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## ORIGINAL OPERATING MANUAL



Mast Type: 120-4KVL4

Model/Year: 2013

ID: AAAA308

Serial No.: 41028

last revised: 05.08.2013

**Crank Mast 120-4KVL4**  
**AAAA308**

Rigid mounting device BMAK043  
24 V DC Motor drive BMAA160

Please keep in a safe place for reference

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## 1. **Safety**

### 1.1 **Safety Notes**

The 120-4KVL4 mast has undergone a safety check in order to ensure the corresponding safety standards are met. Incorrect mounting or use, however

- may lead to personal injury to or death of the operator
- may damage the mast or other relevant items
- may limit the functionality of the mast

Persons involved in the mounting, putting into operation, operation or maintenance of the mast should therefore read and understand the following notes in complete for their own safety.

### 1.2 **Authorised Use**

The mast is to be used as a telescopic antenna carrier and should be mounted on the wall of the vehicle.

The mast is suitable only for wind speeds up to 120 km/h and top loads up to 25 kg.

The wind area  $A \cdot c_w$  of the mast top load (antennas including accessories) must not exceed 0.35 m<sup>2</sup>.

The maximum permissible side angle for the vehicle is 10° when the mast is fully extended and exposed to maximum wind speed and top load.

**Any other use of the mast is not authorised and will therefore lead to a loss of warranty.**

The manufacturer of the compound system must make sure that all relevant regulations and instructions will be observed when additional components and accessories (such as antennas, cables, cable guides, electric or electronic equipment etc.) are added to the system and when the system is mounted on a vehicle and will take responsibility for any violation of such regulations and instructions.

#### **Warning!**

- Do not expose the mast to wind speeds or top loads exceeding the maximum specified.
- Before the mast is put into operation, make sure it is fastened correctly to a solid mounting frame, as described in section 2.3, Assembly.
- Before extending the mast, please check that the mast will be positioned at a sufficient distance to buildings, bridges, roofs or other objects.

- Before mounting the mast, please check that the mast will be positioned at a sufficient distance to electrical installations and high voltage lines.
- In case of thunder storms, do NOT assemble or dismantle the mast and keep away from the extended mast.
- Do not move the vehicle unless the mast is fully retracted.
- Do not climb the mast.

**For your own safety, any modifications to the mast are not admissible unless they have been explicitly authorised by the producer of the mast.**

For the operation, maintenance and repair of the mast the instructions supplied in this manual must in any case be followed. Any use of or work at the mast not in compliance with these instructions is not authorised by the producer and will rule out warranty.

### 1.3 Avoiding Accidents

- Do not operate the mast when the gear case cover (protection cap) has been removed.
- The mast is operated through a rope drive. Damaged pull-out ropes can result in uncontrollable retraction of the mast.
- In order to avoid personal injury, do not touch the moving telescoping tubes during retraction or extending of the mast.
- The safety winch is fitted with a load pressure brake to keep the mast in its adjusted position. Do not remove the safety winch, therefore, unless the mast is fully retracted, as this would result in an uncontrollable retraction of the mast.

### 1.4 Operator

The company operating the mast and its agents and representatives must provide the instructions to the operator of the mast. They must make sure the operator has completely read and understood the instructions, before the mast is put into operation.

### 1.5 Safety Check

As set forth in the German regulations for the prevention of accidents concerning winches, pulling and lifting devices BGV D8 (formerly VBG 8), winches, lifting and pulling devices must be checked by a qualified engineer prior to the initial operation and at least once a year. These regulations apply to this mast both in Germany and, as a part of the terms and conditions for the purchase of the mast, in all other countries.

For more information on the extent and the procedures to be used in this checkup, please see the printed checklist attached.

## 2. **Pre-operational measures**

### 2.1 **Specifications**

#### Telescoping mast, type 120-4KVL4 AKAE078

Length of mast, extended	approx. 4.0 metres
Length of mast, retracted	approx. 1.29 metres
No. of mast stages	4
Base tube, cross section	120 mm x 120 mm
Weight	approx. 21 kg

Permissible top load: 25 kg max.

Permissible wind area of top load: 0.35 m<sup>2</sup> max.

Permissible wind speed 120 km/h max.

Permissible side angle at max.  
Wind load and max. Top load: 10° max.

#### Motor drive

Rated voltage	24 V DC
Rated current	17 A
Protective system	IP 54

### 2.2 **Functions**

The gear case at the base stage of the mast holds a winch drum to be operated through a motor drive. The pull-out and retraction ropes are routed from the winch drum via guide rollers to the individual telescoping stages and thus control the extension and retraction of the mast.

