



2006/42/EC Machinery Directive
USE AND MAINTENANCE MANUAL
MAGNETIC BRAKE PULLEY
MINI PULLEY



FOR USE ON STEEL CABLE SYSTEMS KNOWN AS ZIPLINES

Martello S.r.l.
Headquarters: Frazione Sachet 119/G
32020 Vallada Agordina (BL)
VAT: 01269240253

Email: assistenza@martellozipline.com

All instructions contained in the specific documentation for each part regarding use, maintenance, and everything necessary for the proper functioning of the parts and the entire machine must be followed.

TABLE OF CONTENTS

Chapter	Description	Page
1	Preliminary Information	6
1.1.	Scope of application of the Mini Pulley	6
	See Fig. 1 - General view of the Mini Pulley	21
1.2.	Traceability and marking	6
	See Fig. 2 - Identification data	21
2	Purpose and importance of the instruction manual	6
2.1.	Importance of the instruction manual.	6
2.2.	Structure of the manual	7
2.3.	Symbols used in the manual	7
	See Fig. 3 - Symbols used in the manual	21
2.4.	Glossary of terms used in the manual	8
3	Safety Regulations	8
3.1.	General information	8
3.2.	Warnings for safe use of the machine	8
3.3.	Personal Protective Equipment (PPE)	9
	See Fig. 4 - Recommended PPE	21
3.4.	Legislative Decree 81/2008 Article 20 "Worker's Obligations"	9
4	Description of the line and the machine	9
4.1.	Scope of application	9
4.2.	Operational purposes and intended use	9
4.3.	General description	10
	Group A - Support cable	10
	Group B - Pulley	10
	See Fig. 5 - Group B - Pulley	22
4.4.	Description of the machine (pulley)	10
4.5.	Main components of the machine (pulley)	10
	See Fig. 6 - Pulley components	22
4.5.1.	Main components of Group B and its correct assembly	10
	See Fig. 7 - Main components of Group B	22
4.5.2.	Danger zone	10
	See Fig. 8 - Danger zone	23
4.6.	Design advice and techniques for mounting the support rope for better machine (pulley) functionality	11
	See Fig. 9 - Graph of the slope and optimal rope length	23
5	Technical Data	11
5.1.	Dimensional characteristics of the machine (pulley)	11
5.1.1.	White Pulley	11
5.1.2.	Blue Pulley	11
5.1.3.	Red Pulley	11
5.2.	Other data	11
	See Fig. 10 - Pulley colours and braking levels	24
6	Instructions for Use	12
6.1.	Checks and inspections before first use - Calibration	12
6.1.1.	Instructions for the cart calibration procedure	12
6.2.	Usage	12
6.3.	Installation and removal of the pulley on the rope	13
6.3.1.	Installation	13
	See Fig. 11 - Pulley installation	24

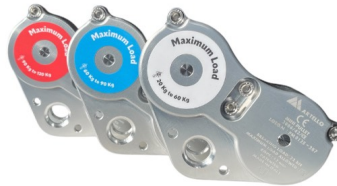
6.3.2.	Removal of the pulley	13
	See Fig. 12 - Uninstalling the pulley	24
6.4.	Usage precautions	13
6.5.	Incorrect or improper use	14
	See Fig. 13 - Correct use	24
	See Fig. 14 - Incorrect use	25
	See Fig. 15 - Usage modes.	25
6.6.	Main risks	14
7	Maintenance and Cleaning	15
7.1.	Introduction to maintenance	15
7.2.	Routine checks	15
7.3.	Equipment to be used	15
	See Fig. 16 - Tools and equipment to use	25
7.4.	Periodic checks	16
7.5.	Annual checks	16
7.6.	Extraordinary maintenance	16
	See Fig. 17 - Torsion force	25
7.7.	List of spare parts	17
	See Fig. 18 - List of spare parts	26
7.8.	Compatibility	17
7.9.	Strength and performance	17
7.10.	Repairs or replacement of parts	17
7.10.1.	Exploded view of the Mini Pulley with its parts	18
	See Fig. 19 - exploded view of machine parts (pulley)	26
7.10.2.	How to replace the parts	18
7.11.	Storage	18
7.12.	Lifespan and eventual disposal	18
7.13.	Disposal	19
8	Warranty	19
8.1.	Warranty terms and conditions	19
8.2.	Responsibility	20
9	Additional Information	20
	See all figures and images	21



CE DECLARATION OF CONFORMITY

Pursuant to Annex II A of the Machinery Directive 2006/42/EC

The Company
Martello Srl
Frazione Sachet 119/G
32020 Vallada Agordina (BL), Italy
VAT Number: 01269240253



HEREBY DECLARES UNDER ITS SOLE RESPONSIBILITY

That the product: Magnetic brake mechanical pulley
Model: MINI PULLEY
Type of machine: Device for transporting people on steel cables in adventure parks, known as zipline
Year of manufacture: _____
Serial number: _____

COMPLIES WITH THE FOLLOWING DIRECTIVES:

- **Machinery Directive 2006/42/EC**
- **Electromagnetic Compatibility Directive 2014/30/EU**

AND WHERE APPLICABLE TO THE FOLLOWING STANDARDS:

- EN 12100: 2010 – Machinery Safety – Design and Risk Assessment

The person authorised to compile the Technical File on its behalf is:

Name: Isabel

Surname: Diez

Legal Representative of Martello Srl - Frazione Sachet 119/G 32020 Vallada Agordina (BL), Italy

ISABEL DIEZ

Place and date

Legal Representative

Blank page

1. Preliminary Information

1.1. Scope of Application

The "Mini Pulley" magnetic braking pulley is a device designed for the recreational transport of individuals along steel cables in adventure parks known as zip lines.



Warning!

Activities involving the use of this machine are inherently dangerous.

- The pulley must not be used beyond the specified limits and under no circumstances outside its intended purpose.
- Martello S.r.l. declines all liability for damage to persons or property resulting from improper use of the machine, use not in accordance with the explicit indications of this manual, or use by unqualified or untrained personnel.
- Before using the machine, it is mandatory to read and fully understand this manual, adhere to all usage and safety instructions provided, become familiar with the machine, understand its performance and limitations, and finally, acknowledge and accept the associated risks.



Failure to comply with these warnings may result in serious or fatal injuries.

This product must be used exclusively by competent and trained individuals or under the direct visual supervision of a competent and trained individual.

See Fig. 1 - General view of the Mini Pulley.

1.2. Traceability and Marking

The identification data of the machine can be found in the location indicated in Fig. 2.

- A. Manufacturer name
- B. Compliance with EU requirements
- C. Product name or model
- D. Standard reference
- E. Lot and serial number
- F. Breaking load
- G. Maximum load
- H. Cable diameter
- I. Patented
- J. Made in Italy
- K. Read the technical instructions carefully
- L. General hazard warning

See Fig. 2 - Identification data.

2. Purpose and Importance of the Instruction Manual

2.1. Importance of the Instruction Manual

This user and maintenance manual aims to illustrate the correct usage criteria for the "Mini Pulley" magnetic braking pulley and provide maintenance instructions.

It is essential that the information contained within is available to park operators.


This manual is an integral part of the supplied equipment and must be carefully preserved. It must also be accessible to maintenance personnel and company safety managers.



Failure to comply with the instructions in the manual, even a single one, voids the warranty and exempts the manufacturer from any liability for any damage to the machine, property, or individuals.

Before using the machine, the manual must be read in its entirety and fully understood.

