



Service Manual

Chassis, Mast & Options

EP20K	ETB8B-00011-up
EP25K	ETB8B-50001-up
EP30K	ETB9B-00011-up
EP35K	ETB9B-50001-up

FOREWORD

This service manual is a guide for servicing Cat® lift trucks of 2.0 ton, 2.5 ton, 3.0 ton and 3.5 ton models. The instructions are grouped by systems to conveniently provide a ready reference.

A long productive life of your lift truck depends to a great extent on correct servicing — servicing consistent with what you will learn from this service manual. Read the respective sections of this manual carefully and familiarize yourself with all the components you will work on before attempting to start a test, repair or rebuild job.

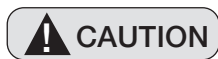
The descriptions, illustrations and specifications contained in this manual are of the trucks with the serial numbers in effect at the time it was approved for printing. Cat lift truck reserves the right to change specifications or design without notice and without incurring obligation.

Safety Related Signs

The following safety related signs are used in this service manual to emphasize important and critical instructions:



Indicates a specific potential hazard that could result in serious bodily injury or death.



Indicates a specific potential hazard that may result in bodily injury, or damage to, or destruction of, the machine.



Indicates a condition that can cause damage to, or shorten service life of, the machine.

SAFETY

 **WARNING**

The proper and safe lubrication and maintenance for this lift truck, recommended by Cat lift truck, are outlined in the **OPERATION & MAINTENANCE MANUAL** for these trucks.


Improper performance of lubrication or maintenance procedures is dangerous and could result in injury or death. Read and understand the **OPERATION & MAINTENANCE MANUAL** before performing any lubrication or maintenance.

The serviceman or mechanic may be unfamiliar with many of the systems on this truck. This makes it important to use caution when performing service work. A knowledge of the system and/or components is important before the removal or disassembly of any component.

Because of the size of some of the truck components, the serviceman or mechanic should check the weights noted in this Manual. Use proper lifting procedures when removing any components.

Following is a list of basic precautions that should always be observed.

1. Read and understand all warning plates and decals on the truck before operating, lubricating or repairing the product.
2. Always wear protective glasses and protective shoes when working around trucks. In particular, wear protective glasses when pounding on any part of the truck or its attachments with a hammer or sledge. Use welders gloves, hood/goggles, apron and other protective clothing appropriate to the welding job being performed. Do not wear loose-fitting or torn clothing. Remove all rings from fingers when working on machinery.
3. Do not work on any truck that is supported only by lift jacks or a hoist. Always use blocks or jack stands to support the truck before performing any disassembly.

 **WARNING**

Do not operate this truck unless you have read and understand the instructions in the **OPERATION & MAINTENANCE MANUAL**. Improper truck operation is dangerous and could result in injury or death.

4. Lower the forks or other implements to the ground before performing any work on the truck. If this cannot be done, make sure the forks or other implements are blocked correctly to prevent them from dropping unexpectedly.
5. Use steps and grab handles (if applicable) when mounting or dismounting a truck. Clean any mud or debris from steps, walkways or work platforms before using. Always face truck when using steps, ladders and walkways. When it is not possible to use the designed access system, provide ladders, scaffolds, or work platforms to perform safe repair operations.
6. To avoid back injury, use a hoist when lifting components which weigh 23 kg (50 lb.) or more. Make sure all chains, hooks, slings, etc., are in good condition and are of the correct capacity. Be sure hooks are positioned correctly. Lifting eyes are not to be side loaded during a lifting operation.
7. To avoid burns, be alert for hot parts on trucks which have just been stopped and hot fluids in lines, tubes and compartments.
8. Be careful when removing cover plates. Gradually back off the last two bolts or nuts located at opposite ends of the cover or device and pry cover loose to relieve any spring or other pressure, before removing the last two bolts or nuts completely.
9. Be careful when removing filler caps, breathers and plugs on the truck. Hold a rag over the cap or plug to prevent being sprayed or splashed by liquids under pressure. The danger is even greater if the truck has just been stopped because fluids can be hot.

