



AVANTI 助爬器-VI型  
**AVANTI CLIMB ASSISTANCE – TYPE VI**  
用户手册和安装说明  
**User's Manual and Installation Instructions**

## AVANTI 助爬器-VI型

用户手册和安装说明

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# EC-Declaration of Conformity for Machinery

Directive 98/37/EEC, Annex II, A

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herewith declares that the model of the following machinery.

**Type:** AVANTI Climbing Assistance OPS.VI

**Serial no.:**

- is in conformity with the provision of the Machinery Directive 98/37/EEC as amended at the time of the declaration,
- is in conformity with the provision of the following additional EC-Directives as amended at the time of the declaration:

Low-Voltage directive 73/23/EEC und 93/68/EEC

Directive 89/336/EEC; 92/31/EEC; 93/68/EEC EMV

- conform to the following harmonized standards:

EN ISO 12100-1:2003 Safety of machinery – Basic concepts, general principles for design – Part 1: Basic terminology, methodology

- EN ISO 12100-2:2003 Safety of machinery – Basic concepts, general principles for design – Part 2: Technical principles

- EN 60204-1:1998 Safety for machinery, Electrical equipment of machinery; Part 1: General requirements;

**Place:** Hillerød, Denmark

**Date:** April 20<sup>th</sup> 2006

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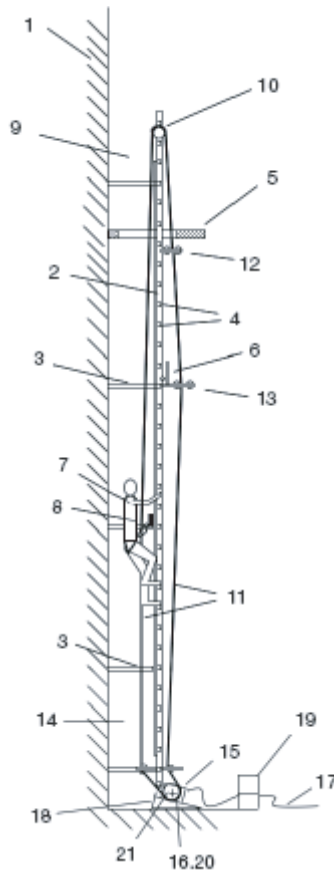
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# 系统概述

图 1



符号列表:

- |               |            |
|---------------|------------|
| 1. 墙          | 12. 导轮     |
| 2. 梯子         | 13. 导轮     |
| 3. 梯子托架       | 14. 下端     |
| 4. 梯级         | 15. 电机     |
| 5. 平台         | 16. 驱动轮    |
| 6. 休息平台       | 17. 电源     |
| 7. 爬梯人员       | 18. 弹簧加载基座 |
| 8. 安全带        | 19. 电气控制箱  |
| 9. 顶端         | 20. 护轮板    |
| 10. 带有轮子的顶部配件 | 21. 电缆传感器  |
| 11. 牵引绳       |            |

# 简介

警告:

- ◆ 专家是指参加并通过了 AVAVNTI 防坠落技术课程的 AVANTI 防坠落技术人员。
- ◆ 合格人员是指充分**阅读和理解**助爬器用户手册和安装说明的人员。
- ◆ AVANTI 助爬器的安装和服务仅可通过合格人员或专家完成。
- ◆ 如果合格人员或专家在安装、维修时或以任何其他方式改变了助爬器系统，则根据用户手册和安装说明，合格人员或专家为此负责。

危险:

- ◆ 牵引绳储藏时须避免阳光暴晒。
- ◆ 保持牵引绳清洁，避免与油、润滑脂和化学物品接触。
- ◆ 仅安装脉冲直流漏电保护器。

## 安装手册

AVANTI 建议以下安装程序：

1. 在梯子下方安装电机。
2. 安装牵引绳和导轮。

### 1. 电机安装

1. 以电机及拽引轮在梯子中心来定位电机基座（见图 2）。这时，防坠落导轨定位在梯子中心，与电机基座对齐，如图 3 所示。牵引绳向右偏离防坠落导轨大约 20mm（图 3）。一旦电机对齐，使用 4 个 Ø8mm 螺栓将电机固定到塔架平台。从最靠近梯子中心的螺栓开始（最靠近防坠落导轨的螺栓）。

如果可能，将电机安置在底部平台下面的墙角。那样的话使用墙锚安装。

2. 将电气控制箱安置在梯子附近，使用弯头将电气控制箱安装到工作台。（见图 4）

图 2 电机



图 3 电机定位

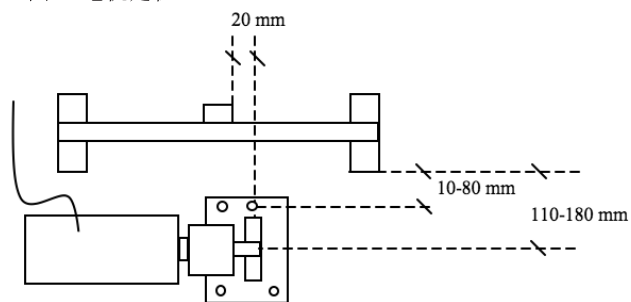
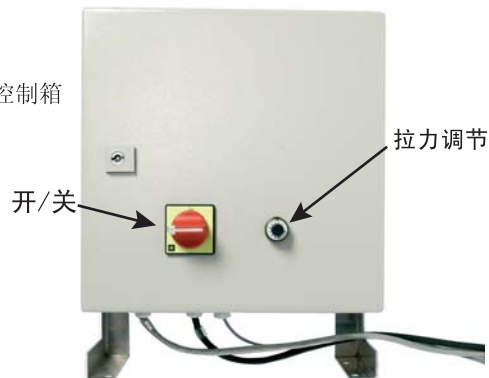


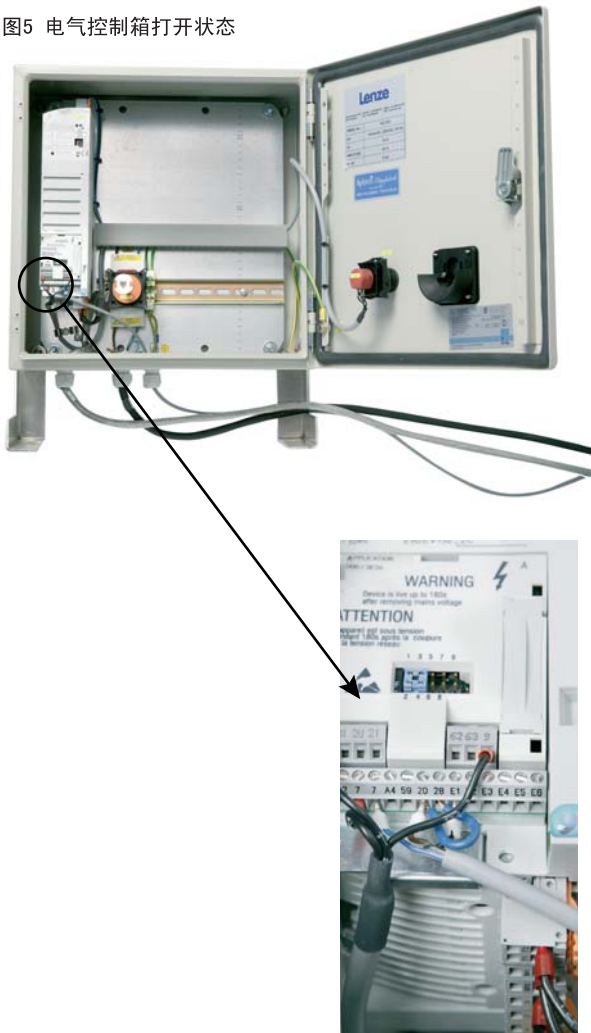
图 4 电气控制箱



## 2. 电缆安装

标记电缆，将电缆连接到电气控制箱内部搁架，参考下图或附录 B 电路图。

图5 电气控制箱打开状态



## 2.1 传感器安装

通过电气控制箱下面的中间引线给传感器电缆馈电(见附录 A)。

图6 传感器和传感器电缆



将脉冲传感器连接到电气控制箱如下：

- 黑线连接 E1
- 棕色线连接 20 或 28
- 蓝线连接 7(7 没有使用)

