# SERVICE MANUAL

C3E100R

C3E130R

C3E150R

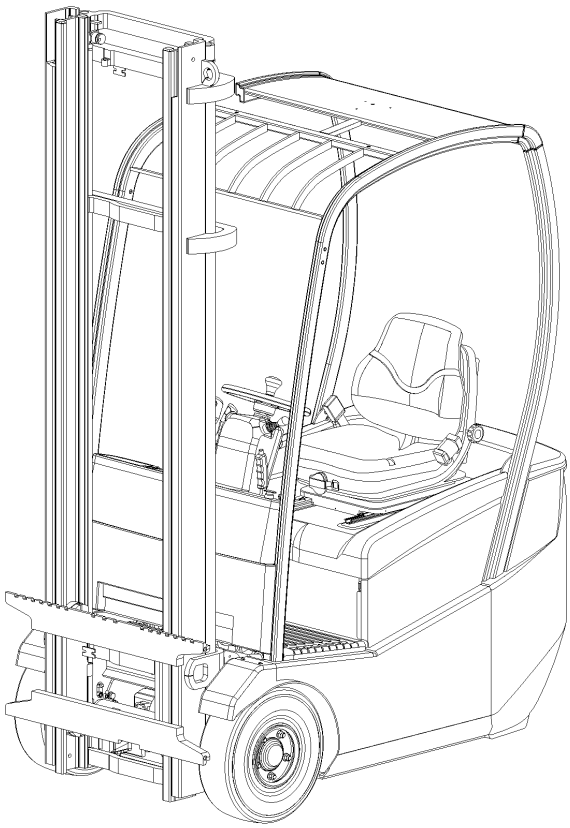
*Code 036-0424-01*

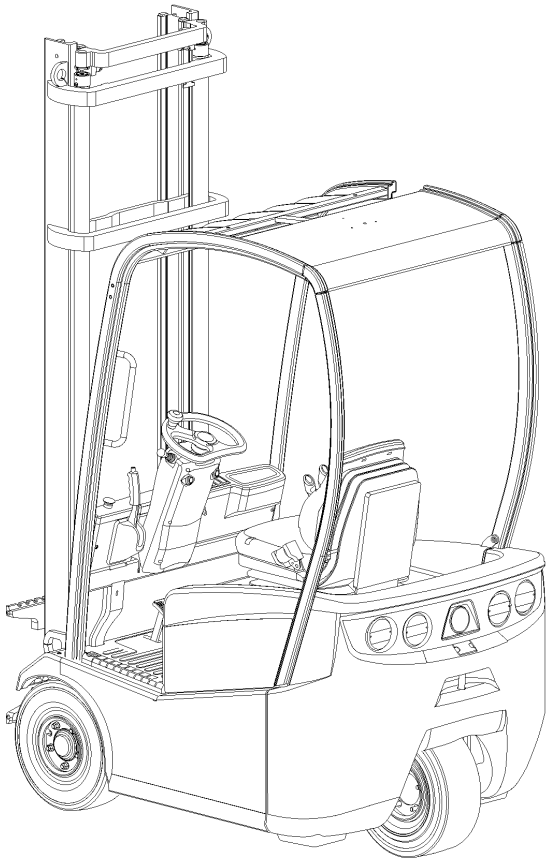
*05/2006*

# INDEX

# CHASSIS

## VEHICLE EXTERIOR VIEW

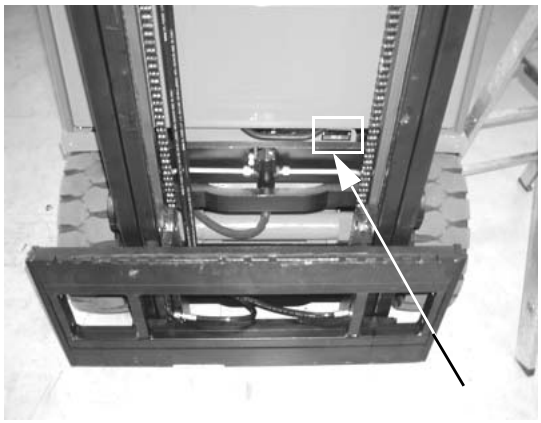




## VEHICLE MODELS

| Vehicle model code | Load Capacity | Control method | Voltage (V) |
| --- | --- | --- | --- |
| 100 | 1.0 ton | AC microcomputer controller | 24 |
| 130 | 1.25 ton | ↑ | ↑ |
| 150 | 1.5 ton | ↑ | ↑ |

## FRAME NUMBER

| Vehicle model code | S/N Format | Serial number position |
| --- | --- | --- |
| 100 | CE000000 |  |
| 130 | CE000000 | |
| 150 | CE000000 | |

# HOW TO USE THIS MANUAL

## EXPLANATION METHOD

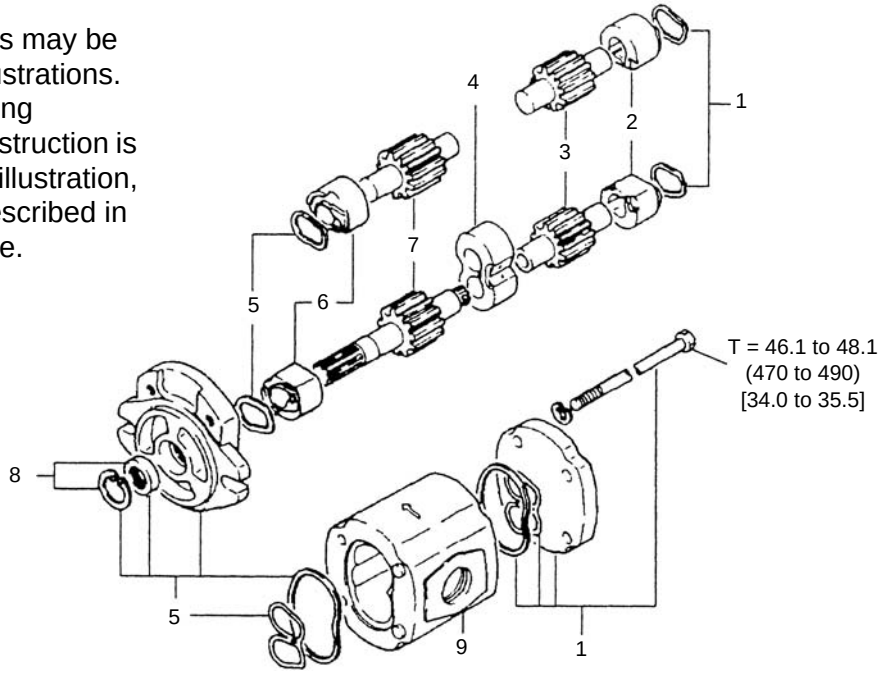
1. Operating procedure
2. Operating procedures are described using either pattern A or pattern B.
3. Pattern A: Each step of the operation is explained with its own illustration.
4. Pattern B: The entire operation is indicated by step numbers in one illustration, followed by cautions, notes, and point operations.

**Example of pattern B**

## DISASSEMBLY · INSPECTION · REASSEMBLY

T=N·m

- Some step numbers may be omitted in some illustrations.
- When a part requiring tightening torque instruction is not indicated in the illustration, the part name is described in the illustration frame.




