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## **SERVICE MANUAL**

*Machine: X-Ergo*

*Manual No: 005997*

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Edition 2008B

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# **1 General information and technical data**

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Edition 2008B

# 1 General information and technical data

## Scope of Service Manual

### General

This manual describes the service procedures for ATLET Sit-on stackers in the X-Ergo series. Use the manual for quick and correct service of respective truck models.

The manual describes models manufactured when X-Ergo was introduced at the end of 2003.

You may find contradictions in the manual compared to the models supplied due to optional designs and upgrades, and the like.



### **Warning!**

**If the truck is rebuilt after delivery or supplemented in such a manner that safety may be affected, ATLET AB or its authorised representative must be contacted.**

Unauthorised modification of the truck is not permitted. The user may only implement changes or modifications to the truck if the truck manufacturer no longer exists as a company and no other company has taken over the truck manufacturer's operations, and then only on the assumption that the user:

- Arranges for the modification or change to be designed, tested and implemented by one or more experts in industrial trucks and their safety.
- Produces and archives documentation covering the design tests and implementation of the modification or change.
- Approves and makes suitable changes to type plates, decals, and markings, and in the Instruction Handbooks.
- Attaches a permanent and clearly visible sign, or the like, that reports in which way the truck has been modified or changed, together with the date of the modification or change and the name and address of the organisation that has implemented the assignment.

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Modifications and updates will be distributed via ATLET AB Service Manual Change.

Printing errors and manifest errors found in the manual should be reported on the Correction Report Form available on Gateway. The form can also be obtained from After Sales Support in Mölnlycke, Sweden.

## Scope of X-Ergo

The Sit-on stacker trucks in the X-Ergo series are available in a number of different variants with mast system, adjustable straddle lift, extendable stabilisers and telescopic forks.

# How to use the manual

## Structure

The manual is built up according to the same principles as ATLET spare parts catalogues, with the truck divided into one subsystem per section.

Sections 1 - 3 in this manual contain more comprehensive information regarding technical data, general service instructions and tools.

Sections 4-12 in this manual contain information limited to a specific area in the truck concerning the description of the mechanical handling of different components, e.g. Masts (section 6) and Hydraulic System (section 8).

The software is described in section 10.

The main principle for extra accessories is to place them under the respective sections. Otherwise they are placed under section 12 "Miscellaneous". For this reason section 12 is not always included in the Service Manual.

For specific problems or information about procedures, look in the main index for the correct section in the manual.

## Symbol key



### **Warning!**

Used for risk of personal injury.



### **Important!**

Used for risk of damage to machine.



### **Note!**

Used for general observation.

# Safety instructions

## General

Extreme importance must be placed on precautionary measures to avoid accidents during all work on the vehicle.

A general rule is to always implement preventive measures that are adapted to the type of vehicle to be worked on. The general rules below must always be observed:

- Smoking or naked flames are strictly forbidden as there is a risk of explosion in the vicinity of batteries and while working on gas-equipped vehicles.
- The battery should always be protected during grinding work.
- Local fire directives should always be followed.
- The drive wheel should always be lifted up free from the floor during service work to prevent the vehicle from moving.
- The battery plug should be pulled out before working on the electrical system. The battery plug may only be connected while trouble shooting, and when the greatest of care is exercised, (with the truck raised).
- To prevent crush injuries the battery plug should always be removed when working on and around the mast and hydraulic unit. The mast or hydraulic unit can be actuated by an electrical fault or a mistake while working.



### ***Warning!***

**Having the power connected to the truck while working on and around the mast can lead to fatal injury!**

- When working on and around lifting devices and the hydraulic unit, they must be locked by using the mast lock, wooden blocks or some other appropriate means.
- No other persons should be in the vicinity of the truck when it is test run in conjunction with repair work, in view of the risk of accidents or near-accidents from the truck making an unexpected manoeuvre.
- When dismantling parts in the hydraulic system the system must be relieved of pressure. For example, the pump motor should be switched off and the forks should be in their lowest position.
- All metal objects such as watches, chains, spectacles and rings should be removed when working on the electrical system, or in its immediate vicinity. A short-circuit from such objects can result in serious burn injuries.

## Lifting the truck

### Inspection/Preparation

- When the truck is lifted up with a jack, make sure you secure it with blocks. The truck must not rest on the jack, while work is carried out.
- Ensure that straps, wires or chains have a sufficient lifting capacity before lifting the truck.
- Ensure that the drive wheel runs free of the floor before trouble shooting.

### Permitted lifting points

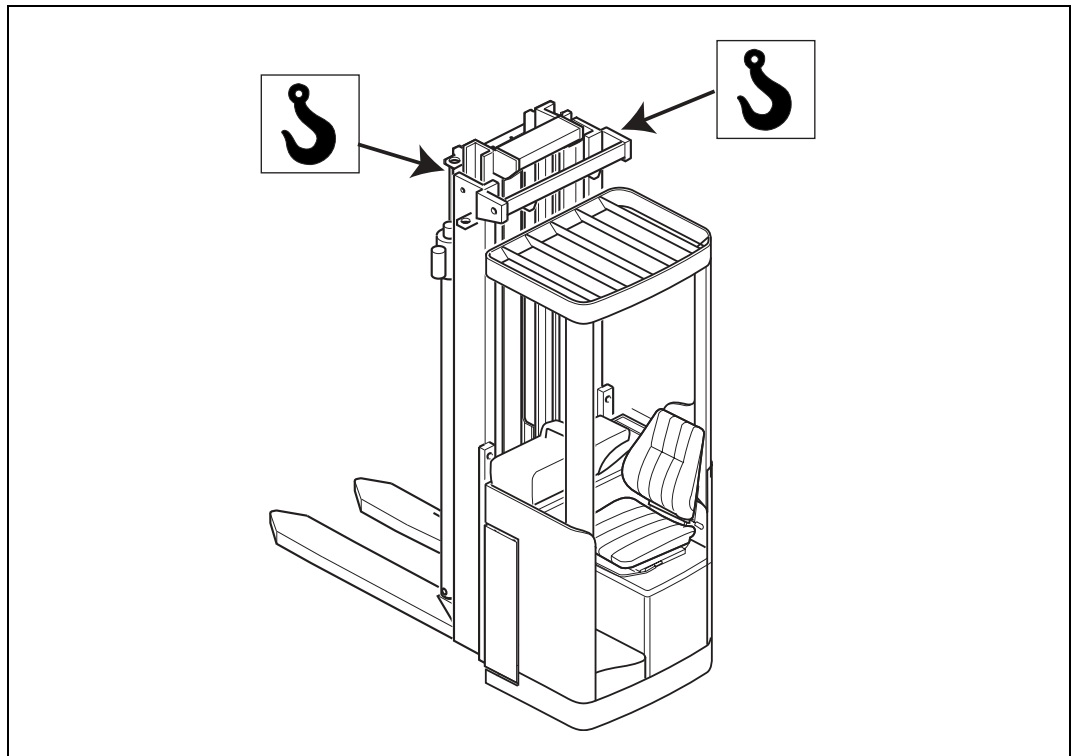


Figure 1.1 Permitted lifting points X-Ergo

Figure 1.1 shows where the permitted lifting points are placed on the truck. The lifting points are marked with a decal representing a lifting hook, and the lifting holes in the outer mast must be used.