调节传感器，使驱动轮和传感器之间留有 0.5-1.5mm 的距离。**在系统电源插头拔去后才能调节传感器。**

安装牵引绳后，传感器可能需要调整。

## 2.2 传感器测试

安装牵引绳后接通电源，传感器上的绿色二极管会点亮。拉动绳索-传感器应显示运动，由白色指示响应，启动电机。如果没有显示，则根据传感器安装，调节传感器对正驱动轮。

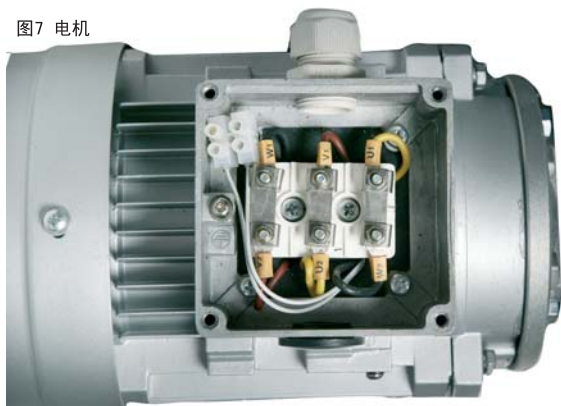


## 2.3 电机电缆安装

如下方式将电机电缆 W1 3、3 相连接到电机：

- 导线 1 连接 U
- 导线 2 连接 V
- 导线 3 连接 W
- 绿-黄导线接地
- 导线 4 和 5-连接到端子。4 和 5 连接到一个热控开关-因此接线次序不重要。
- 导线 6 没有使用。

图7 电机



## 2.4 电源电缆安装

一旦助爬器完全安装，将电源电缆连接到 230 伏，50-60 赫兹(1 相+0 线+地线)的电源。

如果附带额外的电源电缆，则为 0 相和接地电缆使用  $3 \times 1.5\text{mm}^2$ 。用一个 10 安的保险丝保护电源。使用一个具有 300 毫安故障电流保险丝的 HPFI 继电器。

## 3. 绳索安装

1. 将包括滑轮、螺栓和牵引绳一端的顶端配件带到梯子顶部。通常在前面将绳索提上来，在后面将绳索向下放会比较容易。

图8



2. 在梯子顶部安装顶端配件，如图 8 所示。使用顶端配件的孔，滑轮定位恰好偏离导轨中心，因此滑轮能与底部牵引轮位置匹配。安装顶端配件和滑轮是为了消除对手指等的潜在伤害。如果不可能安装顶端配件和滑轮，则需要一个防护装置。
3. 通过滑轮拉动绳索，下降时在梯子另一面使绳索下落。
4. 在基座平台向下，通过牵引轮使绳索向下进给。稍微拉紧绳索并固定-不要拼接。

5. 在梯子非攀爬侧安装牵引绳导向器。导向器功能是防止绳索拖在梯子、平台等地方(图 9-10)。在每一塔架平台和梯子休息平台上使用导轮。某些梯子休息平台需要加长的导轮。(图 9)

图9 导轮



图10 安装的导轮



6. 在攀爬侧的第一个或第二个梯级安装一个被保护的导轮(见图 11)。

图11 被保护的导轮



7. 安装完所有滚轮和电机后, 松开拉伸弹簧(16 页图 16), 尽可能打开电机基座平板。以 75Kg 力张紧绳索。使用单独的绳索或绳索张紧器, 如图 15 所示。搁置绳索 20 分钟, 复核张力。绳索尽可能拉直-再次张紧。重复该步骤, 直到绳索不能再被拉伸。

图12

绳索张紧 a)



绳索张紧 b)



8. 剪去过量的绳索, 留下 **50cm 的重叠**, 50cm 的重叠在拼接时需要。
9. 按照下面第 3 部分的说明拼接绳索
10. 最后拉紧电机基座上的弹簧, 拉紧到 60mm 长度。

安装牵引绳后, 按照 2.2 节的说明测试传感器。

### 3. 绳索安装

#### 3.1 牵引绳拼接

使用提供的插接针拼接绳索。

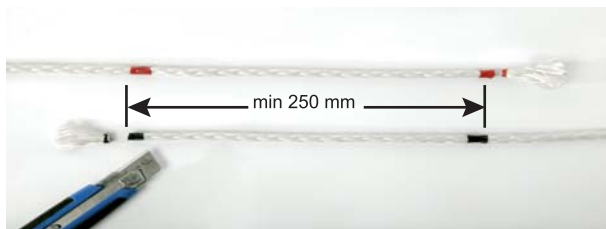
首先确保绳索充分拉伸。

为了阐明拼接过程，其中一个绳子用红带标记，另一个用黑带标记。

用红带对一个绳子封口，在该绳索同一端，用另一个红带在距离绳索末端至少 250 毫米处标记。

另一绳索末端以同样方式封口，以黑带标记。

Fig.13.1



将黑色绳端插入直径为 10 毫米的插接针。确信绳端稳固地放在插接针内，处于针槽内。

Fig.13.2a



Fig.13.2b



将插接针(黑绳)插入红绳，插入点距离红绳末端最少 250毫米。

Fig. 13.3



进给插接针，使插接针完全进入红绳。

图13.4



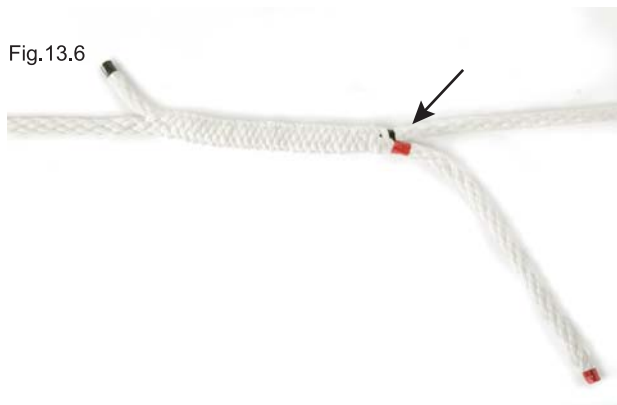
进给插接针，使插接针从红绳一侧穿出。

Fig.13.5



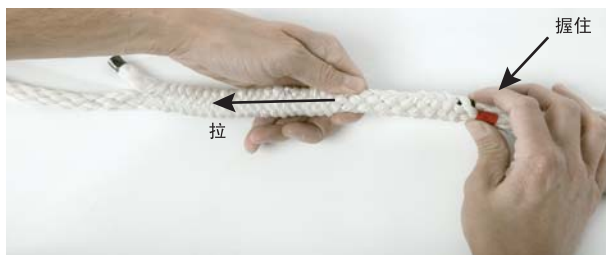
拿走插接针，拉动黑绳从红绳穿过，直到黑色标记恰好通过红色标记。

Fig.13.6



用右手握住红绳和黑绳标记的地方。

图13. 7a



用左手使红绳在黑绳上滑动。

Fig.13.7b



通过这种方式，黑绳端被拉回到红绳。黑绳标记应恰好可见。

Fig.13.8



黑绳现在被锁在红绳里面了-现在通过以下步骤给红绳端进入黑绳：

插入点尽可能地靠近黑绳标记，将插接针插入黑绳。

Fig.13.9



将红绳端固定到插接针内。

Fig.13.10



进给插接针，以插接针全长穿过黑绳。

Fig.13.11



进给插接针，使插接针从黑绳一侧穿出。

Fig.13.12



尽可能拉动红绳。

Fig.13.13a



Fig.13.13b



用左手握住拼接中心-在红绳表面拉动黑绳，以便红绳被拉入黑绳。

Fig.13.14a



Fig.13.14b



最后从拼接中心朝着绳索端部拉动外部绳索，使绳索工作。这样确保拼接正确锁定。

Fig.13.15



4. 拆卸

取下绳索，拆下滚轮、顶端轮、电机和电气控制箱，根据地方当局要求处理。

5. 标记



图14 产品标记

图15 快速指南

Avanti 助爬器  
AVANTI Climbing Assistance

• User must be at least 10 years old.