## Disassembly Procedure

Operation to be explained

1 Remove the cover. **[POINT 1]**
2 Remove the bushing. **[POINT 2]**
3 Remove the gear.

Explanation of operation point with illustration

**Point Operations**
**[POINT 1]**
Disassembly:
Make match marks before removing the pump cover

**[POINT 2]**
Inspection:
Measure the bushing inside diameter
**Limit 19.12 mm.**

1. Matters omitted from this manual
   (1) This manual omits descriptions of the following jobs, but perform them in actual operation:
      (a) Cleaning and washing of removed parts as required
      (b) Visual inspection (partially described)

## TERMINOLOGY

**Caution:**
**Important matters, negligence of which may cause accidents. Be sure to observe them.**

**Note:**
**Important items, negligence of which may cause accidents, or matters in operating procedure which require special attention.**

**Standard: Value showing the allowable range in inspection or adjustment**

**Limit: The maximum or minimum value allowed in inspection or adjustment.**

## ABBREVIATIONS

| Abbreviation | Meaning | Abbreviation | Meaning |
|---|---|---|---|
| ATT | Attachment | SAE | Society of Automotive Engineers (USA) |
| EHPS | Electronically controlled fully hydraulic power steering | RH | Right hand |
| FHPS | Fully hydraulic power steering | SST | Special service tool |
| LH | Left hand | STD | Standard |
| L/ | Less | T= | Tightening torque |
| OPT | Option | ○ ○ T | Number of teeth (○ ○ T) |
| O/S | Oversize | U/S | Undersize |
| PS | Power steering | W/ | With |

# SI UNITS

**Meaning of SI**

This manual uses SI units. SI represents the International System of Units, which was established to unify the various systems of units used in the past for smoother international technical communication.

**New Units Adopted in SI**

| Item | New unit | Conventional unit | Conversion rate*1 (1 [conventional unit] = X [SI unit]) |
|---|---|---|---|
| Force*2 | N (newton) | kgf | 1 kgf = 9.80665 N |
| Torque*2 (Moment) | N·m | kgf·cm | 1 kgf·cm = 9.80665 N·m |
| Pressure*2 | Bar | kgf/cm$^2$ | 1 Bar = 1 kgf / cm$^2$ |
| Pressure*2 | Pa (pascal) | kgf/cm$^2$ | 1 kgf/cm$^2$ = 98.0665 kPa = 0.0980665 MPa |
| ↑ | ↑ | mmHg | 1 mmHg = 0.133322 kPa |
| Revolving | rpm | rpm | 1 rpm = 1 r/min |
| Spring con- | N/mm | kgf/mm | 1 kgf/mm = 9.80665 N/mm |
| Volume | l | cc | 1 cc = 1 mℓ |
| Power | W | PS system | 1 PS = 0.735499 kW |
| Heat quantity | W·h | cal | 1 kcal = 1.16279 W·h |
| Specific fuel | g/W·h | g/PS·h | 1 g/PS·h = 1.3596 g/kW·h |

**<Reference>**

*** 1: X represents the value in SI units as converted from 1 [in conventional units], which can be used as the rate for conversion between conventional and SI units.**

*** 2: In the past, kilogram [kg] representing mass was often used in place of weight kilogram [kgf], which should be used as the unit of force.**

**Conversion between Conventional and SI Units**

**Equation for conversion**

| | |
|---|---|
| Value in SI unit = Conversion rate × Value in conventional unit | Conversion rate: Figure corresponding to X in the conversion rate column in the table above |
| Value in conventional unit = Value in SI unit ÷ Conversion rate | |

**When converting, change the unit of the value in conventional or SI units to the one in the conversion rate column in the table above before calculation. For example, when converting 100 W to the value in conventional unit PS, first change it to 0.1 kW and divide by the conversion rate 0.735499.**