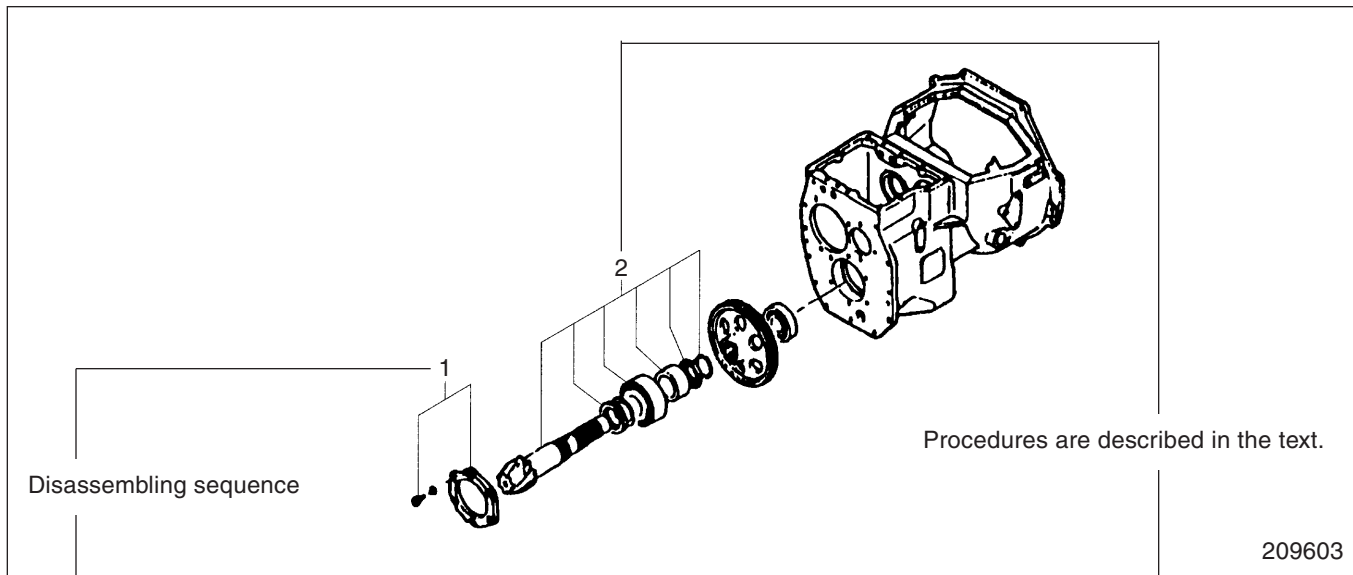
10. Always use tools that are in good condition and be sure you understand how to use them before performing any service work.
11. Reinstall all fasteners with same part number. Do not use a lesser quality fastener if replacements are necessary.
12. If possible, make all repairs with the truck parked on a level, hard surface. Block truck so it does not roll while working on or under truck.
13. Disconnect battery and discharge any capacitors (electric trucks) before starting to work on truck. Hang "Do not Operate" tag in the Operator's Compartment.
14. Repairs, which require welding, should be performed only with the benefit of the appropriate reference information and by personnel adequately trained and knowledgeable in welding procedures. Determine type of metal being welded and select correct welding procedure and electrodes, rods or wire to provide a weld metal strength equivalent at least to that of parent metal.
15. Do not damage wiring during removal operations. Reinstall the wiring so it is not damaged nor will it be damaged in operation by contacting sharp corners, or by rubbing against some object or hot surface. Place wiring away from oil pipe.
16. Be sure all protective devices including guards and shields are properly installed and functioning correctly before starting a repair. If a guard or shield must be removed to perform the repair work, use extra caution.
17. Always support the mast and carriage to keep carriage or attachments raised when maintenance or repair work is performed, which requires the mast in the raised position.
18. Loose or damaged fuel, lubricant and hydraulic lines, tubes and hoses can cause fires. Do not bend or strike high pressure lines or install ones which have been bent or damaged. Inspect lines, tubes and hoses carefully. Do not check for leaks with your hands. Pin hole (very small) leaks can result in a high velocity oil stream that will be invisible close to the hose. This oil can penetrate the skin and cause personal injury. Use cardboard or paper to locate pin hole leaks.
19. Tighten connections to the correct torque. Make sure that all heat shields, clamps and guards are installed correctly to avoid excessive heat, vibration or rubbing against other parts during operation. Shields that protect against oil spray onto hot exhaust components in event of a line, tube or seal failure, must be installed correctly.
20. Relieve all pressure in air, oil or water systems before any lines, fittings or related items are disconnected or removed. Always make sure all raised components are blocked correctly and be alert for possible pressure when disconnecting any device from a system that utilizes pressure.
21. Do not operate a truck if any rotating part is damaged or contacts any other part during operation. Any high speed rotating component that has been damaged or altered should be checked for balance before reusing.
22. When handling the parts containing asbestos, be careful not to inhale the asbestos. Doing so is hazardous to your health.

