SMART BELAY

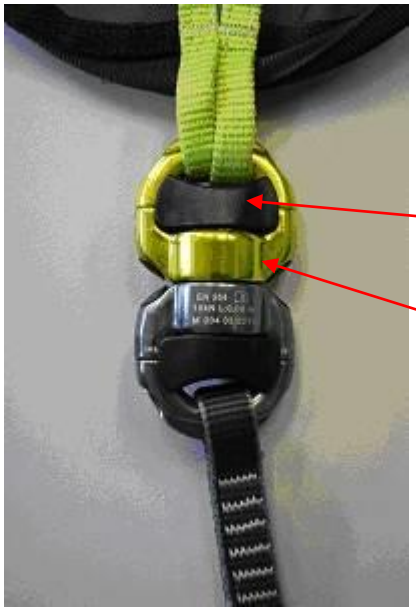
TECHTOOL

Topics

- Smart Belay Update
- Care and Maintenance
- Issue- and functional test
- Construction of the communication mechanics

- **Diagnosis**
- **Cable Adjustment (with practice)**
- Rescue

Smart Belay Update



CONECTO SWIVEL

- With Inlays → Reduction of „Reverting“
- With Plugins → Covering of potential sharp burrs → Protection of Lanyard

Smart Belay Update

REVISED LANYARD

- Additional abrasion protection at the most exposed areas (Loop of lanyard, V between the two arms)
- Robust tarpaulin instead of meash
- Improved fixation of batch marking: sewn label can be securely stored and therefore can‘t be ripped off

Smart Belay Update

PILOT BAR

- Possibility to steer in Flying Fox in order to reduce injuries / accidents when landing wrongly on platforms
- Defined bar to hold onto, in the parcours
- Possibility of self rescue after a fall
- Twisting of lanyards arms is made almost impossible with Pilot Bar
- Residual Risk of strangulation during improper use of Smart Belay is minimized.

Care and Maintenance

Principles:

„Only a clean SMART BELAY is a good SMART BELAY!“

Smart Belay as a complex system:

frequent inspection and servicing for optimal functionality

Care and Maintenance

- Daily:
  - Issue- and functionaltest
  - Visual Inspection of Karabiner, Lanyard, Connector
- Weekly:
  - Control of the screws with a torque wrench
  - Lubrication if needed
- Monthly:
  - More detailled visual inspection of all parts - Seams, Edges, Screws
- Yearly:
  - PPE-Inspection by trained person (according to BGG 906)
  - Yearly inspection (service) by EDELRID
- Always:
  - As little as possible dirt during use, appropriate storage

Issue- and functional test

Daily
Weekly
Monthly

- At every Smart Belay before issue to the customer
- „Communication-Check“
- 3-point check:
  - Open Karabiner 1, check slackness (< 1,5mm) at Karabiner 2, close Karabiner 1.
  - Open Karabiner 2, check slackness (< 1,5mm) at Karabiner 1, close Karabiner 2.
  - Push both triggers at the same time to except a opening of both Karabiners.
  - Important: The lanyard must be straightened out during the functional test, otherwise the result is distorted.
- Pay attention of frictions, grinding or other striking features during opening and closing the karabiners, if you feel any – replace/repair the unit.

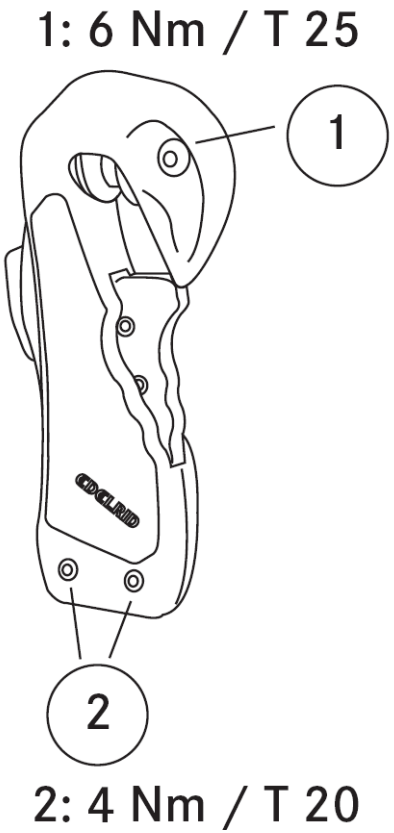
Visual Inspection

Daily
Weekly
Monthly

- CHECKLIST (error search)
  - Connection of the Screws (are all screws present?)
  - Connectors (Conecto, Conecto Swivel, Maillon… screw joints!!)
  - Textile Laynard in good order (any wearout?)

Schrauben Anzugsmomente

Daily
Weekly
Monthly



- Use a torque wrench

- Use the correct drill-bit.
- Pay attention of the correct torque.
- Watch the „Click“ of the torque wrench.

Connectors: After the first 20 hours usage, after inserting new screws + once a year (PPE inspection)

- CONECTO / allen key 4 mm / 6 Nm (53 in.lbf)
- CONECTO SWIVEL / allen key 3 mm / 4 Nm (36 in.lbf)
- SCREW LINK / 14 mm spanner wrench / 3 Nm (27 in.lbf)

Warning

During the course of extensive checking of the bolts on the hardware products „Conecto“, „Conecto Small“ and „Conecto Swivel“ by EDELRID, it was ascertained:

- Many of the bolts were not inspected yearly,
- some of the bolts wer damaged (the only way to detect if the bolt is damaged is by checking the torque),
- some of the bolts had been replaced by users with bolts that did not have the required strength class.

