

A blurred photograph of a forklift in a warehouse, moving from left to right. The scene is lit with a warm, yellowish light, creating a sense of motion and activity. The forklift is carrying a large stack of white boxes on its pallet. The background shows the structural elements of the warehouse, including beams and a high ceiling.

Bonfiglioli Mobile

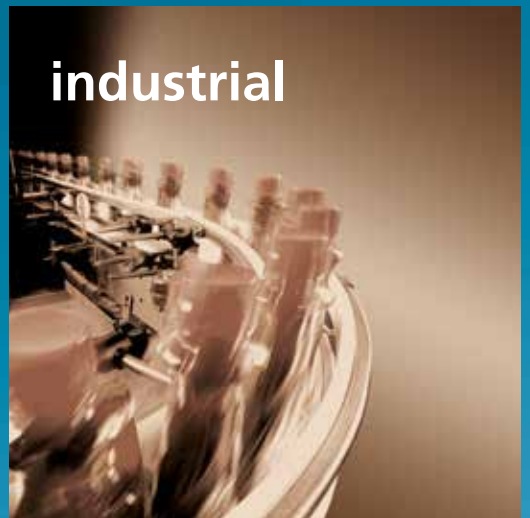
Solutions for electromobility

Bonfiglioli solutions

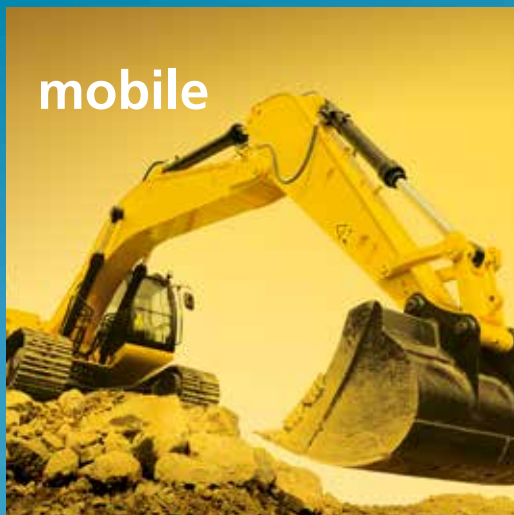
wind



industrial



mobile



photovoltaic



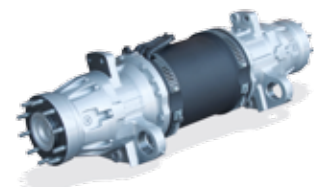
Bonfiglioli, one name for a large international group.

It was back in 1956 that Clementino Bonfiglioli established in Bologna, Italy, the company that still bears his name. Now, some fifty years later, the same enthusiasm and dedication is driving Bonfiglioli to become the world's top name in power transmission and control solutions. Through directly controlled subsidiaries and production plant around the world, Bonfiglioli designs, manufactures and distributes a complete range of gearmotors, drive systems and planetary gearboxes, and boasts the most integrated offering on the market today.

Now, to emphasise its commitment to health, safety and environmental sustainability, Bonfiglioli is adding the term "green" to the description of its offering.

In a market in which excellent product quality alone is no longer sufficient, Bonfiglioli also provides experience, know-how, an extensive sales network, excellent pre-sales and after-sales service and modern communication tools and systems to create high level solutions for industry, mobile machinery and renewable energy.

This commitment becomes now more visible and evident thanks to the solutions that can respect the environment: hybrid and electric vehicles are now an important drive for electric piece of Bonfiglioli offer. This is our way to contribute to a better world.



Bonfiglioli electromobility



Electric powertrain solutions



Heavy duty vehicle manufacturers are eagerly seeking improvements in efficiency. OEMs are looking for solutions that can increase productivity and reduce the total cost of ownership for the end user. Over the next few years we can also expect the emission regulations currently applied to the automotive industry to be extended to heavy duty vehicles too, and the strict standards involved can only be met by improving powertrain efficiency. Heavy duty powertrains are therefore being electrified: the hydraulic motors conventionally installed in these machines are gradually being replaced by electric motors which are intrinsically more efficient.