If the shop dust may contain asbestos, follow the precautions described below.

 - a. Do not use compressed air for cleaning.
 - b. Do not brush or apply grinder on asbestos containing materials.
 - c. To clean asbestos containing materials, wipe with moistened cloth or use a vacuum cleaner with particle filter.
 - d. If you have to handle the parts containing asbestos for a long time, be sure to do it in a well-ventilated area.
 - e. If the asbestos in the air cannot be removed, wear a mask.
 - f. Be sure to observe the working rules and regulations.
 - g. When disposing of materials with asbestos, be sure to observe the environmental protection regulations of your area.
 - h. Avoid working in the atmosphere where asbestos particles may be suspended.

HOW TO USE THIS MANUAL (Removal, Installation, Assembly and Disassembly)

Disassembly diagram (example)

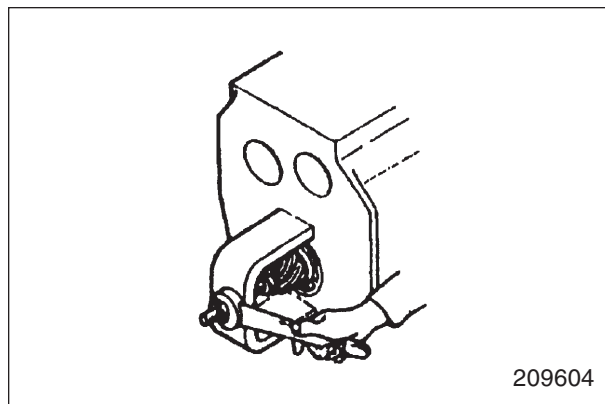


Sequence

- 1 Cover, Bolt, Washer (part name)
- 2 Snap ring (part name)

Suggestion for disassembling

1. Output shaft, Removing
Remove output shaft using a special tool.



Service Data

Gear Backlash	A	0.11 to 0.28 mm (0.0043 to 0.0110 in.)
	B	0.5 mm (0.020 in.)

A: Standard Value

B: Repair or Service Limit

Symbols or abbreviation

OP	Option
R1/4	Taper pipe thread (external) 1/4 inch (formerly PT1/4)
Rc1/8	Taper pipe thread (internal) 1/8 inch (formerly PT1/8)
G1/4A	Straight pipe thread (external) 1/4 inch (formerly PF1/4-A)
Rp1/8	Straight pipe thread (internal) 1/8 inch (formerly PS1/8)

Units

1. SI Units are used in this manual.
2. The following table shows the conversion of SI unit and customary unit.

Item	SI unit	Customary unit
Force	1 N	0.1020 kgf
	(1 lbf)	(0.4536 kgf)
Pressure	1 kPa	0.0102 kgf/cm ²
	(1 psi)	(0.0703 kgf/cm ²)
Torque	1 N·m	0.1020 kgf·m
	(1 lbf·ft)	(0.1383 kgf·m)

GROUP INDEX

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GENERAL INFORMATION	Serial Number Locations, Chassis and Mast Model Identification, Dimensions, Technical Data
VEHICLE ELECTRICAL COMPONENTS	Electrical Component Locations, Console Box, Key Switch, Lamp Specification Chart, Electrical System of FC
POWER TRAIN	General Structure, Removal and Installation
TRANSFER AND DIFFERENTIAL	Structure and Functions, Procedures and Suggestions for Disassembly and Reassembly, Service Data
FRONT AXLE	Structure and Functions, Disassembly and Reassembly of Front Axle Assembly, Service Data
REAR AXLE	Rear Axle, Rear Wheels, Removal and Installation, Disassembly and Reassembly, Adjustment, Troubleshooting, Service Data
BRAKE SYSTEM	Specifications, Structure and Functions, Procedures and Suggestions for Disassembly and Reassembly, Inspection and Adjustment, Troubleshooting, Service Data
STEERING SYSTEM	Specifications, Structure and Functions, Procedures and Suggestions for Removal and Installation, Steering Gear, Hydraulic Circuit, Troubleshooting, Service Data
HYDRAULIC SYSTEM	Tank, Pump, Control Valve, Lift and Tilt Cylinders, Flow Regulator Valve, Down Safety Valve
MAST AND FORK	Simplex Mast, Duplex Mast, Triplex Mast
SERVICE DATA	Inspection Standards, Periodic Replacement of Parts, Lubrication Standards, Main Component Weights, Tightening Torque for Standard Bolts and Nuts, Special Tools
OPTIONS	Rearview Mirror Kit, Backup Buzzer Kit, Working Lamp Kit, Tire Kit, Foot Direction Control Kit