Conecto Small

Conecto

(71780)

Conecto Swivel

(71766)

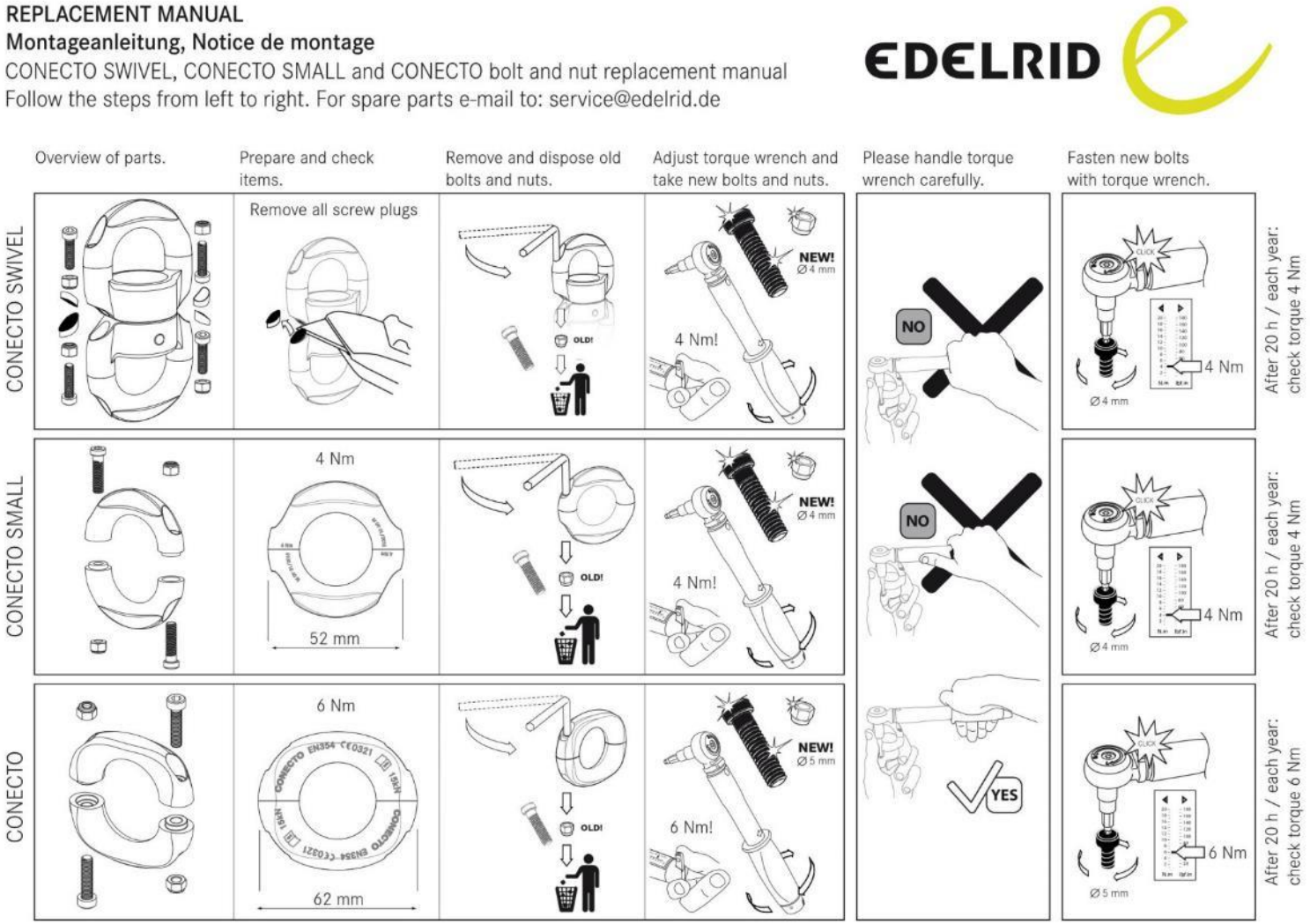
Replacement manual

REPLACEMENT MANUAL

Montageanleitung, Notice de montage

CONECTO SWIVEL, CONECTO SMALL and CONECTO bolt and nut replacement manual

Follow the steps from left to right. For spare parts e-mail to: service@edelrid.de



Lubrication

Daily
If required
Monthly

- Only if needed, because of friction or grinding!
- Use only acid free oil or grease sprays with nozzle if possible.
- Lubricate through the gate opening on top.
- Push the nozzle inside the gate and turn the needle in a circle while spraying out of the gate.
- Don‘t use too much oil.

- EDELRID recommends commercial (acid free) lubricants, such as:
  - WD40 Lithium Grease
  - Brunox Turbo Spray
  - S.K.D 170

Control of all units

Daily
Weekly
Monthly

Pay attention to all visible damages!

- Deformation or cracks at the shells (check the clearance!)
- Sharp edges at the karabiners or connectors
- Damages at the lanyard
  - Wear (fleecy)
  - Visible Dyneema® core of the TecWeb webbing
  - For lanyards with addittional black abrasion protectors: Visible green PA-material?
  - Cuts at the lanyard
  - Stitching intact
- Bolted connections at both karabiners as well at the connector.

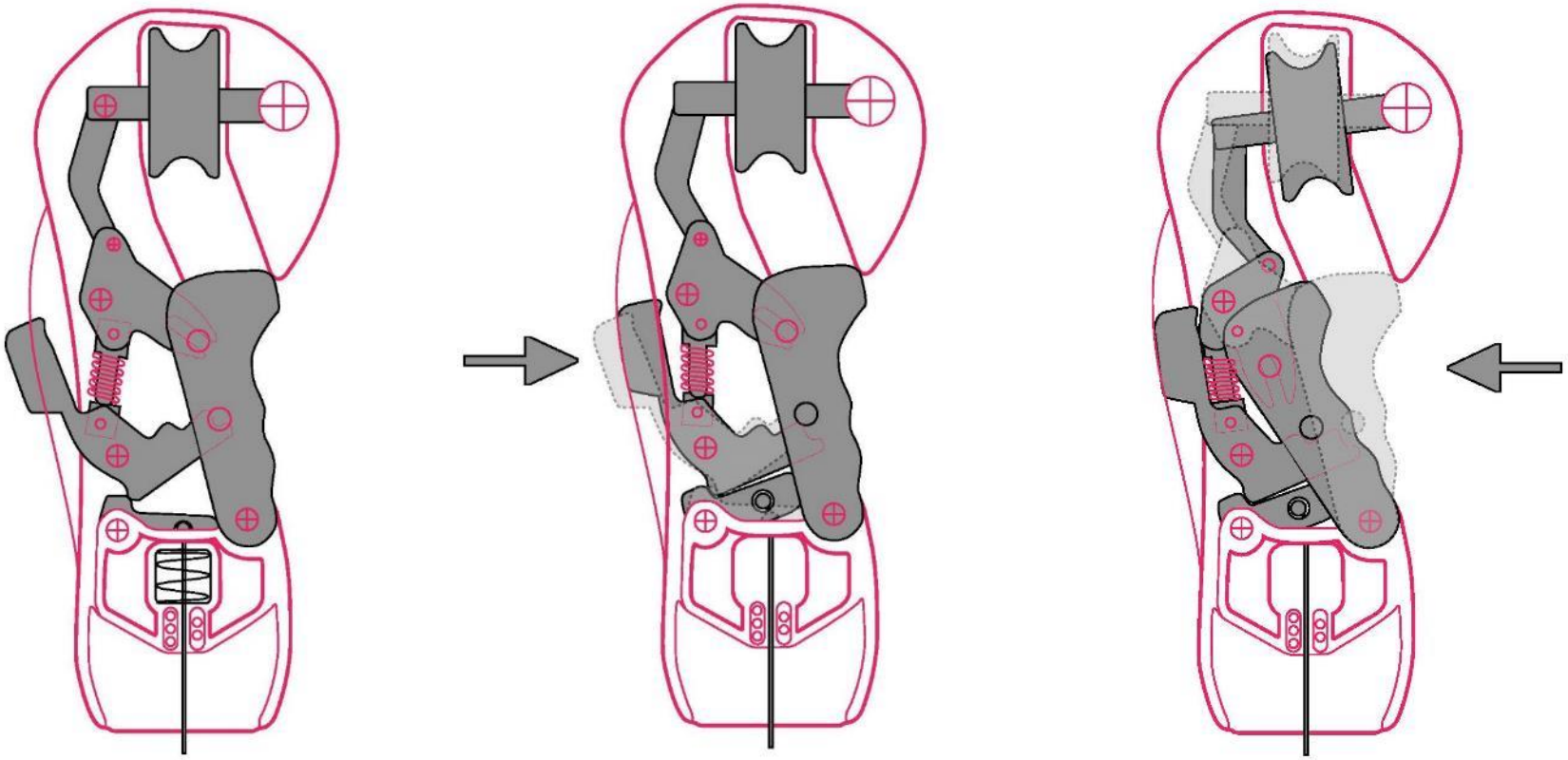
→ If a SB is affected, contact your Distributor!

