SERVICE MANUAL

Machine: A-Ergo

Manual No: 005975

Edition 2008B

1 General information and technical data

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Scope, service manual

General

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

The manual describes models manufactured from and including the introduction of A-Ergo at the end of 2002.

You may find contradictions in the manual compared with the models supplied due to optional designs, 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 should be contacted.

The electrical system must never be rewired in any form after delivery without written authorisation from Atlet AB, since this may change the measured and applicable EMC.

 The material has undergone careful examination with regard to correctness. Subject to alteration. In the event of inconsistent information in the Swedish and translated editions, it is the Swedish edition that applies.

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

Scope of the A-Ergo model

The stand-on stacker trucks in the A-Ergo series are available in a number of different variants with mast system, straddle lift, extendable stabilisors and telescopic forks (ATF).

How to use the manual

Structure

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

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

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

With regard to software this is described under 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.

History

The following modifications affect the service procedure.

Table 1.1 Upgrades of the truck that affect the service procedure

Date	Chassis no.	Event

Symbol key

Warning!

Used if there is a risk of personal injury.

Important!

Used if there is a 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 regulations must be followed.
- The drive wheel should always be lifted up free from the floor during service work to prevent the vehicle from moving.
- Before working on the electrical system the battery plug should be pulled out.
- To prevent injuries caused by crushing the battery plug should always be removed when working on or around the mast and hydraulic unit. The mast or hydraulic unit can be actuated due to an electrical fault or a mistake while working. The battery plug may only be connected while trouble shooting, and when the greatest of care is exercised, (with the truck raised).

Warning!

Having the power connected to the truck when working on or around the mast can result in fatal injury!

- When working on or around the mast 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.
- The system should not be pressurised, e.g. the pump motor shutoff and the forks down, when dismantling parts of the hydraulic system.
- All metal objects such as watches 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

Checks/Preparations

- When the truck is lifted by using 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

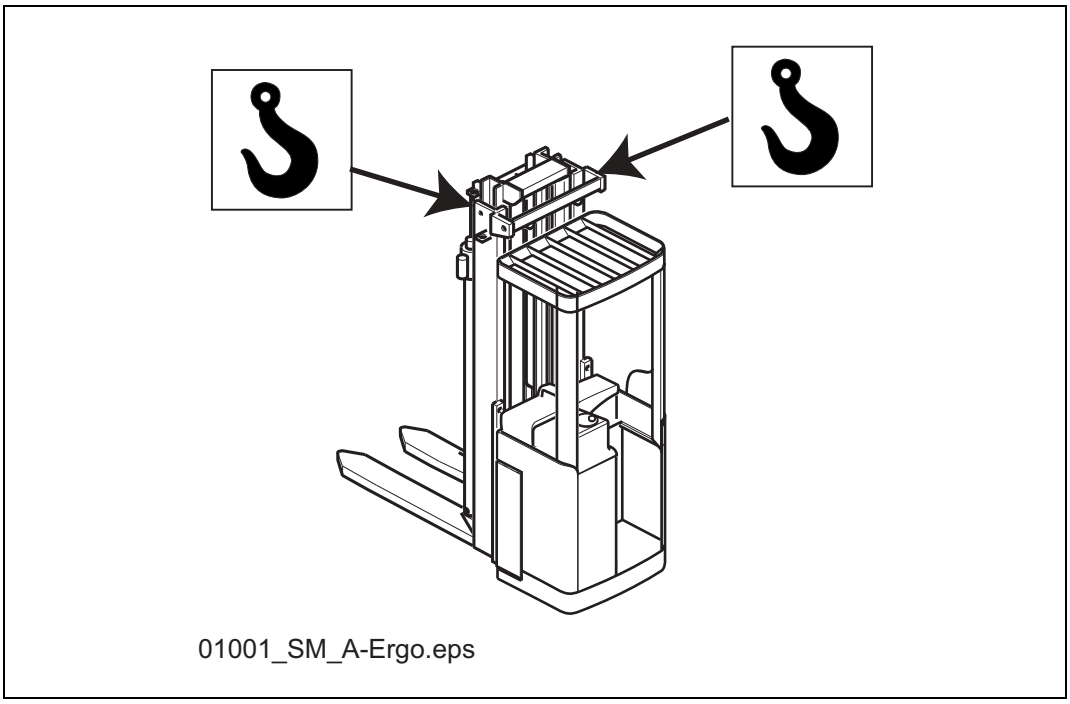

Figure 1.1 Permitted lifting points, A-Ergo

Figure1.1 shows where the permitted lifting points are placed on the truck. The lifting points are marked with a decal representing a lifting hook; the lifting holes in the outer mast should 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 regulators (concerns all electronic units) should be disconnected. On completion of welding work the connectors should first be connected to the electronic units, after which the battery plug is 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.