Bonfiglioli Trasmital began developing and producing powertrains consisting of planetary gearboxes driven by electric and hydraulic motors back in the 1980s. More recently, Bonfiglioli Mobile Solutions also began investing in the personnel, tools and technologies needed to develop electric powertrain technology. As a result, Bonfiglioli Mobile Solutions can now serve the electric powertrain market with two different but complementary offerings.

Standard products for various applications

Various products have been designed specifically for use with electric motors, and offer a wide range of performance specifications and deliverable torque ratings. The latest products include a series of planetary drives for electric material handling vehicles and planetary drives with integrated electric motors for hybrid agricultural machines. These solutions have been shown to deliver numerous benefits in terms of machine manoeuvrability, reliability, operating costs and sustainability, thanks to low emissions and low working noise levels.

Custom solutions

Wherever a custom solution is required, manufacturers benefit from Bonfiglioli's vast technical expertise. Bonfiglioli works closely with powertrain designers and component suppliers to develop innovative, tailored solutions. Bonfiglioli can draw on years of experience in powertrain design for light and medium duty vehicles, and the concepts and technologies involved are likely to be scaled up to heavy duty applications over the medium term.



Electric solutions for material handling



600F series

Electric powertrains for material handling trucks



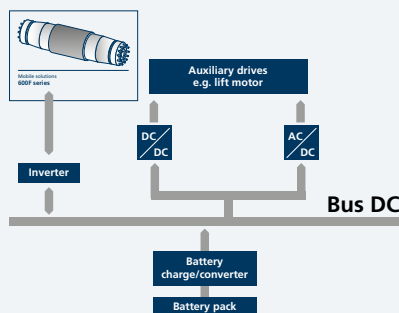
Bonfiglioli supplies high efficiency, low noise planetary axes and drives with integrated, high performance electric motors and low maintenance braking systems for Class 1 material handling vehicles. Typical applications include 3 and 4 wheel counterbalance lift trucks and ground support equipment. Bonfiglioli electric powertrains are fully tested in the factory and guarantee reduced energy consumption. This, in turn, means longer battery operating times, extended service intervals and a lower total cost of ownership. Bonfiglioli's 600F Series drives are complemented by a range of idle steering systems based on axles or steering units, depending on the number of wheels on the vehicle.

Type	Lift capacity [kg]	
601 F		2000
602 F		3500
603 F		5000

Type	Max deliverable torque [Nm]	
601 F		3000
602 F		5500
603 F		7000

Type	Max input speed	Rated motor power	Typical wheel size
	[min ⁻¹]	[kW, S2-60 ¹]	[inches]
601 F	5500	2x4.5	18
602 F	5500	18	23
603 F	4500	26	28

Functional diagram



Application

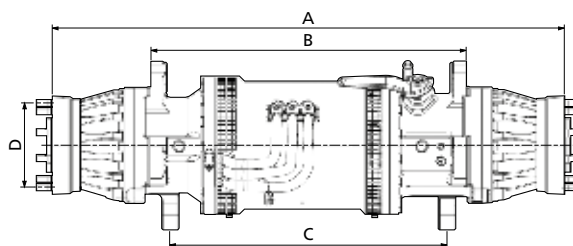
- Material handling vehicles (CB forklifts, airport equipment)
- Indoor and outdoor use
- CB trucks with lift capacity from 1.6 to 5.0 tons
- GSE vehicles with draw bar pull from 6000 to 25000 kgf
- Vehicle speeds up to 20 km/h

Standard features

- Dual planetary gearbox
- Optimised gear design for maximum efficiency and minimum noise
- Wet disc service brake with low displacement actuation
- Parking brake with mechanical lever actuation
- Integrated, customised mast support
- Integrated AC traction motor in IP20 or IP43 protection ratings
- Integrated, high accuracy, silicon based, KTY temperature sensor
- Integrated, high resolution, Hall effect speed sensor

Optional features available on request

- Spring applied hydraulic release parking brake
- Mechanical disengagement for towing, with no need to remove the wheel and without oil drop