### ***Warning!***

**The machine must never be lifted from the overhead guard.**

## Welding on the truck

- During welding work the battery plug should always be disconnected and all connections to the control units and controllers (applies to all electronic units) disconnected. On completion of welding work the contactors should first be connected to the electronic units, after which the battery plug is then connected to the battery.
- The welding earth should always be connected as close to the welding area as possible to eliminate damage to surrounding components.

## Atlet AB takes care of the environment

The majority of our products consist of steel, and can be completely recycled.

## Environmental impact

All products have an impact on the environment throughout their entire life cycle.

The consumption of energy during their use is one of the most important factors regarding impact on the environment.

Through correct care, maintenance and use, the consumption of energy can be reduced, thereby reducing the environmental impact.

## Waste

Waste material in conjunction with repairs, maintenance, cleaning, or scrapping, must be collected and disposed of in an environment-friendly way and in accordance with the directives of respective countries. Such work should only be carried out in areas intended for this purpose.

Recyclable material should be taken care of by specialised authorities.

Environmentally hazardous waste, such as oil filters, batteries and electronics, can have a negative effect on the environment, or health, if handled incorrectly.



# Preparations

## Service

- Go through all the safety instructions.
- Make sure that you have all the essential tools close at hand before starting work.
- Before cabling or other electrical components are disconnected, check the colour codes and check for damage to cables or connections.
- When complex components are repaired and dismantled, make sure that you have a good overview of the different component parts to avoid the risk of confusion.
- When repairing or maintaining sensitive components, make sure that you use clean tools and work on a clean work surface.
- Dismantle, inspect and adjust components according to the prescribed routines. See respective sections for detailed information.

## Trouble shooting

When you suspect a faulty component, do not replace it immediately. First check the surrounding equipment and carry out complete trouble shooting routines. Make sure you know the reason for the fault before replacing a component.

# Data X-Ergo

## Designations

### Truck designation

**Table 1.1** Truck designations

Truck type	X-Ergo	Sit-on stacker, standard
	XTF-Ergo	Sit-on stacker with telescopic forks
	XLL-Ergo	Sit-on stacker, low-lifting
	XML-Ergo	Sit-on stacker, medium-lifting
Load capacity	X-Ergo	1,600 alternatively 2,000 kg
	XTF-Ergo	1,000 kg
	XLL-Ergo	2,000 kg
	XML-Ergo	1,600 kg