- It is forbidden to remove or damage parts of this manual or modify its content.
- Rewriting or reproducing this manual, even partially, without prior authorization from the manufacturer is prohibited.
- This manual is an integral part of the supplied equipment and must therefore be used and preserved carefully throughout the machine's operational life.
- The manual must be kept in a secure and easily accessible place to allow for quick consultation at any time.
- In case of loss or deterioration, a copy can be downloaded from our website at www.martellozipline.com or requested from the addresses indicated on the cover.
- If the machine is sold or transferred to another location, the manual must be delivered in perfect condition to the new user.

 The manual may be subject to modifications following the evolution and/or changes made to the machine itself.

The descriptions and illustrations contained in the manual are non-binding: the machine may slightly differ from the one illustrated in this manual. In such cases, the manual may include images of a similar machine with the same characteristics as the machine covered by these instructions.

This manual remains valid until the issuance of a subsequent edition.

This manual exclusively refers to "Mini Pulley" magnetic braking pulleys and should not be considered exhaustive for the maintenance of the entire adventure park.

Warning

For the management and maintenance of the park and the system (excluding Mini Pulley pulleys), refer to the Operational Manual, which is mandatory and the responsibility of the system/park manufacturer or operator. In the event of a sale or management change of the park, drafting the Operational Manual is the responsibility of the new owner/operator. Martello S.r.l. disclaims any responsibility regarding the management of the system and/or park and the related documentation.

2.2. Manual Structure

The manual consists of a series of chapters that should be read in the order presented.

- **Chapter 1 - Preliminary Information:** Provides general information.
- **Chapter 2 - Purpose and Importance of the Instruction Manual:** Explains the importance of the instruction manual.
- **Chapter 3 - Safety Standards:** Summarizes and describes safety standards and warnings for the safe use of the machine.
- **Chapter 4 - Description of the Line and the Machine:** Describes the machine and its operational purposes.
- **Chapter 5 - Technical Data:** Provides the technical specifications of the pulley and accessories.
- **Chapter 6 - Instructions for Use:** Describes the conditions of use.
- **Chapter 7 - Maintenance and Cleaning:** Details maintenance and cleaning operations, as well as disposal procedures.
- **Chapter 8 - Warranty:** Summarizes the warranty terms.
- **Chapter 9 - Additional Information.**

Any illustrations, photos, drawings, or tables in the manual are numbered sequentially.

2.3. Symbols Used in the Manual

1. Indicates an imminent risk of serious or fatal injury.
2. Warning or caution signal. Exposure to a potential risk of accident or injury.
3. Important information regarding the operation or performance of the product.
4. Material incompatibility.
5. Note or warning signal. Indicates important information.
6. Maintenance intervention indication.
7. Maintenance intervention exclusive to the manufacturer.
8. Ecological Disposal and Recycling signal - Indicates the importance of the ecological disposal of products and materials.
9. Symbol identifying electrical and electronic equipment (WEEE) subject to separate collection and disposal.

See Fig. 3 - Symbols Used in the Manual.

2.4. Glossary of Terms Used in the Manual

Below are descriptions of some terms used in this instruction manual:

- **Machine:** The "Mini Pulley" model pulley covered in this manual.
- **Pulley:** The subject of this manual, also conventionally referred to as the machine.
- **Line:** The system consisting of a support cable + machine (pulley).
- **Cable or Support Rope:** A component of the line along which the machine (pulley) moves.
- **Manufacturer:** Martello S.r.l.
- **Operator:** The purchaser or the person responsible for management.
- **Instructor:** A trained and authorized individual with the necessary skills and information for use, adjustment, maintenance, cleaning, or transportation of the machine.
- **Passenger/User:** The person transported by the pulley.
- **Maintenance:** The set of operations necessary to maintain the machine's functionality and efficiency.
- **Dangerous Area:** Any area inside and/or around the machine where the presence of an exposed person poses a safety and health risk.
- **Exposed Person:** Any individual who is entirely or partially in a hazardous area.
- **PPE (Personal Protective Equipment):** Equipment worn to protect individuals from potential dangers or risks.
- **Hazard:** A situation or cause associated with potential damage or injury.
- **Risk:** The probability that a potential hazard results in actual harm.


3. Safety Standards

3.1. General Information

The machine is equipped with all necessary safety devices to protect individuals and, secondarily, to safeguard its components. However, certain conditions may arise during operational use that could compromise safety standards.


Some of these conditions include:

- Functions not envisaged in the original design
- Tampering with the machine or its components
- Use without protective measures
- Operation in locations where safety and/or prevention criteria are not fully met
- Personnel who are inadequately trained and/or not in optimal physical or mental condition
- Personnel whose qualifications do not match the specific task
- Failure to use, incorrect use, or misuse of PPE (Personal Protective Equipment)
- Incorrect or non-compliant maintenance
- Improper storage
- Any conditions that do not fully comply with the standards outlined in this manual

 Lack of awareness of the potential dangers can result in the risk of injury to the user and/or others near the line.

The manufacturer accepts no liability if the machine is used in the above-mentioned conditions and strongly advises against its use in such situations.

If you have any doubts or need specific advice, please consult the manufacturer.

 The instructor and the passenger must use appropriate PPE (Personal Protective Equipment) in compliance with current accident prevention regulations. The responsibility for using PPE correctly lies solely with the park operator.

- The manufacturer shall not, under any circumstances, be held responsible for the failure or incorrect use of such equipment.
- ***When using the pulley, children under the age of 14 must always be supervised by a parent or guardian who takes responsibility for their safety and for the duration of the activity.***
- ***The manufacturer accepts no liability in the event of non-compliance with the safety rules listed here.***

3.2. Warnings for Safe Use of the Machine

- Before using the pulley, the operator and the responsible instructor must check that all equipment has not been tampered with and that there are no anomalies that could compromise operational safety. In the event of problems, the pulley or structure must be taken out of service.
- Before operating the machine, the operator and instructor must read the instruction manual and receive training on its proper use.
- Do not place hands near the steel cable.
- Maximum allowable weight: 120 kg.
- Always wear a helmet.
- Only one person is permitted on the cable at a time.

3.3. Personal Protective Equipment (PPE)

PPE refers to any equipment worn and used by the passenger to protect them from risks that could threaten their safety while using the machine.

PPE must comply with current regulations and bear the CE marking.

PPE must be maintained in perfect working order, used only for its intended purposes, and designated for personal use. If multiple individuals need to share the same PPE, appropriate measures must be taken to ensure hygiene and safety for all users.

It is strictly prohibited to modify PPE.

1. **Adventure park helmet**, CE EN 397 or CE EN 12492 certification
2. **Aluminium alloy carabiner**, CE EN 362 certification
3. **High-strength steel carabiner**, CE EN 362 certification
4. **Harness**, CE EN 12277 or EN 361 certification
5. **Main connection lanyard**, single (recommended length: 100 cm) or double (recommended lengths: 100 cm/80 cm), CE EN 17109, CE EN 354 certification
6. **Secondary safety connection lanyard**, single or double with different lengths, CE EN 17109, CE EN 354 certification

See Fig. 4 - Recommended PPE.

3.4. Legislative Decree 81/2008, Article 20 - "Worker Obligations"

The text of Article 20 of Legislative Decree 81/2008 regarding worker obligations is attached.

It is strongly recommended to read it in full, thoroughly understand it, and comply with ALL regulations BEFORE performing any operations on the machine.

