



# EFL403-HV

## HIGH CAPACITY ELECTRIC COUNTERBALANCED FORKLIFT 4T

 4000 kg  7000 mm  309 V Li-Ion



### Compact and Mighty

The EFL403/453/503/553-HV offers more compact sizes while delivering enhanced performance over low-voltage forklift models. Their single front wheel design allows maneuverability in tighter spaces, making them ideal for industries like steel manufacturing, automotive, and heavy machinery production where space can be limited.

| SPECIFICATION           | REF                            | UNIT | VALUE       |
|-------------------------|--------------------------------|------|-------------|
| Manufacturer            |                                |      | EP          |
| Model designation       |                                |      | EFL403-HV   |
| Battery voltage         |                                | V    | 309         |
| Rated capacity          | Q                              | kg   | 4000        |
| Load centre distance    | c                              | mm   | 500         |
| Service weight          |                                | kg   | 6450        |
| Height, mast lowered    | h <sub>1</sub>                 | mm   | 2250        |
| Lift                    | h <sub>3</sub>                 | mm   | 3000        |
| Height, mast extended   | h <sub>4</sub>                 | mm   | 4177/3835   |
| Overall length          | l <sub>1</sub>                 | mm   | 4125        |
| Overall width           | b <sub>1</sub> /b <sub>2</sub> | mm   | 1495        |
| Length to face of forks | l <sub>2</sub>                 | mm   | 3055        |
| Fork dimensions         | s/e/l                          | mm   | 50×150×1070 |
| Turning radius          | Wa                             | mm   | 2680        |
| Drive                   |                                |      | Electric    |
| Operator type           |                                |      | Seated      |

# Features

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## High Performance: High speed and high gradeability

High-voltage Li-ion batteries enable more power delivery to motors, improving acceleration and travel speeds for high-capacity trucks. PMSMs complement this with rapid response times, swiftly reaching required speeds and torques. This combination of PMSM and high voltage can provide stable and strong power output, which further gives high-capacity trucks excellent climbing capabilities ensuring that the forklift can cope with various applications with ease.

The high-voltage model offers a 1.5-2 times performance improvement over the low-voltage model. Taking the 10-ton model as an example:

100% improvement in travel speed for high voltage models in laden and unladen conditions.

The high-voltage model demonstrates a 45% faster lifting speed.

100% improvement in gradeability when unladen, 45% improvement when laden for high voltage models.



## Energy Efficiency: extended runtime and fast charging

High-voltage Li-ion batteries have high energy density and can store more electrical energy within a compact volume. High-voltage systems consume less energy and provide longer battery running time comparing low-voltage systems. Notably, these high-voltage Li-ion batteries boast an impressive cycle life of up to 4000 cycles, ensuring long-term durability and minimizing the need for battery replacements.

The PMSMs incorporate advanced control technology to optimize motor efficiency. Unlike traditional AC motors, PMSMs have higher energy conversion efficiency and reduce energy waste. This means that high-capacity trucks can work continuously for prolonged hours at lower costs.

Equipped with fast charging capabilities, high-capacity trucks offer a remarkable charging experience. The high-voltage models are compatible with vehicle-grade charging stations and support 1C charging rating, allowing them to be fully charged in as fast as 1-1.2 hours. This minimizes downtime and maximizes productivity, making it ideal for multi-shift operations

Lithium batteries present considerably lower charging costs than fuel expenses. The integration of high-voltage and PMSM technology achieves up to 15% greater electricity savings versus traditional lithium and AC technology configurations. This significantly reduces long-term energy consumption costs.