Taking the environment into consideration

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

Environmentally hazardous waste, such as oil filters, batteries, hydraulic hoses and electronics, can have a negative effect on the environment, or health, if handled incorrectly. Recyclable material should be taken care of by specialised authorities.

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 good control 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 A-Ergo

Designations

Truck designation

Table 1.2 Truck designations

Truck type	A-Ergo	Stand-on stacker, Standard
	A-Ergo TF	Stand-on stacker with telescopic forks
Load capacity	A-Ergo	1600 or 2000 kg
	A-Ergo TF	1000 kg

Type designation

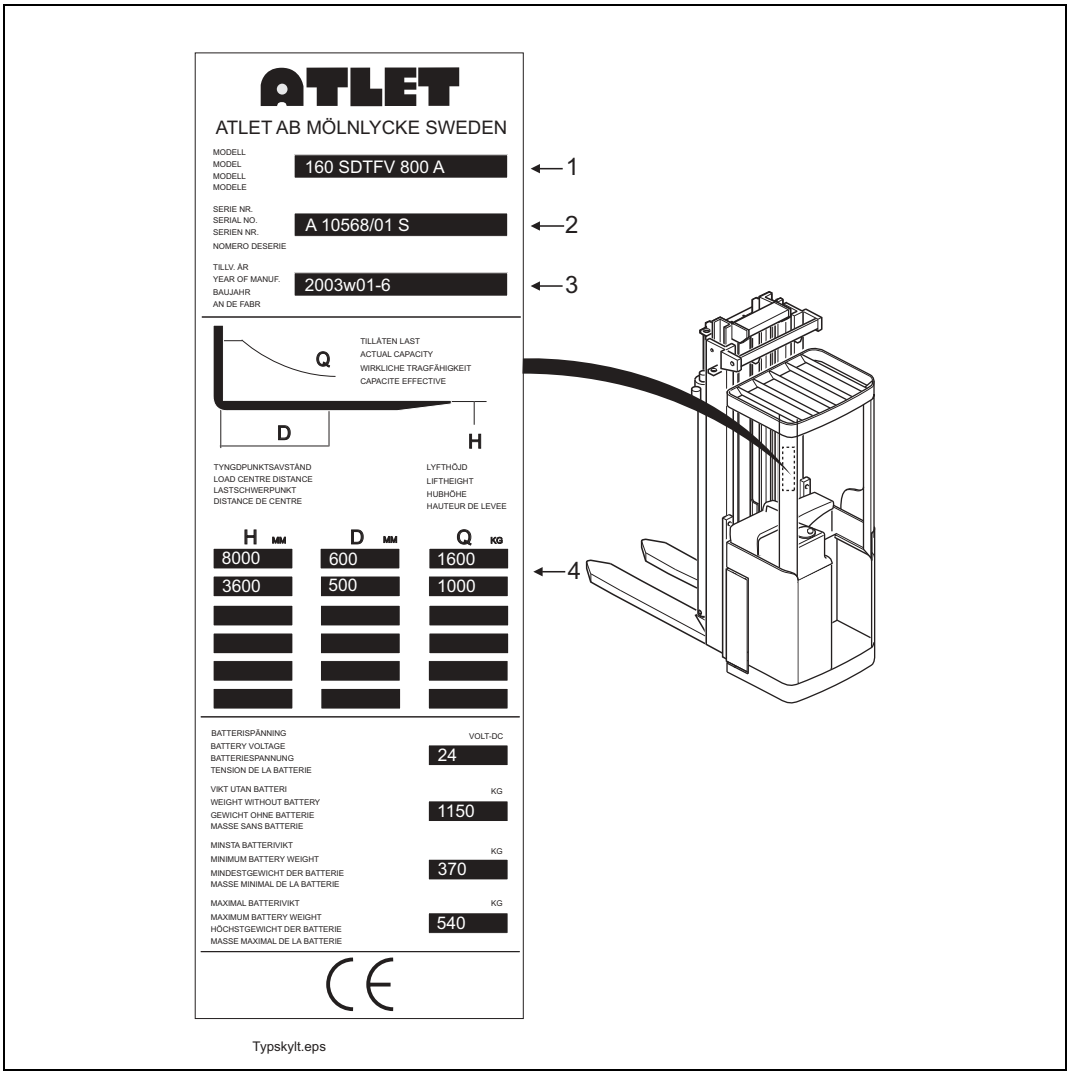

Figure 1.2 Example of type plate (–2006w36)

1. Model designation.
2. Type Series no./Version (S=Special version.).
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. Any load restrictions, depending on the position of the load on the forks (D) and/or lifting height (Q).