Functions of the Smart Belays

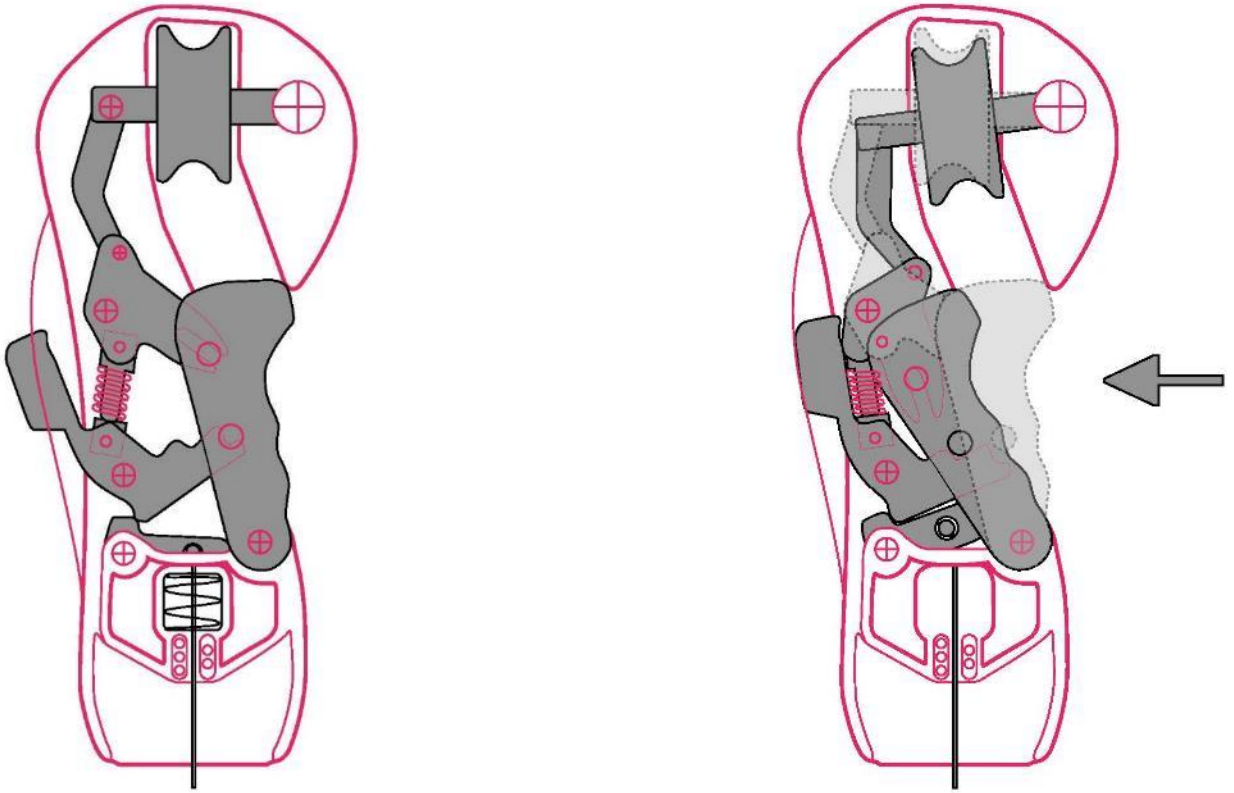
Three functions:

- Locking of the gate
- Closure of the gate by the pulley
- Communication between the two karabiners

