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Godrej | MATERIAL HANDLING

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**Raw Power,
Clean Power,
BRAVO Power.**

BRAVO
ELECTRIC FORK LIFT

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At last, a worthy alternative to IC engine forklifts!

The IC engine forklift has played a pivotal role in the development of the material handling sector of India and many other emerging economies. Versatile, powerful, productive and easy to maintain, it has served all types and scales of applications across almost all industrial sectors, besting electric forklifts on all counts, save maneuverability and environment friendliness.

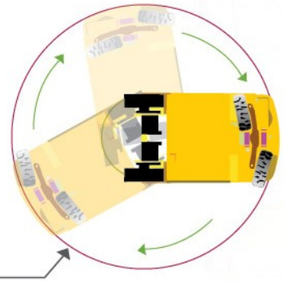
Over the last 10 years or so, breakthroughs in electric forklift technology have dramatically changed this paradigm. The advent and proliferation of AC drives in traction and hydraulics with advanced controllers, and operator interfaces have made electric trucks somewhat faster, but hugely more beneficial in terms of energy efficiency, operational safety and maintenance costs.

This left the electric forklift lagging its IC engine counterpart on only one point - productivity - a combination of speed and power. The BRAVO series 4-wheel electric forklifts from Godrej have narrowed this gap in performance like never before. With a top travel speed of 15 kmph, lifting speed of 340 mm/s and ability to climb 21% gradients, makes the Godrej BRAVO India's first and only electric forklift to deliver productivity close to that of an IC engine forklift.

What's more, the Godrej BRAVO electric forklifts best IC engine and other electric forklifts on turning performance, energy efficiency and safety. This new series is designed to serve in demanding applications and users who need to move more pallets per hour around the clock in a clean, quiet and safe manner.

What more can a forklift truck user ask for?

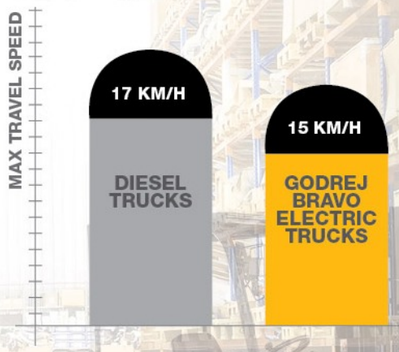
BEST IN CLASS TURNING RADIUS OF 1.77 M*

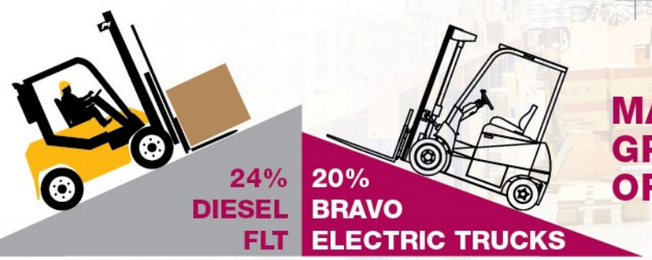


Bravo turns around the centre of its drive axle.

Conventional traction and steering system have a larger turning radius.

MAX TRAVEL SPEED 15 KM/H





MAXIMUM GRADEABILITY OF 20%

*For 2 tonne only. For 3 tonne - 1.98 m.

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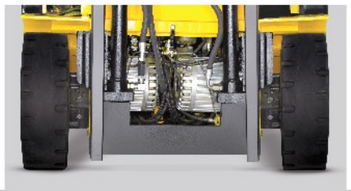
How is the Godrej BRAVO different from other electric forklifts?

Godrej BRAVO electric forklifts differ from other electric counterbalance forklifts essentially in 4 ways:

- Twin traction motors with an electronic differential deliver high travel speed and climbing power
- Unique steer axle that delivers a turning performance close to 3-wheel electric forklifts
- Can work outdoors and in light rain
- Wet disc brakes that boost safety and maintenance characteristics

Traction

- Front drive wheels driv en by independent AC traction motors and gearboxes
- Right and left AC traction controllers are perfectly synchronised to create an electronic differential, which gives the ability to rotate the drive wheels in opposite directions, dramatically reducing the turning radius
- Powerful drive motors and gearboxes mean that gradients as steep as 21% are all-in-a-day's-work for the Godrej BRAVO
- Externally mounted hall effect motor encoders are more tolerant to variations in working conditions and are easy to replace compared to shaft mounted encoders. This means low downtime due to any encoder maintenance, should the need arise.