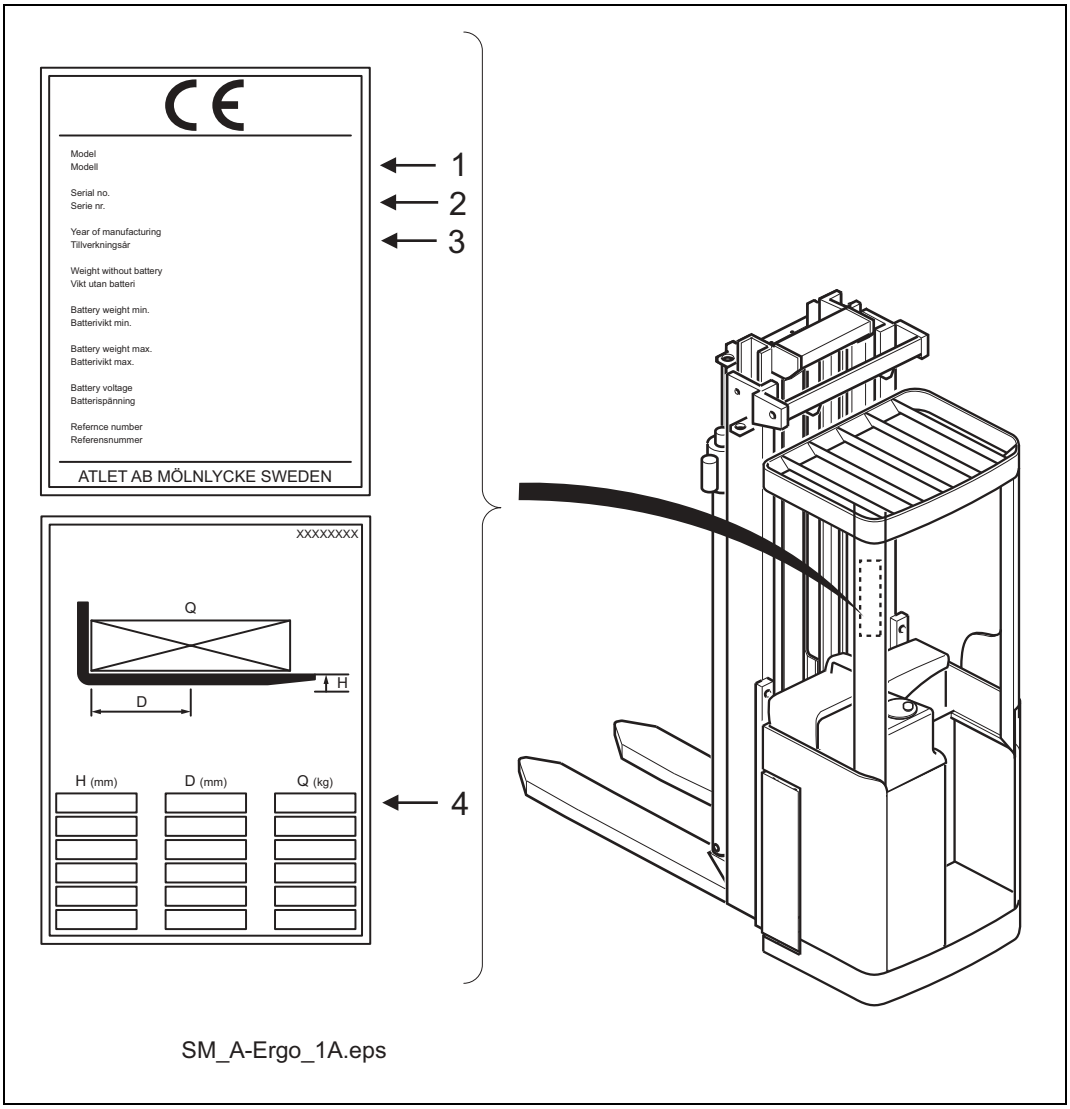

Figure 1.3 Example of type plate (2006w37–)

1. Model designation.
2. Type Series no./Version (S=Special version.).
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. Any load restrictions, 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.