• User must have a bodyweight of minimum 50 kg/110 lbs.

• Use only original AVANTI rope clamp.

• Always use full protection equipment (PPE).

The Climbing Assistance does not replace full protection equipment (PPE).

1. Check rope tension spring on motor base. If spring length is more than 80 mm, the rope needs tensioning. See manual for tensioning method.

2. Check if green light on motor wind casing is on. If not, connect to the power supply and/or turn on the red switch on the grey control box.

3. Adjust pull force on grey control box (1 to 10).

4. Connect Personal Protective Equipment (PPE) as prescribed by manufacturer.

5. Fasten rope clamp carabiner on harness.

6. Fasten rope clamp on black climbing assistance rope.

7. Pull climbing assistance rope to activate motor.

8. STOP – stand still for 5 seconds.

9. After use, turn off the power supply.

• Darf nicht von Personen unter 10 Jahren benutzt werden.

• Darf nicht von Personen unter 55 kg benutzt werden.

• Darf nur mit originaler AVANTI Seilhalterung benutzt werden.

• Darf nur gleichzeitig mit Stageschutzvorrichtung (PSA) benutzt werden.

Die Aufstiegshilfe ersetzt nicht die Stageschutzvorrichtung (PSA).

1. Die Seil-Spannhülse auf dem Motorschacht kontrollieren. Falls die Federlänge mehr als 80 mm ist, ist eine Aufspannung des Seils notwendig. Beschreibung der Vorgehensweise, siehe Gebrauchsanleitung.

2. Kontrollieren, ob das grüne Licht auf dem Motorschacht eingeschaltet ist. Falls nicht, die Stromversorgung anschließen und/oder den roten Kontakt auf der grauen Kontrollkabine einschalten.

3. Die Zugkraft auf die graue Kontrollkabine (1 bis 10) justieren.

4. Die persönliche Schutzausrüstung (PSA) befestigen, wie vom Hersteller vorgeschrieben.

5. Den Karabinerhaken der Seilhalterung am Gurt befestigen.

6. Die Seilhalterung am schwarzen Seil der Aufstiegshilfe befestigen.

7. Das Seil der Aufstiegshilfe ziehen, um den Motor zu betätigen.

8. STOP – 5 Sekunden abwarten.

9. Nach Gebrauch die Stromversorgung ausschalten.

6. 技术说明

电气连接:	230 伏, 50-60 赫兹交流电, 接地 (1 相+0 线+地线)
保险丝:	10-16 安
最大功耗:	9 安
满载时功耗:	约 7.2 安
可调提升能力:	35-45 公斤
可调速度:	预调 0±14 米/分钟
操作温度:	-10°C - +55°C
重量-驱动器:	约 23 公斤
电气箱:	约 12 公斤
牵引绳 Ø8, 8 毫米:	约 68 克 /米
齿轮油:	
齿轮箱内 0.7 升, 例如	CLP460 Mobil(美孚) CLP460 AGIP OMALA460 Shell (壳牌) 或者相似品牌。 交货时装满油。

## 用户手册

### 7. 目的

#### 警告：

- ◆ 专家是指参加并通过了 AVANTI 防坠落技术课程的 AVANTI 防坠落技术人员。
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- ◆ 牵引绳储藏时须避免阳光暴晒。
- ◆ 保持牵引绳清洁，避免与油、润滑脂和化学物品接触。
- ◆ 因为会引起操作问题，电源不能配备不对脉冲直流电起反应的漏电保护器。

#### 用途

AVANTI 助爬器适用于个人在固定梯上长时间上下爬梯。

#### 不适用于：

- ◆ 不适用于提升工具或零件。

- ◆ 不适用于低于 18 岁或少于 55 公斤体重的人员。
- ◆ 不适用于多用户同时使用。
- ◆ 不要固定到身体部分或衣服。

**助爬器不是防坠落设备。务必穿戴合适的防坠落设备(P.P.E)**

**使用原厂零件—由于设备重装或更改、或者使用非原厂零件引起的损坏，对此不提供保证。**

#### 功能

系统包括一个电机，一个连续牵引绳，一个电气控制箱和一个绳夹。使用绳夹钩住牵引绳，通过拉动牵引绳激活电机。然后牵引轮上的传感器登记运动，启动电机。不论爬梯的速度和方向如何，牵引绳以预先调整的力（例如 30 公斤）牵引。绳索在同一位置停止 3 秒，传感器登记运动已停止，拉力消失。

### 8. 日常检查

- a) 检查电机基座上的绳索张紧弹簧（见图 16）。如果弹簧长度超过 60 毫米，绳索需要拉紧。使用扳手张紧弹簧。如果不能充分拉紧绳索，则需要缩短绳索。见 2.7 节安装说明。



- b) 确保绳索沿着导轮和牵引轮对齐（见图 17）。绳索沿着左右边对齐。
- c) 如果观察到助爬器有任何异常情况，则不要使用助爬器。在继续使用前纠正错误。

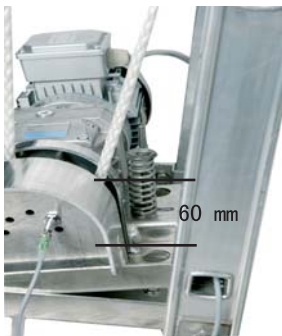


图16 具有感应传感器和  
张紧弹簧的电机基座板

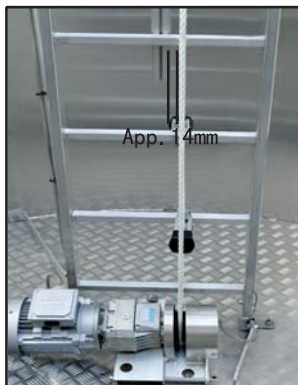


图17绳索校准.  
绳索能按照左右边校准.