Locking of the gate

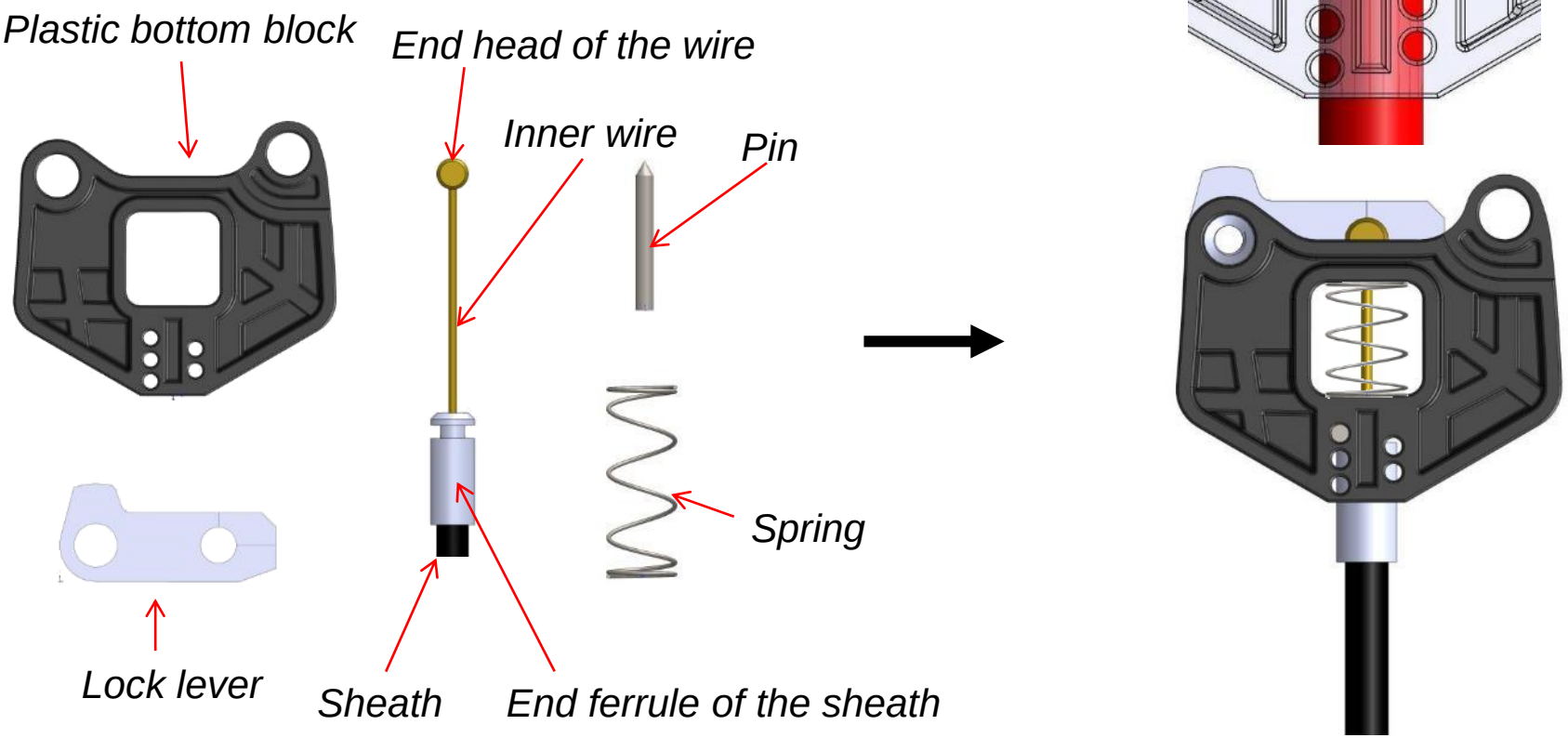


Closure of the gate by the pulley

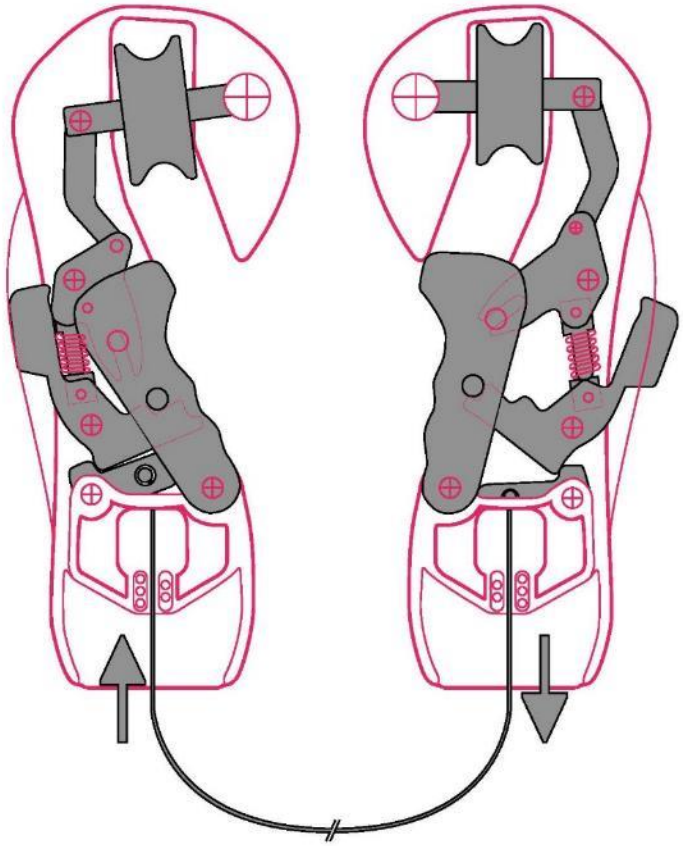


Communication of the Smart Belay

How is the cable system built up in the karabiners?