Steering system

- Uniquely designed steer axle with turning angles of 103° and 77°
- Combined with the electronic differential, this results in a class leading turning radius. A 3 tonne BRAVO electric forklift has a minimum outer turning radius of 1980 mm while for the 2 tonne model it is 1770 mm.
- This is very close to the turning radius offered

Wet disc brakes

Proven, powerful and safe, wet disc brakes are virtually maintenance free and need servicing at intervals of 8,000 to 10,000 hours Completely sealed, multiple wet disc brakes are integrated into each of the traction gear boxes

Main advantages:

- Five times more braking surface area than conventional drum-and-shoe brakes - rapid action, high safety, long working life
- Its construction eliminates parts like springs and linkages that may need adjustment - maintenance free system
- Sealed system provides protection against contamination and corrosion - extended brake life

*3-wheel forklifts.

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WHAT THE BRAVO PROMISES TO DO FOR YOU?

Godrej BRAVO series electric forklifts promise to do four things for you:

1. Boost productivity
2. Reduce operating costs
3. Increase safety at work
4. Keep the environment clean

Boost Productivity

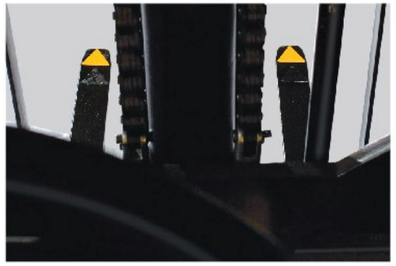
- High operating speeds combined with assured safety and operator comfort ensure that you maximise the number of pallets moved per hour
- The low centre of gravity offers greater lifting capacities at higher fork heights and superior turning stability compared to other electric and IC engine forklifts. Operators are more confident and feel safer while traveling with load on the forks.
- The class leading turning performance helps you reduce aisle width and increase number of pallet positions in the racking systems. Or if it's a factory floor, the forklift can safely and easliy maneouver in small spaces. The economic productivity of floor space gets a boost.
- The forklift's operating parameters can be pre-programmed in three different modes - Economic, Standard and Power, by pressing just one button. All operating functions can be set to suit the needs of a particular application or operator skill.
- CAN Bus system integrates the traction and hydraulic controllers in real time, ensuring extremely high safety and coordination across all functions
- Combined with advanced motor technology, it results in a beautifully harmonised operating system that gives the operator total control and confidence in the machine. An operator who feels safe and confident will be able to move more pallets per hour.

Reduce Operating Costs

- Energy efficient AC traction motors, combined with planetary reduction gearboxes, ensure that your forklift runs 10-12% longer per charge than older generation forklifts
- Intelligent torque control of AC traction motors greatly improves energy efficiency through motor current optimisation
- Low friction gearboxes minimise energy lost in overcoming friction, making more battery power available for operations
- Electronic control of the AC pump motor drives it at the RPM necessary for a particular function demanded by the operator such as steering, tilting or lifting. When the motor delivers only as much power as required for a particular operation, it improves the running time per charge.
- AC motors do not use carbon brushes, springs or commutators. They run cooler than DC motors and are virtually maintenance free.
- Electric forklifts have fewer moving parts and lower vibration levels than IC engine models. This reduces the maintenance needs of the forklift, lowering maintenance costs compared to IC engine forklifts.
- On-board diagnostics with fault code display enables quick fault identification, minimising down time
- Battery roll out system ensures quick battery changes, maximising operating hours in a day
- Thoughtfully provided access for maintenance includes detachable floor plates, accessible dip sticks, under hood hydraulic motor pump set. The design ensures that you can easily and conveniently reach all key areas of the forklift for checks and maintenance.

Increase Safety of Handling Operations

- Wet disc brakes are extremely safe and powerful, responding to a light touch on the brake pedal
- Anti-roll back system senses when the forklift needs to be held steady on a slope and automatically prevents it from rolling down. It also allows the operator to smoothly and safely start from a stationery position on a slope.
- Parking brake lever on the dashboard acts on the wet disc braking system via cables
- An operator presence sensor in the seat ensures that all functions of the forklift are disabled the instant the operator leaves his seat. The forklift will not move and neither will the hydraulics function. (Except forks lowering function.)
- Rounding sharp corners is safe because the controller senses this and automatically slows the forklift down to a safe speed
- At 20% battery charge level, all lifting operations are disabled, forcing the operator to place the forklift for charging or change the battery. This prevents deep discharge - almost certain death - of the expensive traction battery.
- Advanced instrumentation with interactive LCD display keeps the operator advised of all key operating parameters, like battery charge condition, running hours, travel speed, parking brake indicator, steer wheel position, etc
- A low dashboard and wide view mast offer excellent visibility in all directions including the fork tips and load, even when raised high.