## 9. 使用说明

使用前，阅读和理解用户说明。

使用时按照以下操作：

- a) 执行上述日常检查。
- b) 检查电机轮防护装置上的绿灯是否点亮（见图 16）。如果没亮，则连接电源（230 伏-50-60 赫

兹），或打开灰色电气控制箱上的红色开关。

- c) 在灰色电气控制箱上调节拉力（1~10）（图 18）。依靠绳索长度，拉力约等于 35-45 公斤。
- d) 按照制造商规定连接安全带和防坠落设备。
- e) 将绳夹锁扣固定在安全带上。
- f) 将绳夹固定在助爬器绳索上。
- g) 拉动助爬器绳索以启动电机。
- h) 停止-保持 5 秒钟静止状态。
- i) 使用后，关闭电源，并拔掉电源。

以最舒服的方式将绳夹锁扣连接到腰际或胸前的安全带 D 形环。

### 警告！

保持牵引绳干燥，避免与油和油脂接触。

使用助爬器时，保持手指和其他身体部分、衣物等远离牵引绳、驱动轮、滑轮等。

注意！主开关不可以快速连续的方式连接/断开几次。这样做可能损坏电气设备。

图18



图19 绳索上绳夹





## 10. 维护

AVANTI 助爬器主要是免于维护。按照以上规定做日常检查，如果发现异常，则采取措施。

## 11. 年度控制

合格人员或专家必须每年一次检查助爬器。如果没有检查，则使保证无效。

AVANTI 定期开办“防坠落专家课程”。如果感兴趣，请联系 AVANTI。

- ◆ 在维修电机、电机基座、护轮板和双护滚轮前，断开电源，至少等待 1 分钟。

年度控制：

1. 确保所有螺栓和螺帽固定（电机、电气控制箱、滚轮和顶端配件）。
2. 确保拉紧压缩弹簧，使  $L=60$  毫米（见 8a 节, 日常检查）。
3. 齿轮油：每三年更换齿轮油（参考 8.部分系统说明）（上次更换齿轮油年份写入附录 C 的测试报告）。
4. 其余零件一旦发现有磨损迹象，则更换（驱动轮、牵引绳等）。如果牵引绳的一部分要更换，在磨损的地方插入一段新绳。

## 12. 检修故障

- ◆ 拉动牵引绳时，牵引绳没启动：

1. 用手拉动牵引绳，如果绳索被卡住，则找出阻滞的原因，并修理。
2. 检查系统是否插上电源。
3. 检查系统是否接通。
4. 检查护轮板上**绿色**传感器二极管是否被点亮。如果没有点亮，则根据安装说明检查是否进行了电气安装。
5. 用手拉动牵引绳。如果用力拉动绳索后电机没有启动，检查电机保护上的**白色**传感器。白色传感器指示运动。如果拉动绳子时白色传感器没有显示运动，则根据 2.1 节传感器安装说明调整传感器。

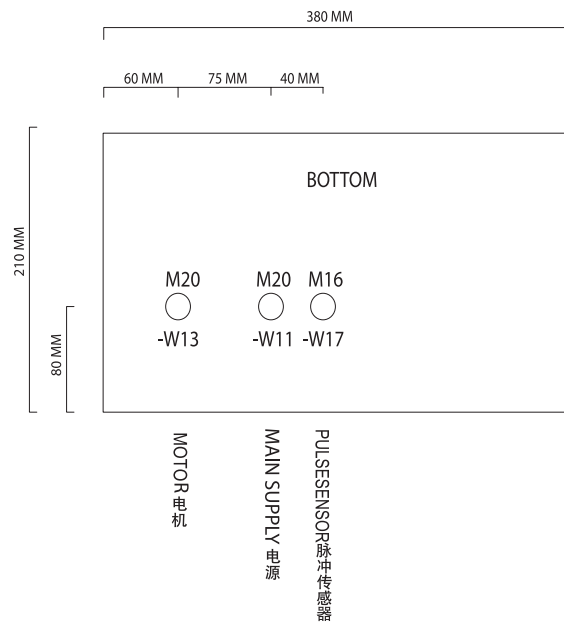
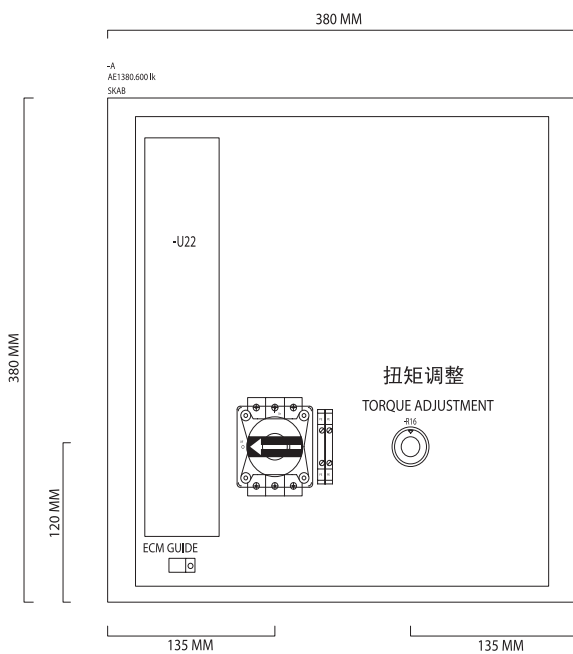
- ◆ 电机和电机轮自转，但牵引绳没有转：

1. 检查驱动轮是否固定在齿轮轴上。
2. 检查绳夹是否卡在顶端滑轮。
3. 检查牵引绳张紧。张紧弹簧是否拉紧到大约 60 毫米。
  - 如果没有张紧，则根据 8 a) 节说明的日常检查调整绳索。
4. 检查绳索和驱动轮损耗。如果牵引绳或驱动轮磨损，则会松开张紧夹。更换绳索或驱动轮。
5. 检查是否导轮被卡紧。

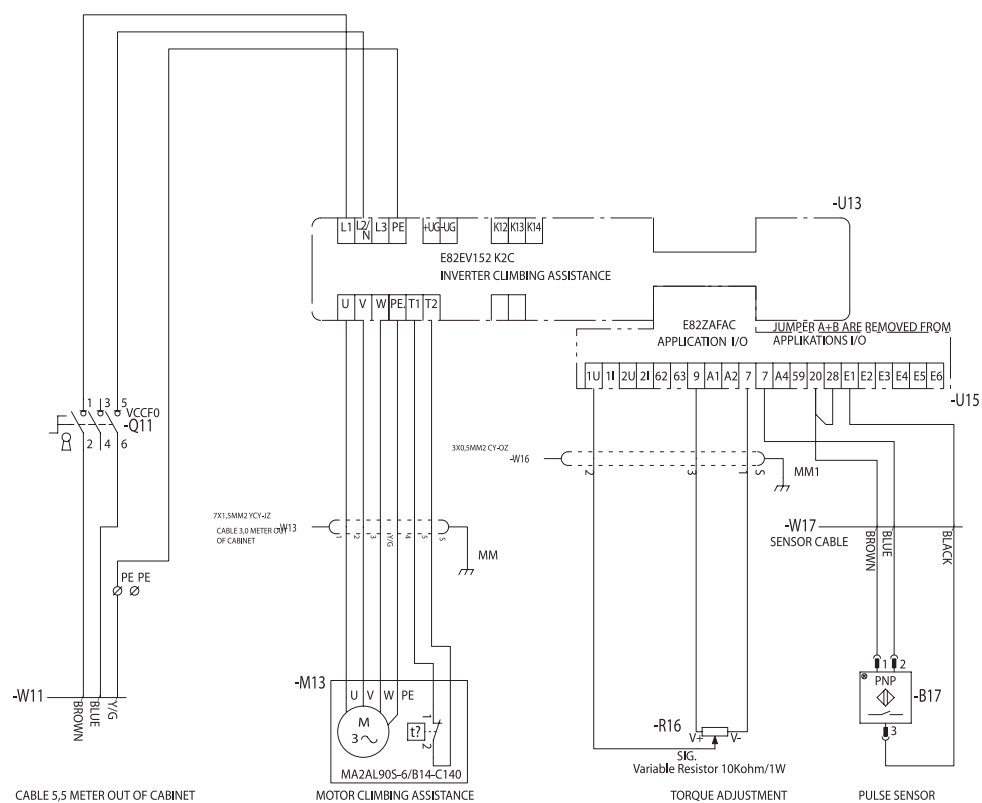
- ◆ 牵引力太小：

1. 检查电机电气是否三相连接-如果不是，则三相连接。

# 附录 A：电气控制箱概览



附录 B： 电路



## **AVANTI Climb Assistance – Type VI**

User's Manual and Installation Instructions

## **AVANTI Aufstieghilfe – Typ VI**

Benutzerhandbuch und Montageanleitung

2nd Edition: December 2006

2. Ausgabe: Dezember 2006

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# EC-Declaration of Conformity for Machinery

Directive 98/37/EEC, Annex II, A

**Manufacturer:** Avanti Stigefabrik A/S  
Høgevej 19  
DK-3400 Hillerød

**Phone:** +45 4824 9024  
**Fax:** +45 4824 9124

herewith declares that the model of the following machinery.