## Type designation

CE

MODELL  
MODEL  
MODELL  
MODELE

X160STJN420 ← 1

SERIE NR.  
SERIAL NO.  
SERIEN NR.  
NOMERO DESERIE

X23513/01 ← 2

TILLV. ÅR  
YEAR OF MANUF.  
BAUJAHR  
AN DE FABR

2003-12-03 ← 3

TILLÅTEN LAST  
ACTUAL CAPACITY  
WIRKLICHE TRAGFÄHIGKEIT  
CAPACITE EFFECTIVE

Q

D H

TYNGDPUNKTSAVSTÅND  
LOAD CENTRE DISTANCE  
LASTSCHWERPUNKT  
DISTANCE DE CENTRE

LYFTHÖJD  
LIFTHEIGHT  
HUBHÖHE  
HAUTEUR DE LEVEE

H	D	Q
MM	MM	KG
8000	600	1600
3600	500	1000

BATTERISPÄNNING  
BATTERY VOLTAGE  
BATTERIESPANNUNG  
TENSION DE LA BATTERIE

VOLT-DC

24

VIKT UTAN BATTERI  
WEIGHT WITHOUT BATTERY  
GEWICHT OHNE BATTERIE  
MASSE SANS BATTERIE

KG

1100

MINSTA BATTERIVIKT  
MINIMUM BATTERY WEIGHT  
MINDESTGEWICHT DER BATTERIE  
MASSE MINIMAL DE LA BATTERIE

KG

270

MAXIMAL BATTERIVIKT  
MAXIMUM BATTERY WEIGHT  
HÖCHSTGEWICHT DER BATTERIE  
MASSE MAXIMAL DE LA BATTERIE

KG

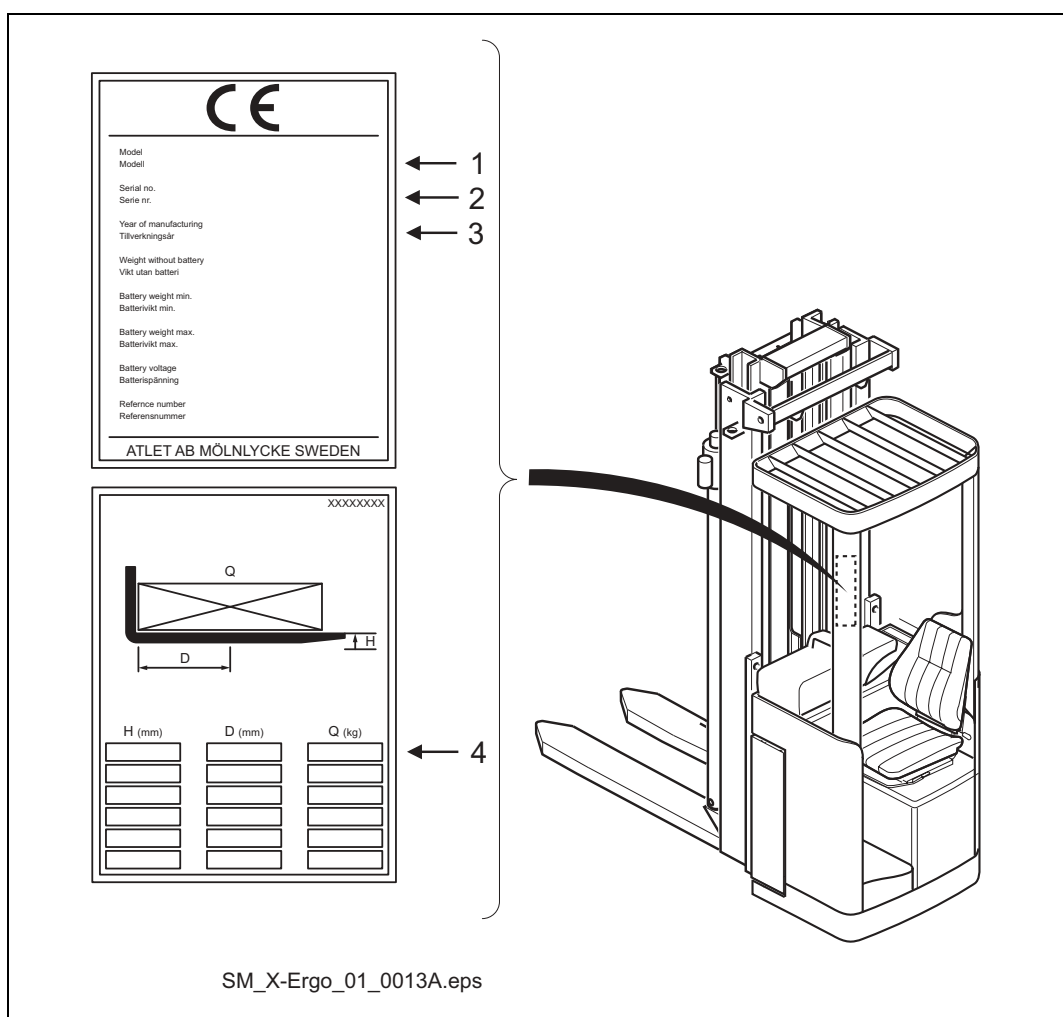
400

ATLET AB MÖLNLYCKE SWEDEN

← 4

**Figure 1.2** Example of type plate (–2006w36)

1. Model designation.
2. Type Serial no./Version (S = Special ver.).
3. Year of manufacture, week, and warranty period in months (only Sweden).  
(On the assumption that the service instructions in the warranty regulations are followed).
4. Where appropriate, load limitations depending on the position of the load on the forks (D) and/or lifting height (Q).

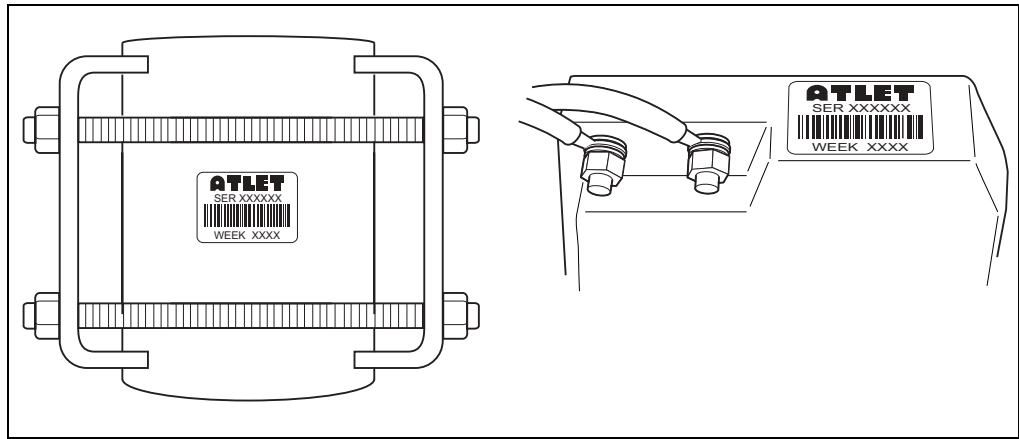


**Figure 1.3** Example of type plate (2006w37-)

1. Model designation.
2. Type Serial no./Version (S = Special ver.).
3. Year of manufacture, week, and warranty period in months (only Sweden).  
(On the assumption that the service instructions in the warranty regulations are followed).
4. Where appropriate, load limitations depending on the position of the load on the forks (D) and/or lifting height (Q).

**Note!**

In cases where the machine plate has been lost or become illegible, it must be renewed immediately. In order to identify the machine's serial number, there is a plate located on each main component such as drive motor, gearbox, hydraulic unit, TMC etc. For some machines there is even a plate attached inside the battery compartment, or serial number punched on the side of the mast.



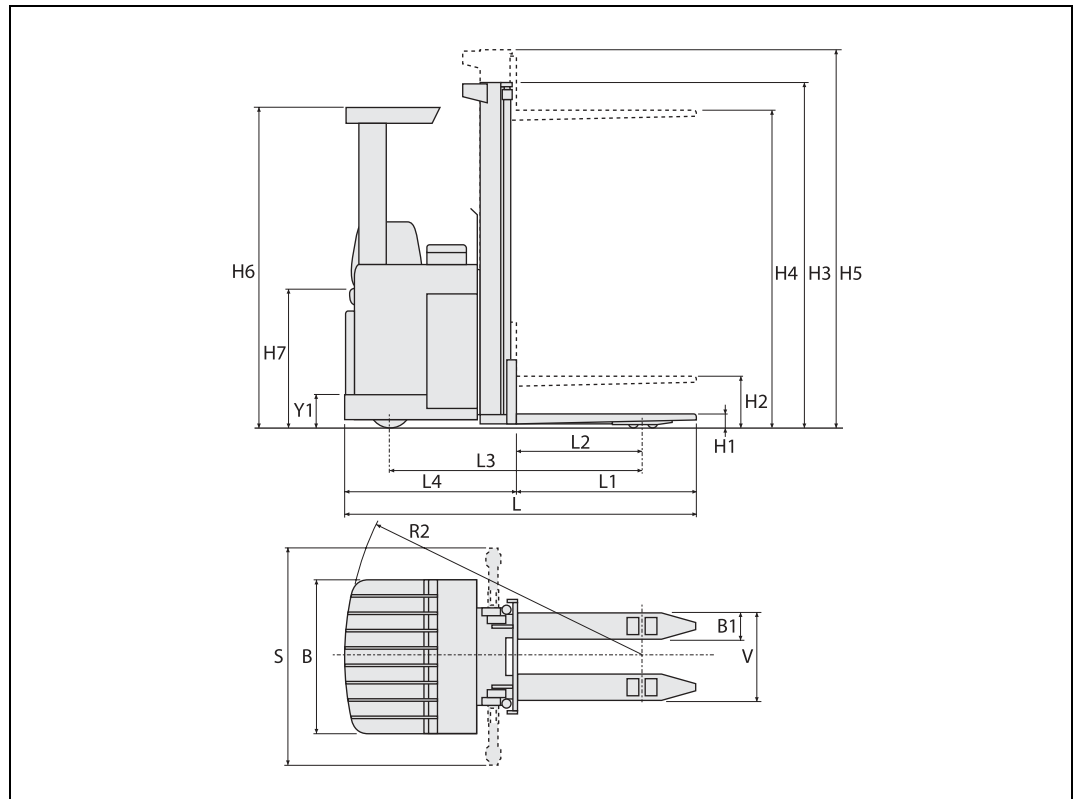
**Figure 1.4** Example of plate with serial number.