1. Every worker must take care of their own health and safety and that of others in the workplace affected by their actions or omissions, in accordance with their training, the employer's instructions, and the provided equipment.
2. Workers must specifically:
 - a. Contribute, alongside the employer, managers, and supervisors, to fulfilling obligations for workplace health and safety.
 - b. Follow the employer's, managers', and supervisors' instructions regarding collective and individual protection.
 - c. Properly use work equipment, hazardous substances and preparations, transport vehicles, and safety devices.
 - d. Appropriately use the protective equipment provided.
 - e. Immediately report to the employer, manager, or supervisor any deficiencies in the equipment and devices referred to in points (c) and (d), as well as any hazardous conditions they become aware of. In case of emergency, they should take direct action within their competencies and capabilities, without prejudice to the obligation set out in point (f), to eliminate or reduce serious and imminent danger, notifying the workers' safety representative.
 - f. Not remove or modify safety, warning, or control devices without authorisation.
 - g. Not perform tasks or manoeuvres beyond their competence that could jeopardise their own or others' safety.
 - h. Participate in training and instruction programmes organised by the employer.
 - i. Undergo the health checks required by this legislative decree or as mandated by the designated physician.
3. Workers employed by companies operating under contract or subcontract arrangements must display an identification badge, including a photograph, personal details, and the employer's name. This requirement also applies to self-employed workers operating at the same workplace, who must ensure their own compliance.

4. Description of the Line and the Machine

4.1. Scope of Application

High-resistance double pulley for zipline installations in adventure parks, with variable slope depending on the rope length (see the recommended diagram on [page 23](#)) on compacted steel ropes, 12 mm in diameter.

It is not considered a PPE (personal protective equipment) but a machine, used with standard PPE such as high-resistance steel carabiners certified CE EN 362, helmet, harness, and certified lanyards.

This product should not be stressed beyond its limits or used in situations other than those for which it was designed.

4.2. Operational Purpose and Intended Use

The operational purpose of the Line is to allow the movement of the pulley, making it slide along a 12 mm diameter steel support cable for transporting people for recreational or service purposes.

4.3. General Description

The Line consists mainly of two groups:

- **Group A - Support Cable** (external supply)
 - A1. Aerial attachment system with 12 mm diameter steel ropes, preferably compacted for greater functionality
 - A2. Cable anchoring points
 - A3. Starting and arrival stations with their respective protection nets and mattresses
 - A4. Safety signage and regulations
- **Group B - Pulley:**
 - B1. Mini Pulley
 - B2. Main lanyard and carabiner for harness attachment
 - B3. Secondary safety lanyard and carabiner

See Fig. 5 Group B - Pulley

4.4. Machine Description (Pulley)

The structure consists externally of two resistant aluminum heart-shaped frames, which, when coupled together, form the housing. Internally, it consists of a patented system of magnetic wheels capable of limiting travel speed.

Each pulley is made of twin plates connected by stainless steel bolts, between which two steel pulleys rotate, allowing the pulley to slide along the descent rope. Inside the pulley are the bearings and magnets involved in braking. The number of magnets varies depending on the degree of braking desired.

The pulley is wear-resistant; its structure, made of durable aluminum alloy, provides strength and, at the same time, lightness. It is easy to maintain and to replace worn or damaged components, with a 24-month warranty against manufacturing defects.

The pulley is bidirectional with a double pulley and patented magnetic induction braking, with three levels of braking (low, medium, and high). It features a single attachment hole for the main carabiner at the bottom of the shells.

The secondary safety carabiner is located at the top of the pulley, precisely between the frame and the two wheels, where the dedicated seat is created (see Fig. 5 - Group B Pulley).

4.5. Machine Components

1. **Bolts** for fixing the frames
2. **Seat** for safety carabiner
3. Wheel fastening **pin**
4. Attachment **hole** for the main harness carabiner
5. **Steel wheel** or pulley containing bearings and magnets (2 wheels)
6. **Frame** in durable aluminum alloy

See Fig. 6 Pulley Components

4.5.1. Main Components of Group B and Its Correct Assembly

1. Pulley
2. Main carabiner for harness/pulley attachment
3. Main lanyard for harness/pulley attachment
4. Main harness attachment
5. Secondary safety lanyard
6. Secondary safety carabiner

See Fig. 7 Main Components of Group B

4.5.2. Danger Zone

The harness connection must be long enough to prevent the Passenger from reaching the rope or the pulley with their hands.



The Passenger should not be able to reach this area with their hands.



WARNING: RESTRICTED AREA FOR PASSENGERS



DO NOT TOUCH

See Fig. 8 Danger Zone

4.6. Design Recommendations and Installation Techniques for Support Ropes to Improve Machine Functionality (pulley)

Attention!

- The installation and use of a zipline require the expertise of a specialized person.
- For every installation, a risk analysis should be conducted, considering potential obstacles, air tension, speed, the installation of a braking system, the arrival area, and the need to wear a helmet... (air tension, minimum clearance height under the user to avoid hitting obstacles).
- During the zipline installation, preliminary adjustment tests (rope tension, slope...) should be performed with different weights to verify the compatibility of the pulley with the installation. These tests should be repeated with each model of pulley used in this installation.
- To ensure safe braking upon arrival, it is recommended to leave the last 10 (ten) meters of cable in flat conditions.
- The line must be equipped at the end point with a braking system or certified shock absorbers to eliminate any potential risk from improper use or maintenance errors of the pulley.
- It is recommended to use smooth-surfaced, round steel ropes, type "Compacted," with a diameter of 12 mm.
Optimal length: 450 m
- Maximum advancement speed: 20 m/s
- Maximum arrival speed: 5 km/h
- Maximum slope at arrival: +3%, minimum -4%

See Fig. 9 Graph of the slope and optimal rope length

5. Technical Data

5.1. Dimensional characteristics of the machine (pulley)

The pulley is available with three braking levels to suit the weight of the passengers. Each braking level is marked by a different coloured sticker. For example, the pulley with a white sticker has a lower braking level, designed for lighter passengers; the pulley with a blue sticker has an intermediate braking level, while the pulley with a red sticker offers the highest braking level, designed for heavier passengers up to 120 kg.

5.1.1 White Pulley

Pulley weight: 0.725 kg
Width: 134 mm
Depth: 35 mm
Height: 85 mm
Passenger weight: 20 kg to 60 kg
Braking level: Low

5.1.2 Blue Pulley

Pulley weight: 0.748 kg
Width: 134 mm
Depth: 35 mm
Height: 85 mm
Passenger weight: 60 kg to 90 kg
Braking level: Medium

5.1.3 Red Pulley

Pulley weight: 0.771 kg
Width: 134 mm
Depth: 35 mm
Height: 85 mm
Passenger weight: 90 kg to 120 kg
Braking level: High

5.2. Other Data

Operating temperature: -10°C to +40°C
Minimum load capacity: 20 kg
Maximum load capacity: 120 kg
Cable diameter: 12 mm

See Fig. 10 Pulley colours and braking levels

6. Operating Instructions

6.1. Checks and inspections before first use - Calibration



Initial testing of the system must be performed by qualified personnel

Proceed as follows:

Before commissioning, the pulleys must be calibrated. To do this, a few test descents should be carried out using the three different pulley color options and varying weights.

Before starting the calibration, keep these parameters in mind:

- Maximum arrival speed: **5 km/h**
- To begin calibration tests, the cable slope at the arrival point must be zero.

Further precautions:

- All three pulley colors must be tested.
- Use a maximum load of **60 kg** for the white pulley.
- Use a maximum load of **90 kg** for the blue pulley.
- Use a maximum load of **120 kg** for the red pulley.