# OPERATING TIPS

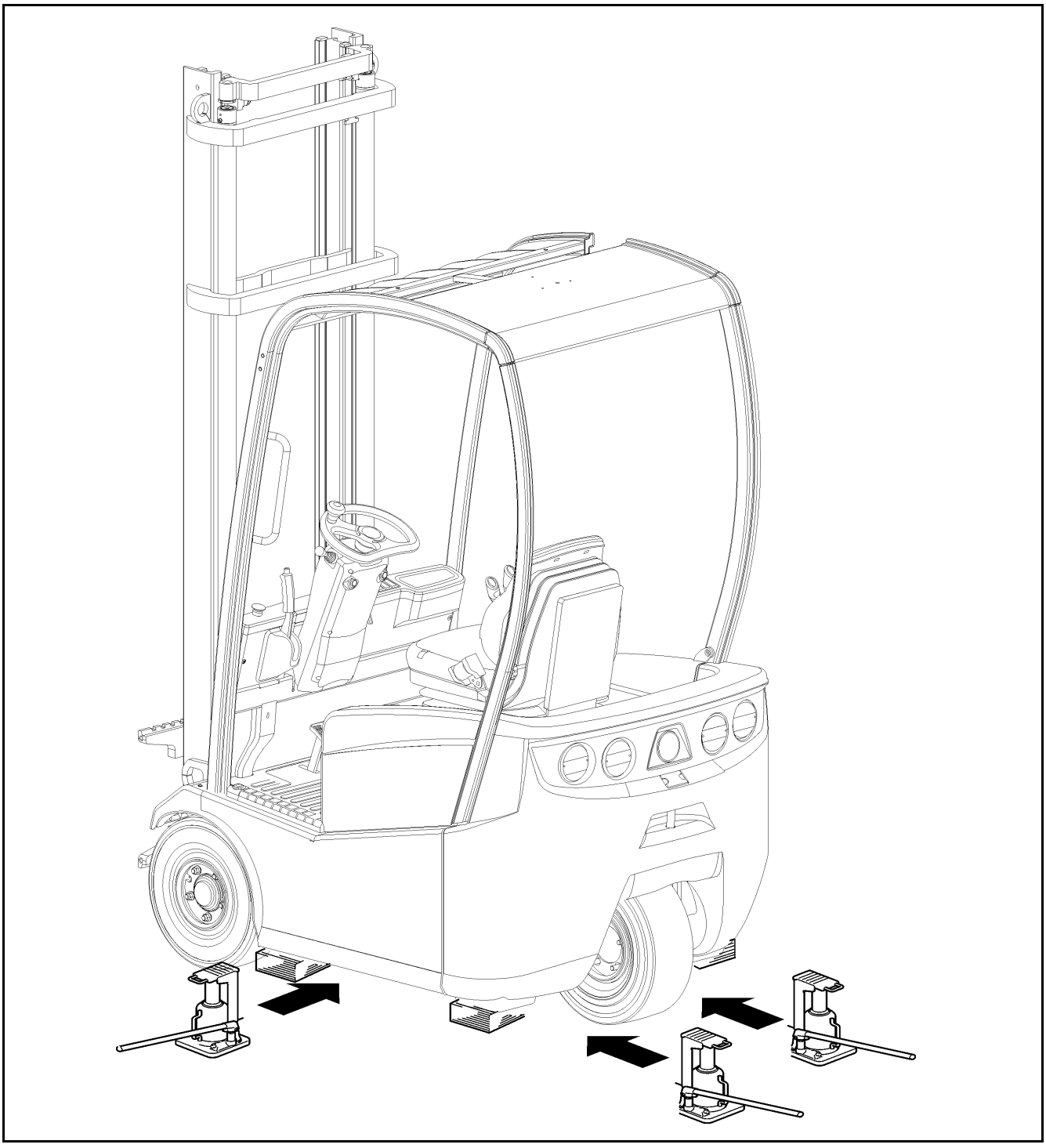
## GENERAL INSTRUCTIONS

1. Safe operation
   (1) After jacking up, always support with wooden blocks or rigid stands.
   (2) When hoisting the vehicle or its heavy component, use wire rope(s) with a sufficient reserve in load capacity.
   (3) Always disconnect the battery plug before the inspection or servicing of electrical parts.
2. Skillful operation
   (1) Prepare the tools, necessary measuring instruments (circuit tester, megohmmeter, oil pressure gauge, etc.) and SSTs before starting operation.
   (2) Check the cable color and wiring state before disconnecting any wiring.
   (3) When overhauling functional parts, complicated sections or related mechanisms, arrange the parts neatly to prevent confusion.
   (4) When disassembling and inspecting a precision part such as the control valve, use clean tools and operate in a clean location.
   (5) Follow the specified procedures for disassembly, inspection and reassembly.
   (6) Always replace gaskets, packing, O-rings, self-locking nuts and cotter pins with new ones each time they are disassembled.
   (7) Use genuine Toyota parts for replacement.
   (8) Use specified bolts and nuts and observe the specified tightening torque when reassembling. (Tighten to the medium value of the specified tightening torque range.) If no tightening torque is specified, use the value given in the “standard tightening torque table”.
3. Protection of functional parts (battery operated vehicles)
   (1) Before connecting the battery plug after vehicle inspection or maintenance, thoroughly check each connector for any connection failure or imperfect connection.
   Failure or imperfect connection of connectors related to controllers, especially, may damage elements inside the controllers.
4. Defect status check
   Do not start disassembly and/or replacement immediately, but first check that disassembly and/or replacement is necessary for the defect.
5. Waste fluid disposal
   Always use a proper container when draining waste fluid from the vehicle.
   Careless discharge of oil, fuel, coolant, oil filter, battery or other harmful substance may adversely affect human health and the environment. Always collect and sort well, and ask specialized companies for appropriate disposal.

## JACK-UP POINT

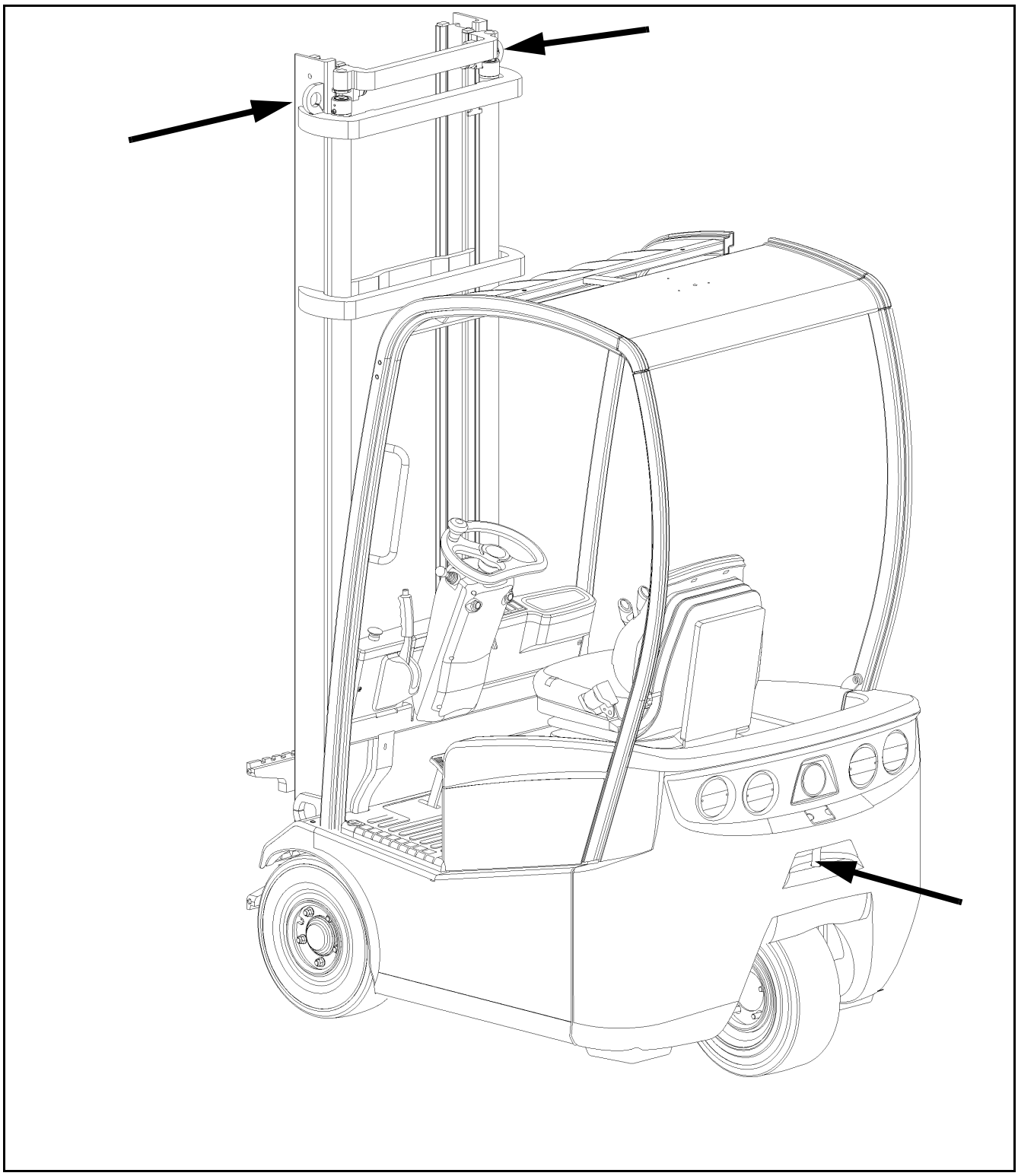
Always observe the following instructions when jacking up the vehicle:

- **When the fork is loaded, unload it and park the vehicle on a flat surface. Be sure to avoid an inclined or rough surface.**
- **Use a jack with ample capacity and jack up the vehicle at the specified jack-up point. Jacking up at any other point is dangerous.**
- **Always support the load of jacked-up vehicle with wooden blocks at specified points. Supporting the vehicle with the jack only is very dangerous.**
- **Never, under any circumstances, put any part of the body (including hands and feet) under the jacked-up vehicle.**



## LIFTING THE VEHICLE

When hoisting the vehicle, always observe the specified hoist attachment section and method. Never hoist by any other attachment section as it is very dangerous.