Explanation of Model designation

Example:		<b>X</b>	<b>160</b>	<b>S</b>	<b>DTF</b>	<b>V</b>	<b>S</b>	<b>JN</b>	<b>360</b>	<b>225</b>	<b>40</b>
Truck type											
Load capacity/10											
Narrow gauge	S										
Broad gauge	B										
Telescopic mast	T										
Telescopic mast, free-lift	TF										
Double-telescopic mast	DT										
Double-telescopic mast, free-lift	DTF										
Clear-view mast	V										
Stabilisers	S										
Adjustable straddle lift	H										
Tray size, Junior	JN										
Tray size, Senior	SN										
Lifting height in cm											
Battery Ah/5											
Charger Ampere											

## Dimensions and weights

### Dimensions X-Ergo



**Figure 1.5** Positions for dimensions X-Ergo

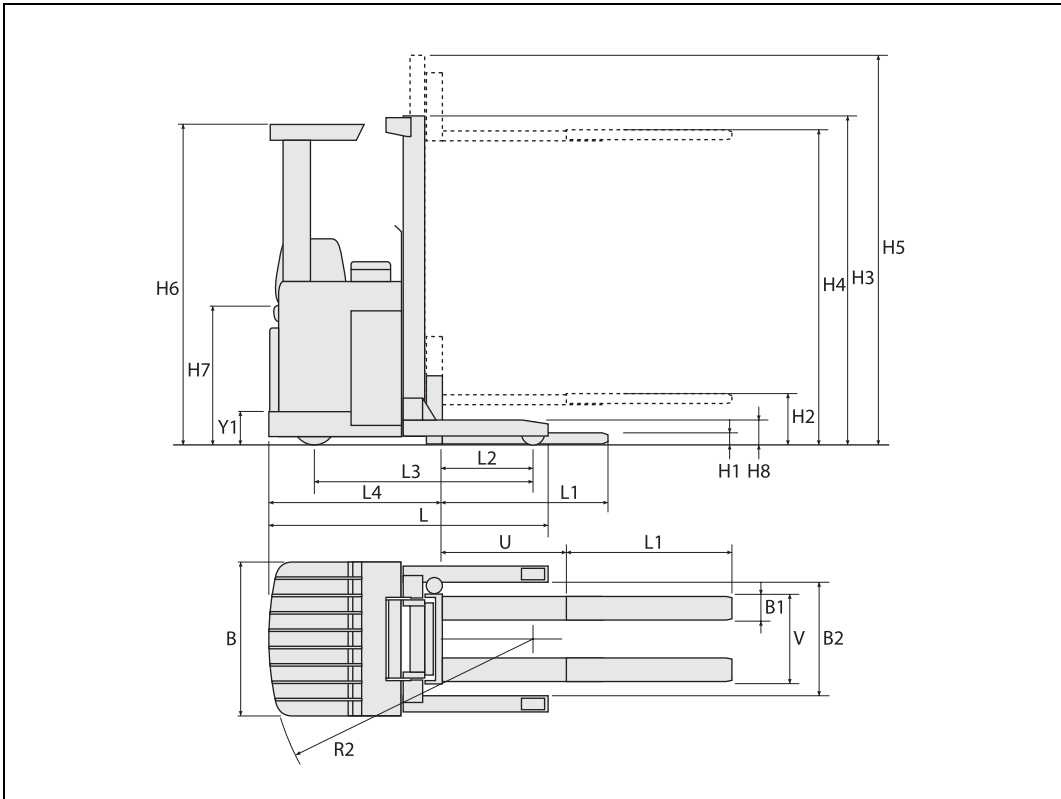


Figure 1.6 Positions for dimensions XTF-Ergo

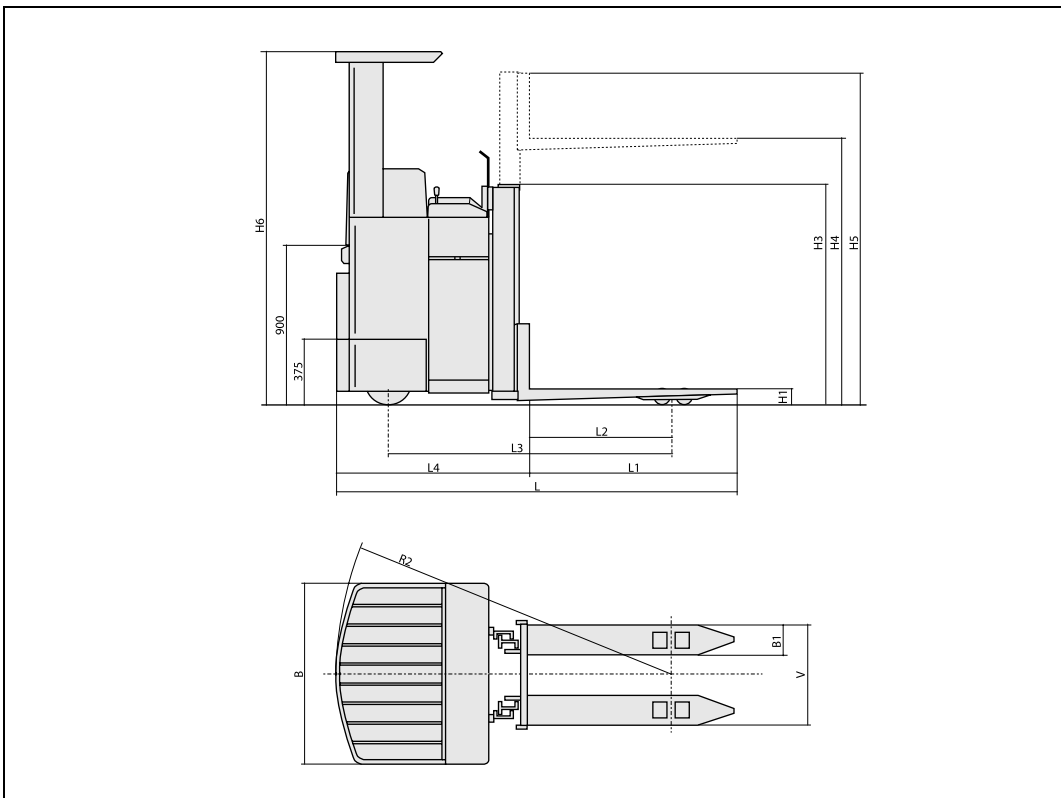


Figure 1.7 Positions for dimensions XML-Ergo



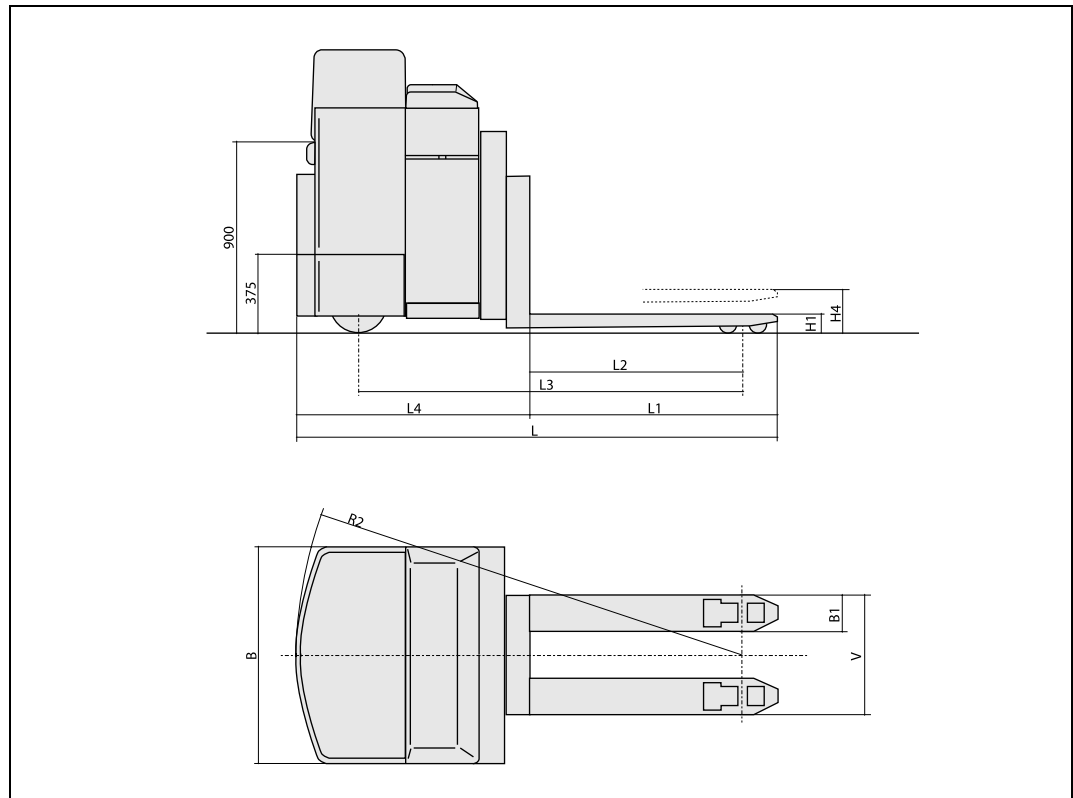


Figure 1.8 Positions for dimensions XLL-Ergo

## Machine specification

No.				JN 160 S	JN 160 B	JN 200 S	JN 200 B