Type	A	B	C	D
	Flange to flange	Frame mounting	Mast mounting	Wheel stud PCD
	[mm]	[mm]	[mm]	[mm]
601 F	1015	610	630	120
602 F	1090	640	600	170
603 F	1150	670	620	225

Electric solutions for aerial platforms



600WE series

Electric powertrains for aerial platforms



Bonfiglioli's 600WE planetary drives incorporate an integrated, maintenance-free electric motor and offer significant benefits in terms of compact dimensions, low noise and high efficiency. 600WE Series drives are designed for use with all kinds of aerial platforms, including articulated and telescopic boom types, vertical and scissor lifts with service heights from 5 to 27 metres, for indoor use in tight spaces or outdoor use even on rough ground. This advanced powertrain solution uses a two or three stage gearbox offering reduction ratios of up to 1:95 to satisfy the widest possible range of needs. The gearbox is coupled to a low voltage induction motor (BT Series) specially developed for traction power and control applications.

Type	Max deliverable torque [Nm]
600 WE	900
602 WE	3500
603 WE	7000
605 WE	8500

Type	Rated motor data	Typical machine weight
	[kW, S2-60']	[tons]
600 WE	1 ... 3	1 ... 3
602 WE	3 ... 5	4 ... 9
603 WE	5 ... 7	9 ... 13
605 WE	7 ... 9	13 ... 16

Application

- Aerial platforms (vertical, scissor, articulated or telescopic boom)
- Indoor and outdoor use
- Full-load vehicle weights from 1.0 to 16.0 tons
- Vehicle speeds up to 6 km/h
- Working heights from 5 to 27 m

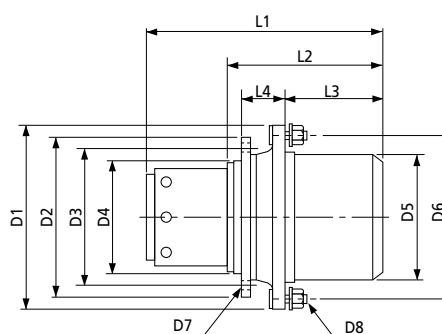
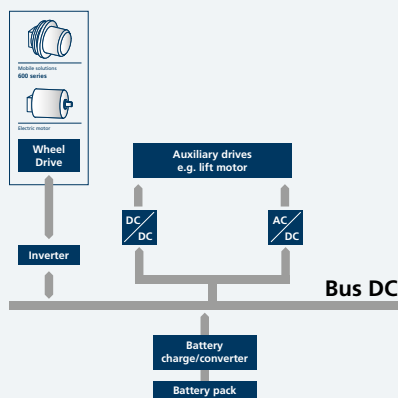
Standard features

- Two stage or three stage planetary drive with reduction ratios of up to 1:95
- Optimised gear design for maximum efficiency and minimum noise
- Parking brake (spring applied with hydraulic or electromagnetic release)
- Integrated, low voltage, 3 phase induction motor with inverter control
- Integrated, high accuracy, silicon based, KTY temperature sensor
- Integrated, high resolution, Hall effect speed sensor

Optional features available on request

- Speed sensor-bearing
- Other types of temperature sensor
- Mechanical disengagement for towing, with no need to remove the wheel and without oil drop

Functional diagram



		BT 150-			BT 170-			BT 200-		
		050	100	150	050	100	150	050	100	150
P_n	(kW)	1.5	2.5	3.4	2.4	4.3	5.4	3.1	6.2	9.1
T_n	(Nm)	4.8	9.1	12.5	7.7	14	22	10	20	29.5
V_{batt}	(V)	24	24	24	48	48	48	80	80	80
I_n	(A)	80	130	175	67	110	143	53	98	137
n	(rpm)	2894	2617	2610	2945	2952	2357	2957	2963	2958
$\cos\phi$	-	0.85	0.86	0.87	0.77	0.83	0.8	0.77	0.8	0.84
η	(%)	85.5	88.7	89.2	88.3	81.3	91.3	88.8	91.6	92.5

Type	L1									
600 WE	300	350	400							
602 WE			520	430	480	530				
603 WE					500	550	470	520		
605 WE						530	450	500	550	