6.1.1 Calibration Procedure for Pulleys:

1. Attach a 60 kg weight (the maximum transportable) to the white pulley using a carabiner and release the pulley, monitoring the arrival speed with a speedometer. It is essential that the arrival speed does not exceed 5 km/h.
2. Attach a 90 kg weight (the maximum transportable) to the blue pulley using a carabiner and release the pulley, monitoring the arrival speed with a speedometer. It is essential that the arrival speed does not exceed 5 km/h.
3. Attach a 120 kg weight (the maximum transportable) to the red pulley using a carabiner and release the pulley, monitoring the arrival speed with a speedometer. It is essential that the arrival speed does not exceed 5 km/h.
4. If the arrival speed is found to exceed 5 km/h after the first tests, gradually reduce the slope of the cable by 1 percentage point at a time, loosening the cable until the performance matches the manufacturer's requirements.
5. If the arrival speed is too low or insufficient to reach the arrival point, the cable slope can be gradually increased by 1 percentage point at a time, tightening the cable until the required performance is achieved.
6. Careful attention must be paid as increasing the cable slope will increase the arrival speed of the pulley.
7. Once the correct system adjustment is found, it must be maintained for the entire duration of the pulley's use.

WARNING:

- This operation must be performed for all three pulley adjustments and only by qualified personnel.
- A portable speedometer must be used for measurements and aimed at the arrival station.
- It is forbidden to install accessories or carry out work that may alter the characteristics of the pulley.
- The pulley must never be used beyond the maximum slope and length limits as specified in the Fig. 9 chart for cable slope and optimal cable length.

6.2. Usage



Important

To be able to use the pulley in adventure parks, instructors must complete courses in 'sports and recreational facilities and acrobatic routes' run by certified and authorised organisations.

The park's safety manager must ensure that each worker has attended a PPE course, a ropes course and a first aid course in accordance with the occupational health and safety regulations and the courses required by Legislative Decree 81/2008, as amended. This responsibility lies with the designated safety manager within the company, who is also responsible for ensuring that each worker has access to and wears the necessary PPE in accordance with occupational health and safety regulations.

Carefully follow the following operational sequence:

Before opening the system, the instructor must:

- Visually check that the pulley is not damaged.
- Check the free rotation of the pulleys, proper tightening of bolts, and the absence of visible damage (this check should be carried out before each use, as described in the maintenance section).

Carry out the procedure for harnessing the passenger:

1. start with the process of putting on the harness, which must be carried out directly by the instructor
2. Using a weighing scale, check the weight of the slinging passenger and select the pulley with the appropriate braking level according to the table on [page 11](#), taking care not to exceed the maximum weight of 120 kg.
3. Place the pulley on the cable.
4. Connect the main carabiner to the designated ring and the secondary carabiner around the pulley.
5. Ensure that the connecting cables are long enough to prevent the passenger from reaching the pulley or cable with their hands.
6. Make all adjustments to the wiring harness.
7. Provide a safety briefing to explain the course and the use of the pulley.
8. After receiving confirmation of a free line downstream, send the passenger (using a two-way radio).
9. On arrival at the arrival station, unhook the connectors, remove the pulley from the cable and have the passenger move away.
10. Transfer the pulley and harness to a dry, clean place for future use.
11. Use radio communication to announce a clear line to proceed with the next passenger.

If the zipline is particularly fast (over 10 km/h), it is essential to have qualified personnel at the end of the line to greet incoming passengers.

The line must also be equipped, at the arrival point, with a braking system or approved shock absorbers to eliminate any potential risks arising from improper use or pulley maintenance.

In the event that the opposite situation occurs, i.e. the passenger does not reach the arrival station, it will be necessary to have a system for the recovery or evacuation of the passenger stopped on the line.

6.3. Installation and deinstallation of the pulley on the rope

6.3.1 Installation

1. Insert the pulley into the cable as shown in the figure, pushing it down.
2. Straighten the pulley forward.
3. Insert the main carabiner into the lower ring of the pulley.
4. Insert the secondary carabiner onto the cable
5. Position the secondary carabiner in the groove of the pulley.

See Fig. 11 for pulley installation.

6.3.2 Pulley deinstallation

6. Move the secondary carabiner towards the cable.
7. Once on the cable, unclip the secondary carabiner.
8. Unclip the secondary carabiner.
9. With one hand, release the main carabiner while supporting the pulley with the other hand.
10. Remove the pulley from the cable.

See Fig. 12 for Uninstalling the pulley

6.4. Safety Precautions

- Ensure all safety information is provided to the passenger.
- Discontinue use in case of rain, strong winds, snowfall, or ice, as adverse weather conditions may affect the pulley's performance.
- **Caution:** This pulley is not designed for impact with a full-speed braking system.
- The machine is intended exclusively for the transport of persons. Do not use the machine to transport loads other than the intended passenger.
- A rescue procedure must be planned in case a stop occurs on the line (for the rescue procedure, refer to the Operational Manual of the system).



The Operational Manual is the responsibility of the system/park builder/manager. Martello Srl provides instructions only for the Mini Pulley and declines any responsibility for system and park management and related documentation.

6.5. Incorrect or Improper Use

To avoid malfunction, accidents, or damage to people or property, ensure the pulley is used only within the limits and purposes for which it was designed and built.

- The pulley must not be used beyond the permitted weight limits.
- The pulley must not be used for any purposes other than those specified in section 4.2 ("Operational Purpose and Intended Use").
- It is the passenger's responsibility to ensure the pulley is not used improperly, wrongly, or unreasonably.

The passenger and instructors must use the pulley following the guidelines provided in this manual, adhering to safety regulations and avoiding improper or unreasonable actions that could be potentially dangerous.

Correct Use:

1. During flight, the secondary safety carabiner must be placed in the designated slot on the pulley housing.
2. Keep hands away from the danger zone (pulley and steel cable). See Fig. 8.
3. Attach the main cord to the harness's ventral ring, and if desired, place hands on the cord without touching the pulley.

See Fig. 13 for correct use.

Incorrect Use:

1. The secondary safety carabiner must not remain on the steel cable during flight.
2. Do not touch the pulley's gears.
3. Do not touch or hold the rope before or during the flight.
4. Do not touch or hold the rope during flight.

See Fig. 14 for incorrect use.

See Fig. 15 for usage modes.

6.6. Main Risks

Below is a brief list of the most common risks that could occur when using the pulley.



Please note that the following table is only a guideline. Therefore, it is recommended to refer exclusively to the Risk Analysis Document available upon request to be correctly informed about the potential risks associated with the use of the machine. The manufacturer cannot assume any responsibility if this essential rule is not followed.

These preventive measures are essential to ensure the safety of the instructor and passenger during the use, maintenance, and management of the pulley.

Residual risks (for the instructor)	Preventive measures
Crushing of fingers between pulleys and rope	Use of appropriate PPE (gloves). Adequate staff training.
Entanglement of hair and/or clothing	Tie hair back in a ponytail and avoid wearing scarves and ties.
Falls from height	Strictly follow the instructions in this manual. Use of compliant and functional PPE. Employment of suitably trained personnel.
Residual risks (for the passenger)	Preventive measures
Rubbing or crushing of the ends due to the speed of the pulley on the cable along the travel route	Adequate training for the passenger on necessary precautions and use of cords of proper length to prevent the passenger from reaching the danger zone (see fig. 7).
Entanglement of hair and/or clothing	Tie hair back in a ponytail and avoid wearing scarves and ties.
Falls from height	Properly conducted briefing procedure. Use of compliant PPE. Functional and correctly used harness.
Excessive speed descents	Check the correct adjustment of the cable slopes. Check the condition of the Line. Check the proper functionality of the system."