1	Lifting capacity, rated	Q	kg	1,600	1,600	2,000	2,000
1a	Distance to centre of gravity	D	mm	600	600	600	600
2	Lifting height	H4	mm	See masts. A/X	See masts. A/X	See masts. A/X	See masts. A/X
2a	Mast height	H3	mm				
2b	Transport free-lift	H5	mm				
2c	Full free-lift	H2	mm				
2d	Straddle lift						
4	Lifting speed without load – with rated load		m/s	See the table below	See the table below	See the table below	See the table below
5	Lowering speed without load – with rated load		m/s	0.30-0.60	0.30-0.60	0.35-0.50	0.35-0.50
6	Driving speed without load – with rated load		km/h	10.0-9.0	10.0-9.0	10.0-8.5	10.0-8.5
	Increased speed		m/s	2.8-2.5	2.8-2.5	2.2-2.2	2.2-2.2
			km/h	11.0-9.0	11.0-9.0	11.0-8.5	11.0-8.5
			m/s	3.0-2.5	3.0-2.5	3.0-2.4	3.0-2.4
8	Gradient	Max	%	7	7	7	7
10	Turning radius at L1=1150	R2	mm	1793	1779	1836	1814
11	Minimum aisle width Ast incl. 200 mm R2-L2+load length+200	Ast	mm	1993	2036	2042	2082
	Load length 800 mm	Ast	mm	2193	2236	2242	2282
	Load length 1,000mm	Ast	mm	2393	2436	2442	2482
	Load length 1,200mm						
13	Height over protective roof	H6	mm	2110	2110	2110	2110