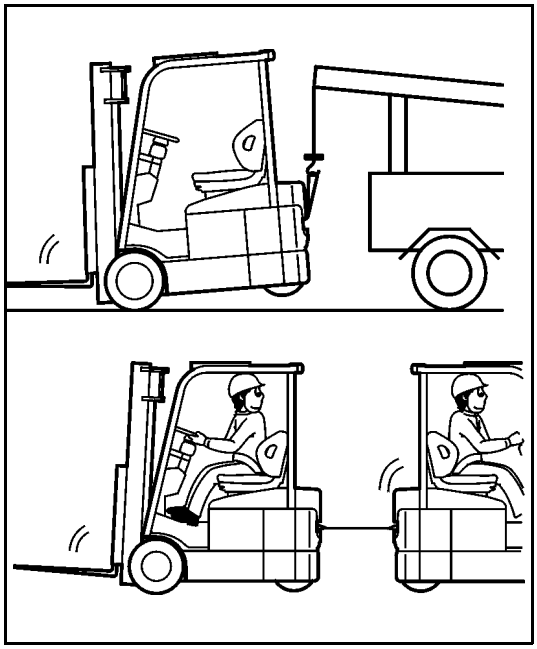


## MEMBER WEIGHTS

Unit: kg

| Member | Vehicle model code | Weight |
|---|---|---|
| BATTERY | 100 | min. 381 - max. 420 |
| | 130 | min. 524 - max. 590 |
| | 150 | min. 600 - max. 690 |
| Drive motor | All Models | Approx.34 |
| Pump motor (Hydraulic pump + electric motor) | All Models | Approx.40 |
| Rear axle L/Drive motor and wheel | All Models | Approx.53 |
| Counterweight | All models | 900 |
| Mast W/ lift bracket (W/ lift cylinder, L/ fork, Lifting height 4000 mm, V mast | All Models | Approx 450 |
| Vehicle weight (w/battery) | 100 | Approx.2550 |
| | 130 | Approx.2820 |
| | 150 | Approx.2930 |

## TOWING THE VEHICLE

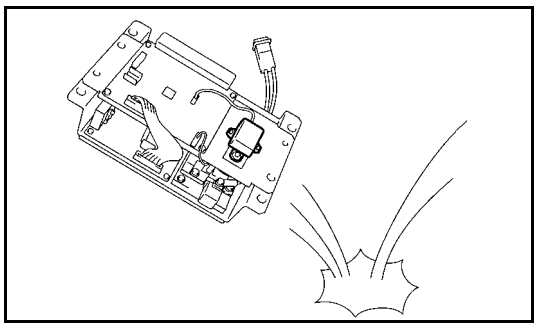


**Note the cautions below when towing the vehicle.**

1. Lift the rear wheels for towing
2. The traveling speed when towing must not exceed the maximum traveling speed of the forklift.
3. Before starting towing, always set the key switch to OFF and the direction switch to the neutral position.
4. Before towing, either remove the fork or take action to prevent the fork from coming into contact with the ground due to bouncing.

## ELECTRICAL PARTS INSPECTION

1. Always disconnect the battery plug before inspecting or servicing electrical parts.
2. Pay sufficient attention when handling electronic parts.

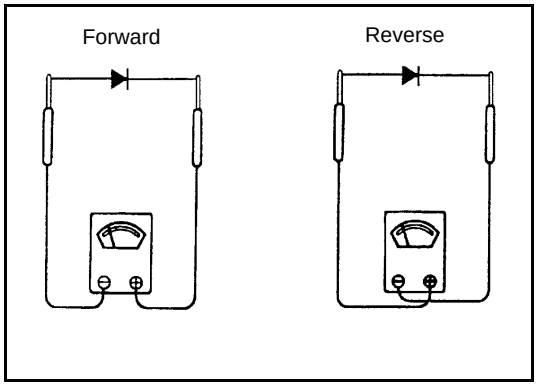


(1) Never subject electronic parts, such as computers and relays, to impact.
(2) Never expose electronic parts to high temperature or moisture.
(3) Do not touch connector terminals, as they may be deformed or damaged due to static electricity.

3. Use a circuit tester that matches the object and purpose of measurement.
   Analog type: This type is convenient for observing movement during operation and the operating condition. Measured value is only a reference
   Digital type: A fairly accurate reading is possible. However, it is difficult to observe operation or movement.

(1) Difference between results of measurement with analog and digital types
∗ The results of measurements using the analog type and the digital type may be different. Differences between the polarities of the analog type and the digital type are described below.

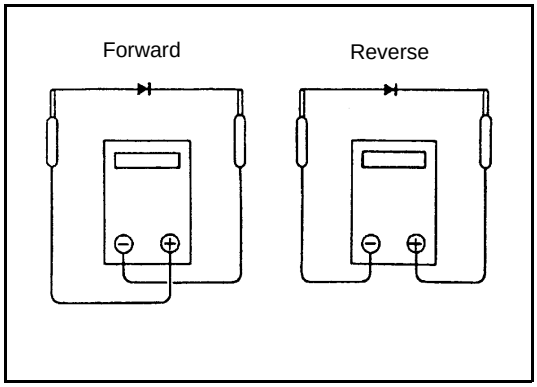
1) Analog circuit tester




Example of measurement result
Tester range: kΩ range

| | Analog type |
|---|---|
| Forward | Continuity |
| | 11 kΩ |
| Reverse | No continuity |
| | ∞ |

2) Digital circuit tester




Example of measurement result
Tester range: 2 MΩ range

| | Digital type |
|---|---|
| Forward | No continuity |
| | 1 |
| Reverse | Continuity |
| | 2 MΩ |

# TIGHTENING TORQUE TABLE

The tables here below are valid for screws and bolts without superficial covering, preventively lubricated with oil.