	L2	L3	L4	D1	D2	D3	D4	D5	D6	D7	D8
600 WE	120	47	66	232	235	220	200	190	215	8xM8	6xM10
602 WE	240	130	70	275	275	250	220	200	240	9xM12	9xM16
603 WE	260	120	100	275	300	275	250	200	245	8xM16	6xM18
605 WE	240	160	70	310	300	275	250	220	275	8xM18	6xM20

Electric solutions for lightweight vehicles



600D series

Electric powertrains for lightweight vehicles

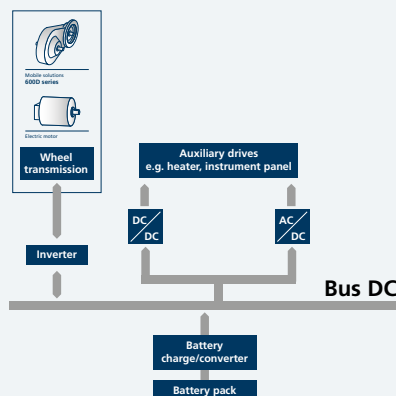


Bonfiglioli supplies versatile, low noise drives coupled to electric motors for all-electric, battery powered vehicles like urban passenger cars, commercial vehicles and delivery trucks. This solution ensures more energy-efficient operation and extended autonomy from the battery thanks to optimised, low backlash helical gears and high speed bearings. Bonfiglioli's 600D Series of drives is extremely lightweight thanks to cast aluminium casings developed using all of Bonfiglioli's vast process expertise. 600D drives allow vehicle manufacturers to satisfy even the toughest restrictions on gross vehicle weight. They are complemented by a range of electric motors, inverters and matched mechanical joints and shafts to provide vehicle OEMs with complete powertrain solutions.

Type	Max deliverable torque [Nm]
600 D	1000
601 D	1500
602 D	3000

Type	Rated motor power [kW, S2-60']	Vehicle weight [kg]
600 D	5 ... 20	700 ... 1250
601 D	20 ... 30	1300 ... 1750
602 D	30 ... 45	1800 ... 3500

Functional diagram



Application

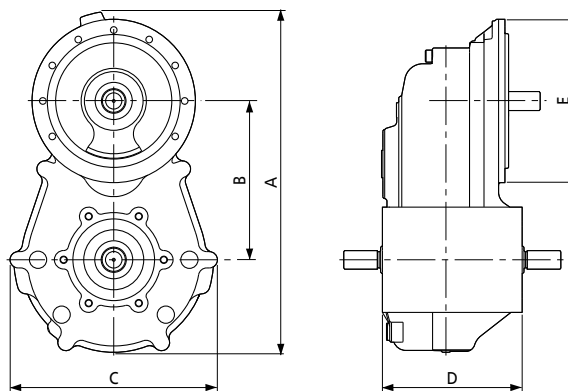
- Light duty, lightweight, battery powered vehicles
- Passenger transport and/or commercial deliveries
- Urban or suburban use
- Vehicle weights from 700 to 3500 kg
- Vehicle speeds up to 100 km/h
- Battery autonomy from 100 to over 200 km

Standard features

- Multi-stage, parallel shaft gearbox with reduction ratios of up to 1:15
- Optimised gear design for maximum efficiency and minimum noise
- Integrated mechanical differential
- Lightweight cast aluminium housing
- Versatile gearbox installation in the chassis
- Low voltage electric traction motor with inverter control

Optional features available on request

- Integrated mechanical parking brake
- Integrated, high resolution, Hall effect speed sensor
- Matched mechanical joints and shafts
- Matched electric motors and inverters