**Type:** AVANTI Climbing Assistance OPS.VI

**Serial no.:**

- is in conformity with the provision of the Machinery Directive 98/37/EEC as amended at the time of the declaration,
- is in conformity with the provision of the following additional EC-Directives as amended at the time of the declaration:

Low-Voltage directive 73/23/EEC und 93/68/EEC

Directive 89/336/EEC; 92/31/EEC; 93/68/EEC EMV

- conform to the following harmonized standards:

EN ISO 12100-1:2003 Safety of machinery – Basic concepts, general principles for design – Part 1: Basic terminology, methodology

- EN ISO 12100-2:2003 Safety of machinery – Basic concepts, general principles for design – Part 2: Technical principles

- EN 60204-1:1998 Safety for machinery, Electrical equipment of machinery; Part 1: General requirements;

**Place:** Hillerød, Denmark

**Date:** April 20<sup>th</sup> 2006

## Signature:

**Name:** Niels Bramsen,  
**Identification:** Technical Manager

Signature: 

## Limited Warranty

AVANTI Stigefabrik A/S warrants that commencing from the date of shipment to the Customer, and continuing for a period of the longer of 365 days thereafter, or the period set forth in the standard AVANTI warranty, the AVANTI Climbing assistance ("Product") described in this Manual will be free from defects in material and workmanship under normal use and service when installed and operated in accordance with the provisions of this Manual.

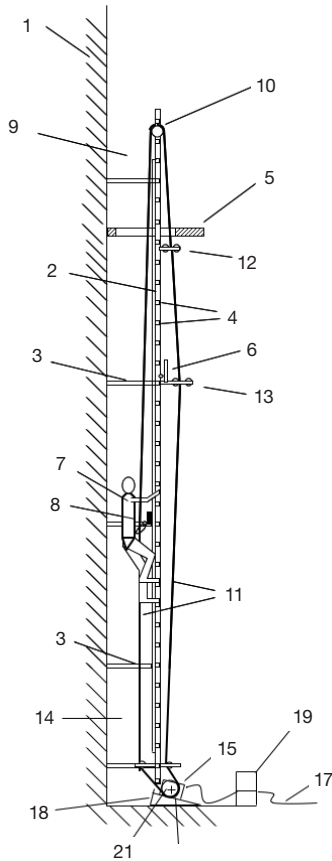
This warranty is made only to the original user of the Product. The sole and exclusive remedy and the entire liability of AVANTI under this limited warranty, shall be, at the option of AVANTI, a replacement of the Product (including incidental and freight charges paid by the Customer) with a similar new or reconditioned Product of equivalent value, or a refund of the purchase price if the Product is returned to AVANTI, freight and insurance prepaid. The obligations of AVANTI are expressly conditioned upon return of the Product in strict accordance with the return procedures of AVANTI.

This warranty does not apply if the Product (i) has been altered without the authorization of AVANTI or its authorized representative; (ii) has not been installed, operated, repaired, or maintained in accordance with this Manual or other instructions from AVANTI; (iii) has been subjected to abuse, neglect, casualty, or negligence; (iv) has been furnished by AVANTI to Customer without charge; or (v) has been sold on an "AS-IS" basis.

Except as specifically set forth in this Limited Warranty, ALL EXPRESS OR IMPLIED CONDITIONS, REPRESENTATIONS AND WARRANTIES, INCLUDING, BUT NOT LIMITED TO, ANY IMPLIED WARRANTY OR CONDITION OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, NON-INFRINGEMENT, SATISFACTORY QUALITY, COURSE OF DEALING, LAW, USAGE OR TRADE PRACTICE ARE HERBY EXCLUDED TO THE MAXIMUM EXTENT PERMITTED BY APPLICABLE LAW AND ARE EXPRESSLY DISCLAIMED BY AVANTI. IF, PURSUANT TO ANY APPLICABLE LAW, TO THE EXTENT AN IMPLIED WARRANTY CANNOT BE EXCLUDED AS PROVIDED IN THIS LIMITED WARRANTY, ANY IMPLIED WARRANTY IS LIMITED IN TIME TO THE SAME DURATION AS THE EXPRESS WARRANTY PERIOD SET FORTH ABOVE. BECAUSE SOME STATES DO NOT PERMIT LIMITATIONS ON THE DURATION OF IMPLIED WARRANTIES, THIS MAY NOT APPLY TO A GIVEN CUS\*TOMER. THIS LIMITED WARRANTY GIVES CUSTOMER SPECIFIC LEGAL RIGHTS, AND CUSTOMER MAY HAVE OTHER LEGAL RIGHTS UNDER APPLICABLE LAWS. This disclaimer shall apply even if the express warranty fails of its essential purpose.

## System outline

Fig. 1



### List of Signs:

- |                            |                            |
|----------------------------|----------------------------|
| 1. Wall                    | 12. Guide roller           |
| 2. Ladder                  | 13. Guide roller           |
| 3. Ladder brackets         | 14. Lower end              |
| 4. Steps                   | 15. Motor                  |
| 5. Platform                | 16. Driving wheel          |
| 6. Resting platform        | 17. Power supply           |
| 7. Person ascending        | 18. Spring loaded base     |
| 8. Harness                 | 19. Electrical control box |
| 9. Upper end               | 20. Wheel guard            |
| 10. Top fitting with wheel | 21. Sensor with cable      |
| 11. Hauling rope           |                            |

## Introduction

### Caution:

- An AVANTI Fall Protection Technician is a person that has participated in and passed the AVANTI Fall Protection Technician Course and is considered an expert.
- A competent person is a person that has fully **read and understood** these Climbing Assistance User's Manual and Installation Instructions.
- The AVANTI Climbing Assistance installation and service may only be carried through by a competent person or an expert.
- Once a competent person or an expert installs, services, or in any other way alters the Climbing Assistance system, he alone is responsible for doing so in accordance with these User's Manual and Installation Instructions.

### Danger:

- Do not keep or store the hauling rope in direct sunlight.
- Keep the hauling rope clean and free of oil, grease and chemicals.
- Only install an earth leakage circuit breaker that react to pulsing DC.

# Installation Manual

AVANTI recommend the following installation procedure.

1. Install the motor underneath the ladder.
2. Install hauling rope and guide rollers.

## 1. Motor installation:

1. Position motor base with motor and rope wheel at the centre of the ladder (see fig. 2). In case a fall protection rail is positioned at the ladder centre, align the motor base as shown in fig. 3. This will leave the hauling rope approximately 20 mm off the fall protection rail to the right side (fig 3). Once the motor is aligned fasten it to the tower platform using 4 pcs. Ø8mm bolts. Start with the bolt closest to the ladder centre (the bolt closest to the fall protection rail).

If possible it may be an advantage placing the motor in the basement underneath the bottom platform. In that case use wall anchor for mounting.

2. Position the electrical control box in the vicinity of the ladder. Mount electrical control box to the platform using the angle fittings (see fig. 4).