13a	Seat height min-max		mm	900-1,000	900-1,000	900-1,000	900-1,000
13b	Step height min-max	Y1	mm	350-430	350-430	350-430	350-430
14	Truck length	L	mm	2143	1981	2192	2020
15	Truck width	W	mm	1010	1105	1010	1105
15b	Width over stabilisers	S	mm	See masts. A/X		See masts. A/X	
16	Fork length std	L1	mm	See masts. A/X	See masts. A/X	See masts. A/X	See masts. A/X
17	Width over forks std max-min	W	mm	See masts. A/X	See masts. A/X	See masts. A/X	See masts. A/X
17a	Width between fork blades						
19	Truck length to fork support area Narrow gauge L-L1 Wide gauge L-L2	L4	mm	993	1033	1042	1082
20	Fork arm width	W1	mm	See masts. A/X	See masts. A/X	See masts. A/X	See masts. A/X
20a	Fork height, lowered	H1	mm	See masts. A/X	See masts. A/X	See masts. A/X	See masts. A/X
21	Straddle lift height	H7	m	See masts. A/X	See masts. A/X	See masts. A/X	See masts. A/X
22	Width between straddle lift	W2	mm	See masts. A/X	See masts. A/X	See masts. A/X	See masts. A/X
23	Dim. front axle – fork support area	L2	mm	See masts. A/X	See masts. A/X	See masts. A/X	See masts. A/X
24	Wheelbase L2+L4-195	L3	mm	1,600	1583	1643	1621
25	Wheel track – front, back centre of wheel		mm	390-685	980-685	375-685	980-685
26	Ground clearance half L3		mm	25	57.5	23	59.5
27	Service weight with/without battery		kg	See the table below	See the table below	See the table below	See the table below
28	Max shaft pressure, load wheel without/with rated load		kg	400-1900	420-1920	670-2270	690-2300
29	Max axle pressure, drive wheel without/with rated load		kg	1170-1330	1200-1350	1500-1650	1520-1670
39	Battery capacity		kWh	5.7-11.1	5.7-11.1	11.1	11.1
39a	Battery voltage		Ah V	240-465 24	240-465 24	465 24	465 24
41	Traction motor AC S2 = 60 min		kW	2.2 / 2.4	2.2 / 2.4	2.2 / 2.4	2.2 / 2.4
42	Speed control			AC Transistor	AC Transistor	AC Transistor	AC Transistor
43	Lift motor AC S3=12% 10 min		kW	4.5/7.6*	4.5/7.6*	4.5	4.5
43a	Hydraulic pressure		MPa	17.5	17.5	17.5	17.5
44	Wheel type, load wheel drive wheel/castor wheel			Vulkollan Rubber/vulk. 3-4	Vulkollan Rubber/vulk. 3-4	Vulkollan Rubber/vulk. 3-4	Vulkollan Rubber/vulk. 3-4
44a	No. of drive/castor/load wheels						
45	Wheel dimensions		mm	(4x) 85x75	(2x) 150x60	(4x) 85x75	(2x) 150x60
45a	Load wheel W*width		mm	250x80	250x80	250x80	250x80
45b	Drive wheel W*width		mm	(2x) 150x60	(2x) 150x60	(2x) 150x60	(2x) 150x60
45c	Castor wheel		mm				
46	Steering unit			Electric servo	Electric servo	Electric servo	Electric servo
47	Main brake type – actuated part			El. drive motor.	El. drive motor.	El. drive motor.	El. drive motor.
48	Parking brake type – actuated part			Mech. drive motor.	Mech. drive motor.	Mech. drive motor.	Mech. drive motor.

\*Requires 450Ah battery and loads <1,000 kg

No.				SN 160 S	SN 160 B	SN 200 S	SN 200 B
1 1a	Lifting capacity, rated Distance to centre of gravity	Q D	kg mm	1,600 600	1,600 600	2,000 600	2,000 600
2 2a 2b 2c 2d	Lifting height Mast height Transport free-lift Full free-lift Straddle lift	H4 H3 H5 H2	mm mm mm mm	See masts. A/X	See masts. A/X	See masts. A/X	See masts. A/X
4	Lifting speed without load – with rated load		m/s	See the table below	See the table below	See the table below	See the table below
5	Lowering speed without load – with rated load		m/s	0.30-0.60	0.30-0.60	0.35-0.50	0.35-0.50
6	Driving speed without load – with rated load Increased speed		km/h m/s km/h m/s	10.0-9.0 2.8-2.4 11.0-8.5 3.0-2.4	10.0-9.0 2.8-2.4 11.0-8.5 3.0-2.4	10.0-9.0 2.8-2.4 11.0-8.5 3.0-2.4	10.0-9.0 2.8-2.4 11.0-8.5 3.0-2.4
8	Gradient	Max	%	7	7	7	7
10	Turning radius at L1=1150	R2	mm	1897	1883	1940	1918
11	Minimum aisle width Ast incl. 200 mm R2-L2+load length+200 Load length 800 mm Load length 1,000mm Load length 1,200mm	Ast Ast Ast	mm mm mm	2097 2297 2497	2140 2340 2540	2146 2346 2546	2186 2386 2586
13	Height over protective roof	H6	mm	2110	2110	2110	2110
13a	Seat height min-max		mm	900-1,000	900-1,000	900-1,000	900-1,000
13b	Step height min-max	Y1	mm	350-430	350-430	350-430	350-430
14	Truck length	L	mm	2247	2085	2296	2124
15 15b	Truck width Width over stabilisers	W S	mm mm	1010 See masts. A/X	1105 See masts. A/X	1010 See masts. A/X	1105 See masts. A/X
16	Fork length std	L1	mm	See masts. A/X	See masts. A/X	See masts. A/X	See masts. A/X
17 17a	Width over forks std max-min Width between fork blades	V	mm	See masts. A/X	See masts. A/X	See masts. A/X	See masts. A/X
19	Truck length to fork support area Narrow gauge L-L1 Wide gauge L-L2	L4	mm	1097	1137	1146	1186
20 20a	Fork arm width Fork height, lowered	B1 H1	mm mm	See masts. A/X See masts. A/X	See masts. A/X See masts. A/X	See masts. A/X See masts. A/X	See masts. A/X See masts. A/X
21	Straddle lift height	H7	m	See masts. A/X	See masts. A/X	See masts. A/X	See masts. A/X
22	Width between straddle lift	W2	mm	See masts. A/X	See masts. A/X	See masts. A/X	See masts. A/X
23	Dim. front axle – fork support area	L2	mm	See masts. A/X	See masts. A/X	See masts. A/X	See masts. A/X
24	Wheelbase L2+L4-195	L3	mm	1704	1687	1747	1725
25	Wheel track – front, back centre of wheel		mm	390-685	980-685	375-685	980-685
26	Ground clearance half L3		mm	25	57.5	23	59.5
27	Service weight with/without battery		kg	See the table below	See the table below	See the table below	See the table below
28	Max shaft pressure, load wheel without/with rated load		kg	500-1980	520-2,000	750-2550	770-2570

29	Max axles pressure, drive wheel without/with rated load		kg	1270-1430	1290-1450	1500-1700	1520-1730
39	Battery capacity		kWh	13.4-18.0	13.4-18.0	13.4-18.0	13.4-18.0
39a	Battery voltage		Ah V	560-750 24	560-750 24	560-750 24	560-750 24
41	Traction motor AC S2 = 60 min		kW	2.4	2.4	2.4	2.4
42	Speed control			AC Transistor	AC Transistor	AC Transistor	AC Transistor
43	Lift motor AC S3=12% 10 min		kW	4.5/7.6*	4.5/7.6*	4.5	4.5
43a	Hydraulic pressure		MPa	17.5	17.5	17.5	17.5
44	Wheel type, load wheel drive wheel/castor wheel			Vulkollan Rubber/vulk.	Vulkollan Rubber/vulk.	Vulkollan Rubber/vulk.	Vulkollan Rubber/vulk.
44a	No. of drive/castor/load wheels			3-4	3-2	3-4	3-2
45	Wheel dimensions						
45a	Load wheel W*width		mm	(4x) 85x75	(2x) 150x60	(4x) 85x75	(2x) 150x60
45b	Drive wheel W*width		mm	250x80	250x80	250x80	250x80
45c	Castor wheel		mm	(2x) 150x60	(2x) 150x60	(2x) 150x60	(2x) 150x60
46	Steering unit			Electric servo	Electric servo	Electric servo	Electric servo
47	Main brake type – actuated part			El. drive motor.	El. drive motor.	El. drive motor.	El. drive motor.
48	Parking brake type – actuated part			Mech. drive motor.	Mech. drive motor.	Mech. drive motor.	Mech. drive motor.