Type	A [mm]	B [mm]	C [mm]	D [mm]	E [mm]
600 D	375	175	229	154	148

Electric solutions for agriculture



600 series wheel drive with BPD electric motor

Solutions for hybrid agricultural machinery

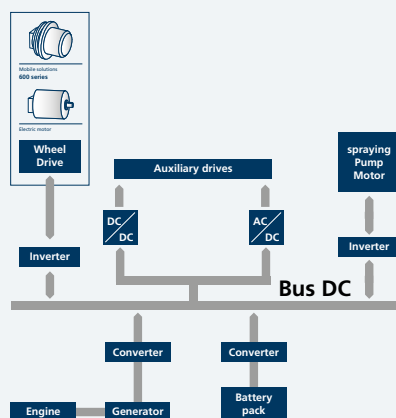


This complete mechatronic solution from Bonfiglioli was originally conceived for use on self-propelled crop sprayers. It can, however, also be applied to other types of new-generation hybrid agricultural vehicle capable of integrating electrical power with a mechanical transmission and weighing between 7 and 20 tons. It incorporates a high-power electric motor, instead of the conventional hydraulic motor, and a braking system. A central tyre inflation/deflation system may be also included in the solution to improve the overall efficiency of the diesel engine to wheel drivetrain. Power losses due to incorrect inflation can be avoided by optimising pressure to suit field work or on-road transport conditions.

Main benefits

- Technologically innovative: outmost mechatronics application in the agriculture field
- Power and diffused available torque are always efficiently delivered
- Outmost controllability: each transmission drive can be controlled independently by means of the dedicated inverter
- Extreme compact electric solution: dimensions are really comparable to standard solutions
- Possibility to store or regenerate energy during passive activity (e.g. downhill)
- Hybrid solution is cleaner: no oil contamination for crop / cultivation