Fig. 2 Motor



Fig. 3 Motor positioning

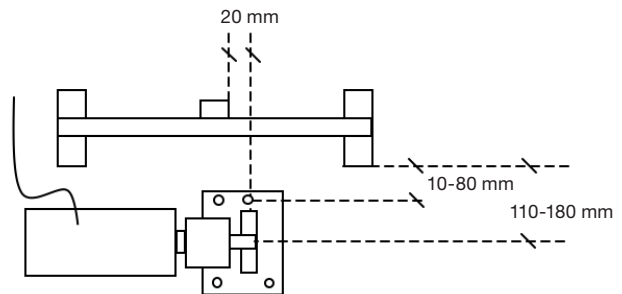
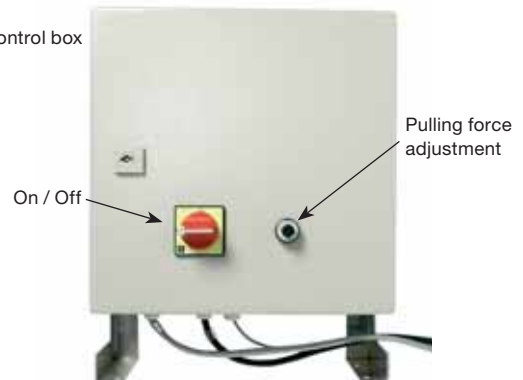


Fig. 4  
Electrical control box





## 2. Electrical cable installation

The electric cables are marked. Connect the cables to the rack inside the electrical control box as follows below or alternatively see Circuit diagram in appendix B.

Fig. 5  
Electrical control box open



## 2.1 Sensor installation

Feed the sensor cable through the middle connection underneath the electrical control box (see Appendix A).

Fig. 6 Sensor and sensor cable



Connect the pulse sensor cable to the electrical control box as follows:

- Black wire to E 1
- Brown wire to 20 or 28
- Blue wire to 7 (the 7 that is not in use)

Adjust sensor leaving a distance of 0,5-1,5 mm between driving wheel and sensor. **ONLY ADJUST SENSOR WHILE THE SYSTEM IS UNPLUGGED.**

After mounting hauling rope, the sensor may need adjustment.

## 2.2 Sensor test

After installing the hauling rope turn on the power and the green diode on the sensor will light. Pull rope – the sensor should register the movement and respond by indication in white and start the motor.

– If not, adjust the sensor focus on the driving wheel according to the Sensor installation.

## 2.3 Motor cable installation

Connect motor cable W1 3, 3-phase to motor as follows:

- Conductor 1 to U
- Conductor 2 to V
- Conductor 3 to W
- Green-yellow conductor to earth connection
- Conductor 4 and 5 – connect to the terminal. 4 and 5 connects to a thermal switch - hence the order of connection is of no importance.
- Conductor 6 is not used

Fig. 7 Motor



## 2.4 Power cable installation

Once the climbing assistant is fully installed connect power cable to 230 V, 50-60 Hz (1 phase + 0 + earth) power outlet.

If additional power cable is attached use a 3x1,5mm<sup>2</sup> for phase 0 and earth cable. Secure power supply with a 10 amp fuse. Use a HPFI-relay with 300mA fault current fuse.

## 3. Rope mounting

1. Bring the top fitting including block, bolts, and the one end of the hauling rope to the ladder top. It is often easier to bring up the rope on the front side and down on the rear side.

Fig. 8



2. On top of the ladder, mount the top fitting as shown in fig. 8. Using the holes in the top fitting, the block is positioned just off the rail centre so it marches the bottom pulling wheel position. The top fitting and block shall be mounted so potential injury to fingers etc. is eliminated. If this is not possible a guard is needed.
3. Pull the rope through the block and bring down the rope on the other side of the ladder while descending.
4. Down at the base platform feed the rope down through the pulling wheel. Tighten rope slightly and fasten – do not splice yet.

5. On the non climbing side of the ladder mount the hauling rope guiders. The guiders function is to prevent the rope from dragging on the ladder, platforms etc (fig. 9-10). Use a guide roller at every tower platform and at every ladder resting platform. Some ladder resting platforms may need a long version of the guide roller (see fig 9).

Fig. 9 Guide roller



Fig. 10 Guide roller mounted



6. On the climbing side of the 1st or 2nd step mount a guarded version of the guide roller. (see fig. 11).

Fig. 11 Guarded guide roller



7. After having mounted all rollers and motor loosen the tensioning spring (fig. 16 page 16) and open the motor base plate as much as possible. Tighten the rope with kg. 75. Use separate rope or rope tensioner as shown in fig. 15 below. Leave rope for 20 min. and recheck tension. The rope has most likely stretched – tighten again. Repeat until the rope does not stretch any more.

Fig. 12

Rope tensioning a)



Rope tensioning b)



8. Cut of the excess rope leaving an overlap of 50 cm. These 50 is needed for the splicing.
9. Splice rope as described in section 3 below.
10. Finally tighten the spring on the motor base to a length of 60 mm.

After mounting hauling rope, test the sensor as described in section 2.2.

## 3. Rope mounting

### 3.1 Splicing of hauling rope

For the rope splicing use the supplied splicing needle.

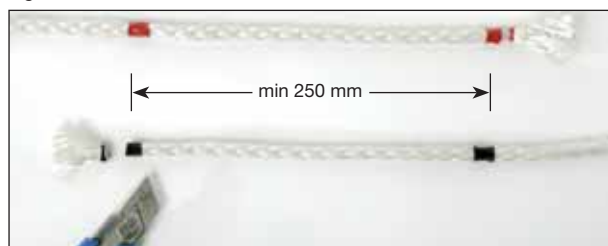
First assure the rope is stretched satisfactory.

For clarifying the splicing process one rope marked with red tape and the other with black.

Seale one rope with red tape. On the same rope-end place a red tape mark minimum 250 mm from rope end.

The other rope-end is likewise sealed and marked with black tape.

Fig. 13.1



Insert black rope-end into splicing needle Ø10mm. Make sure the rope end is firmly placed inside the needle and lies in the needle sloth.

Fig. 13.2 a



Fig. 13.2 b



Insert splicing needle (black rope) into red rope minimum 250 mm from red rope-end.

Fig. 13.3



Feed the splicing needle through red rope – in the full length of the needle.

Fig. 13.4



Feed splicing needle out through the side of the read rope.

Fig. 13.5



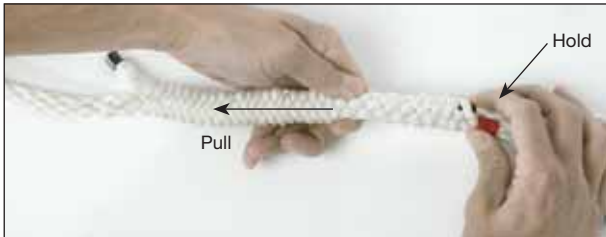
Remove splicing needle. Pull black rope through red rope until the black mark has just passed the read mark.

Fig. 13.6



With your right hand hold red and black rope mark fixed.

Fig. 13.7 a



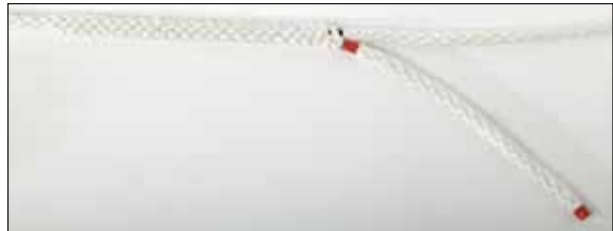
Uses your left hand for sliding red rope over black rope.

Fig. 13.7 b



This way black rope end gets pulled back into red rope. The black mark should just be visible.