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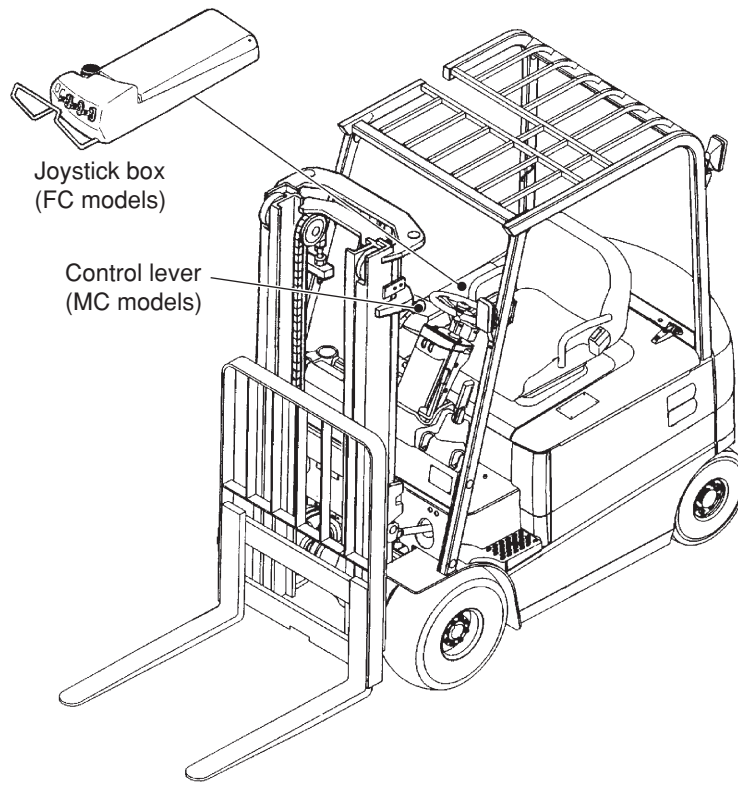
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GENERAL INFORMATION

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Vehicle Exterior



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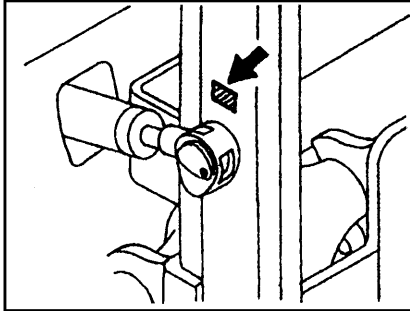
Models

This manual applies to EP20K, EP25K, EP30K and EP35K.

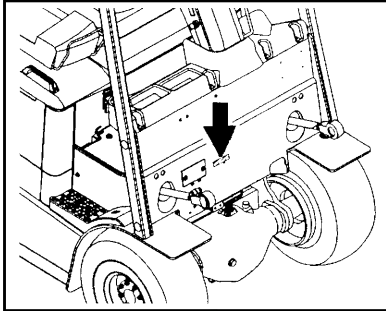
Class	Truck Model	Serial Number
2 ton	EP20K	ETB8B-00011-up
2.5 ton	EP25K	ETB8B-50001-up
3 ton	EP30K	ETB9B-00011-up
3.5 ton	EP35K	ETB9B-50001-up