7. Maintenance and Cleaning

7.1. Introduction to Maintenance

Regular maintenance is essential to ensure functionality, efficiency, and longevity over time.

Every maintenance operation must conclude with proper checks to ensure the work is complete and the correct functionality of all involved components is verified.

No specific lubrication is required as the ball bearings are pre-greased. Bearings should be replaced when broken or noisy, and in any case, every 5 years.



The person responsible for maintenance must wear the required personal protective equipment (PPE) as prescribed for the work environment.



Failure to follow the instructions in this manual exempts the manufacturer from any responsibility for damage to the machine, property, or people.



All waste material generated during maintenance must be disposed of in accordance with current waste disposal and recycling regulations.

7.2. Routine Inspections

Before each use, perform a thorough visual inspection that includes:

- Check the structure for any deformation, cracks, marks, or wear.
- Check the wheels for any wear, cracks, deformation, or corrosion.
- Verify the correct rotation of the pulleys and ensure there is no rubbing between the pulleys and the plate by manually moving or sliding the pulley along the available cable segment.
- Check the correct tightening of the bolts that secure the two plates. **The torque force to apply is 9 Nm.**

During use:

It is important to regularly check the condition of the pulley and its connections with other devices in the zipline system (carabiners, ropes, etc.). Ensure the correct positioning and compatibility of these devices with each other.

7.3. Equipment to Use

1. Work gloves
2. Clean cloth or sponge
3. 5 mm hexagonal Allen key
4. 10 mm hexagon socket spanner with female insert
5. 10 mm combination spanner
6. Calibre
7. Dynamometric spanner
8. Small flat screwdriver
9. Rubber hammer


See Fig. 16 Tools and equipment to use

7.4. Cleaning and Periodic Checks


Frequency	Intervention	Person Responsible	How to Check	How to Solve
Weekly	Check the external cleaning of the plates, particularly for metal dust attracted by magnetism, which may interfere with the proper rotation of the pulleys	Instructor or facility manager	Visual inspection	Clean with a clean cloth
Monthly	Check the correct tightening of each bolt, which should be tightened to 9 Nm of torque force	Instructor or facility manager	Use of a Dynamometric spanner	Make any necessary tightening adjustments
Monthly	Check the wear of the steel wheels; their diameter should not fall below 31 mm	Instructor or facility manager	Use of a calibre	If the diameter is less than 30 mm, immediately request a replacement and replace the wheel by opening the pulley with a 5 mm hexagonal Allen key and a 10 mm hexagon socket spanner. Replace the wheel and reassemble the pulley, ensuring the correct tightening torque (9 Nm), which can be checked with a Dynamometric spanner
Monthly	Perform a visual and functional check by manually rotating the wheels and ensuring there are no foreign objects between the pulleys and plates	Instructor or facility manager	"Manually rotate the wheels and listen for any sounds indicating improper functioning. Use compressed air, a clean cloth, a 5 mm hexagonal Allen key and a 10 mm hexagon socket spanner.	If the wheel does not rotate, rotates with difficulty, or foreign objects are heard, blow compressed air between the space of the wheels and plates. If this doesn't work, open the pulley by removing the 4 screws using a 5 mm hexagonal Allen key and a 10 mm hexagon socket spanner. clean the interior with a clean cloth, and reassemble the pulley, ensuring the screws are properly tightened to a force of 9 Nm with a Dynamometric spanner.

7.5. Annual Checks

Your safety is tied to the integrity of the machine.

 Martello recommends a thorough check at least every 12 months by a competent person (depending on the regulations in your country and your usage conditions).

Please note, the intensity of use may require more frequent checks of the pulley.

 **IMPORTANT:** Bearings should be replaced every five years or sooner if needed due to external factors such as high temperatures, water, chemicals, poor storage conditions, etc. The use of the pulley in a marine environment may accelerate corrosion, shortening the replacement intervals for wheels and bearings.

7.6. Extraordinary Maintenance

Extraordinary maintenance should be performed in the event of:

- Breakdowns or malfunctions
- Unforeseen accidents
- Improper use
- Unknown reasons

If the pulley stops working, follow these steps:

1. Check externally that the pulley is not damaged.
2. Check with a torque spanner that the screws are properly tightened.
3. Manually check that the wheels turn freely; if they do not turn, check that there are no foreign bodies between the wheels.
4. Clean with compressed air or a clean cloth. It may be necessary to open the pulley

If the pulley still doesn't work after these steps:

- Set the pulley aside and label it as broken.
- Contact the supplier and schedule technical assistance.



If the supplier is directly Martello Srl, send an email to: assistenza@martellozipline.com; otherwise, contact your intermediary supplier.

See Fig. 17 for torsion force

7.7. Spare Parts List

Martello Srl Supplier

1. Galvanized steel wheel or pulley
2. Stainless steel wheel pin
3. Magnet disc D13 x 3 mm
4. White adhesive
5. Blue adhesive
6. Red adhesive

Standard Commercial Supplier

7. Deep groove ball bearing KBS 608-2RS D22 d8 x 7 mm
8. TCEI screw 6 mm x 25 mm INOX
9. Low self-locking nut M6 INOX
10. Washer M8 X 1.5 mm INOX

See Fig. 18 for spare parts list (available on request via email to assistenza@martellozipline.com)

7.8. Compatibility

Check the compatibility of the machine with other system components for better functionality. The carabiners and lanyards used with the MINI PULLEY must comply with the regulations in force in your country (e.g., EN 362 connectors).

7.9. Strength and Performance

- Working load limit is 120 kg
- Working load limit based on the braking level of the white pulley: 20/60 kg
- Working load limit based on the braking level of the blue pulley: 60/90 kg
- Working load limit based on the braking level of the red pulley: 90/120 kg
- Breaking load: 22 kN



Magnetic braking is a safety system that regulates the speed along the rope and, in particular, on the landing platform. For it to function correctly, the slope parameters specified in Fig. 9 must be observed. In addition, it is necessary to comply with the weight limits according to the colour and degree of braking of the pulley..

7.10. Repairs or Part Replacements



Repairs or modifications to the pulley are prohibited, except for the replacement of worn parts carried out by qualified personnel (See spare parts list).



Warning! In case of simple malfunctioning of the pulley, proceed as follows:

- Set the pulley aside to prevent accidental use until a qualified technician can intervene.

7.10.1. Exploded View of the Mini Pulley with its Parts

See Fig. 19 for Exploded view of machine parts (pulley))

1. Anodized aluminum shell or frame x2
2. Galvanized and hardened steel wheel x2
3. KBS 608-2RS deep groove ball bearing D22 d8 x 7 mm x4
4. Stainless steel wheel pin x2
5. Flat washer D8 INOX x4
6. Magnet disc D13 x 3 mm x8 white, 16 blue, 24 red
7. TCEI screw 6 mm x 25 mm INOX x4
8. Low self-locking nut M6 INOX x4
9. Brake level color adhesive x3

7.10.2. How to Replace Parts

Precautions:

- Keep the work table clean and free of unnecessary objects.
- Keep all metallic objects away from magnets.