Functional diagram



Solution main features

Gearbox data

Technology

Bonfiglioli Trasmital planetary multi stages

Type

606W

Gear ratio

1:47

Max output torque

12000 Nm

Brake

Negative multi-disc

Weight

90 kg

Motor data

Technology

BPD® Hairpin Stator

Electric power

30-60 kW

DC bus voltage

560 V

Max speed

9000 rpm

Cooling type

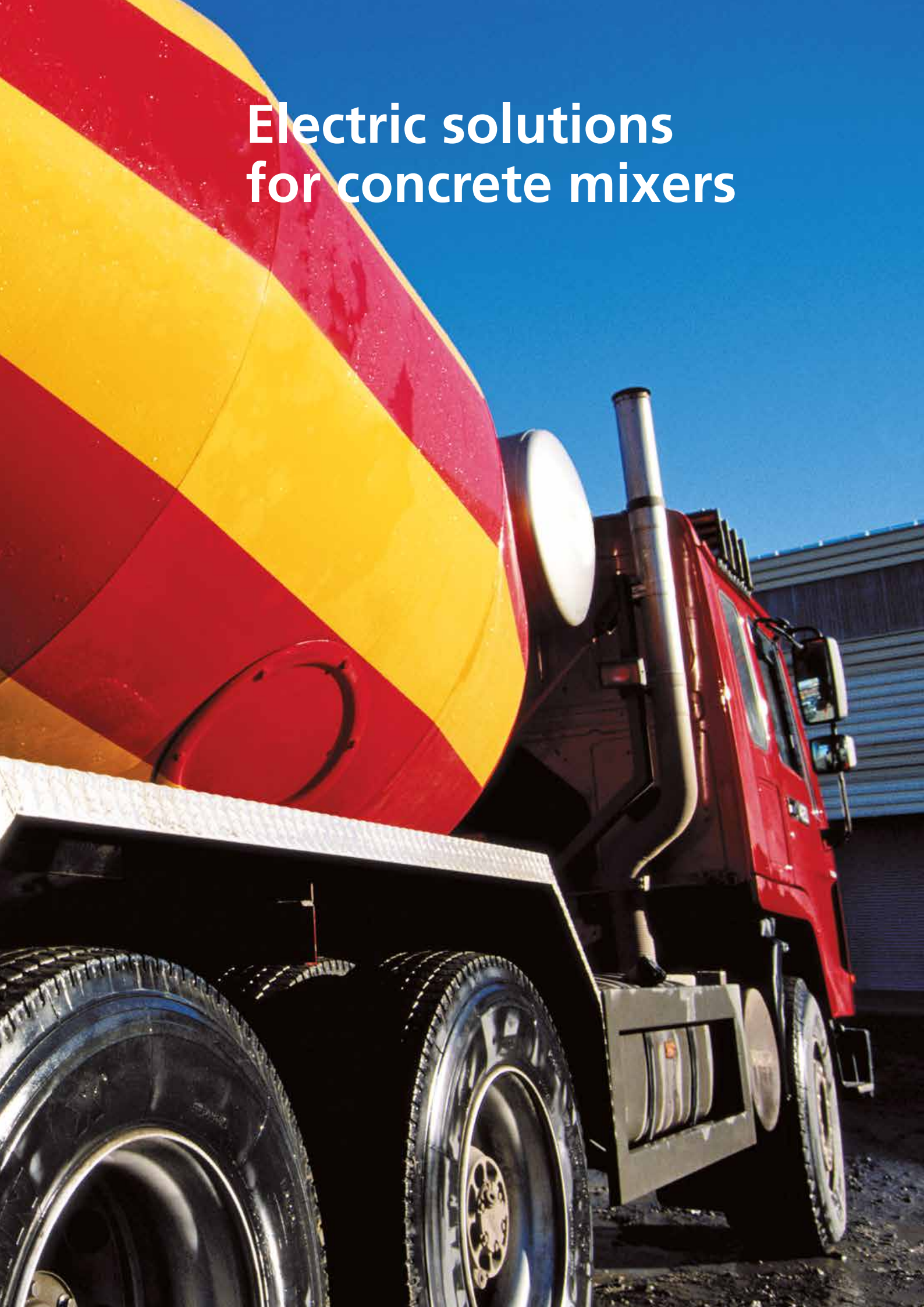
Liquid, input temperature: max 100°C

Weight

45 kg



Electric solutions for concrete mixers



500 series drum drive with electric motor

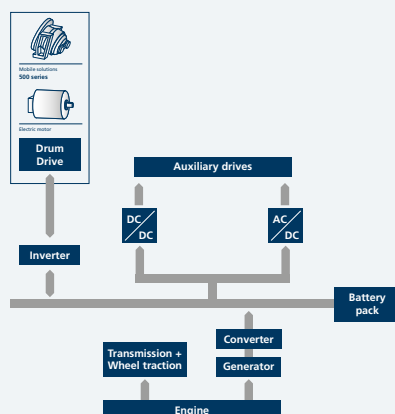
Solutions for hybrid concrete mixers



This solution is designed for use with medium/large mixer trucks that have medium/long delivery distances to travel. Drum rotation speed is between 15 and 22 rpm and capacity between 6 and 14 m³.

Bonfiglioli innovative solution comprises a gearbox of Bonfiglioli's historical 500 Series coupled to an AC electric motor that provides normal power and a DC electric motor for emergency use. This solution not only guarantees greater energy efficiency and reduced fuel consumption, but also helps cut cement mixer truck operating costs (for example by extending service intervals and making servicing simpler than on hydraulic drive solutions). Performance is improved too: rotation speed control is more accurate, operating noise levels are significantly lower (thanks to the electric motor and the helical tooth profile of the high speed gearbox stage). Finally, functionality remains higher in the event of a failure: the presence of a second, backup DC motor gives reassuring redundancy and eliminates the risks and potentially hazardous situations caused by failures of the drum emptying system (if the drum cannot rotate, the cement can solidify and put the mixer truck out of action).

Functional diagram



Main benefits

- Increased Energy Efficiency
- Reduced fuel consumption
- Service intervals less frequent and simplified vs the standard hydraulic solution
- Better drum rotation speed control
- Optimised gear design for maximum efficiency and minimum noise
- The emergency electric DC motor allows a higher availability in case of machine failure

Solution main features

Gearbox data

Ratio
Main: 1:220
Emergency: 1:2200

Max output torque
Main: 60000 Nm
Emergency: 10500 Nm

Max input speed
Main: 3500 rpm
Emergency: 2000 rpm

Oil quantity
8 lt

Dry weight
328 kg

Motor data

Type
Main: Induction AC
Emergency: PM DC motor

Rated Power
Main: 40 kW
Emergency: 2 kW

Voltage
Main: 170 Vac
Emergency: 24 Vdc

Protection degree
IP66

Cooling
Main: Liquid
Emergency: Air forced



Our quality



Sharing the value of our work with you.