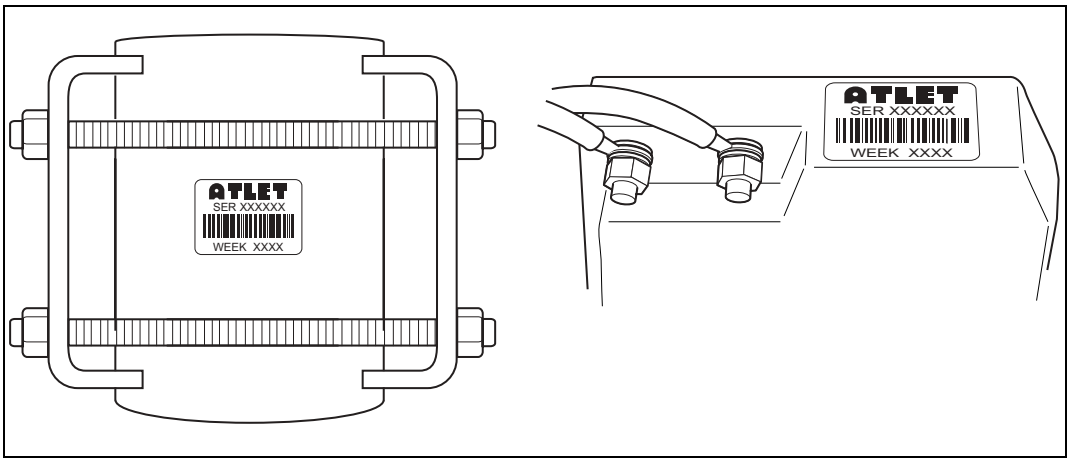

Figure 1.4 Example of plate with serial number.

Explanation of Model designation

Example: **A 160 S DTF V S 360 225 40**

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
Free-view mast	V
Stabilisers	S
Straddle lift	H
Lifting height in cm	
Battery Ah/5	
Charger Ampere	