Tools required:

1. 5 mm exagonal Allen key
2. 10 mm exagonal socket spanner
3. Small flat screwdriver
4. 10 mm combination wrench
5. Dynamometric spanner
6. Rubber hammer to push the bearing

How to Replace Broken or Loose Screws, Nuts, and Internal Parts (Wheels, Bearings, Wheel Pin, Magnets)

1. Remove the 4 screws using a 5 mm exagonal Allen key and a 10 mm exagonal socket spanner, and place them on the work table.
2. Open the shell, taking care not to lose any internal parts.
3. Remove and replace the damaged internal part with a new one.
4. Replace any broken or loose screws and nuts with new ones.
5. Close the shell, ensuring the screws are correctly tightened.
6. When replacing magnets, use a small screwdriver to pry under the magnet pad. Reinstall the magnets symmetrically (e.g., two on the bottom + two on top, on both sides). Do not leave unmatched magnets as this can cause vibrations in the pulley (see Fig. 19).
7. Place the magnets side by side with the poles repelling each other (see Fig. 19).

7.11. Storage

The pulley should be stored in a protected location, away from extreme temperatures, chemical agents, and direct UV rays. The environment must be dry, well-ventilated, and inaccessible, protected from any external tampering.

7.12. Lifespan and Disposal

The machine has an indefinite lifespan as it is made of metal materials.



Attention: Exceptional events (such as a strong impact or excessive force), poor storage (extreme temperatures, chemicals, etc.), or aggressive use environments (marine environments, etc.) can compromise the machine's functionality and require disposal.

The pulley must be discarded in the following cases:

- It has undergone a significant impact or strain
- Its safety check is unacceptable
- The previous use is unknown
- The product is obsolete (incompatibility with accessory devices, changes in laws).



The discarded pulley must be destroyed to prevent accidental use and removed from the annual inspection register.

7.13. Disposal



In the case of replacing or disposing of the pulley and/or its parts, ensure compliance with the laws in your country regarding ecological disposal and recycling.

Note that the machine is made of: Aluminum and steel metal parts.



Disassembling the machine should be done to facilitate the differentiated disposal and recycling of various materials, in full compliance with applicable regulations.



Equipment marked with the crossed-out bin symbol must be subject to separate collection and disposal.



Improper disposal will result in administrative penalties in accordance with current regulations.

8. Warranty

This product is covered by a 24-month Manufacturer's warranty against material or manufacturing defects, starting from the date of purchase, which includes only the replacement of the defective component.

Exclusions: Normal wear and tear, oxidation, modifications or touch-ups, poor storage, improper maintenance, negligence, and uses for which this product was not intended.

To avoid invalidating the warranty, it is mandatory:

- Comply with all conditions stated in the 'Warranty Terms and Conditions' section.
- Follow the instructions and rules contained in this manual.

8.1. Warranty Terms and Conditions

- 1) The warranty does not cover the costs of transportation and shipping to our warehouse, which will be at the buyer's expense.
- 2) The warranty covers the replacement of the faulty or defective component, labor, and the return shipping of the revised product, but only after thorough inspection and verification of the construction defect.
- 3) The defective product or part must be delivered to the manufacturer at our production site located at Via degli Artigiani 29, 32020 Falcade - Belluno, Italy, upon request via email to assistenza@martellozipline.com.
- 4) During the warranty period, replaced products become the property of the manufacturer. The warranty covers product parts, not the work that may be required.
- 5) In case of improper use of the product, the replaced parts and shipping costs will be borne by the buyer.
- 6) Only the original purchaser who has adhered to the standard maintenance instructions in the manual is entitled to benefit from this warranty.
- 7) Our warranty responsibility expires when the original owner transfers ownership of the product or if modifications have been made to it.
- 8) The warranty does not cover normal wear and tear, improper use or storage, or failure to adhere to the instructions in this manual.
- 9) The manufacturer assumes no responsibility for difficulties arising from resale or use abroad due to regulations in the country where the product was sold.
- 10) Failure to perform the mandatory annual product check, as prescribed by the manufacturer and the EN 15567-1:2020 standard, will void the warranty.
- 11) Warranty claims do not entitle the buyer to exemption from payment obligations, nor any right to request refunds for damages, extend payment deadlines, or cancel ongoing orders.
- 12) The warranty terms are valid only if the product is used under the specified conditions. Any repairs or modifications made to the product by the user or unauthorized companies will invalidate the warranty.
- 13) The warranty does not cover damages caused by inexperience or negligence in using the product, neglect, or failure to carry out maintenance.

Note: Failure to follow the procedures for maintenance and use of the machine described in this manual will invalidate the terms of the warranty. .

8.2. Liability

Under no circumstances may the manufacturer be held liable for accidents or damage to persons or property resulting from improper, incorrect or unintended use of the machine, due to negligence on the part of the user/user/passenger, as well as from failure to comply, even partially, with the operating methods, safety regulations, maintenance procedures and periodic or extraordinary checks described in this manual.

9. Additional Information

This product complies with the Machinery Directive 2006/42/EC. The EU Declaration of Conformity is attached to this manual.

- **Safety and Emergency Intervention:** Ensure that necessary rescue equipment is in place to intervene promptly in case of difficulties.
- **Compatibility of Safety Devices:** When using multiple devices simultaneously, ensure that the safety functions of one device do not compromise those of another.
- **Warning – Abrasion or Cutting Hazard:** Ensure that the products do not come into contact with abrasive materials or sharp parts that could compromise their integrity.
- **User Suitability:** Users must possess the necessary health qualifications to perform activities at height.
- **Risk of Inactive Suspension: WARNING:** Inactive suspension in the harness can cause severe physiological disturbances or, in extreme cases, lead to death.
- **Instructions for Associated Devices:** It is mandatory to strictly follow the instructions in the informational notes of each device associated with this product.
- **Language of Instructions:** The product's instructions must be provided to users in the official language of the country where the product is used.
- **Product Markings:** Ensure that all markings on the product are legible and intact.
- **Marcature sul Prodotto:**
Verificare che tutte le marcature riportate sul prodotto siano leggibili e integre.

Fig. 1 - General view of the Mini Pulley.



Fig. 2 - Identification data.



Fig. 3 - Symbols Used in the Manual.

1	2	3	4	5	6	7	8	9

Fig. 4 - Recommended PPE.