The development of effective, tailored solutions for a wide range of applications is a fundamental aspect of our work.

We succeed in this because we co-operate closely with our customers, listen to their requests and work with them to improve our own performance.

Bonfiglioli is determined to deliver the best service possible – before, during and after the sale of any of our products – by applying all our know-how, experience, technology, and advanced communication tools. Bonfiglioli works to the strictest standards of quality and safety, as certified by seven different internationally recognised institutes.

We believe in innovation, and back up this belief by dedicating 100 of our people and 5 activity centres to research and development, and by working hand in hand with some of the world's most prestigious universities.

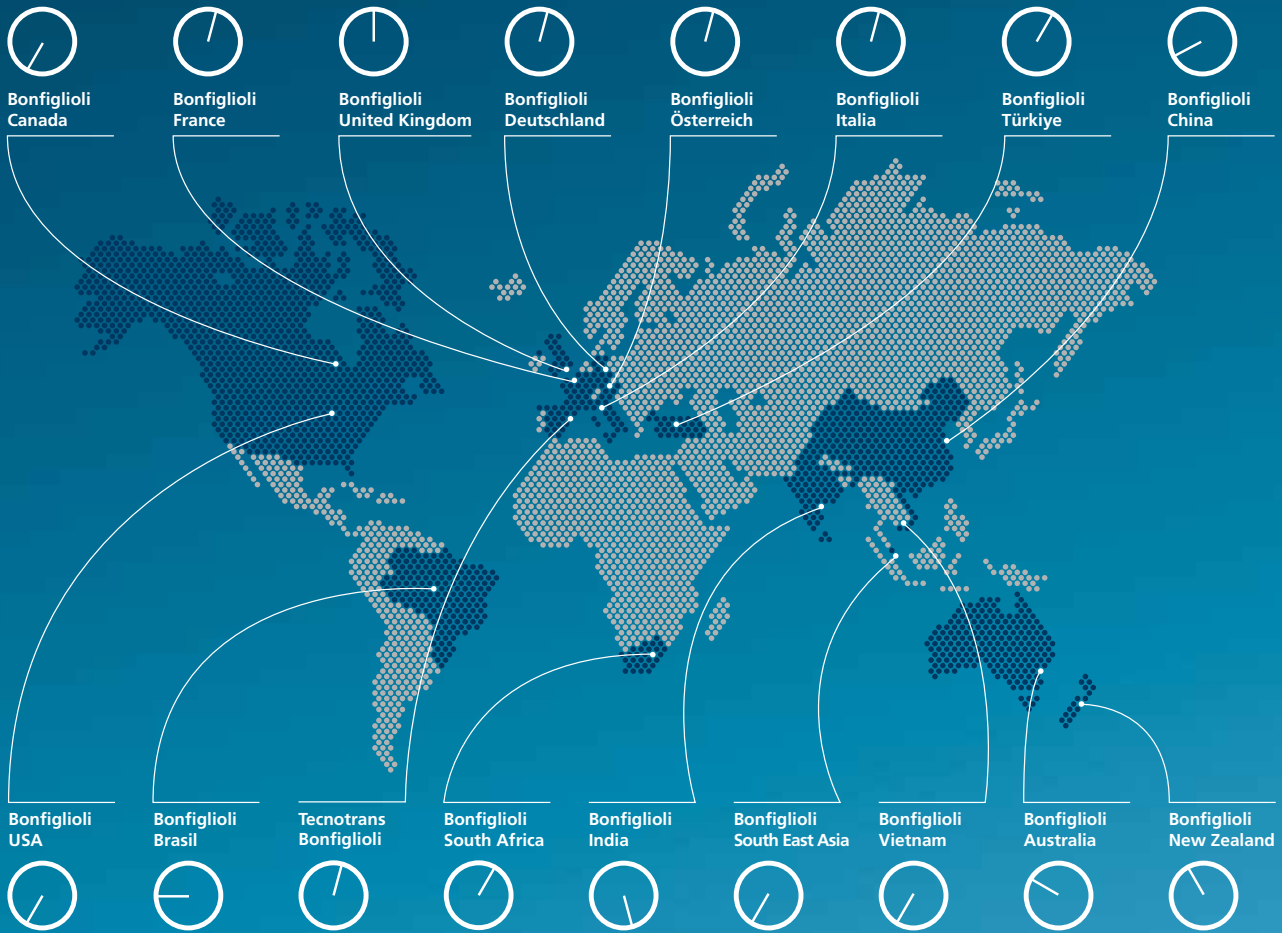
Our work increasingly brings us into contact with other nations and cultures, for which we have the greatest respect and with whom we share a vision of sustainable development based on renewable energy.