Serial Number Locations

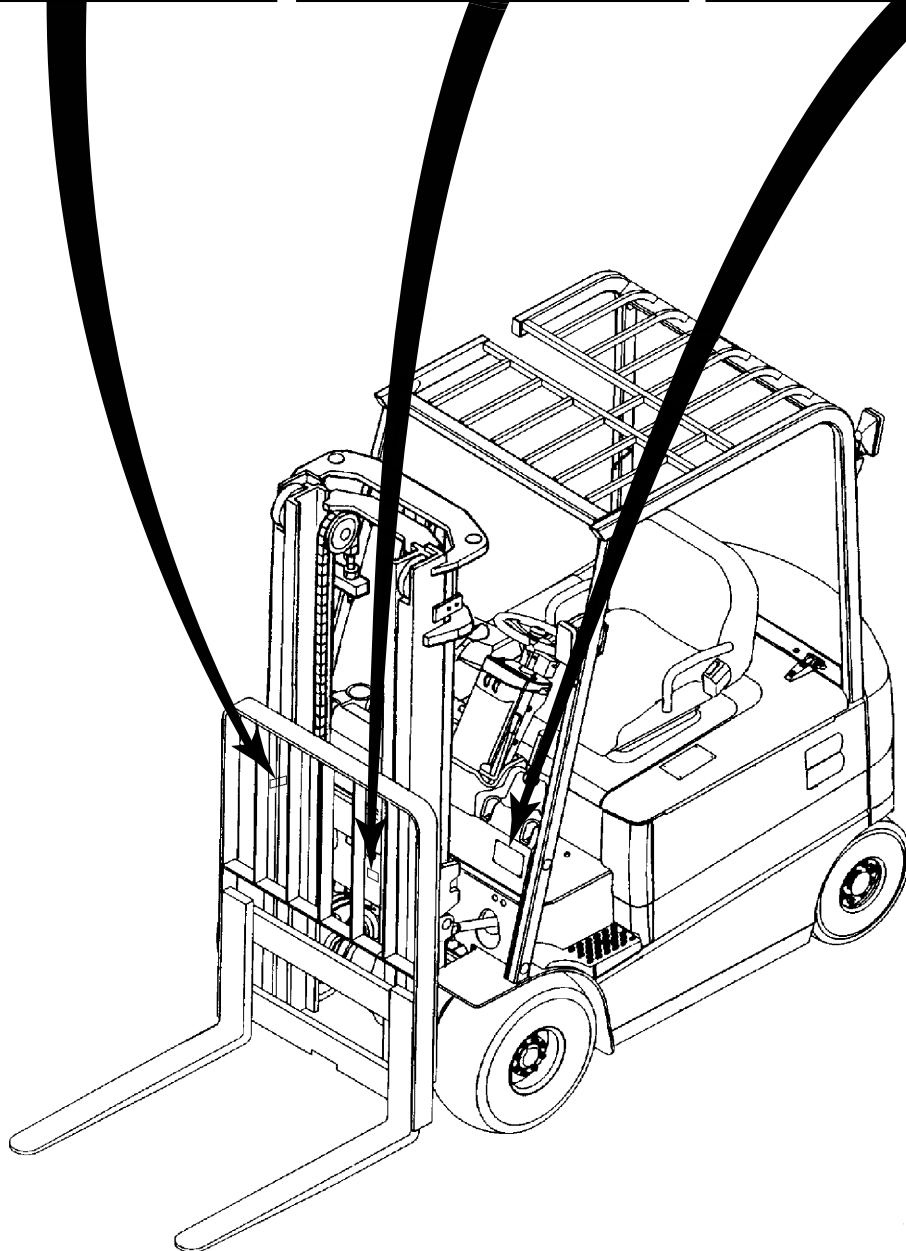
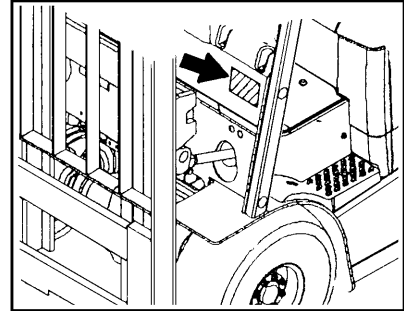
Mast number