Dimensions and weights

Dimensions A-Ergo

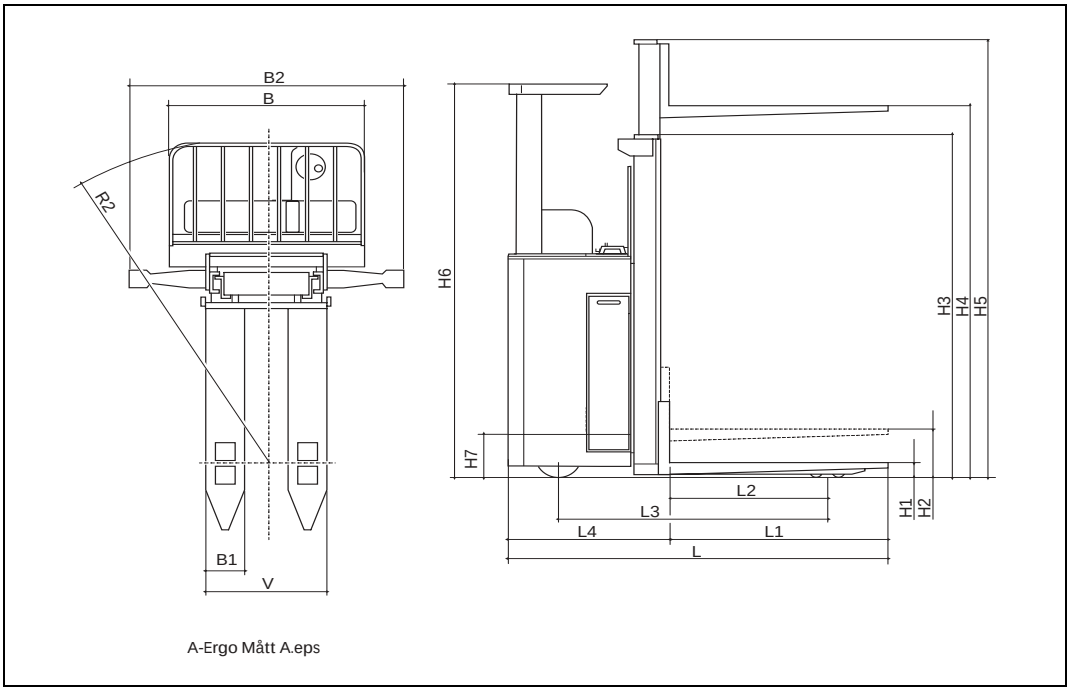

Figure 1.5 Positions for dimensions A-Ergo

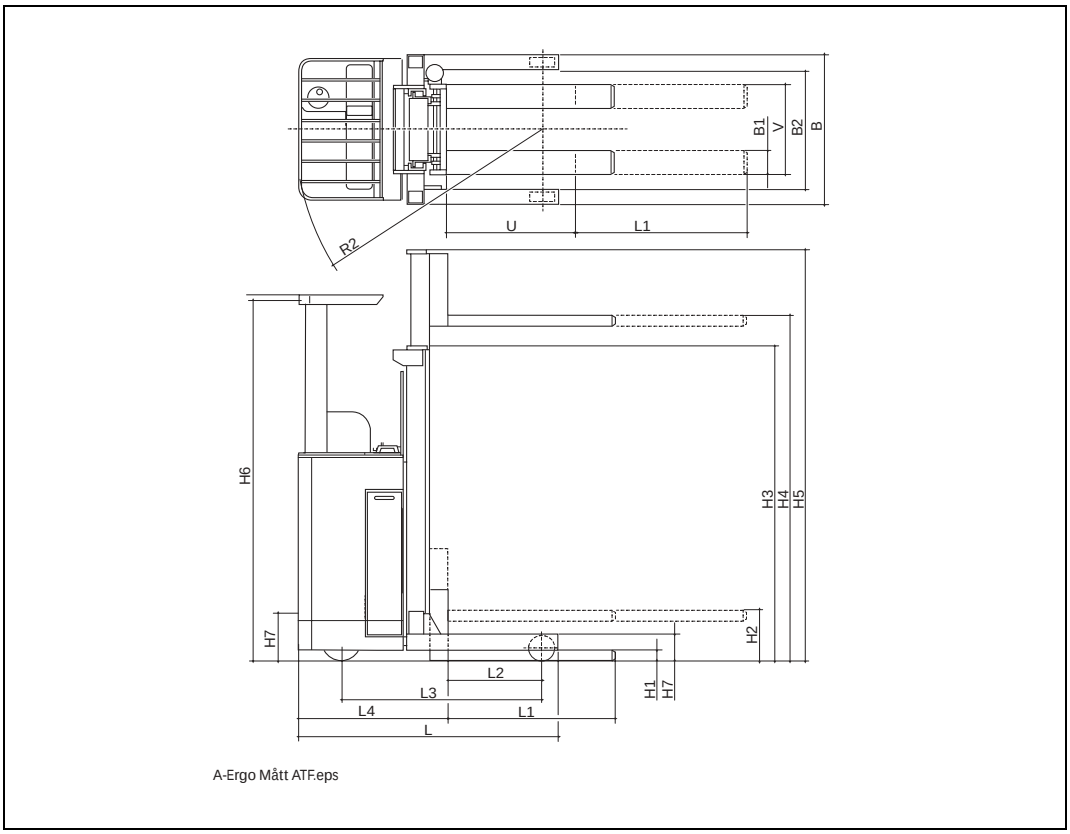

Figure 1.6 Positions for dimensions A-Ergo TF

Component specification

Table 1.3 Component specification

Component		Specification	
Drive motor		Drive voltage	16V
		Output standard	2.2 / 2.4 kW S2 60 min
		Insulation resistance	>24 kΩ
Gearbox		Gear ratio (standard)	16,95:1
		Oil volume	1.5 litres
Hydraulic system		Max pressure	17.5 MPa (=175 kp/cm²)
		Oil volume	max 19 litres
Hydraulic unit (motor and pump)	Type 1	Output	3.5 kW
	Type 2	Output	4.5 kW
	Type 3	Output	7.6 kW
Control system for drive motor		Type Zapi AC1	AC Transistor
		Voltage	24 V
		Max current	250A (RMS) in 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 pcs.	250A
		Drive motor fuse 1 pcs.	160A