Communication of the Smart Belay

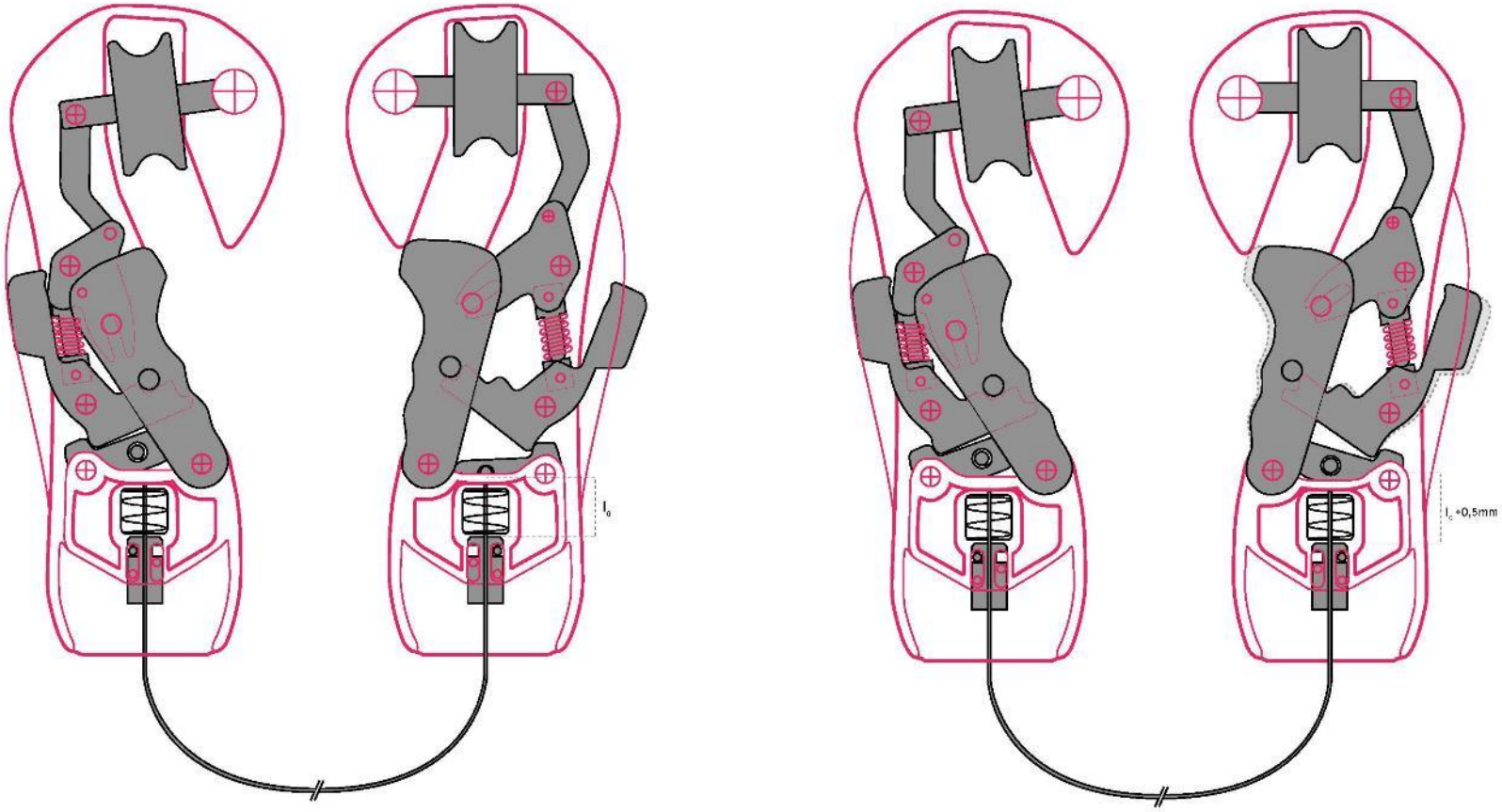


Communication of the Smart Belay

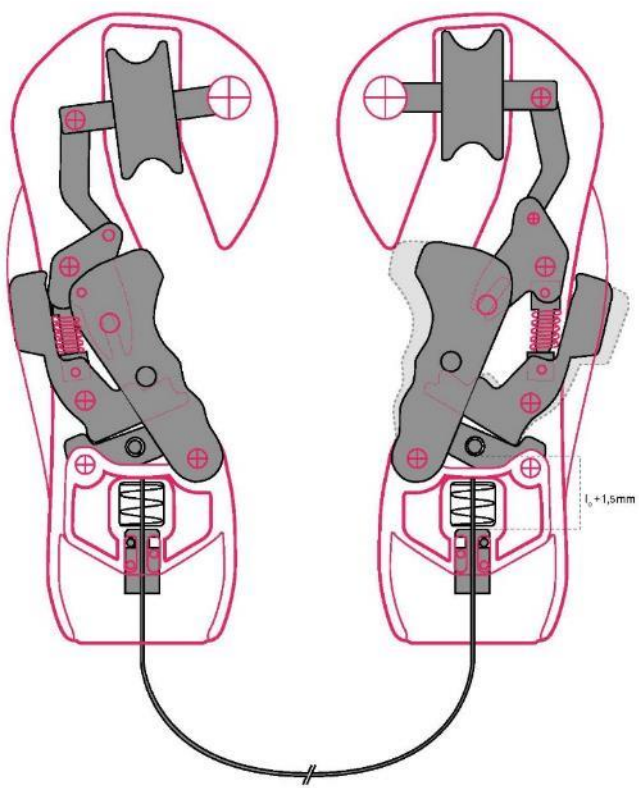
Communication of the two karabiners via a bowden cable

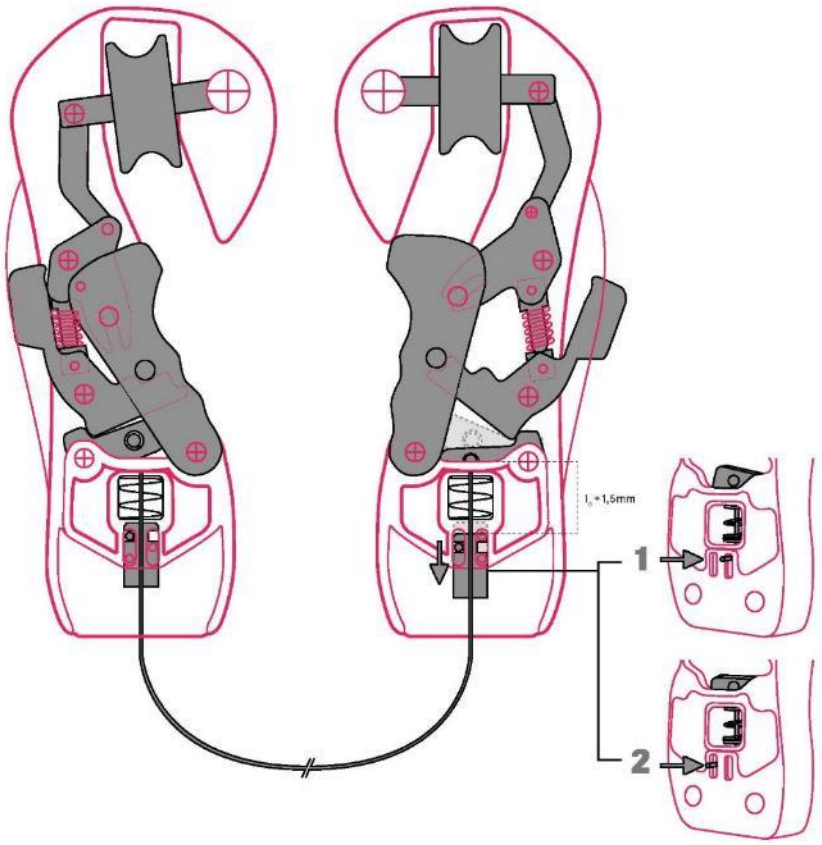
- Specifically produced bowden cable
- Inner wire made from twisted braids (1 x 19)
- Sheath made from twisted braids, plastic over and pressed end ferrule
- Neutral in length (e.g. when bent)