1	1	2	2	3	3
4	4	5	5	6	6

Fig. 5 - Group B - Pulley

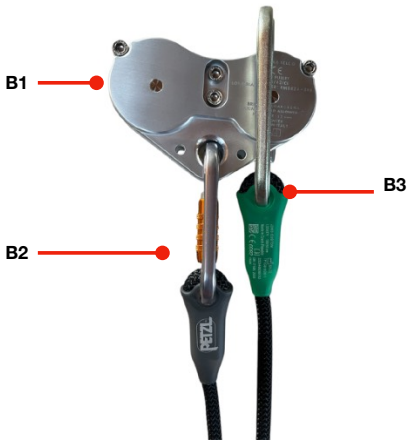


Fig. 6 - Pulley Components

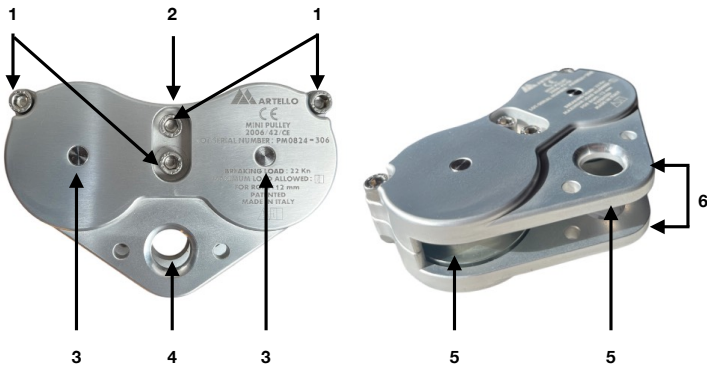


Fig. 7 - Main Components of Group B

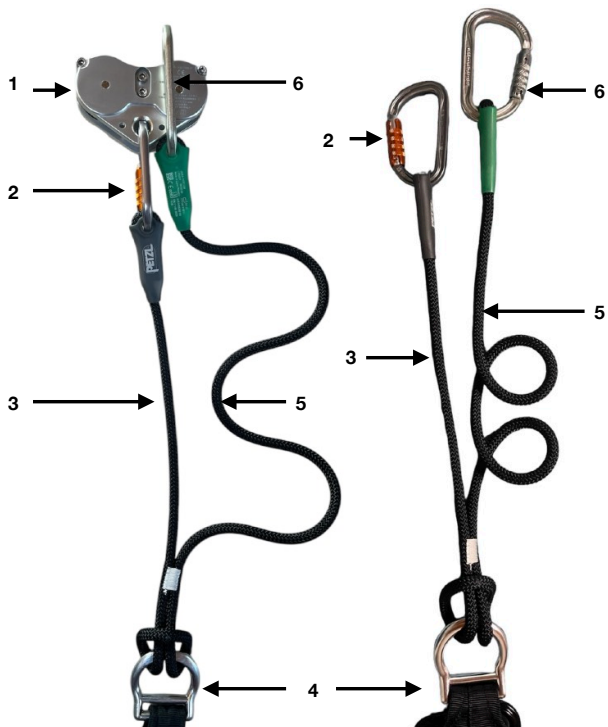


Fig. 8 - Danger Zone

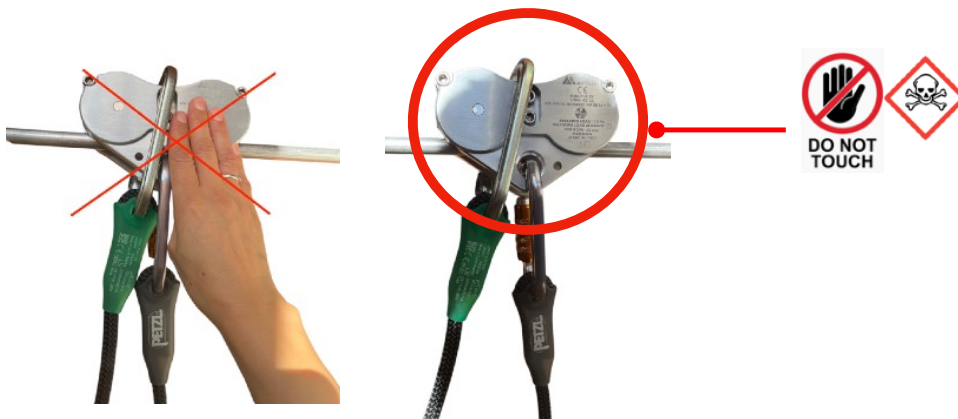


Fig. 9 - Graph of the slope and optimal rope length

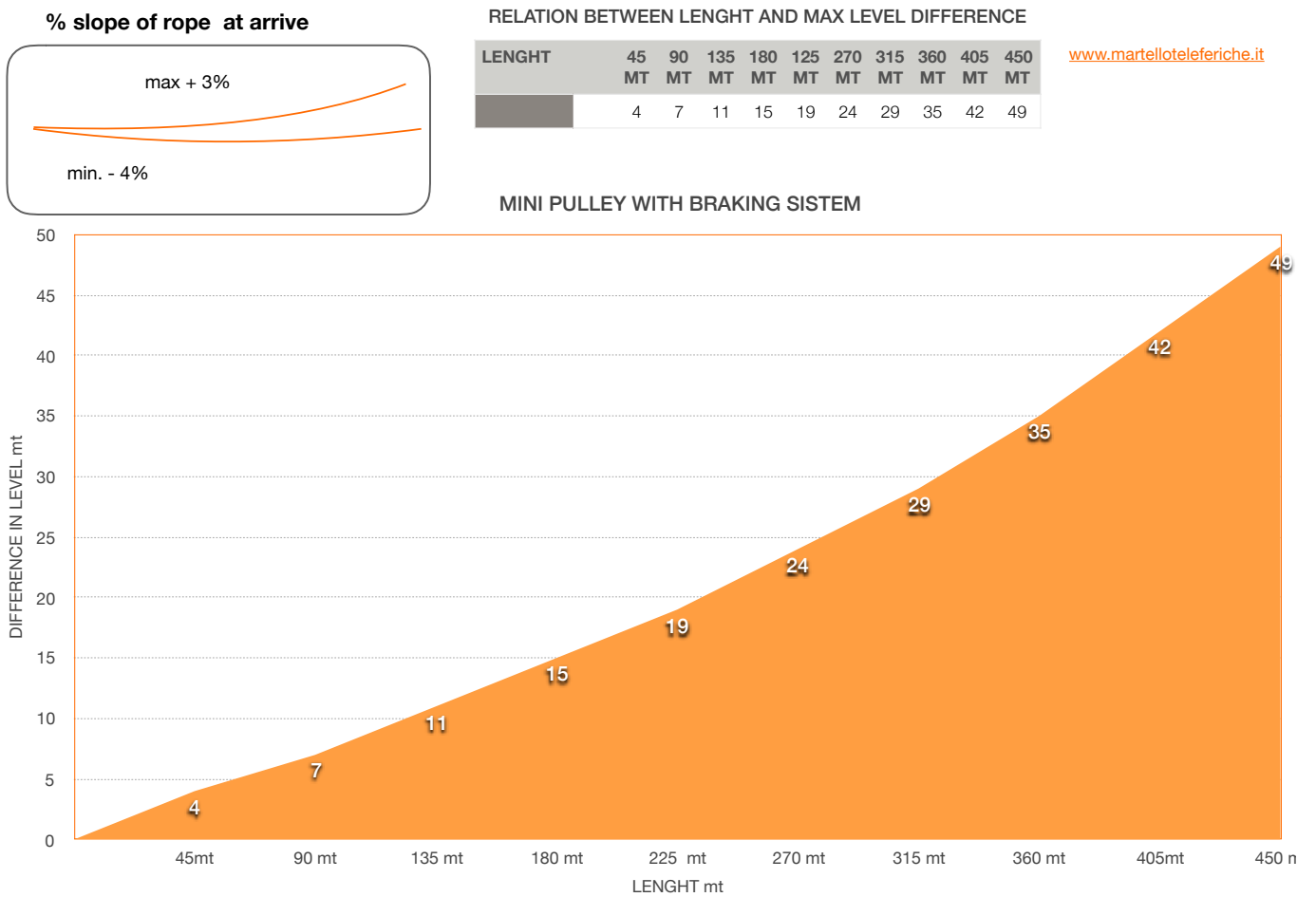


Fig. 10 - Pulley colours and braking levels



Fig. 11 - Pulley Installation

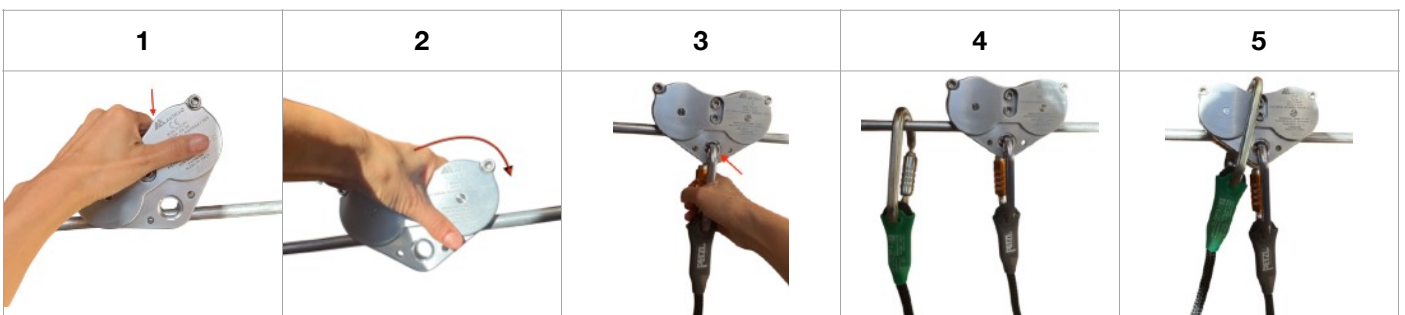


Fig. 12 - Uninstalling the pulley

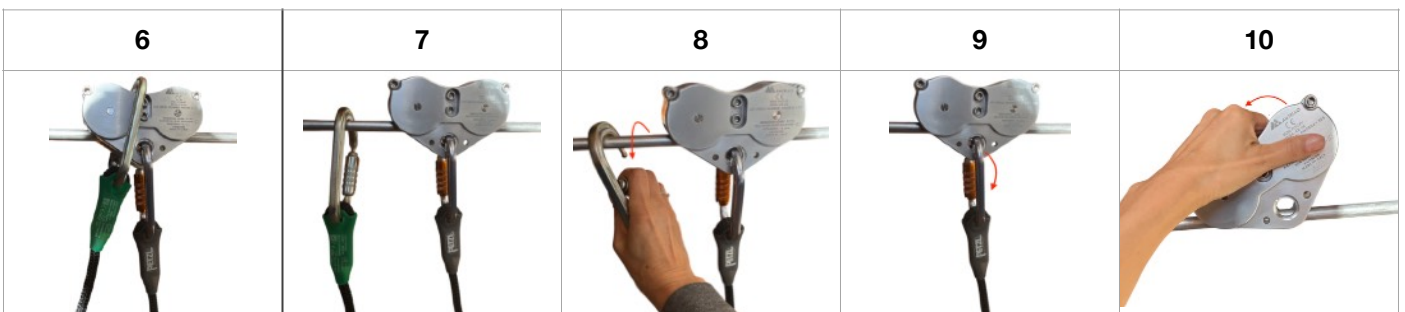


Fig. 13 - Correct use.

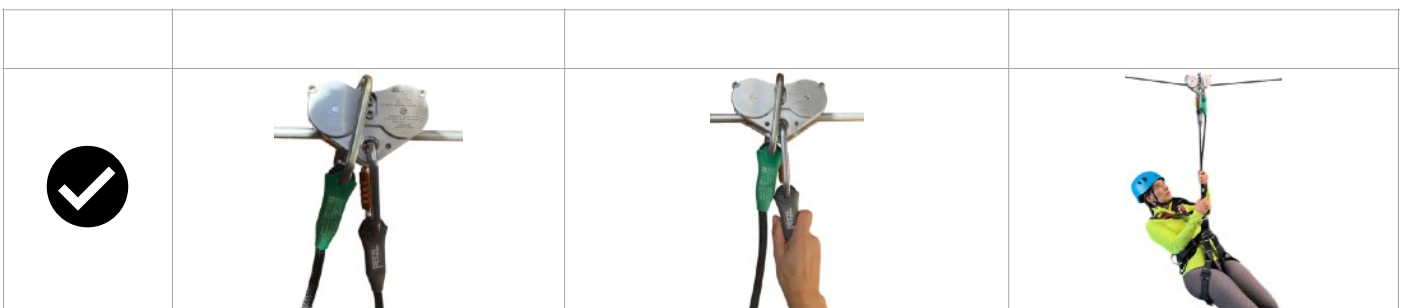


Fig. 14 - Incorrect use.

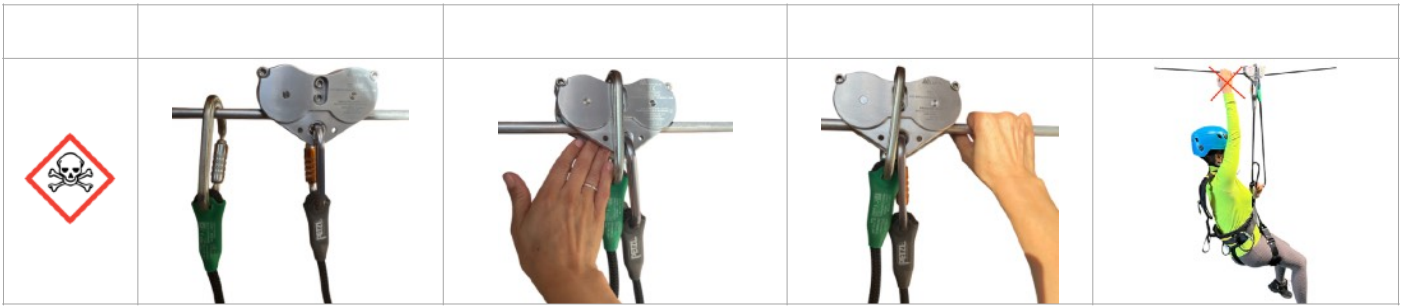


Fig. 15 - Usage modes.



Fig. 16 - Tools and equipment to use



See Fig. 17 - torsion force