**SCREWS WITH "ISO" METRIC COARSE THREAD**

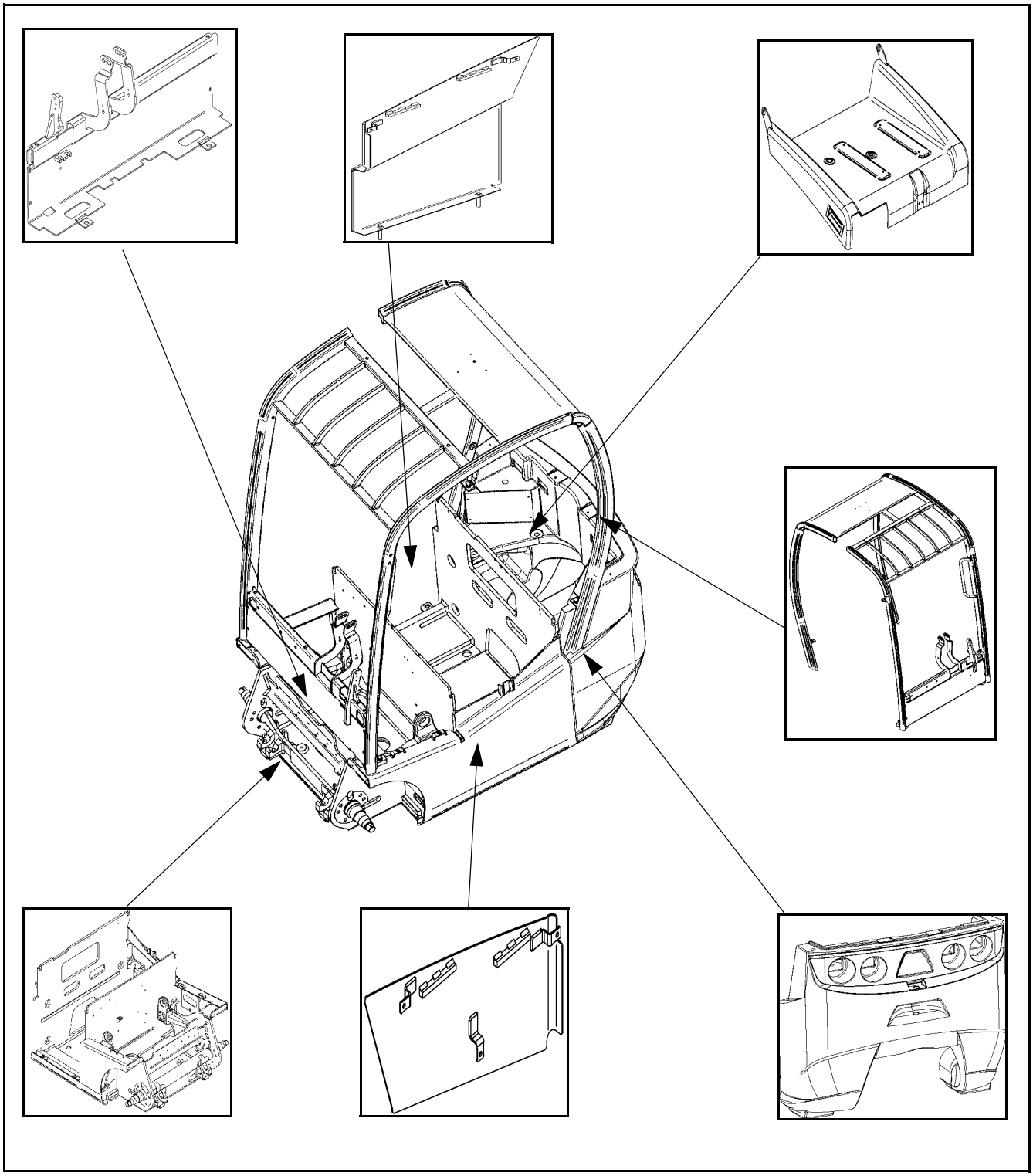
| Nominal diameter mm | PRELOADING V (IN) | | | | TORQUE Max (N.m) | | | |
|---|---|---|---|---|---|---|---|---|
| | 6 D | 8 G | 10 K | 12 K | 6 D | 8 G | 10 K | 12 K |
| | 6,6 | 8,8 | 10,9 | 12,9 | 6,6 | 8,8 | 10,9 | 12,9 |
| M 4 x 0,7 | 21781 | 3865 | 5435 | 6524 | 1,7 | 3 | 4,2 | 5,1 |
| M 5 x 0,8 | 3502 | 6229 | 8780 | 10497 | 3,2 | 5,8 | 8,2 | 9,9 |
| M 6 x 1 | 4974 | 8849 | 12459 | 14911 | 5,7 | 10 | 14,3 | 17,1 |
| M 7 x 1 | 7142 | 12753 | 17854 | 21386 | 9,2 | 16,6 | 23 | 27,8 |
| M 8 x 1,25 | 9025 | 16088 | 22661 | 27174 | 13,6 | 24,3 | 34 | 41,1 |
| M 9 x 1,25 | 11870 | 21190 | 29921 | 35610 | 20,1 | 36 | 50,8 | 60,5 |
| M 10 x 1,5 | 14519 | 25506 | 35905 | 42968 | 27,8 | 49 | 69 | 82 |
| M 12 x1,75 | 20797 | 37082 | 52189 | 62588 | 46,5 | 83 | 117 | 140 |
| M 14 x 2 | 28351 | 50620 | 71123 | 85347 | 74 | 132 | 186 | 223 |
| M 16 x 2 | 38750 | 68866 | 97119 | 116739 | 113 | 200 | 283 | 339 |
| M 18 x 2,5 | 47480 | 84366 | 118701 | 142245 | 157 | 279 | 392 | 471 |
| M 20 x 2,5 | 60430 | 107910 | 151565 | 181485 | 218 | 388 | 545 | 653 |
| M 22 x 2,5 | 74850 | 133416 | 187371 | 224649 | 294 | 520 | 731 | 883 |
| M 24 x 3 | 87309 | 155979 | 218763 | 261927 | 383 | 687 | 961 | 1148 |
| M 27 x 3 | 112815 | 202086 | 283509 | 340407 | 549 | 991 | 1393 | 1668 |
| M 30 x 3 | 138321 | 247212 | 347274 | 415944 | 755 | 1354 | 1893 | 2276 |

