	1,1
	D = 200mm	3,7	2,1	1,4	3,7	2,1	1,4



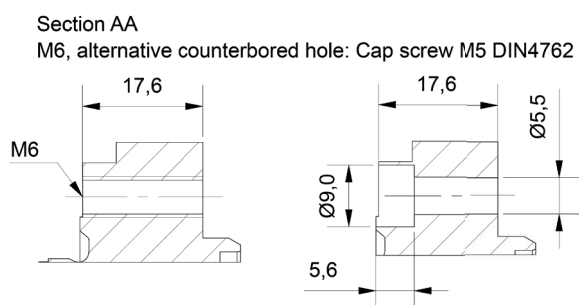
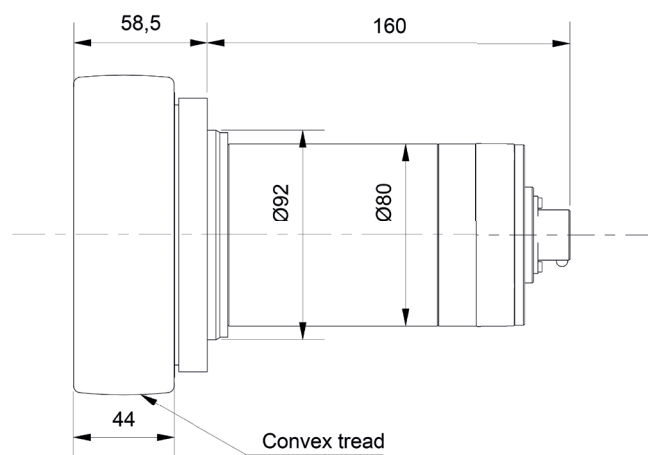
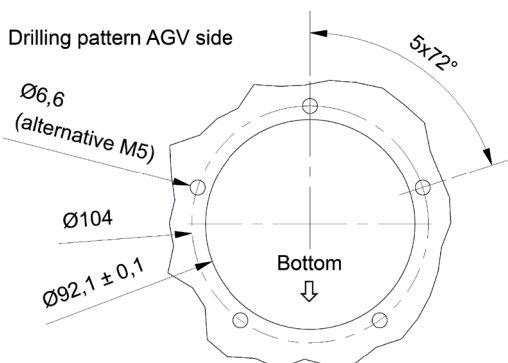
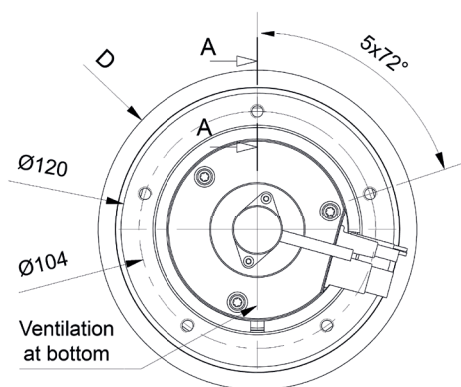
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# Size L

- Large motor for high performance and high vehicle speeds
- Motor with IP54
- Dynamic internal rotor with 4 pole pairs
- Encoder with 1024 increments
- Integrated Hall sensors
- Extremely high overload capacity at low moment of inertia

Motor Design		L-24V			L-48V		
Gearbox variant		i11	i20	i30	i11	i20	i30
Gear reduction		11,4	20,0	30,0	11,4	20,0	30,0
Nominal voltage [V]		24			48		
Nominal current [ $A_{eff}$ ]		24			12		
Maximum current [ $A_{eff}$ ]		64,0			32		
Maximum torque [Nm]		35	64	90	35	64	90
Parking brake torque [Nm]		22,9	40,0	60,0	22,9	40,0	60,0
Payload per wheel[kg]		500			500		
Wheel/motor protection class		IP69/IP54			IP69/IP54		
Maximum speed with wheel-Ø (m/s)	D = 140mm	2,6	1,5	1,0	2,6	1,5	1,0
	D = 160mm	2,9	1,7	1,1	2,9	1,7	1,1
	D = 200mm	3,7	2,1	1,4	3,7	2,1	1,4