Chassis number

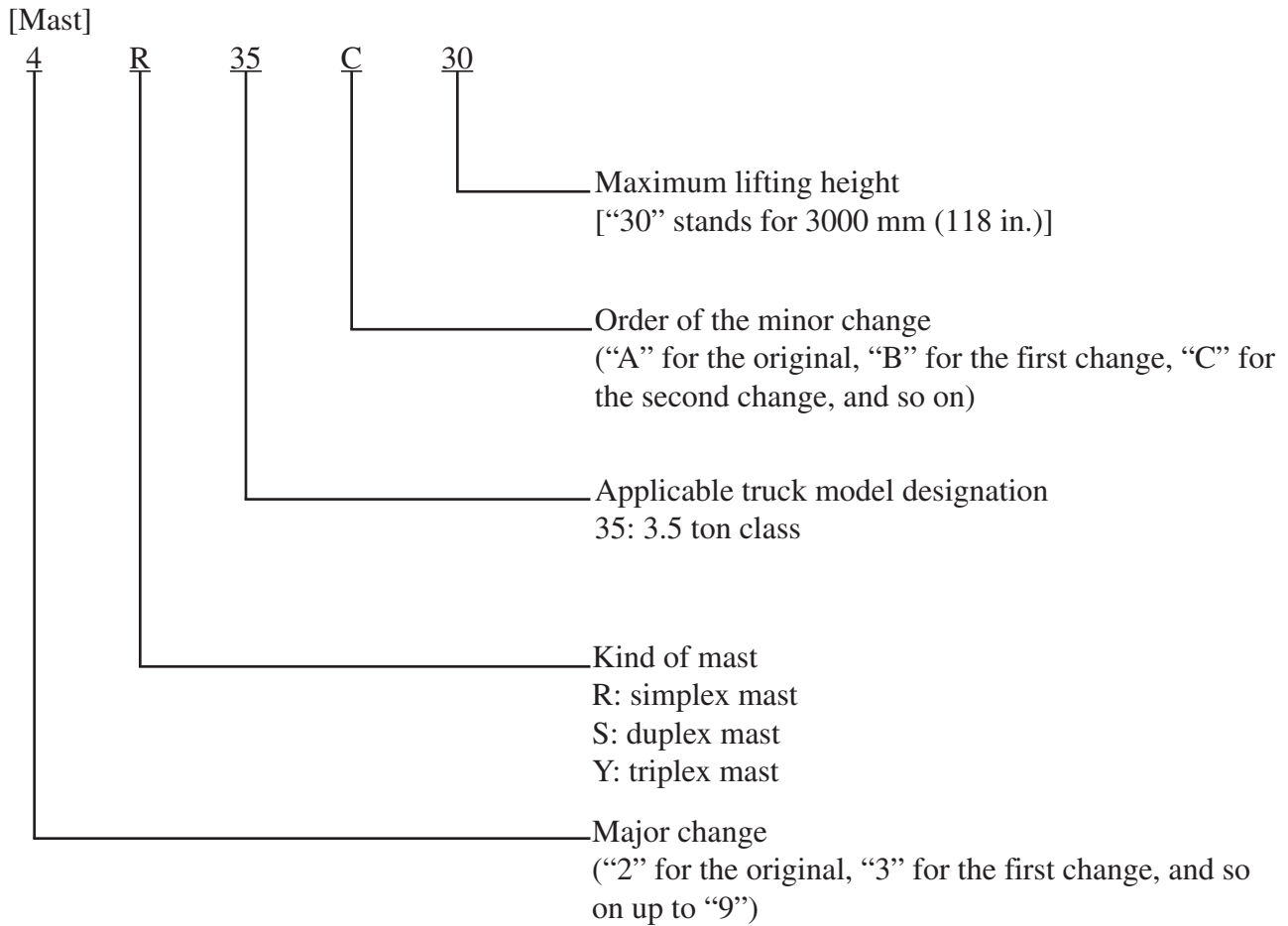
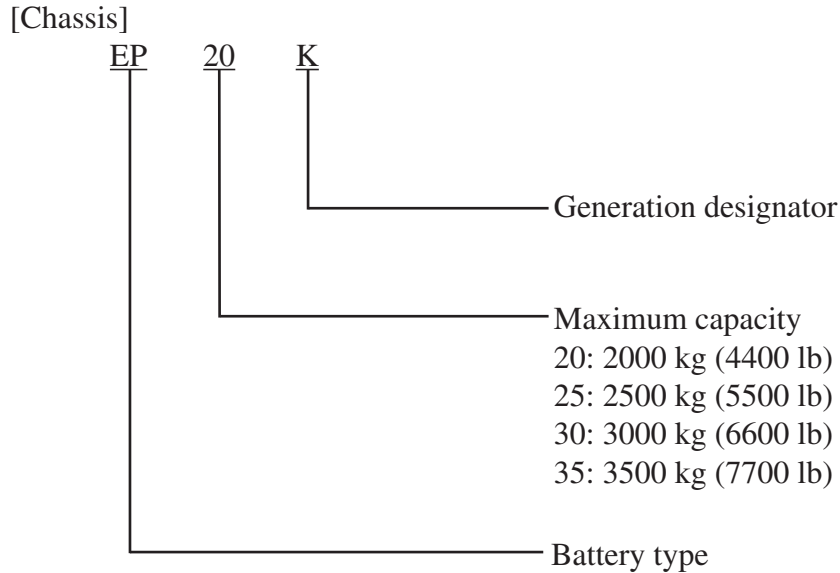