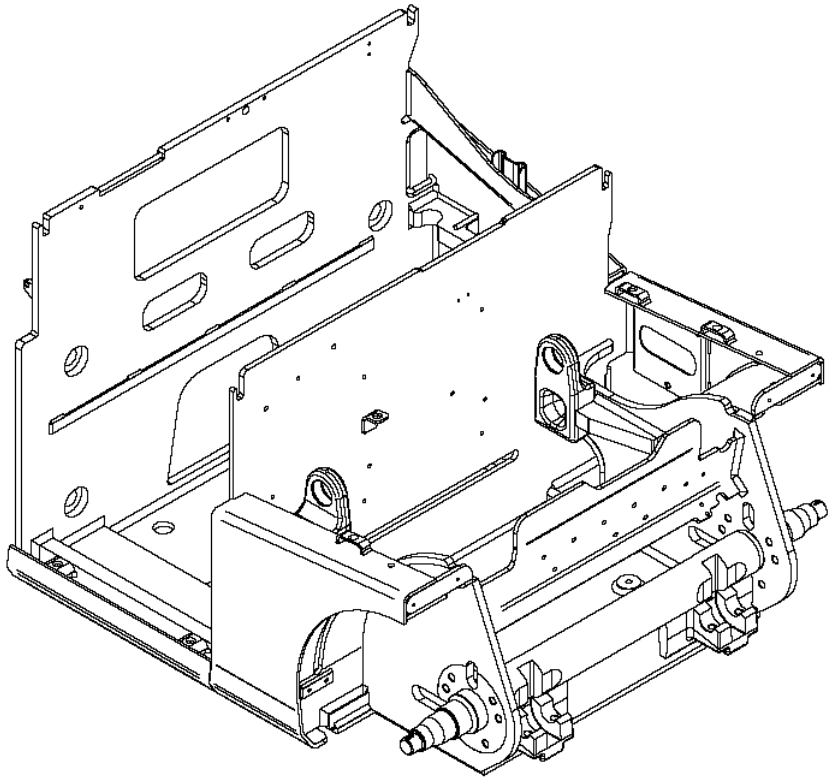
**SCREWS WITH "ISO" FINE THREAD**

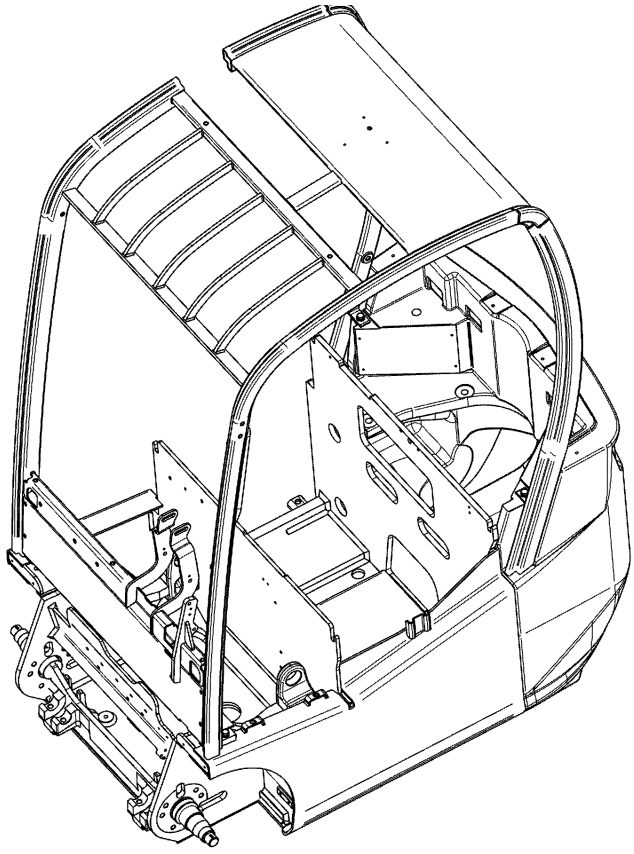
| Nominal diameter mm | PRELOADING V (IN) | | | | TORQUE Max (N.m) | | | |
|---|---|---|---|---|---|---|---|---|
| | 6 D | 8 G | 10 K | 12 K | 6 D | 8 G | 10 K | 12 K |
| | 6,6 | 8,8 | 10,9 | 12,9 | 6,6 | 8,8 | 10,9 | 12,9 |
| M 8 x 1 | 9761 | 17168 | 24231 | 29038 | 14,5 | 25,5 | 36,2 | 43 |
| M 10 x1,25 | 15107 | 26879 | 37867 | 45420 | 28,4 | 51 | 72 | 85 |
| M 12 x1,25 | 23740 | 40613 | 56898 | 68474 | 52 | 89 | 126 | 151 |
| M 12 x1,5 | 21778 | 38848 | 54642 | 65531 | 49 | 87 | 123 | 147 |
| M 14 x 1.5 | 30902 | 54936 | 77303 | 92705 | 78 | 140 | 196 | 235 |
| M 16 x 1,5 | 41202 | 73575 | 103005 | 123606 | 118 | 211 | 294 | 353 |
| M 18 x 1,5 | 53268 | 95157 | 133416 | 159903 | 171 | 304 | 422 | 510 |
| M 20 x 1,5 | 67689 | 118701 | 168242 | 202086 | 239 | 422 | 598 | 716 |
| M 22 x 1,5 | 82404 | 147150 | 206010 | 247212 | 314 | 564 | 790 | 952 |
| M 24 x 2 | 94667 | 168732 | 237402 | 284490 | 402 | 721 | 1010 | 1216 |
| M 27 x 2 | 122625 | 218763 | 307053 | 367875 | 589 | 1050 | 1472 | 1766 |
| M 30 x 2 | 154017 | 272718 | 384552 | 461070 | 814 | 1442 | 2040 | 2453 |