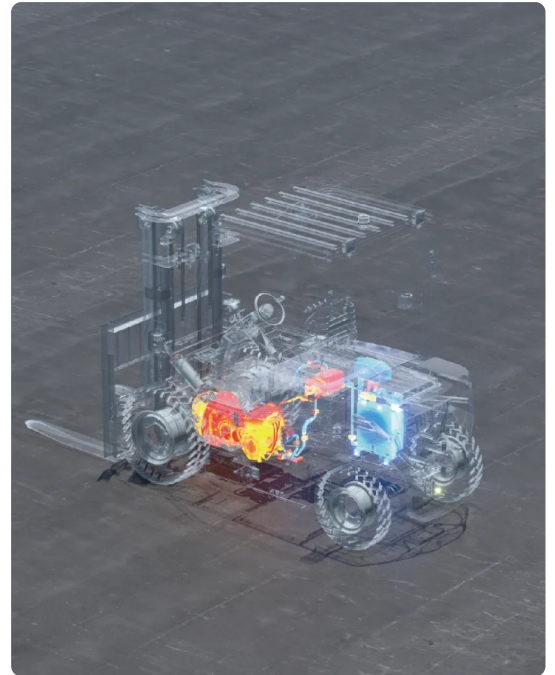
## Safety Assured: Battery, motor protection, monitoring and mast buffering

Both high-voltage lithium batteries and PMSM employ multiple protective measures to ensure safe operations including overcharge protection, over-temperature monitoring, short-circuit protection, etc. minimizing the risk of potential hazards and maximizing operational safety.

The central controlling module- VCU (Vehicle Control Unit) extends the safety of the high-voltage forklifts. VCU provides precise control and real-time monitoring of critical parameters to ensure the truck operates within safe limits.

It also features turn speed control, which adjusts the forklift's speed based on the turning angle, ensuring stability during turns. An over-speed alarm alerts the operator if the forklift exceeds the safe speed limit.\*

The high-capacity forklift mast is equipped with a hydraulic buffering system that ensures smooth lifting and lowering of loads. With controlled deceleration, the fork movement is smooth with no abrupt stops that could damage the load or cause operator discomfort. This feature enhances operational safety and prolongs the lifespan of the mast components.



## Smart and reliable strategy for thermal management

The high-capacity trucks utilize three distinct cooling systems to ensure optimal performance and reliability. Specifically, two water cooling systems are employed for the motor and the battery, while an oil cooling system is dedicated to the hydraulics system.

The water cooling systems provide superior cooling performance, preventing the truck from overheating even under the most demanding conditions or in the heat of summer. Water's higher heat transfer capacity compared to air allows it to dissipate heat more efficiently from critical components like the motor and battery. This efficient heat dissipation helps maintain the battery temperature around 30~35 °C , protecting these vital components from overheating and potential damage or failure. Consequently, this enhances the overall reliability and longevity of the high-capacity trucks.

Additionally, water cooling systems typically operate with less noise compared to air cooling systems that rely on high-speed fans. This noise reduction is particularly beneficial in applications where a quieter operation is desirable, such as in urban areas or indoor facilities.

The oil cooling system, on the other hand, is used for the hydraulics system. This system ensures that the hydraulic components remain within optimal temperature ranges, thereby maintaining their efficiency and preventing overheating. By effectively managing the temperature of the hydraulics system, the oil cooling system contributes to the smooth and reliable operation of the truck's hydraulic functions.



## Low maintenance: Longer battery life span

Operating at a higher voltage allows the battery to be designed with fewer individual cells.

Thanks to advanced BMS (Battery Management System) which helps to regulate and monitor high-voltage battery, these batteries tend to have a longer life than low-voltage lithium batteries, reducing the need of battery replacement.

The brushless, simple rotor design of PMSM eliminates mechanical wear from brushes and commutators. This durable, low-friction construction requires minimal periodic maintenance, reducing associated labor costs and downtime.



## Sustainability : Zero emissions for cleaner environment

As fully electric trucks powered by lithium-ion batteries, these forklifts produce zero emissions during operation, eliminating exposure to toxic fumes like carbon monoxide and nitrogen oxides. Unlike lead-acid batteries which can leak corrosive acid, lithium-ion batteries do not risk hazardous spills. The high-capacity li-ion trucks contribute to a cleaner and safer indoor working environment without compromising handling capabilities.

## Strong adaptability adaptable to harsh outdoor weather conditions

Experience uninterrupted productivity through rain, puddles, and damp conditions with the overall IPX4 rating. Plus an exceptional IP67 rating for high-voltage components. Engineered to withstand harsh temperature, high-capacity trucks offer an ambient temperature range of -20 °C ~40 °C allowing them to perform no matter climate.