Recommended consumable material

Oil and grease

Table 1.4 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 ATF)
	Normal	Cold store	Normal (32)	Cold store (15)		
BP	BP Energear Hypo 80W/140 EP	BP Energear SHX-S 75W/140	BP Bartran HV-32	BP Bartran SHF-S	BP Energrease LC 2	BP Energol SGXP 150
Castrol	Hypol C 80 W/90	-	Hyspin SHS 32	Hydraulic oil OM 15 Alt:Hyspin AWH 15	LMx	Alpha syn T 220
Mobil	Mobilube HD 85 W/ 90	-	DTE 13 M SHS 32	Flowrex 1	Mobilplex 48	GLY goyle 30
Shell	Spirax HD 85 W/90	-	Tellus oil TX 32	Tellus oil T 15	Retinax EP2	Tivela WB
Statoil / Exxon	Gearway G5 80 W/90	-	SHS 32	J 26	Uniway LIX 625	Snäckväxel-olja 375 S
Texaco	Geartex EP-C 80 W/90	-	Rando oil HDZ 32	Rando oil HDZ 15	Hytex EP2	Synlube CLP 220

☞ ***Important!***

Do not mix different lubricants – definitely not synthetic oil with mineral oil!

Standards and abbreviations

Screws

Tightening torque, screws and nuts

Table 1.5 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 torque 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 1.6 Tightening torque, hydraulic couplings

Tightening torque: Pipe thread / metric thread:			
Metric fine thread	**Whitworth pipe thread**	**MA (Nm) with ring**	**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
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 11/4"	600	240
M48 x 2	G 11/2"	800	300

Conversion table

Table 1.7 Conversion table, torque units

Newton metre (Nm)	Kilopond metre (kpm)	Poundforce inch (lbg x in)	Poundforce foot (lbf x ft)
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

Screw types and tensile grades

Table 1.8

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 countersunk screw	4,6

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

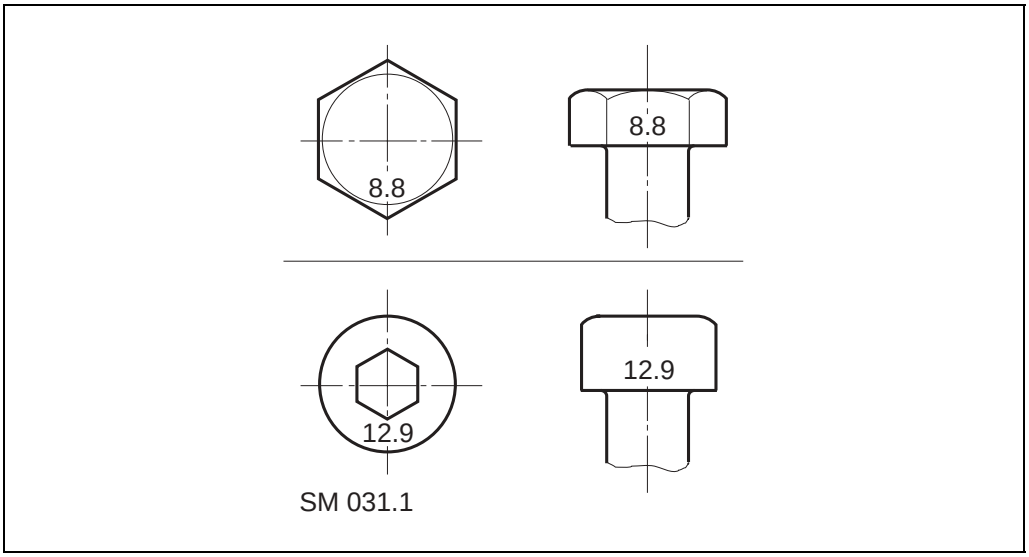

Figure 1.7 Example of marking

Colour of the truck

The truck is painted with the following NCS colour codes:

Table 1.9 NCS colour codes

Machine colour	Designation
Yellow	NCS 0070-Y20R
Medium grey	NCS 7000
Dark grey	NCS 8000

Colour codes, cabling

The colour codes of all the cables in the truck can be read off from the Atlet wiring diagram. The abbreviations have the following implication:

Table 1.10 Colour codes, Atlet wiring diagram

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

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, electrical components

Electrical components normally have a designation of two letters:

Table 1.11 First letter

Code	Designation
A	Component or function without its own letter below
D	Diode
E	Electrical component
F	Fuse
I	Indicator
K	Connector
L	Lamp
M	Motor
P	Plug
R	Relay
S	Switch
T	Terminal
V	Valve
W	Audible warning

Table 1.12 Second letter

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

Example SL = Switch for Lowering function

Standard abbreviations

Table 1.13 Standard abbreviations

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