Cable Adjustment



Cable Adjustment





Cable Adjustment

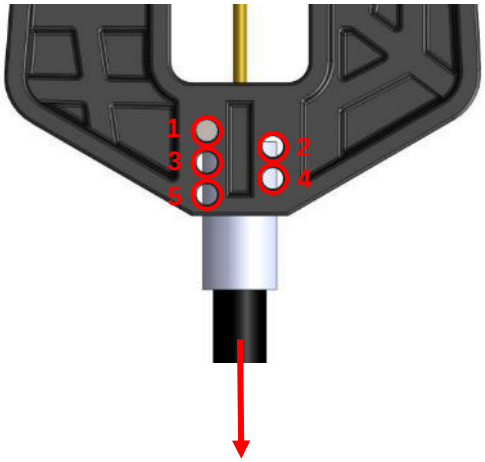
What means wire adjustment:

- Position of end head of the wire (1) = fixed by lock lever
- Position of end ferrule of the sheath (2) = variable with pin in plastic bottom block
- Correction of the game in system by adjusting the position of the end ferrule (2) → Adjustment of the distance between the end points of the wire travel = distance between end ferrule (2) and end head (1).
- Too much game in the system = wire travel is too large
- Too much tension in the system = wire travel is too small
- Adjustament downwards = Enlarging the distance
- Adjustment upwards = Shorten the distance

Cable Adjustment

How does the result looks after the adjustment?

Base position (example)



- 5 steps
- 1 step = 1,5mm

After adjustment

Bowdencable color coding

- Bowden cable in new colour as revision code

→ black: 2010
→ blue: 2011
→ red: 2012, 2013
→ green: since autumn 2013

- Red: Modification of the length of the wire: Wire travel enlarged from 36 to 38 mm.
  → Therefore possibility to „back-adjust“ the system (rare shortening of the wire during use due to the wire being prestretched in production)
- Green: Reconstruction of the end ferrule: Improved pull-out-strength

Diagnosis

In the following damages/ defects on the Smart Belay are described, that can occur especially during extended misuse (see trainer tool) of the Smart Belay and can be detected during the daily visual and function test.

Diagnosis

Diagnosis:
- Lanyard is damaged

Reason:
- Contact with sharp edges within the park
- Abrasion / wear / tear due to use and age

Course of action:
- Exchange of the lanyard by EDELRID service (= SP 11)
- Detect sharp edges and eliminate them by park management

Diagnosis

Diagnosis:
- Both karabiners can be opened
- Trigger game too large (= second gate can be opened with a lot of force)

Reason:
- Setting of the inner wire
- Elongation of the wire due to usage

Course of action:
- Wire adjustment by trained personnel (= Tech-Tool)
- Wire adjustment **downwards**

Diagnosis

Diagnosis:
- Both karabiner are working only very stiffly

Reason:
- Setting of the cable sheath
- Especially if lanyard arms are twisted extensively

Course of action:
- Wire adjustment by trained personnel (= Tech-Tool)
- Wire adjustment **upwards**

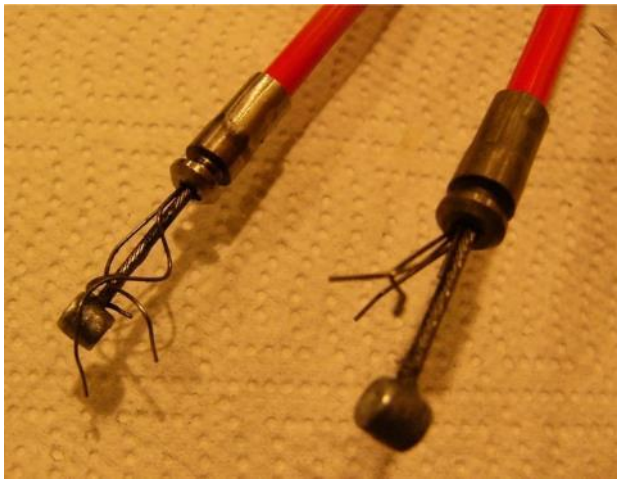
Diagnosis

Diagnosis:

- Extremly stiff working Smart Belay karabiners, wire adjustment doesn‘t solve the problem
- Very stiff working Smart Belay karabiners but still significant trigger game existent
- One karabiner is working very stiffly, after opening and closing it mutiple times if works smooth again → afterwards the second karabiner opens very stiffly.

Reason:

- Defective bowden cable: (friction in the wire, braids are sticking out of the end ferrule – often because of extensive twisting of the lanyard arms)



Course of action:

- Opening of the unit and replacement of the bowden cable (=SP 13) by Edelrid-Service
- If occuring repeatedly: preventive actions
  → adapt the user briefing (no twisting); straighten out and, if necessary, uncoil the twisted lanyards after return of the units

Diagnosis

Diagnosis:

- Gate can only be opened half way. Second karabiner is working perfectly fine.

Reason:

- Steering spring broken

Course of action:

- Opening of the unit and replacement of the steering spring (=SP 8) by Edelrid-Service

Cable Adjustment

Needed Tools

- Pin punch 2 mm
- Hammer (~150 gramm)
- Pliers
- Wooden base (ca. 20- 25 mm thick)

Working method:

- Quietness
- Patience
- Care
- Responsibility

Working environment:

- Working table
- Good lighting
- Base as light as possible (put white paper underneath)