Battery heating when charging comes as a standard function for high capacity models, which is activated when the surrounding temperature is below zero to always offer an optimal temperature range for efficient and safe charging even in cold weather conditions.

The dual front wheels is a standard configuration on several models offering a wider base of support, which greatly improves the forklift's stability. Considering the capacity loads of the high-capacity trucks, the weight of the load is more evenly distributed across a larger surface area. The increased ground contact area provided by the dual wheels enhances traction. This is particularly beneficial in environments where the floor may be slippery or uneven while operating outdoors, ensuring that the forklift can maintain a firm grip and operate safely. This not only helps in maintaining balance but also minimizes the stress on individual tires, extending the lifespan of the tires.



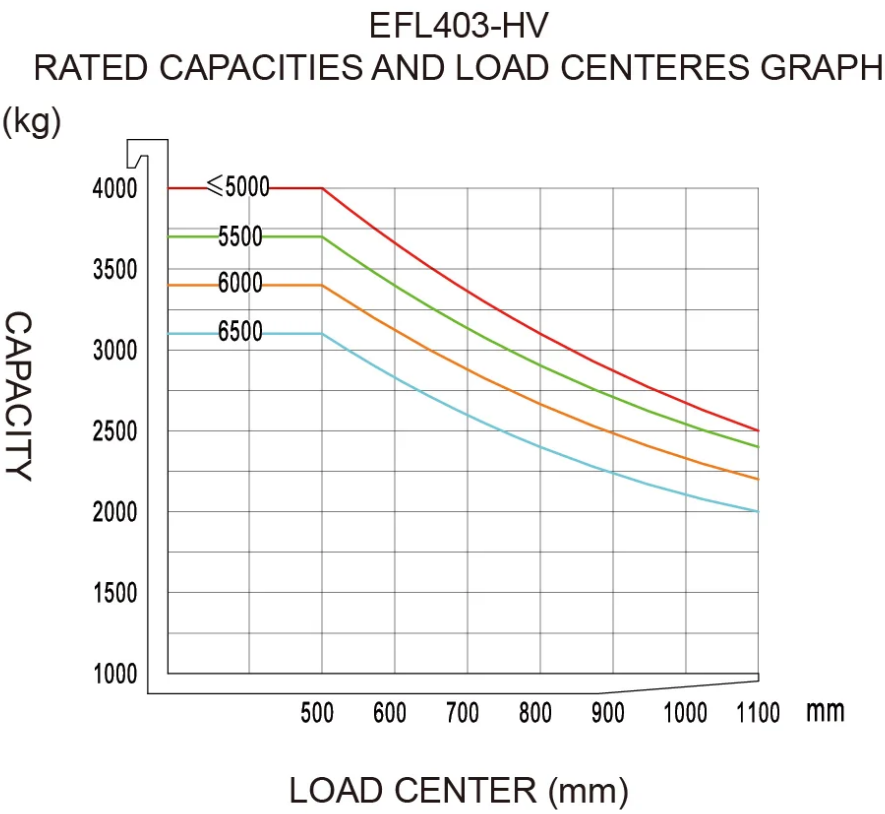
## VDI Chart

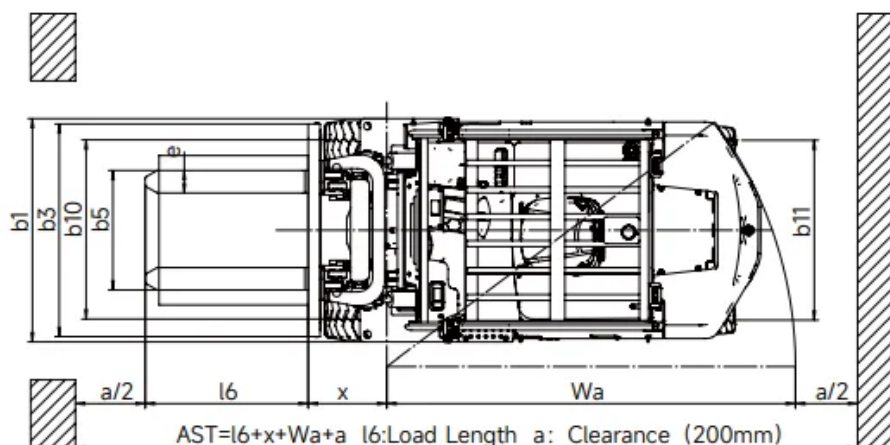
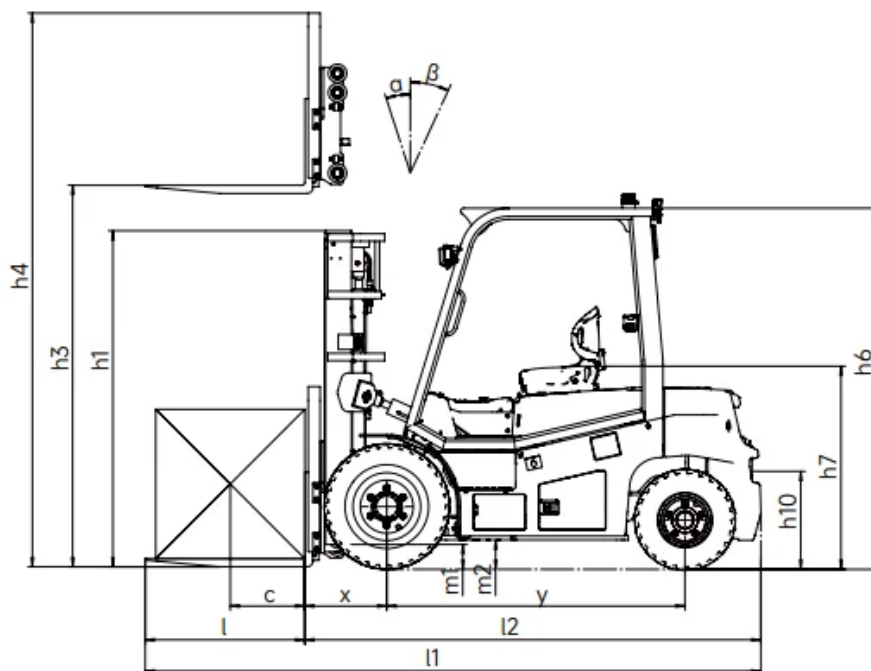
| SPECIFICATION |                                             | REF | UNIT | VALUE     |
|---------------|---------------------------------------------|-----|------|-----------|
| 1.1           | Manufacturer                                |     |      | EP        |
| 1.2           | Model designation                           |     |      | EFL403-HV |
| 1.3           | Drive                                       |     |      | Electric  |
| 1.4           | Operator type                               |     |      | Seated    |
| 1.5           | Rated capacity                              | Q   | kg   | 4000      |
| 1.6           | Load centre distance                        | c   | mm   | 500       |
| 1.8           | Load distance, centre of drive axle to fork | x   | mm   | 545       |
| 1.9           | Wheelbase                                   | y   | mm   | 2000      |
| 2.1           | Service weight                              |     | kg   | 6450      |
| 2.2           | Axle loading, laden front/rear              |     | kg   | 9442/1008 |
| 2.3           | Axle loading, unladen front/rear            |     | kg   | 3352/3098 |