Nameplate

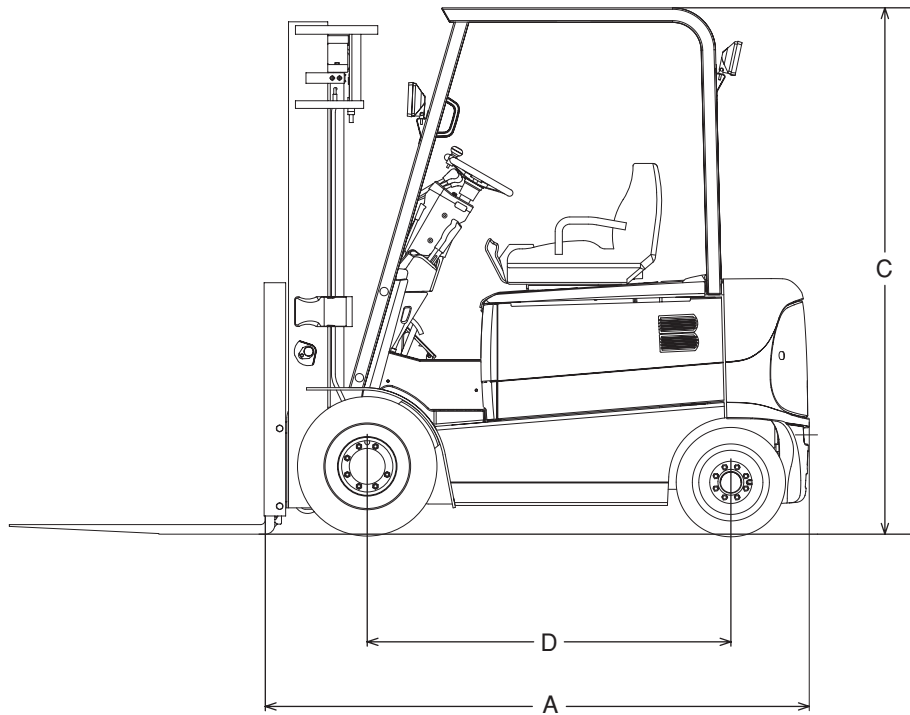
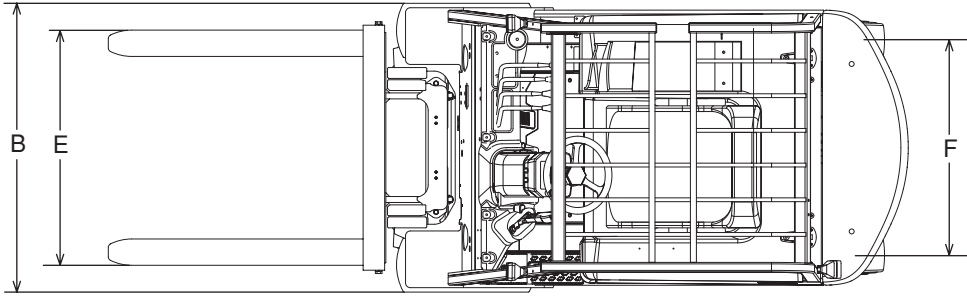


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Chassis and Mast Model Identification