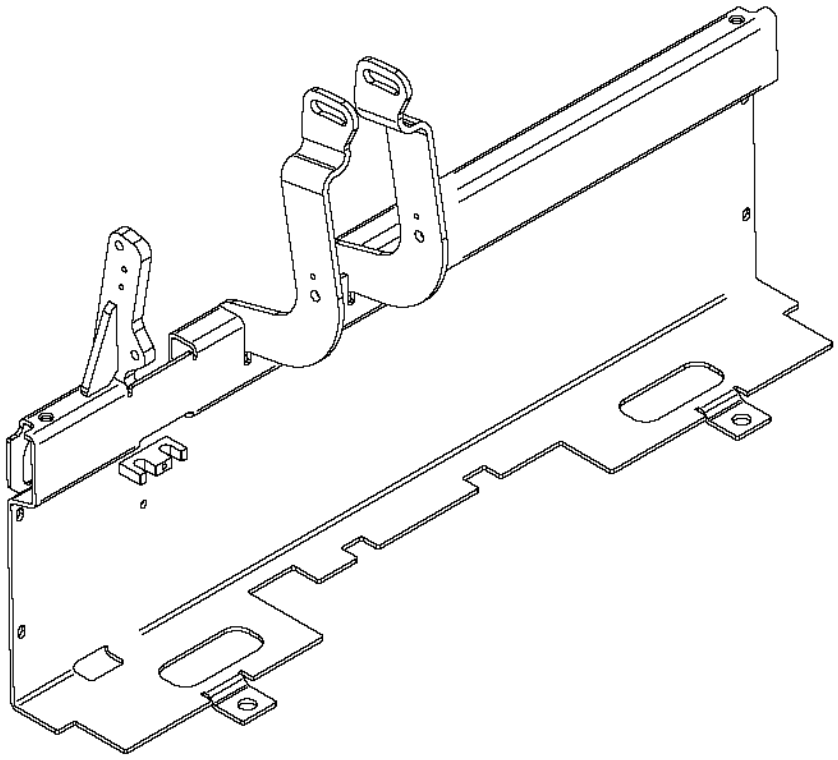
# COMPONENTS

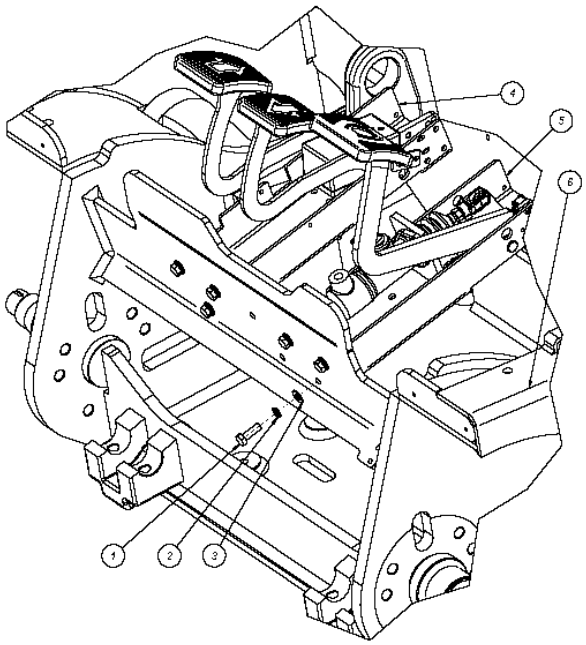
## Body & Frame







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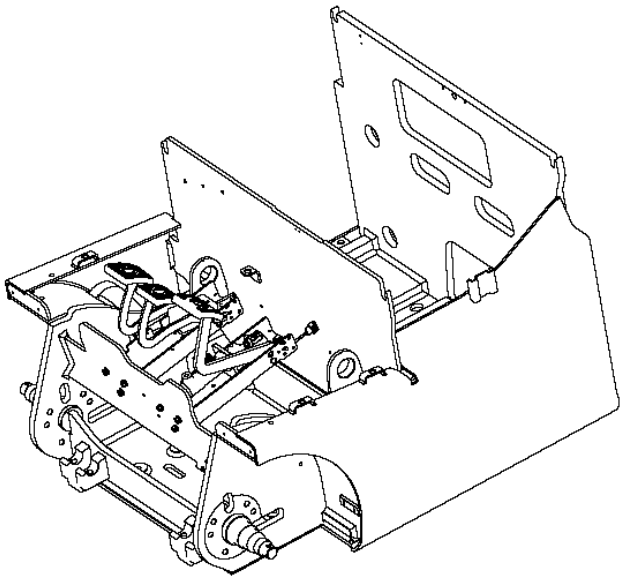
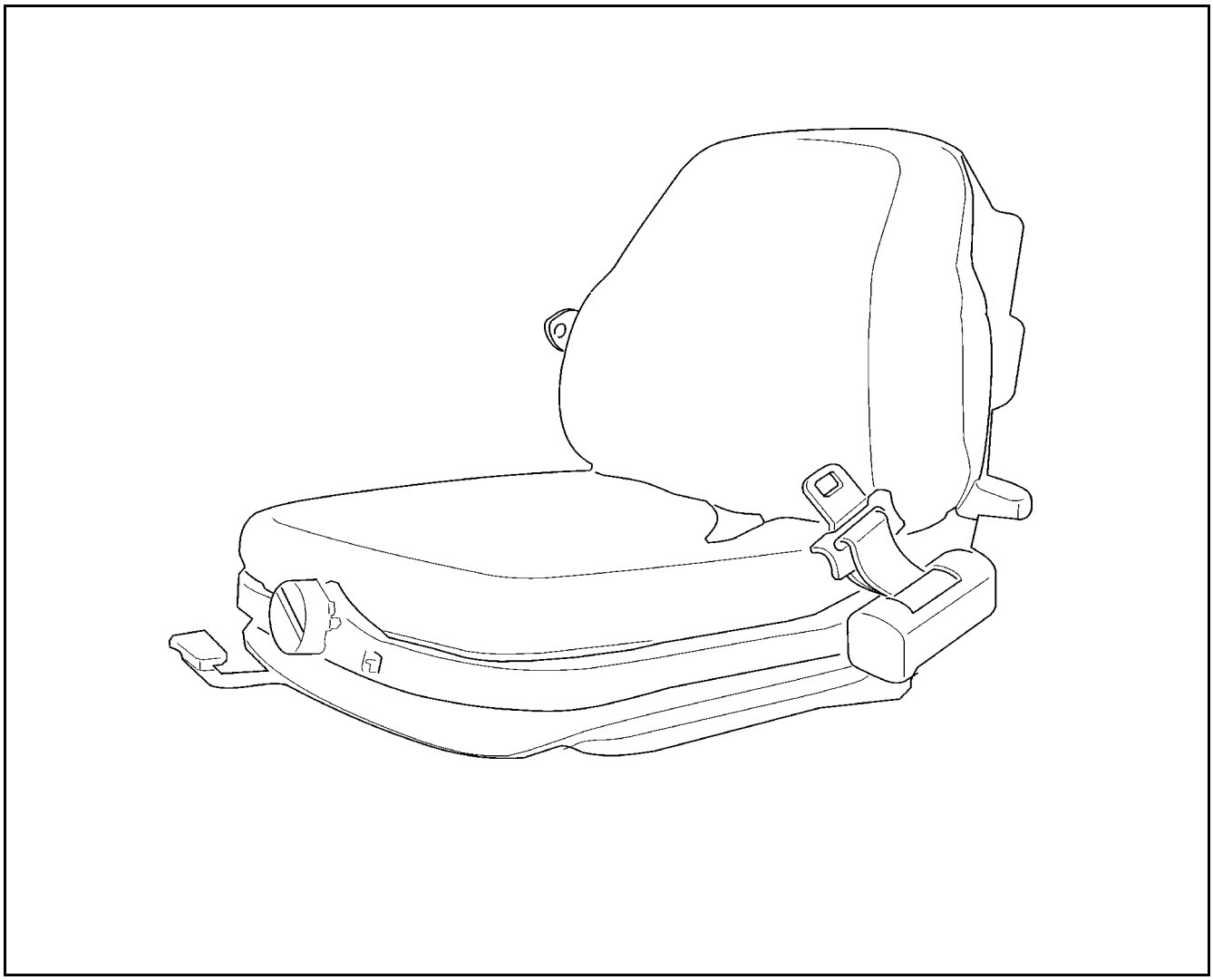
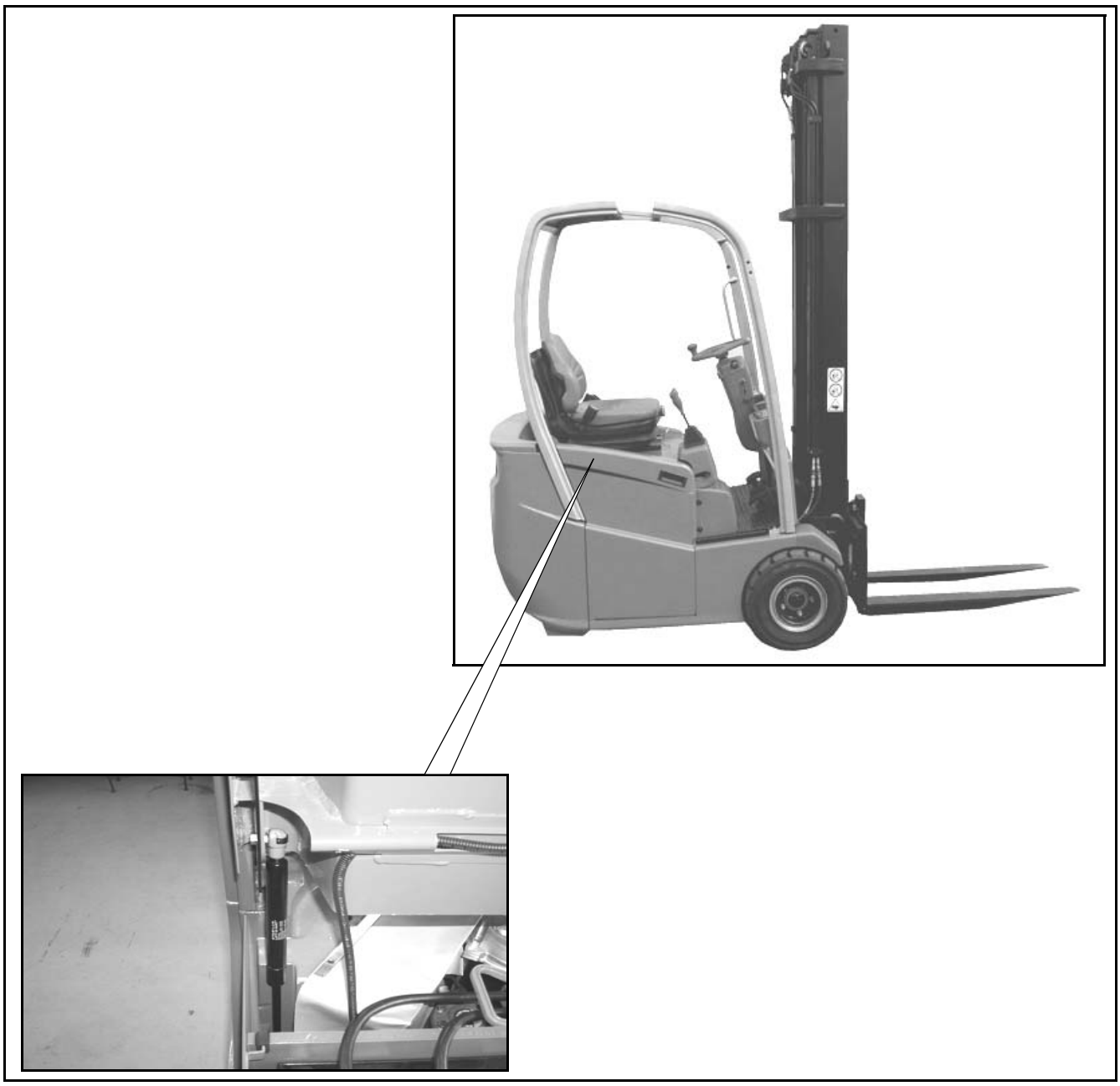




# BATTERY COVER
# REMOVAL • INSTALLATION



## Removal Procedure

1 Disconnect the battery plug.
2 Open the battery cover.
3 Use string to tie the battery cover W/seat to the head guard rear pillar.
4 Disconnect the wiring of the seat switch.
5 Disconnect the battery cover gas spring (on the frame side).
6 Close the battery cover.
7 Remove the battery cover hinge set bolt.
8 Remove the battery cover W/ seat.