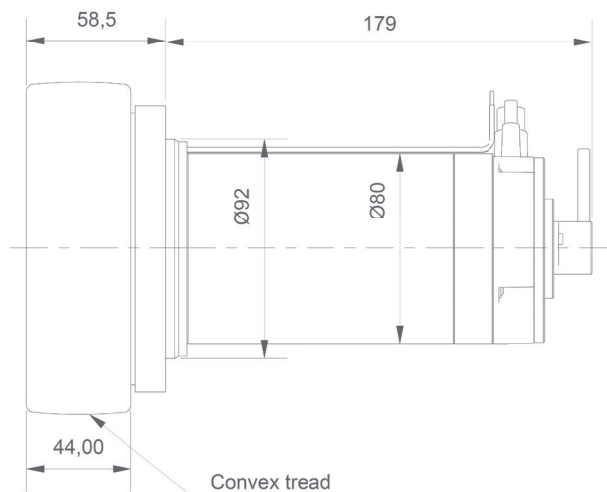
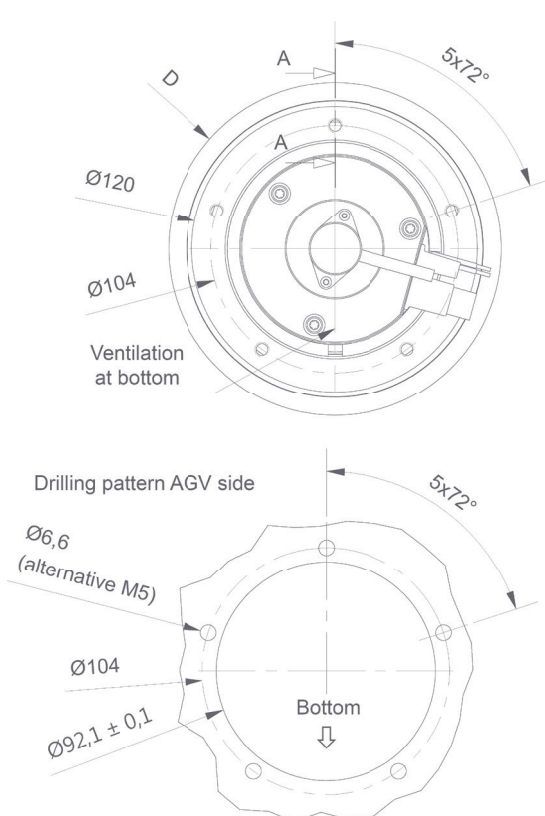




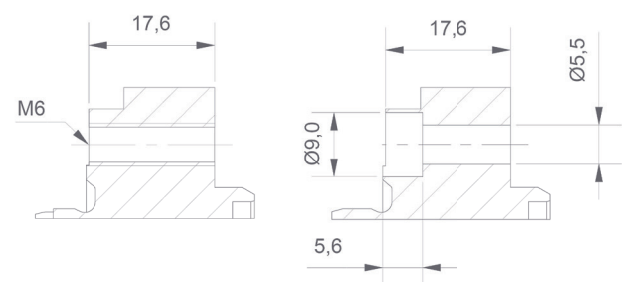
## Size XL

- Large motor for maximum performance and high vehicle speeds
- Motor with IP54
- Dynamic internal rotor with 4 pole pairs
- Encoder with 1024 increments
- Integrated Hall sensors
- Extremely high overload capacity at low moment of inertia

Motor Design		XL-48V		
Gearbox variant		i11	i20	i30
Gear reduction		11,4	20,0	30,0
Nominal voltage [V]		48		
Nominal current[A <sub>eff</sub> ]		18		
Maximum current [A <sub>eff</sub> ]		36		
Maximum torque [Nm]		53	81	100
Parking brake torque [Nm]		22,9	40,0	60,0
Payload per wheel[kg]		500		
Wheel/motor protection class		IP69/IP54		
Maximum speed with wheel-Ø (m/s)	D = 140mm	2,6	1,5	1,0
	D = 160mm	2,9	1,7	1,1
	D = 200mm	3,7	2,1	1,4



Section AA  
M6, alternative counterbored hole: Cap screw M5 DIN4762



## For questions, please contact

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