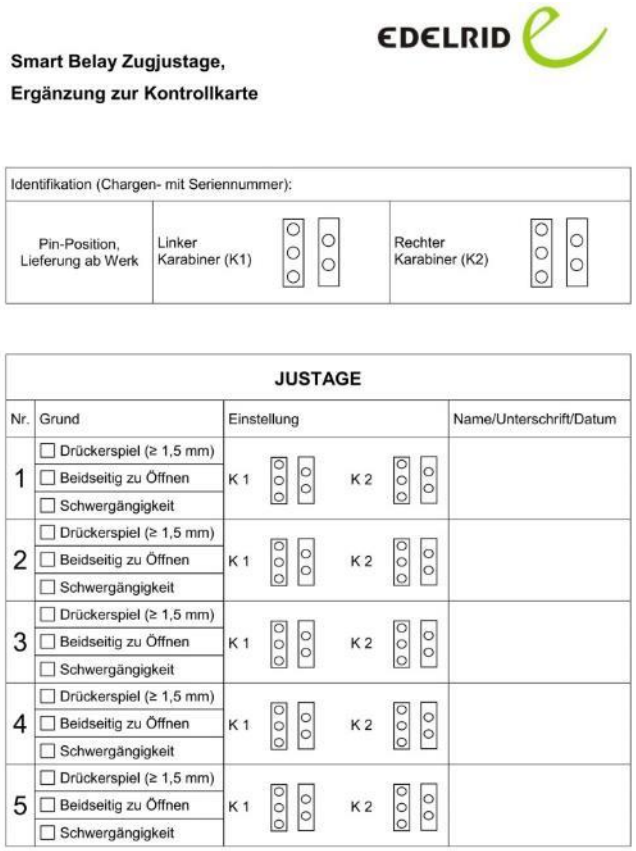
Cable Adjustment

Step 1: Preparation

- Diagnosis
- Both karabiners must be closed
- Lanyard is straightened out

Cable Adjustment

Step 2: Documentation



Smart Belay Zugjustage,
Ergänzung zur Kontrollkarte

Identifikation (Chargen- mit Seriennummer):		
Pin-Position, Lieferung ab Werk	Linker Karabiner (K1)	Rechter Karabiner (K2)

JUSTAGE

Nr.	Grund	Einstellung	Name/Unterschrift/Datum
1	☐ Drückerspiel (≥ 1,5 mm) ☐ Beidseitig zu Öffnen ☐ Schwergängigkeit	K 1 K 2	
2	☐ Drückerspiel (≥ 1,5 mm) ☐ Beidseitig zu Öffnen ☐ Schwergängigkeit	K 1 K 2	
3	☐ Drückerspiel (≥ 1,5 mm) ☐ Beidseitig zu Öffnen ☐ Schwergängigkeit	K 1 K 2	
4	☐ Drückerspiel (≥ 1,5 mm) ☐ Beidseitig zu Öffnen ☐ Schwergängigkeit	K 1 K 2	
5	☐ Drückerspiel (≥ 1,5 mm) ☐ Beidseitig zu Öffnen ☐ Schwergängigkeit	K 1 K 2	

- Documentation of all wire adjustments done
- Record of:
  - Batch number
  - reason for wire adjustment
  - position of pin before and after wire adjustment
  - name and signature of performing perso

→ When sending the units to manufacturer for service: include all documentation

Cable Adjustment

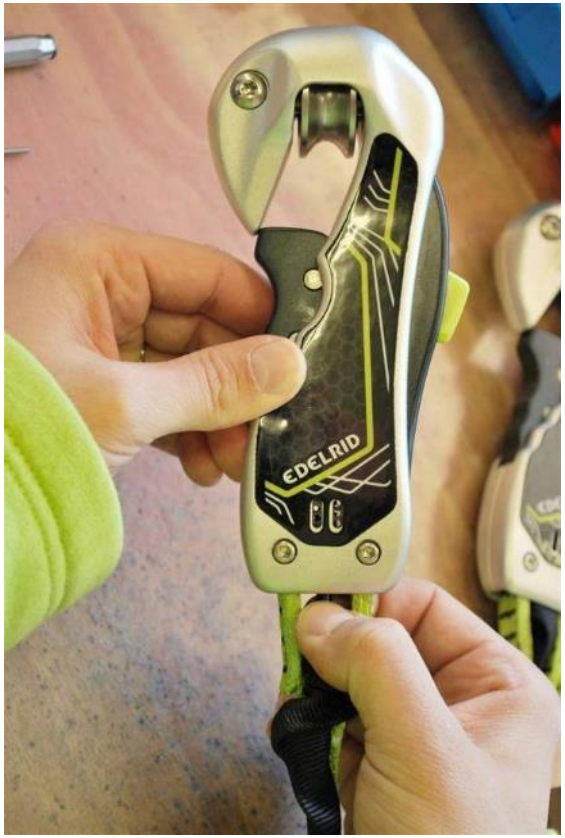
Step 3: Punch out the pin

- Support the Karabiner at the bottom with the wooden base
- Punch out the pin carefully with the 2mm pin punch tool. Take care that you don‘t loose the pin.

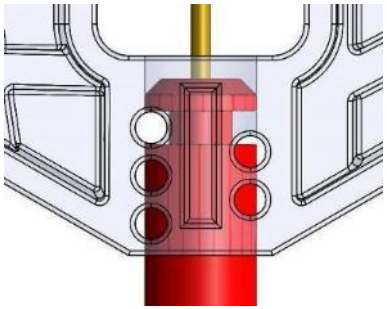
- Edelrid-Tipp: Preplace the pin directly in the position, it should be fixed afterwards!

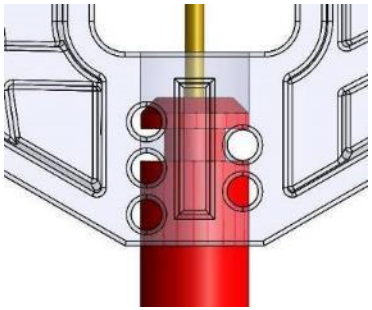
Cable Adjustment

Step 4: Cable adjustment



- Slide down the black tubular webbing.
- Fix the cable by hand or pliers and pull it in the next possible position.
- One position port = 1,5mm.
- Adjust only one by one position.

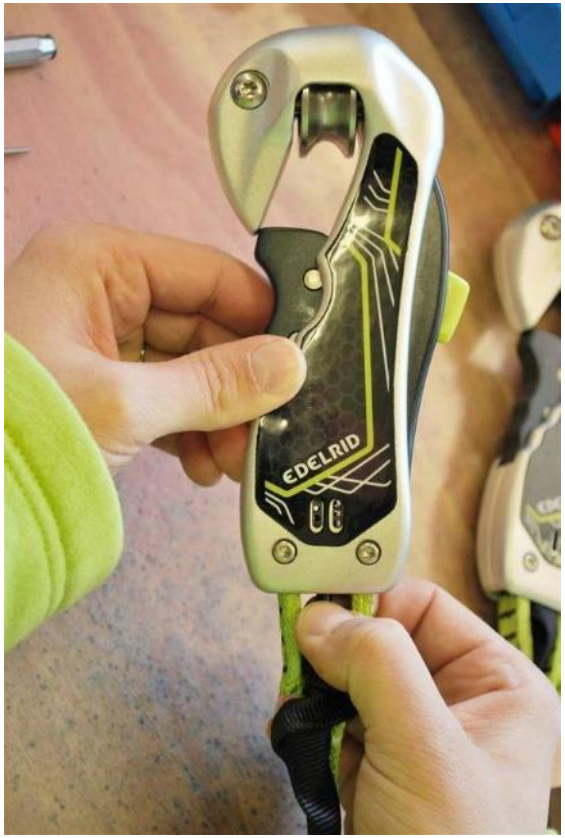
1. 