Fig. 13.8



Red rope is now locked round the black rope – now change directions and feed red rope end into black rope like follows:

Insert splicing needle into black rope as close to the black rope mark as possible.

Fig. 13.9



Fasten red rope-end in splicing needle.

Fig. 13.10



## 3. Rope mounting

### 3.1 Splicing of hauling rope

For the rope splicing use the supplied splicing needle.

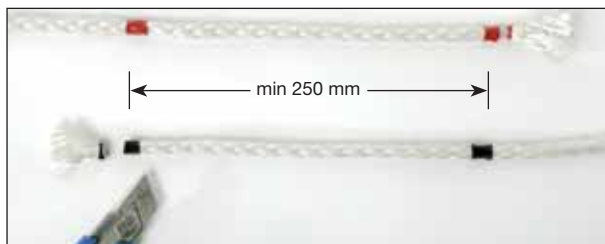
First assure the rope is stretched satisfactory.

For clarifying the splicing process one rope marked with red tape and the other with black.

Seale one rope with red tape. On the same rope-end place a red tape mark minimum 250 mm from rope end.

The other rope-end is likewise sealed and marked with black tape.

Fig. 13.1



Insert black rope-end into splicing needle Ø10mm. Make sure the rope end is firmly placed inside the needle and lies in the needle sloth.

Fig. 13.2 a



Fig. 13.2 b



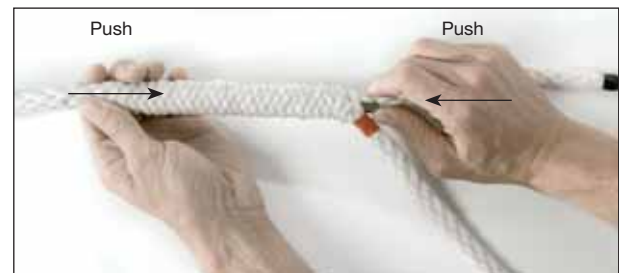
Insert splicing needle (black rope) into red rope minimum 250 mm from red rope-end.

Fig. 13.3



Feed the splicing needle through red rope – in the full length of the needle.

Fig. 13.4



Feed splicing needle out through the side of the read rope.

Fig. 13.5



## 4. Dismantling

Remove rope followed by rollers, top wheel, motor, and electrical control box. Dispose of according to local authorities.

## 5. Marking




Fig. 14 Product marking

Fig. 15 Quick guide

45541072 Quickguide climb EN/DE

AVANTI Climbing Assistance

AVANTI Aufstiegshilfe



• User must be at least 16 years old.

• User must have a bodyweight of minimum 50 kg/110 lbs.

• Use only original AVANTI rope clamp.

• Always use fall protection equipment (PPE).

The Climbing Assistance does not replace fall protection equipment (PPE).

**Instructions**

1. Check rope tension spring on motor base. If spring length is more than 60 mm, the rope needs tensioning, see manual for tensioning method.

2. Check if green light on motor wheel casing is on. If on, connect to the power supply and/or turn on the red switch on the grey control box.

3. Connect Personal Protective Equipment (PPE), as prescribed by manufacturer.

4. Fasten rope clamp on harness.

5. Fasten rope clamp on black climbing assistance rope.

6. Pull climbing assistance rope to activate motor.

7. STOP - stand still for 5 seconds.

8. After use, turn off the power supply.

• *Darf nicht von Personen unter 16 Jahren benutzt werden.*

• *Darf nicht von Personen unter 95 kg benutzt werden.*

• *Darf nur mit originaler AVANTI Seilhalterung benutzt werden.*

• *Darf nur gleichzeitig mit Stiegschutzvorrichtung (PSA) benutzt werden.*

*Die Aufstiegshilfe ersetzt nicht die Stiegschutzvorrichtung (PSA).*

**Instructions**

1. Die Seil-Spanneder auf dem Motorbecken kontrollieren. Falls die Federlänge mehr als 60 mm ist, ist eine Aufspannung der Seile notwendig. Beschreibung der Vorgehensweise, siehe Gebrauchsanleitung.

2. Kontrollieren, ob das grüne Licht auf dem Motorschilde eingeschaltet ist. Falls nicht: Die Stromversorgung anschließen und/oder den roten Schalter auf der grauen Kontrollbox einschalten.

3. Die Zugkraft auf die graue Kontrollbox (7 bis 10 Jahren).

4. Die persönliche Schutzausrüstung (PSA) befestigen, wie vom Hersteller vorgeschrieben.

5. Den Karabinerhaken der Seilhalterung am Gurt befestigen.

6. Die Seilhalterung am schwarzen Seil der Aufstiegshilfe befestigen.

7. Das Seil der Aufstiegshilfe ziehen, um den Motor zu betätigen.

8. STOP - 5 Sekunden stillstehen.

9. Nach Gebrauch die Stromversorgung ausschalten.

**AVANTI**

Engineering since 1988

## 6. Technical specifications

Electricity connection: 230 V, 50-60 Hz AC with earth (1 phase + 0 + earth)

Fuse: 10 – 16 A

Power consumption max.: 9 A

Power consumption at full load: approx. 7.2 A

Adjustable lifting capacity approx.: 35 - 45 kg

Adjustable Speed: 0 +/- ca. 14 m/min preset

Operational temperature: -10°C – +55oC

Weight - Driving unit: approx. 23 kg

Electricity case: approx. 12 kg

Hauling rope Ø8,8mm: approx. 68 g/m

Gear oil:  
0.7 l in the gearbox, e.g. CLP460 Mobil  
CLP460 AGIP  
OMALA460 Shell  
or similar.  
Filled up with oil  
at delivery.



# User's Manual

## 7. Purpose

### Caution:

- An AVANTI Fall Protection Technician is a person that has participated in and passed the AVANTI Fall Protection Technician Course and is considered an expert.
- A competent person is a person that has fully **read and understood** these Climbing Assistance User's Manual and Installation Instructions.
- The AVANTI Climbing Assistance installation and service may only be carried through by a competent person or an expert.
- Once a competent person or an expert installs, services, or in any other way alters the Climbing Assistance system, he alone is responsible for doing so in accordance with these User's Manual and Installation Instructions.

### Danger:

- Do not store the hauling rope in direct sunlight.
- Keep the hauling rope clean and free of oil, grease and chemicals.
- The power supply must not be equipped with an earth leakage circuit breaker that does not also react to pulsing DC as this will cause operational problems.

### Intended use

The AVANTI Climbing Assistance is intended for personal ascending and descending of long durations on fixed ladders.

### Not intended for

- Not intended for lifting tools or parts.
- Not intended for people below the age of 18 or people below the weight of 55 kg.
- Not intended for multiple users at the same time.
- Not to be fastened to body parts or cloth.

**The Climbing Assistant is not a fall protection device. Always wear proper fall protection equipment (P.P.E.)**

**Use original parts – no warranty is provided against damage resulting from reconstruction or modification of equipment or use of non-original parts.**

### Functionality

The system includes a motor, a continuous hauling rope, an electrical control box and a rope clamp. Hook on to the hauling rope using the rope clamp and activate the motor by pulling the hauling rope. A sensor on the pulling wheel then registers the movement and starts the motor. The hauling rope then pulls with the pre-adjusted force (e.g. 30 kg.) no matter the pace and direction of climbing. Stopping the rope in the same position for 3 seconds, the same sensor register that motion has stopped, and the pulling force fades out.

## 8. Daily inspections

- a) Check rope tension spring on motor base (see fig 16). If spring length is more than 60 mm, the rope needs tensioning. Tension the spring with a spanner. If this does not tighten the rope sufficiently a rope shortening is needed. See Installation Instructions section 2.7.