### Lifting speed with 4.5 kW Bosch unit

Machine type	Without load		With load	
	Free-lift	Final stroke	Free-lift	Final stroke
160 T	- -	3.3 s/m 0.30 m/s	- -	5.0 s/m 0.20 m/s
160 TV	- -	3.6 s/m 0.28 m/s	- -	6.6 s/m 0.15 m/s
160 TFV	3.4 s/m 0.29 m/s	3.5 s/m 0.29 m/s	6.3 s/m 0.16 m/s	6.6 s/m 0.15 m/s
160 DTFV	3.6 s/m 0.28 m/s	3.7 s/m 0.27 m/s	6.3 s/m 0.16 m/s	6.7 s/m 0.15 m/s
200 TFV	4.6 s/m 0.22 m/s	4.7 s/m 0.21 m/s	10.6 s/m 0.09 m/s	10.8 s/m 0.09 m/s
200 DTFV	5.3 s/m 0.19 m/s	5.7 s/m 0.17 m/s	10.5 s/m 0.09 m/s	10.9 s/m 0.09 m/s

### Lifting speed with 7.6 kW Thrige unit

Machine type	Without load		With load	
	Free-lift	Final stroke	Free-lift	Final stroke
160 T	- -	2.9 s/m 0.35 m/s	- -	4.3 s/m 0.23 m/s
160 TV	- -	3.0 s/m 0.33 m/s	- -	5.9 s/m 0.17 m/s
160 TFV	2.9 s/m 0.35 m/s	2.9 s/m 0.34 m/s	5.3 s/m 0.19 m/s	5.6 s/m 0.18 m/s
160 DTFV	2.9 s/m 0.34 m/s	3.0 s/m 0.33 m/s	5.3 s/m 0.19 m/s	5.9 s/m 0.17 m/s

**Machine weights without battery at L1 = 1150**

(All machine weights are estimated for the 160 mast = same as for the 125 mast)

Lifting height mm H4	Junior 160		Senior 160		Senior 162-200	
	T, TV, TFV	DTFV	T, TV, TFV	DTFV	TV, TFV	DTFV
2500	1,065	-	1,090	-	1,340	-
3,000	1,095	-	1,120	-	1,375	-
3,300	1,110	-	1,135	-	1,400	-
3,600	1,130	1,135	1,155	1,160	1,425	1,485
4,200	1,160	-	1,185	-	1,475	-
4,350	-	1,175	-	1,200	-	1,550
4,500	1,180	-	1,205	-	1,500	-
4,800	-	1,200	-	1,225	-	1,585
5,250	-	1,225	-	1,250	-	1,625
6,150	-	-	-	1,300	-	1,700
Kg/m H4	50, 60, 57	58	50, 60, 57	58	83, 81	84

Additional for broad gauge version 40 kg

Additional for stabilisers 70 kg

Additional for adjustable straddle lift 100 kg

Additional for Senior 25 kg

**Battery weights approx.**

240 ampere 270 kg

350 ampere 330 kg

460 ampere 400 kg

540 ampere 490 kg

625 ampere 500 kg

750 ampere 600 kg

## Component specification

**Table 1.2** Component specification

Component		Specification	
Drive motor	Drive voltage	24V	
	Output standard	2.2 / 2.4 kW S2 60 min	
	Insulation resistance	>24 k $\Omega$	
Gearbox	Gear ratio (standard)	17.15:1	
	Oil volume	1.5 litres	
Hydraulic system	Max pressure	17.5 MPa (=175 kp/cm <sup>2</sup> )	
	Oil volume	max 21 litres	
Hydraulic unit (motor and pump) 24V DC	Type 2	Output	4.5 kW
	Type 3	Output	7.8 kW
	XLL	Output	1.5 kW
Control system for drive motor	Type Zapi AC1	AC Transistor	
	Voltage	24 V	
	Max current	250A (RMS) for 2 min	
Control system for steering wheel	Type Zapi AC1	AC Transistor	
	Voltage	24V	
	Max current	70A	
Fuses	Control fuses 2 pcs	7.5A 30.0A	
	Pump motor fuse 1	250 A	
	Drive motor fuse 1	160 A	

# Recommended consumable materials

## Oil and grease

**Table 1.3** Table of recommended types of oil and grease

Brand	Gearbox oil As per API value GL-5		Hydraulic oil As per ISO VG 32, VG 15		Bearing grease NLGI 2 Lithium base	Worm gear oil (Only XTF)
	Normal	Cold store	Normal (32)	Cold store (15)		
BP	BP Energear FE 80W140	BP Energear SHX-S 75W/140 EPS	BP Bartran HV-32	BP Bartran SHF-S	Energear LC 2	BP Energol SGXP 150
Castrol	-	-	Hyspin SHS 32	Hydraulic oil OM 15 Alt: Hyspin AWH 15	LMx	Alpha syn T 220
Mobil	-	-	DTE 13 M SHS 32	Flowrex 1	Mobilplex 48	GLY goyle 30
Shell	-	-	Tellus oil TX 32	Tellus oil T 15	Retinax EP2	Tivela WB
Statoil / Exxon	-	-	SHS 32	J 26	Uniway LIX 625	Worm gear oil 375 S
Texaco	-	-	Rando oil HDZ 32	Rando oil HDZ 15	Hytex EP2	Synlube CLP 220



### **Important!**

**Do not mix different lubricants – especially not synthetic oil with mineral oil!**

## Standards and abbreviations

### Tightening torque, screws and nuts

**Table 1.4** Tightening torque, screws and nuts

DIM	Tensile grade			
	4.6	8.8	10.9	12.9
	Nm	Nm	Nm	Nm
M4	1.1	2.9	4.0	4.9
M5	2.2	5.7	8.1	9.7
M6	3.7	9.8	14	17
M8	8.9	24	33	40
M10	17	47	65	79
M12	30	81	114	136
M14	48	128	181	217
M16	74	197	277	333
M18	103	275	386	463
M20	144	385	541	649

The tightening torques in the table above are standard values. In some cases a specific tightening torque is specified in respective sections. If no tightening torque is specified in the service instructions, the values shown in the table above apply.