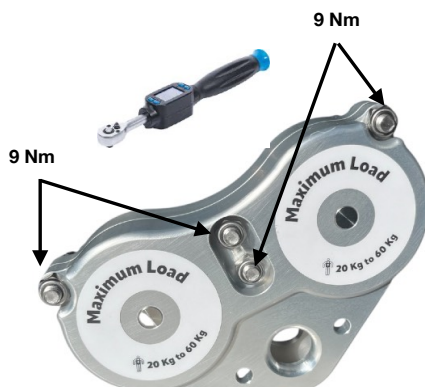


Fig. 18 - Spare parts list (available on request via email to assistenza@martellozipline.com)



Fig. 19 exploded view of machine parts (pulley)

PART LIST			
elemento	qtà	numero parte	descrizione
1	2	GMP-20	GUSCIO MINI PULLEY ANODIZZATO
2	2	RMP 50/22	RUOTA MINI PULLEY ZINCATA+INDURITA
3	4	608 2RS	CUSCINETTO 608 2RS
4	2	PRMP-8	PERNO RUOTA MINI-PULLEY
5	4	RP-D8	RONDELLA PIANA D8 ZINCATA
6	16	M-D13-3	MAGNETE NEODIMIO SP3
7	4	TCEI M6X25-A2	VITE TCEI M6X25-A2 INOX
8	4	M6-A2	DADO AUTOBLOCCANTE-INOX A2
9	3	AC-48/20	ADESIVO COLORE TAGLIA PULLEY

Material	Surface Treatments	General Tolerance	ISO 2768-H1
Dept.	Technical reference	Created by	Approved by
		Assembly Name	Note:
DOCUMENTO RISERVATO AI TERMINI DI LEGGE VIETATA LA RIPRODUZIONE E/O LA COMUNICAZIONE A TERZI		Title	DWG No.
Scale	A3	Rev.	Date of issue
1:2			Sheet 1/1