Godrej BRAVO Electric Forklift - an Environment Conscious Concept

- Energy efficient traction and hydraulics result in longer run time on every battery charge and lower power consumption over a year
- Coupled with faster movement of goods, the BRAVO electric forklift consumes less energy per pallet moved than other battery powered forklifts
- AC traction and hydraulic motors do not generate carbon dust, a common issue with forklifts using DC motors for traction or hydraulics
- The BRAVO's brake discs need replacement only once every 8,000 to 10,000 hours. The number of replacements over the forklift's life is far fewer than with conventional drum brakes.
- Large diameter wheels and soft rubber tyres make the BRAVO equally comfortable outdoors and on delicate painted warehouse floor

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Table no. 1

Technical Specification

Characteristics	Manufacturer		Godrej	Godrej	Godrej	Godrej
	Model		GX150E BRAVO	GX200E BRAVO	GX250E BRAVO	GX300E BRAVO
	Power Unit (Battery, Diesel, LPG/ Petrol)		Battery	Battery	Battery	Battery
	Operation (Manual, Pedestrian, Stand-on, Seated)		seated	seated	seated	seated
	Load Capacity	kg	1500	2000	2500	3000
	Load Centre	c (mm)	500	500	500	500
	Load Distance (Front overhang)	x (mm)	490	490	510	510
	Wheelbase	y (mm)	1470	1470	1585	1585
Weights	Service Weight incl. Battery #	kg	3800	4000	4410	4730
	Axle Loading, Laden Front/ Rear	kg	5080/420	5500/455	6490/445	7375/500
	Axle Loading, Unladen Front/ Rear	kg	2110/1860	2110/1860	2170/2240	2210/2520
Wheels & Chasis	Tyres (S-solid, P-pneumatic)		solid	solid	solid	solid
	Tyre Size, Front Wheel	mm	21"×15"-7"	21"×15"-7"	21"×15"-7"	21"×15"-7"
	Tyre Size, Rear Wheel	mm	18"×7"-8"	18"×7"-8"	18"×7"-8"	18"×7"-8"
	Wheels, Number Front/ Rear (× = driven)		2×/2	2×/2	2×/2	2×/2
	Wheel Tread - Front	b10 (mm)	965	965	1040	1040
	Wheel Tread - Rear	b11 (mm)	990	990	990	990
Dimensions	Tilt of Mast Forward/ Backward	α/β (°)	5/10	5/10	5/10	5/10
	Overall Height - Mast Lowered	h1 (mm)	2630	2630	2630	2630
	Free Lift	h2 (mm)	105	105	105	105
	Lift (MFH)	h3 (mm)	3660	3660	3660	3660
	Overall Height - Mast Extended	h4 (mm)	4260	4260	4410	4410
	Height of Overhead Guard (cabin)	h6 (mm)	2150	2150	2150	2150
	Driver Seat Hight	h7 (mm)	1110	1110	1110	1110
	Coupling Height	h10 (mm)	470	470	470	470
	Overall Length with Forks	l1 (mm)	3240	3240	3470	3470
	Length to Face of Forks	l2 (mm)	2240	2240	2470	2470
	Overall Width	b1 (mm)	1160	1160	1240	1240
	Fork Dimensions (Thickness × Width × Length)	(mm)	40×80×1000	40×80×1000	45×100×1000	45×100×1000
	Fork Carriage Class Type		ISO 2A	ISO 2A	ISO 3A	ISO 3A
	Fork Carriage Width	b3 (mm)	1040	1040	1040	1040
	Ground Clearance Under Mast, Laden	m1 (mm)	110	110	110	110
	Ground Clearance at Centre of Wheelbase	m2 (mm)	125	125	125	125
	Right Angle Aisle Width (1000 ×1200)	Ast* (mm)	3440	3440	3650	3650
	Turning Radius	Wa (mm)	1770	1770	1980	1980
Performance	Travel Speed, Laden/ Unladen	km/h	15/15	15/15	15/15	15/15
	Lift Speed, Laden/ Unladen	m/s	0.34/0.36	0.34/0.36	0.34/0.36	0.34/0.36
	Lowering Speed, Laden/ Unladen	m/s	0.38/0.35	0.38/0.35	0.38/0.35	0.38/0.35
	Max. Drawbar Pull	kg	1000	1000	1100	1100
	Max. Gradeability, Laden/ Unladen	%	20	20	20	20
Drive	Drive (Single/ Twin)		Twin AC	Twin AC	Twin AC	Twin AC
	Drive Motor Rating S2 60 Min	kW	6.5 × 2	6.5 × 2	10 × 2	10 × 2
	Lift Motor, 15 Min Rating	kw	10	10	15	15
	Battery Voltage/ Rated Capacity K5	V/Ah	48/516	48/516	80/344	80/344
	Battery Weight	kg	880	880	1020	1020
Other	Type of Drive Control		MOSFET	MOSFET	MOSFET	MOSFET
	Working Pressure for Attachment	bar	170	170	170	170
	Noise Level at Operator's Ear	db (A)	<80	<80	<80	<80