| SPECIFICATION |                                               | REF                            | UNIT | VALUE        |
|---------------|-----------------------------------------------|--------------------------------|------|--------------|
| 3.1           | Tyres                                         |                                |      | Pneumatic    |
| 3.2           | Tyre size, front                              |                                | mm   | 8.25-15-14PR |
| 3.3           | Tyre size, rear                               |                                | mm   | 7.00-12-12PR |
| 3.5           | Wheels, number front/rear (x=drive wheels)    |                                |      | 2x/2         |
| 3.6           | Tread width, front                            | b <sub>10</sub>                | mm   | 1176         |
| 3.7           | Tread width, rear                             | b <sub>11</sub>                | mm   | 1190         |
| 4.1           | Tilt of mast/fork carriage forward/backward   | $\alpha/\beta$                 | °    | 6/12         |
| 4.2           | Height, mast lowered                          | h <sub>1</sub>                 | mm   | 2250         |
| 4.2.1         | Overall height                                |                                | mm   | 4177         |
| 4.3           | Free lift                                     | h <sub>2</sub>                 | mm   | 150          |
| 4.4           | Lift                                          | h <sub>3</sub>                 | mm   | 3000         |
| 4.5           | Height, mast extended                         | h <sub>4</sub>                 | mm   | 4177/3835    |
| 4.6           | Initial lift                                  |                                | mm   | 150          |
| 4.7           | Height of overhead guard (cabin)              | h <sub>6</sub>                 | mm   | 2400         |
| 4.8           | Seat height relating to SIP/stand height      | h <sub>7</sub>                 | mm   | 1290         |
| 4.10          | Height of wheel arms                          | h <sub>8</sub>                 | mm   | 1290         |
| 4.12          | Coupling height                               | h <sub>10</sub>                | mm   | 640          |
| 4.13          | Loading height, unladen                       |                                |      | 150          |
| 4.15          | Height, lowered                               | h <sub>13</sub>                | mm   | 2250         |
| 4.19          | Overall length                                | l <sub>1</sub>                 | mm   | 4125         |
| 4.20          | Length to face of forks                       | l <sub>2</sub>                 | mm   | 3055         |
| 4.21          | Overall width                                 | b <sub>1</sub> /b <sub>2</sub> | mm   | 1495         |
| 4.22          | Fork dimensions                               | s/e/l                          | mm   | 50×150×1070  |
| 4.23          | Fork carriage ISO 2328, class/type A, B       |                                |      | 3A           |
| 4.24          | Fork carriage width                           | b <sub>3</sub>                 | mm   | 1380 (1424)  |
| 4.31          | Ground clearance, laden, below mast           | m <sub>1</sub>                 | mm   | 150          |
| 4.32          | Ground clearance, centre of wheelbase         | m <sub>2</sub>                 | mm   | 180          |
| 4.34.1        | Aisle width for pallets 1000×1200 crossways   | A <sub>st</sub>                | mm   | 4495         |
| 4.34.2        | Aisle width for pallets 800 × 1200 lengthways | A <sub>st</sub>                | mm   | 4495         |
| 4.35          | Turning radius                                | W <sub>a</sub>                 | mm   | 2680         |
| 4.36          | Internal turning radius                       |                                |      | 2680         |
| 5.1           | Travel speed, laden/unladen                   |                                | km/h | 24/25        |
| 5.2           | Lift speed, laden/unladen                     |                                | m/s  | 0.46/0.53    |
| 5.3           | Lowering speed, laden/unladen                 |                                | m/s  | 0.41/0.42    |

| SPECIFICATION |                                           | REF | UNIT  | VALUE      |
|---------------|-------------------------------------------|-----|-------|------------|
| 5.8           | Max. gradeability, laden/unladen          |     | %     | 25/30      |
| 5.10          | Service brake                             |     |       | Hydraulic  |
| 5.11          | Parking brake                             |     |       | Mechanical |
| 6.1           | Drive motor rating S2 60 min              |     | kW    | 30         |
| 6.2           | Lift motor rating at S3 15%               |     | kW    | 27.8       |
| 6.4.1         | Battery voltage                           |     | V     | 309        |
| 6.4.2         | Battery nominal capacity K5               |     | Ah    | 173        |
| 6.4.3         | Battery type                              |     |       | Li-Ion     |
| 6.5           | Battery weight                            |     | kg    | 473        |
| 8.1           | Type of drive unit                        |     |       | PMSM       |
| 10.7          | Sound pressure level at the driver's seat |     | dB(A) | /          |

Subject to modification of specifications and designs without prior notice as part of continuous product improvement. Images and technical data shown may include optional features and are provided for reference only. All dimensions are subject to standard manufacturing tolerances.