This bond of commitment allows us to be an authoritative and reliable global partner for the present and the future.

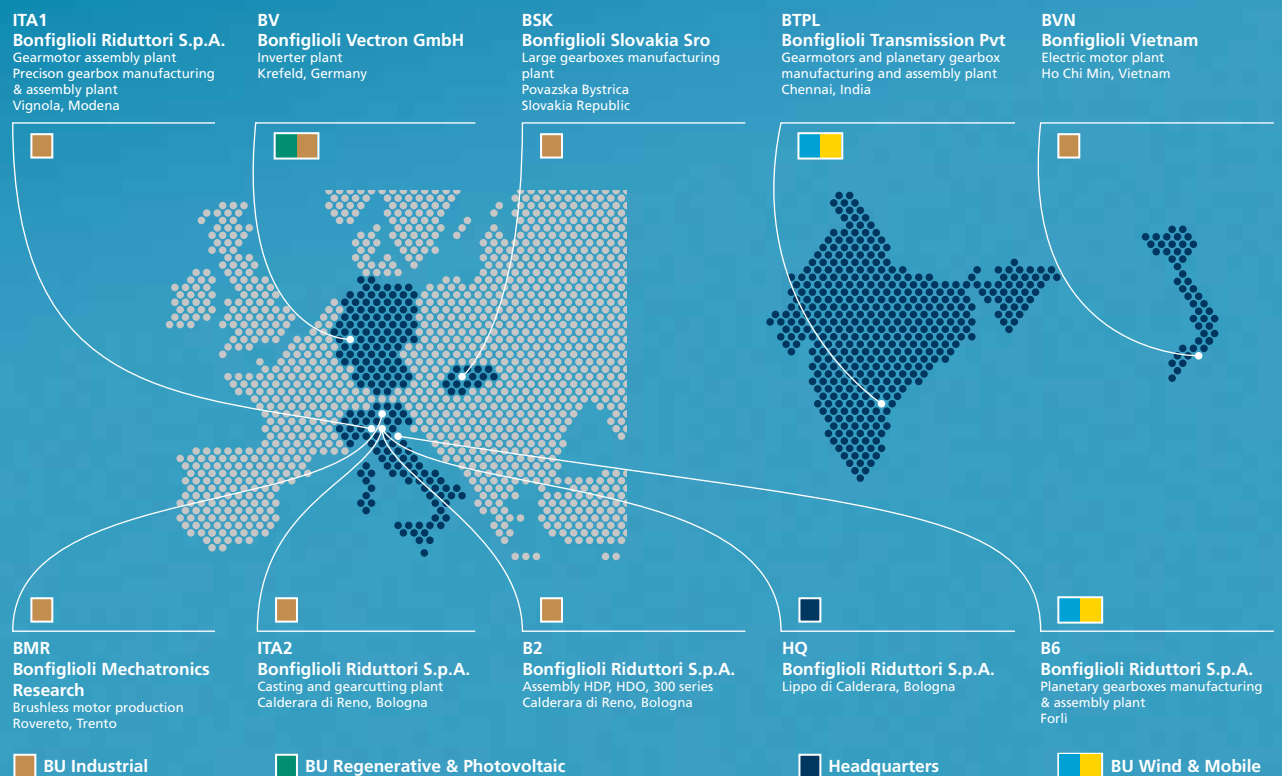


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Bonfiglioli has been designing and developing innovative and reliable power transmission and control solutions for industry, mobile machinery and renewable energy applications since 1956.