## Installation Procedure

The installation procedure is the reverse of the removal procedure.

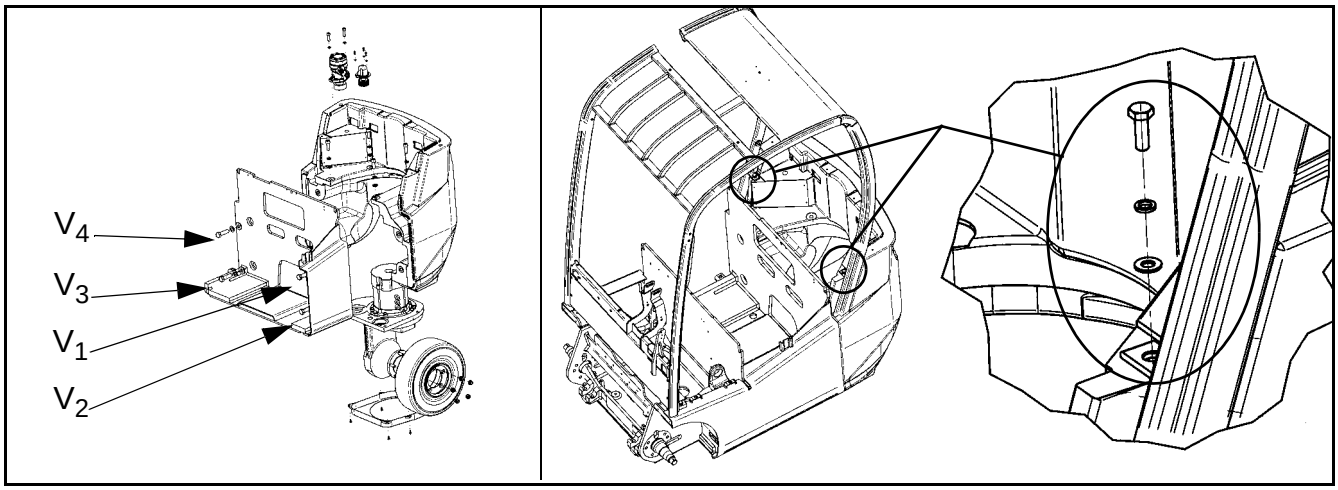
# COUNTERWEIGHT
# REMOVAL • INSTALLATION

## Removal Procedure

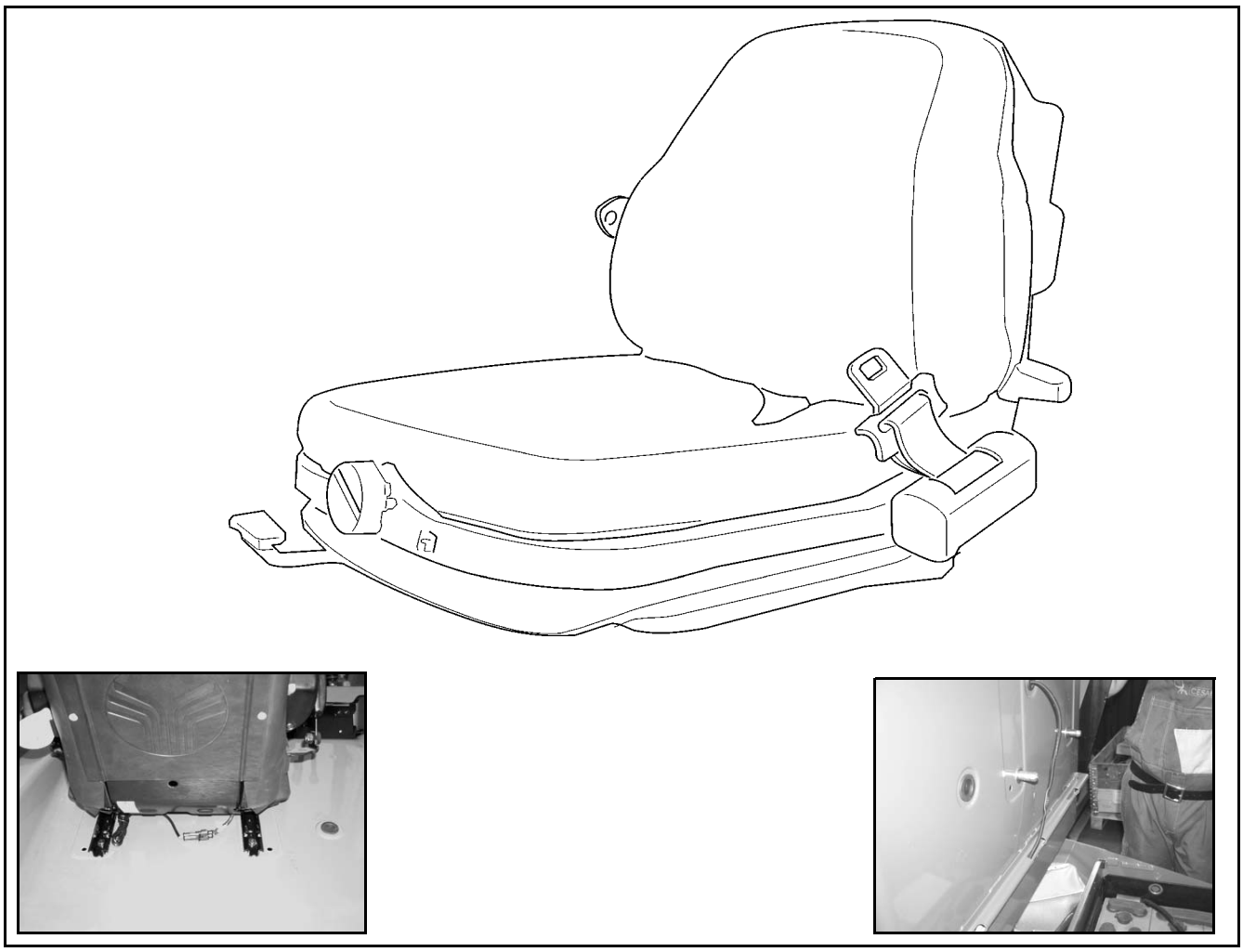
1 Disconnect the battery plug.
2 Remove the rear cover and battery cover.
3 Remove the battery.
4 Disconnect the controller cables and the contactor group.
5 Disconnect the hydraulic motor hoses.
6 Set the hoisting attachment and remove the counterweight set bolt.
7 Remove the counterweight.

## Installation Procedure

The installation procedure is the reverse of the removal procedure.
**Tightening torque of the 4 bolts of the counterweight = 425 Nm.**
**(Note: Tight the bolts with the sequence $V_1$, $V_2$, $V_3$, $V_4$).**
**Tightening torque of the 2 bolts of the OHG = 83 Nm.**



# OPERATOR'S SEAT
# REMOVAL • INSTALLATION



## Removal Procedure

1 Open the battery cover.
2 Disconnect the wiring of the seat switch.
3 Remove the operator's seat set nuts. (Be careful not to drop the operator's seat).
4 Remove the operator's seat.

## Installation Procedure

The installation procedure is the reverse of the removal procedure.