*Ast: Includes Safety Clearance = 200 mm #With regular battery and CVT Mast MFH 4500 mm

Note: All dimensions and specifications indicated above are subject to a variation of ± 15%. Godrej products and specifications are subjected to improvement or change without notice.
Overall height raised with Load back rest = MFH +1200.

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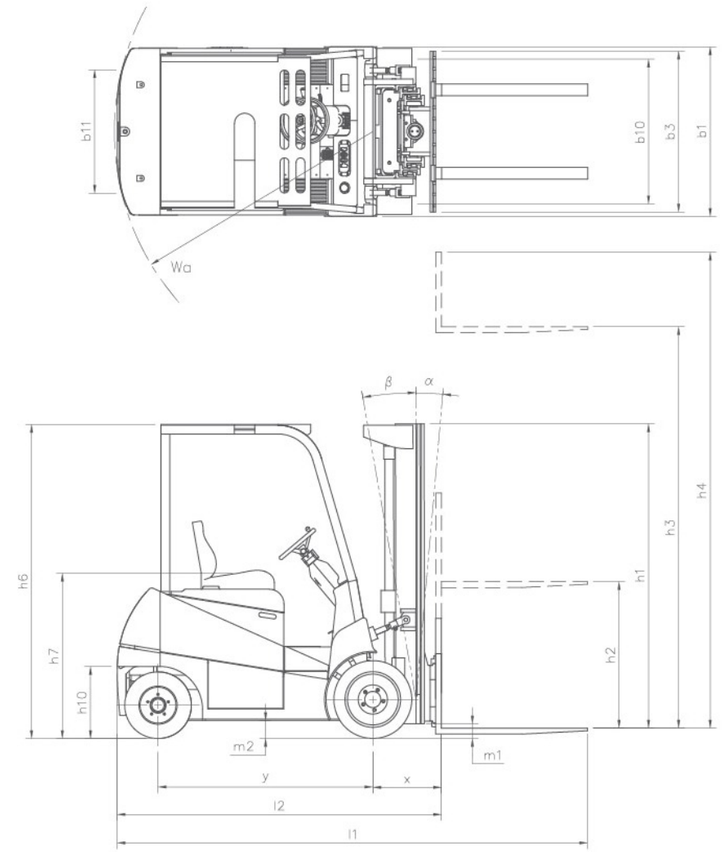
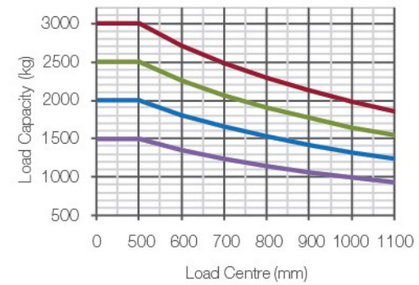
Type of Mast	MFH (mm)	Overall Height Lowered (mm)	Overall Height Raised		Free Lift (mm)	Derated Capacity at MFH (kg)				Tilt Angle	
			GX150E, GX200E	GX250E, GX300E		GX150 E	GX200E	GX250E	GX300E	α°	β°
2 stage	3000	2300	3600	3750	105	1500	2000	2500	3000	5	10
	3300	2420	3900	4050	105	1500	2000	2500	3000	5	10
	3660	2630	4260	4410	105	1500	2000	2500	3000	5	10
2 stage with FFL	3000	2150	3600	3600	1530	1500	2000	2500	3000	5	10
3 stage with FFL	4500	2150	5065	5115	1530	1400	1750	2400	2750	5	10
	5500	2325	6065	6115	1705	1350	1650	2350	2550	2	5



Load Capacity Chart



Standard Accessories:

Head and Tail Lights
Signal Lights
Reverse Alarm
Rear View Mirror
Safety Seatbelt
Operator Presence Sensing System
Advanced Instrumentation Panel.

Optional Fitments:

Fork Extentions
Lateral Clamp
Load Back Rest
Ram
Rotating Forks
Rotating Lateral Clamp
Rotating Paper Roll Clamp
Side Shifter

NOTE:
Capacities shown above are computed with mast in vertical position on level ground.