2. 

- Take care that the position of the pin is on an equal level at both karabiners.
- → Edelrid-Tipp: Use a light base (e.g. white paper)

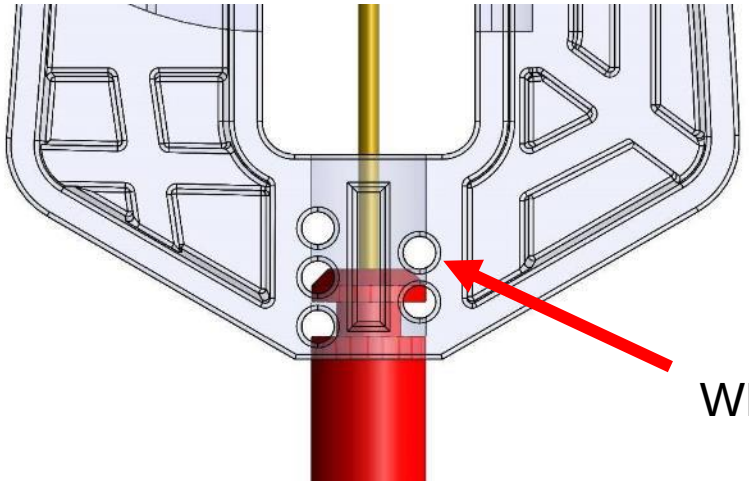
Cable Adjustment

Step 4: Cable adjustment



ATTENTION!

- Take care about the correct position of the ferrule
- Don‘t drive in the pin above the ferrule!



Cable Adjustment

Step 5: Drive in the pin at the new position.

- Fix the pin.
- Pay attention for the correct position of the pin.
- Don‘t slip!
- Drive in the pin.
- Set the pin flush with the plastic bottom block, use your pin punch tool.

Zugjustage

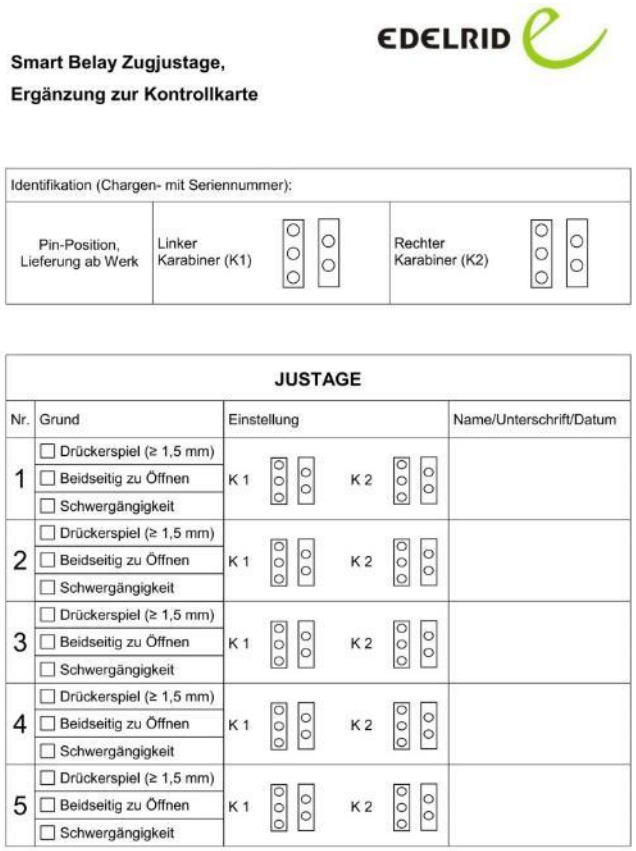
Step 6: Functionaltest

- Check „Issue- and Functionaltest“ (Page 6)
- 3-point check:
  - Open Karabiner 1, check slackness (< 1,5mm) at Karabiner 2, close Karabiner 1
  - Open Karabiner 2, check slackness (< 1,5mm) at Karabiner 1, close Karabiner 2
  - Push both triggers at the same time to except a opening of both Karabiners.
  - **Important:** The lanyard must be straightened out during the functional test, otherwise the result is distorted.

- If the function check is succesful, the Smart Belay is again ready for use.
- If the function check are not passed, the cable must be readjusted a second time. See previous pages and follow the same instructions again.

Cable Adjustment

Schritt 7: Documentation



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- Documentation of all wire adjustments done
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  - Batch number
  - reason for wire adjustment
  - position of pin before and after wire adjustment
  - name and signature of performing perso
- → When sending the units to manufacturer for service: include all documentation

Rescue

Worst Case Szenario: The Smart Belay Karabiners getting stuck because of missusage or defect during the exercise. If possible equip the customer with a replacement unit. Remove the Smart Belay after closing the rope course. Please revert to following solutions.

Solution for SB without maintenance slots:

1. Clip the cable
2. Unscrew the karabiner

Solution for SB with maintenance slots:

1. Drive out the pin – put the system out of action
2. Clip the cable

Forcible opening has a very high use of material consequence. Load bearing parts can be damaged. Through the above-described solutions, it is easy to repair the device

Rescue

Clip the cable

- Last resource if there is no further communication between the karabiners based on a cable defect.
- Pull down the black tubular webbing, the cable will be visible.
- Take a sharp bolt clipper and cut the complete cable.
- Communication is interrupted, carabiners can be independently opened and closed.
- Load bearing parts won‘t be damaged – Cable can be replaced easily.

Rescue

Drive out the pin (especially at a damaged cable):

Check Step 1 at the Cable Adjustment chapter.

- Drive out both pins at the biners with the pin punch tool.
- System is out of action and both karabiner can be removed from the safety line.

Unscrew the karabiner: (If nothing else helps…!)

Each Karabiner is fixed with 7 Screws on each side. 4 screws are under the sticker!

- Remove the sticker.
- Open all Screws with the correct Torx ® Wrench T20 and T25
- Disassemble the Smart Belay karabiner (shells). Watch all screws and parts!
- Remove the Smart Belay from the safety line.

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OPEN QUESTIONS

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