- b) Assure rope is aligned on the guiding rollers and on the pulling wheel (see fig. 17). The rope can be aligned on both right and left side.
- c) If anything abnormal is observed, take climbing assistance out of use. Correct error before continuing use.

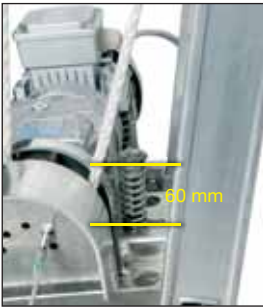


Fig. 16 Motor base plate with inductive sensor and tensioning spring

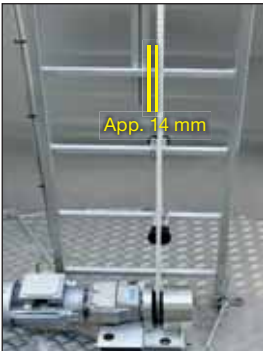


Fig. 17 Rope alignment. Rope can be aligned on both left and right side

## 9. Directions for use

Before use read and understand these user's instructions.

For use do as follows:

- a) Perform the daily inspection described above.
- b) Check if green light on motor wheel guard is on (see fig. 16). If not: connect to the power

supply (230V-50/60 Hz) and/or turn on the red switch on the grey electrical control box.

- c) Adjust pull force (1 to 10) on grey electrical control box (fig. 18). Depending on rope length this equals approximately 35 - 45 kg.
- d) Connect harness and fall protection device (P.P.E) as prescribed by manufacturer.
- e) Fasten rope clamp carabiner on harness.
- f) Fasten rope clamp on climbing assistance rope (fig. 19).
- g) Pull climbing assistance rope to activate motor.
- h) STOP – stand still for 5 seconds.
- i) After use, turn off the power supply and unplug from power outlet.

Connect the rope clamp carabiner to the harness D-ring at waist or chest level for best comfort.

### WARNING!

**Keep hauling rope dry and free of oil and grease.**

**When using the climbing assistance keep fingers and other body parts, clothes, etc. away from hauling rope, driving wheel, blocks, etc.**

NOTE! The main switch may not be connected/ disconnected several times in rapid succession. Doing so may damage the electrical installations.

Fig. 18

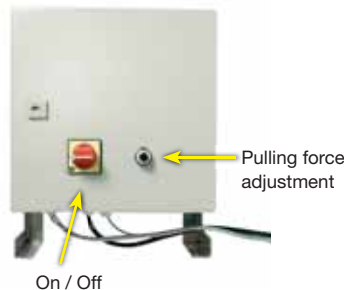


Fig. 19 Rope clamp on rope



## 10. Maintenance

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The AVANTI Climbing Assistance is mainly maintenance free. Perform daily inspection as prescribed above and take action if abnormalities are found.

## 11. Yearly control

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Once a year a competent person or an expert must inspect the climbing assistance. If not – this will void the warranty.

AVANTI runs “Fall Protection Expert classes” on regular basis. If interested contact AVANTI.

- Before servicing the motor, motor base, wheel guard and double guarded rollers un-pluck the power supply and wait for at least 1 minute.

Yearly control:

1. Assure all bolts and nuts are fixed (on motor, electrical control box, rollers, and top fitting).
2. Assure that the compression spring is tightened to  $L = 60\text{mm}$  (see Daily inspections section 8 a).
3. Gear oil: - change gear oil every 3 years (see section 8. System specifications) (year of last oil replacement is entered in test report appendix C).
4. Remaining parts should be replaced once they show sign of being worn out (driving wheel, hauling rope, etc.). If only a part of the hauling rope needs replacement, insert a new section where it is worn.

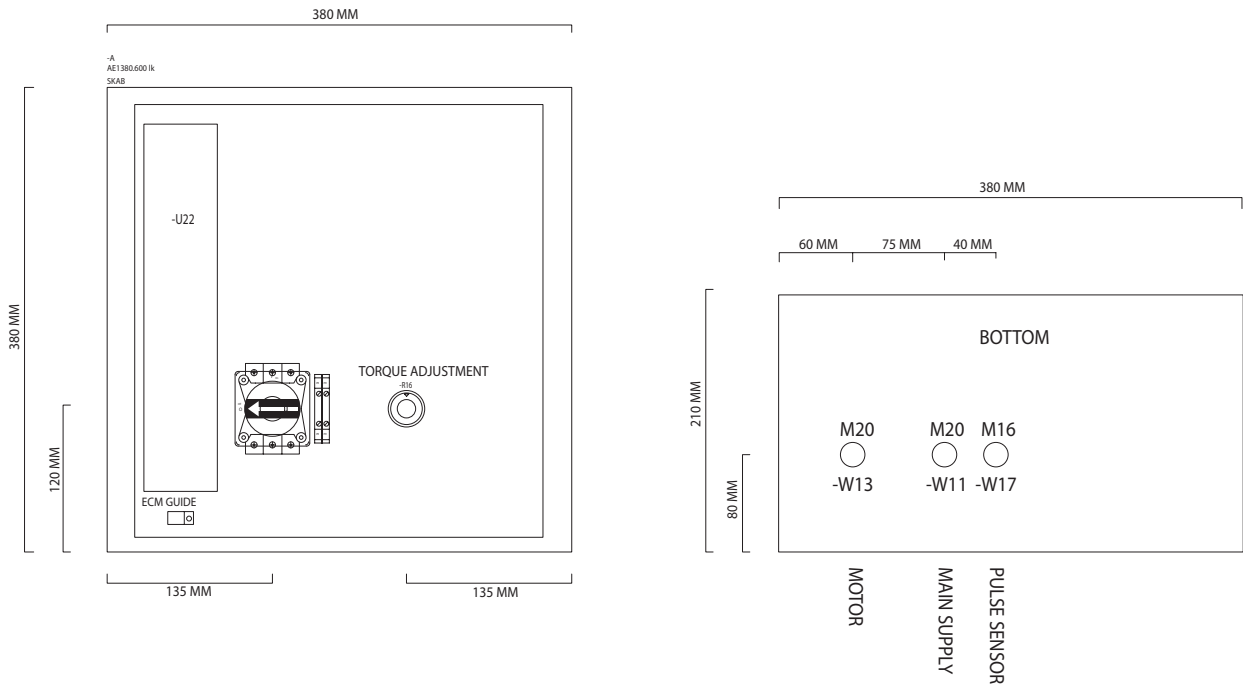
## 12. Trouble shooting

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- The hauling rope does not start when pulled:
  1. Pull the hauling rope by hand. If the rope is stuck – find the blocking factor and fix it.
  2. Check that the system has been plugged in.
  3. Check that the system is switched on.
  4. Check whether the **green** sensor diode on the wheel guard is lit - If not, check whether the electrical installation is done in accordance to the installation instructions.
  5. Pull the hauling rope by hand. If the motor does not start after pulling the rope firmly check **white** sensor on motor guard. The white sensor indicates movement. If the white sensor does not indicate movement when rope is pulled adjust sensor as described in section 2.1 sensor installation.
- Motor and motor wheel goes round, but the hauling rope does not follow:
  1. Check whether the driving wheel is fixed on the gear shaft.
  2. Check whether a rope clamp is stuck in the top block.
  3. Check tension of hauling rope. Is the tensioning spring tightened to approximately 60 mm? – If not adjust rope as specified in section 8 a) Daily inspections.
  4. Check rope and driving wheel for wear and tear. If the hauling rope and/or the driving wheel is worn down they lose grip. Have them replaced.
  5. Check whether the guide rollers are blocked.
- The tractive force too is small:
  1. Check whether the motor electronics is connected in triangle – if not, connect in triangle.

# Appendix A: Electrical control box overview

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Appendix B: Circuits