## Mast Options

| MAST TYPE       | LIFT HEIGHT (H3, MM) | MAST LOWERED HEIGHT (H1, MM) | MAST EXTENDED HEIGHT, NO BACKREST (H4, MM) | MAST EXTENDED HEIGHT, WITH BACKREST (H4, MM) | FREE LIFT HEIGHT, NO BACKREST (H2, MM) | FREE LIFT HEIGHT, WITH BACKREST (H2, MM) |
|-----------------|----------------------|------------------------------|--------------------------------------------|----------------------------------------------|----------------------------------------|------------------------------------------|
| 2-Standard Mast | 3000                 | 22250                        | 3835                                       | 4177                                         | 150                                    | 150                                      |
| 2-Standard Mast | 3500                 | 2500                         | 4335                                       | 4677                                         | 150                                    | 150                                      |
| 2-Standard Mast | 4000                 | 2750                         | 4835                                       | 5177                                         | 150                                    | 150                                      |
| 2-Standard Mast | 4500                 | 3050                         | 5385                                       | 5677                                         | 150                                    | 150                                      |
| 2-Standard Mast | 5000                 | 3300                         | 5885                                       | 6177                                         | 150                                    | 150                                      |

| MAST TYPE       | LIFT HEIGHT (H3, MM) | MAST LOWERED HEIGHT (H1, MM) | MAST EXTENDED HEIGHT, NO BACKREST (H4, MM) | MAST EXTENDED HEIGHT, WITH BACKREST (H4, MM) | FREE LIFT HEIGHT, NO BACKREST (H2, MM) | FREE LIFT HEIGHT, WITH BACKREST (H2, MM) |
|-----------------|----------------------|------------------------------|--------------------------------------------|----------------------------------------------|----------------------------------------|------------------------------------------|
| 2-Standard Mast | 5500                 | 3600                         | 6435                                       | 6677                                         | 150                                    | 150                                      |
| 2-Standard Mast | 6000                 | 3850                         | 6935                                       | 7177                                         | 150                                    | 150                                      |
| 2-Standard Mast | 6500                 | 4150                         | 7485                                       | 7677                                         | 150                                    | 150                                      |
| 2-Free Mast     | 3000                 | 2250                         | -                                          | 4244                                         | 860                                    | 1364                                     |
| 2-Free Mast     | 3500                 | 2500                         | -                                          | 4744                                         | 1110                                   | 1614                                     |
| 2-Free Mast     | 4000                 | 2750                         | -                                          | 5244                                         | -                                      | -                                        |
| 3-Free Mast     | 4500                 | 2247                         | 5242                                       | 5677                                         | 1525                                   | 1091                                     |
| 3-Free Mast     | 5000                 | 2413                         | 5742                                       | 6177                                         | 1692                                   | 1258                                     |
| 3-Free Mast     | 5500                 | 2580                         | 6242                                       | 6677                                         | 1859                                   | 1425                                     |
| 3-Free Mast     | 6000                 | 2797                         | 6792                                       | 7177                                         | 2026                                   | 1642                                     |
| 3-Free Mast     | 6500                 | 2963                         | 7292                                       | 7677                                         | 2193                                   | 1809                                     |
| 3-Free Mast     | 7000                 | 3130                         | 7792                                       | 8177                                         | 2360                                   | 1976                                     |

## Options

| ITEM                       | OPTIONS (optional items marked in yellow)                                                                          |
|----------------------------|--------------------------------------------------------------------------------------------------------------------|
| Fork dimension             | 1070mm forks (500mm LC) /1220mm forks (600mm LC)   Customized fork length/non-standard accessories   Hook-on forks |
| Fork carriage width option | 1424mm   Customized fork carriage width                                                                            |
| Backrest height            | Fork backrest with hook on type fork   Customized fork backrest                                                    |
| Battery capacity           | 309V173Ah LFP battery                                                                                              |
| Charger                    | 20kw (3 phase AC 370V-460V, 50-60HZ, 32A plug)   40kw (3 phase AC 370V-460V, 50-60HZ, 63A plug)                    |
| Attachments                | Hook-on sideshifter   Hook-on fork positioner with sideshifter   Fork positioner: Pin-type forks                   |
| Buzzer                     | Yes                                                                                                                |
| OPS system                 | Yes                                                                                                                |
| Telematics                 | Yes                                                                                                                |
| Overhead guard             | Standard overhead guard                                                                                            |

| ITEM                                           | OPTIONS (optional items marked in yellow)                                             |
|------------------------------------------------|---------------------------------------------------------------------------------------|
| Heating system during lithium battery charging | Yes                                                                                   |
| Rear armrest horn                              | Yes   Upgrade mechanical suspension seat with armrest + headrest + safety belt switch |
| Fork length                                    | 150                                                                                   |