Dimensions



Technical Data

Truck model			EP20K	EP25K
Class			2.0 ton	2.5 ton
Load capacity/load center		N (kgf)/mm [lbf/in.]	19600 (2000)/500 [4400/20]	24500 (2500)/500 [5500/20]
Truck size	Length to fork face	A mm (in.)	2249 (88.5)	2274 (89.5)
	Width	B mm (in.)	1190 (46.9)	1190 (46.9)
	Height of overhead guard	C 2200 (86.6) mm (in.)	2200 (86.6)	
Wheelbase		D mm (in.)	1520 (59.8)	1520 (59.8)
Truck weight (w/o battery)		kg (lb)	2790 (6151)	2983 (6576)
Tread Front/rear		E/F mm (in.)	990/898 (39.0/35.4)	990/898 (39.0/35.4)
Tires size	Front		23 × 9 – 10	23 × 9 – 10
	Rear		18 × 7 – 8	18 × 7 – 8
Turning radius		mm (in.)	1950 (76.8)	1970 (77.6)
Travel speeds Unloaded/loaded		km/h (mph)	16.4/16.0 (10.2/9.9)	16.4/16.0 (10.2/9.9)
Lift speeds Unloaded/loaded		m (in.)/sec	0.60/0.40 (23.6/15.7)	0.60/0.38 (23.6/14.96)
Lowering speeds Unloaded/loaded		m (in.)/sec	0.50/0.50 (19.7/19.7)	0.50/0.50 (19.7/19.7)
Battery voltage		V	80	80
Battery rated capacity (5 hrs.) MAX		Ah	600	600
Battery compartment size		mm (in.)	1025 × 708 × 769 (40.4 × 27.9 × 30.3)	1025 × 708 × 769 (40.4 × 27.9 × 30.3)
Battery weight		kg (lb)	1385 (3053)	1385 (3053)
Tilt angle (forwards – backwards)			6° – 8°	6° – 8°
Drive motor capacity (60 min. short duty)		kW	12.0	12.0
Pump motor output @ 15% duty factor		kW	15	15
Steering pump motor output		W	550	550
Drive motor control method			IGBT chopper	IGBT chopper
Pump motor control method			IGBT chopper	IGBT chopper

GENERAL INFORMATION

Truck model			EP30K	EP35K	
Class			3.0 ton	3.5 ton	
Load capacity/load center N (kgf)/mm [lbf/in.]			29400 (3000)/500 [6600/20]	34300 (3500)/500 [7700/20]	
Truck size	Length to fork face	A	mm (in.)	2522 (99.3)	2577 (101.5)
	Width	B	mm (in.)	1230 (48.4)	1230 (48.4)
	Height of overhead guard	C	mm (in.)	2250 (88.6)	2259 (88.9)
Wheelbase		D	mm (in.)	1690 (66.5)	1690 (66.5)
Truck weight (w/o battery)		kg (lb)	3231 (7123)	3665 (8080)	
Tread Front/rear		E/F	mm (in.)	990/898 (39.0/35.4)	990/898 (39.0/35.4)
Tires size	Front			28 × 9 – 15	250 – 15
	Rear			18 × 7 – 8	18 × 7 – 8
Turning radius			mm (in.)	2180 (85.8)	2230 (87.8)
Travel speeds Unloaded/loaded			km/h (mph)	16.4/16.0 (10.2/9.9)	16.4/16.0 (10.2/9.9)
Lift speeds Unloaded/loaded			m (in.)/sec	0.54/0.34 (21.3/13.4)	0.45/0.28 (17.7/11.0)
Lowering speeds Unloaded/loaded			m (in.)/sec	0.50/0.50 (19.7/19.7)	0.50/0.50 (19.7/19.7)
Battery voltage			V	80	80
Battery rated capacity (5 hrs.) MAX			Ah	750	750
Battery compartment size			mm (in.)	1025 × 852 × 769 (40.4 × 33.5 × 30.3)	1025 × 852 × 769 (40.4 × 33.5 × 30.3)
Battery weight			kg (lb)	1872 (4127)	1872 (4127)
Tilt angle (forwards – backwards)				6° – 8°	6° – 8°
Drive motor capacity (60 min. short duty)			kW	12	12
Pump motor output @ 15% duty factor			kW	15	15
Drive motor control method				IGBT chopper	IGBT chopper
Pump motor control method				IGBT chopper	IGBT chopper

VEHICLE ELECTRICAL COMPONENTS

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