### Tightening torque, hydraulic couplings

**Table 1.5** Tightening torque, hydraulic couplings

Tightening torque: Pipe thread / metric thread:			
Metric fine thread	Whitworth pipe thread	MA (Nm) with pipe olive	MA (Nm) with elastic
M10 x 1	G 1/8"	25	10
M12 x 1.5		30	20
M14 x 1.5	G 1/4"	50	30
M16 x 1.5	G 3/8"	80	35
M18 x 1.5		90	40
M20 x 1.5	G 1/2"	130	50
M22 x 1.5		150	60



**Table 1.5** Tightening torque, hydraulic couplings

<b>Tightening torque: Pipe thread / metric thread:</b>			
<b>Metric fine thread</b>	<b>Whitworth pipe thread</b>	<b>MA (Nm) with pipe olive</b>	<b>MA (Nm) with elastic</b>
M26 x 1.5		250	70
M27 x 1.5	G 3/4"	250	80
M27 x 2		250	90
	G 1"	350	140
M33 x 2		400	140
M42 x 2	G 1 1/4"	600	240
M48 x 2	G 1 1/2"	800	300

## Conversion tables

**Table 1.6** Conversion table, torque units

<b>Newton metre (Nm)</b>	<b>Kilopond metre (kpm)</b>	<b>Poundforce inch (lbg x in)</b>	<b>Poundforce foot (lbf x ft)</b>
1	0.10	8.85	0.74
9.81	1	86.80	7.23
0.11	0.01	1	0.08
1.36	0.14	12.00	1

**Table 1.7** Conversion table, pressure units

<b>Pa (N/m<sup>2</sup>)</b>	<b>Bar (1mb=1hPa)</b>	<b>at (kp/cm<sup>2</sup>)</b>	<b>dry (mm Hg, 0 C)</b>	<b>atm</b>
1	10 <sup>-5</sup>	1.020*10 <sup>-5</sup>	7.501*10 <sup>-3</sup>	9.869*10 <sup>-6</sup>
9.807*10 <sup>4</sup>	0.9807	1	735.6	0.9678
133.3	1.333*10 <sup>-3</sup>	1.360*10 <sup>-3</sup>	1	1.316*10 <sup>-3</sup>
1.013*10 <sup>5</sup>	1.013	1.033	760	1

**Table 1.8** Conversion table, speed

<b>m/s</b>	<b>km/h</b>
1	3.6
0.278	1

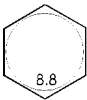

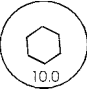
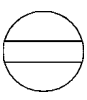

## Standard abbreviations

**Table 1.9** Standard abbreviations

Magnitude	Unit	Designation
Current	Ampere	A
Voltage	Volt	V
Resistance	Ohm	$\Omega$
Output	Watt	W
Torque	Newton metre	Nm
Pressure	Pascal	Pa

## Screw types and tensile grades

**Table 1.10**

Figure	Screw type	Designation	Tensile grade
	M6S	Hexagon screw	8.8 10.9
	MC6S	Hexagon hole screw	8.8 10.9 12.9
	MF6S	Hexagon hole screw, countersunk	10.9
	MCS	Slotted screw	4.6
	MVBF	Oval head counter-sunk screw	4.6

Marking with the manufacturer's trademark, including the tensile grade, is compulsory for screws with a thread diameter from 5 mm and in tensile grades according to the table above. Marking only takes place when the shape of the product permits this.

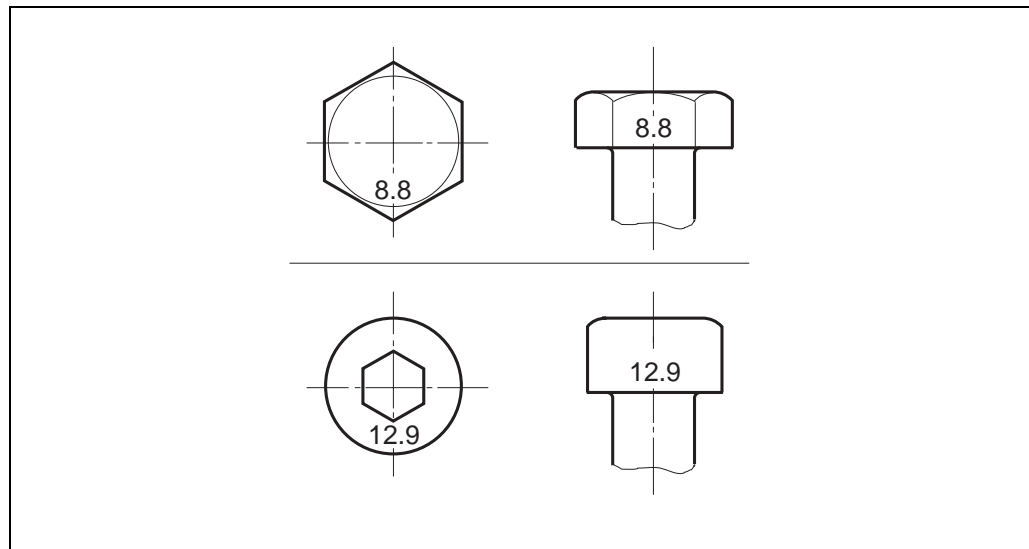


Figure 1.9 Example of marking

## Colour of the truck

The truck is painted in colours with the following NCS colour codes:

Table 1.11 NCS colour codes

Machine colour	Designation
Yellow	NCS 0070-Y20R
Medium grey	NCS 7,000
Dark grey	NCS 8,000

## Colour codes, cabling

The colour markings of all cables included in the truck can be seen in the Atlet wiring diagrams. The abbreviations have the following significance:

**Table 1.12** Colour codes Atlet wiring diagrams

Code	Cable colour
Y	Yellow
BL	Blue
SB	Black
W	White
GN	Green
GR	Grey
R	Red
BN	Brown
VO	Violet
P	Pink
OR	Orange



### **Note!**

**Two-colour cables are shown with both colour codes separated by a slash.  
E.g. blue/yellow cable is shown with colour code BL/Y.**

## Designations for electrical components

Electrical components normally have a designation of two letters:

**Table 1.13** First letter

Code	Designation
A	Component or function without its own letter in the list
C	Capacitor
D/V	Diode
E	Electronic component
F	Fuse
I	Indicator
K	Contact/relay
L	Coil/inductive element
M	Motor
P/X	Connection
R	Resistor
S	Switch/Change-over switch
T	Terminal
Y	Valve/brake
H	Audible warning unit/lamps/lights
G	Battery

**Table 1.14** Second letter

Code	Designation
B	Brake
C	Control system
E	Emergency function
F	Forward
H	Hour
K	Key
L	Lower
M	Manoeuvre
P	Pump
R	Reverse
S	Speed

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