### 2.3 **Assembly**

The vehicle should comply with the licensing and traffic regulations after the mast, the antennas and the accessories have been mounted to the vehicle. In case you are not sure if the vehicle complies to these regulations, please contact the competent vehicle licensing office.

**Warning!**

Incorrect mounting of the mast may lead to hazardous situations and personal injury. Please check that the mounting complies with the mounting instructions to make sure the mast is securely fastened.

- a) For mounting the mast proceed according to the mounting instructions of the vehicle producer.

A minimum distance of 740 mm between the fastening positions has to be met. For mounting example please see figure 3.

Make sure that the upper clamp (fig. 3/pos. 1) and the lower clamp (fig. 3/pos. 2) are aligned in a row and that the mast is mounted vertically.

Check that the vehicle mounting areas are solid enough to support the mast. If necessary, reinforce the mounting areas using metal plates or other reinforcement pieces. The mounting areas should resist horizontal forces of 3400 N in each direction.

Use property class 8.8 screws and secure the screws to avoid uncontrolled loosening.

- b) Mast to the mounting bracket

- The mast must be retracted.
- Coil lifting belt below the head clamp around mast tube.
- After removing the four screws (fig. 1/pos. 3) open the upper (fig. 3 /pos. 1) and lower mast clamp (fig. 3 /pos. 2).
- Then issue the Mast on the lower clamp clip on the axial stop the vehicle-mounted clamp half.
- Now, the upper and lower clamp (fig. 3/pos.. 1) close again by each clamp each for all four screws (fig. 1/pos. 3).
- After the lower clamp is closed, the two screws (fig. 1/ pos. 7) must be attached to the mast base.

- c) Insert mast head for mounting antennas into last mast stage and fasten star handles (fig. 1/pos. 4) as required by the overall construction of the mast assembly, mounting other required parts such as accessories, cables etc., as supplied by the vehicle manufacturer.

**Warning!**

Electrical cable connections must be set up by qualified engineering staff.

Mounting scheme:

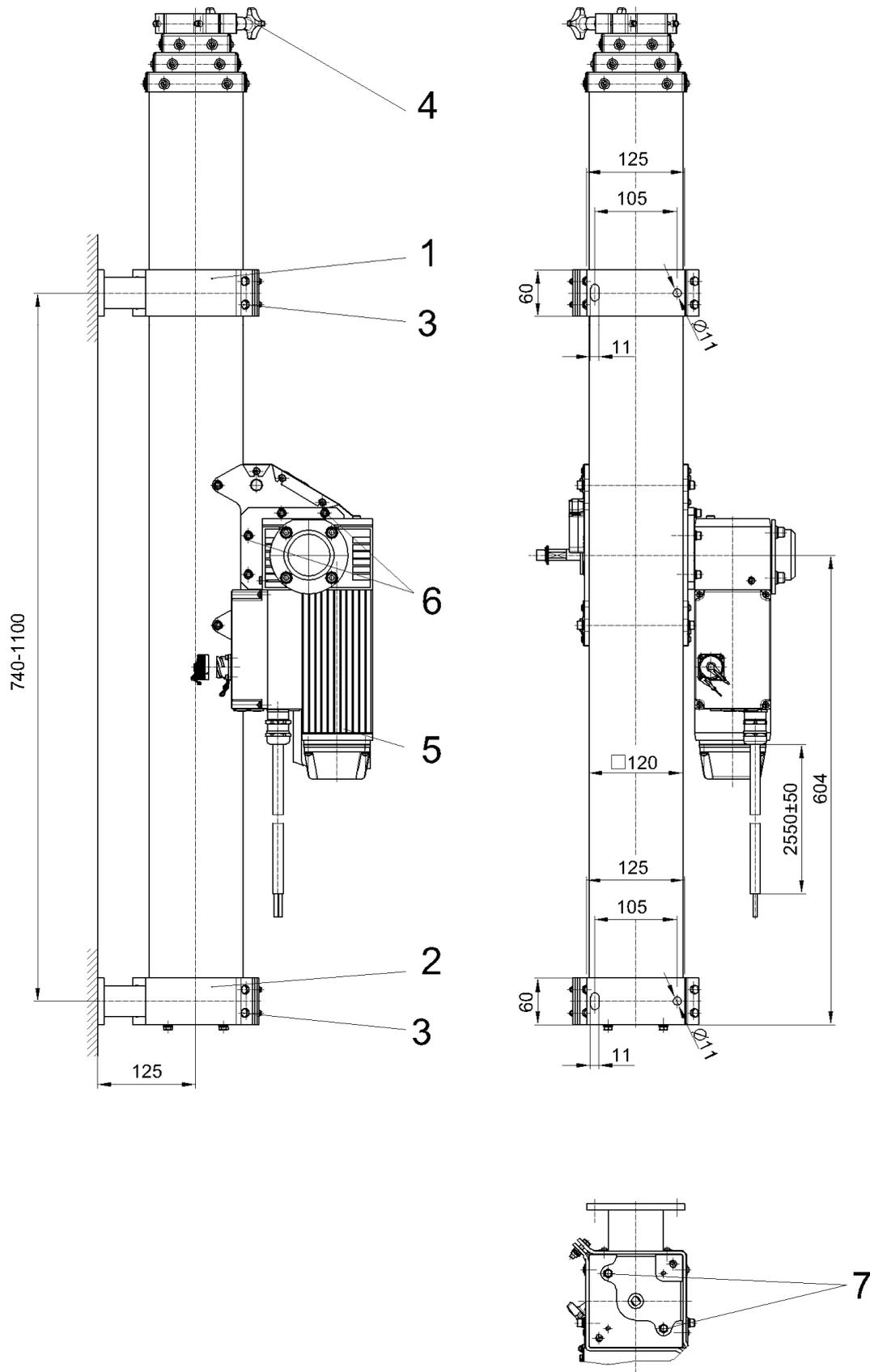


figure 1

## 2.4 Motor Drive

The subsequent description for mounting the motor drive and the adjustment of the limit switches has to be followed in case of an afterwards or new mounting after repair or emergency drive.

In case of mounting carried out by the producer items subsequent mentioned concerning the electrical connections have to be observed.

### **Warning!**

Electrical cable connections must be set up by qualified engineering staff.

The motor drive is to be protected appropriately by fuse when installed.

- a) With the motor drive dismantled, extend the mast using the winch handle, to position the smallest telescopic stage at a distance of at least 105 mm to the head frame of the mast base stage (see fig. 2).
- b) Connect motor drive to 24 volts DC. Make sure you do not mix up the cables when connecting the motor drive to the power supply, as this would destroy motor drive's electronic control system.  
Connect touch button of the motor drive as shown in the diagram attached, and move drive to the lowest position. The "mast retracted" position limit switch "S7" should have operated before the motor drive is mounted to the mast.
- c) Place motor drive on the wrist pin at the mast gear and fasten it using three hexagon head cap screws (fig. 1/pos. 5).  
After mounting, the motor drive's fastening flange should be attached evenly to the mast gear base plate.
- d) Use motor drive to cautiously extend the mast to an extension length of 2750 mm measured from the mast top to the upper edge of the base stage head frame (see fig. 3).  
The "mast extended" position limit switch "S6" should have operated now.

In case the limit switch has not operated, readjust the switch as follows:

Remove case cover from motor drive (see fig. 4/pos. 2) and adjust final switch "S6" through the adjusting hole using a screwdriver:

- turn to the left to decrease switching distance

Or, in case the limit switch "S6" has operated before having reached the correct switching position:

- turn to the right to increase switching distance

After adjusting the drive, extend and retract the mast several times to control the switching distances (see fig. 2 and 3.)

**Caution:**

Do not mount or dismount motor unless the mast has been retracted and limit switch "S6" is activated to ensure that the assignment of the limit switches to the respective mast extension lengths will be retained. The distances should be checked after mounting and readjusted if necessary.

Make sure to follow the motor manufacturers' operating instructions for the motor you will find attached to this manual.

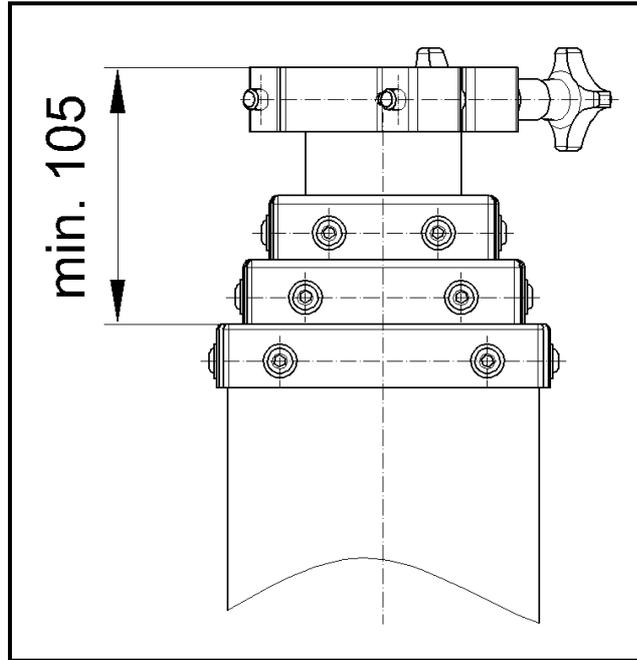


figure 2

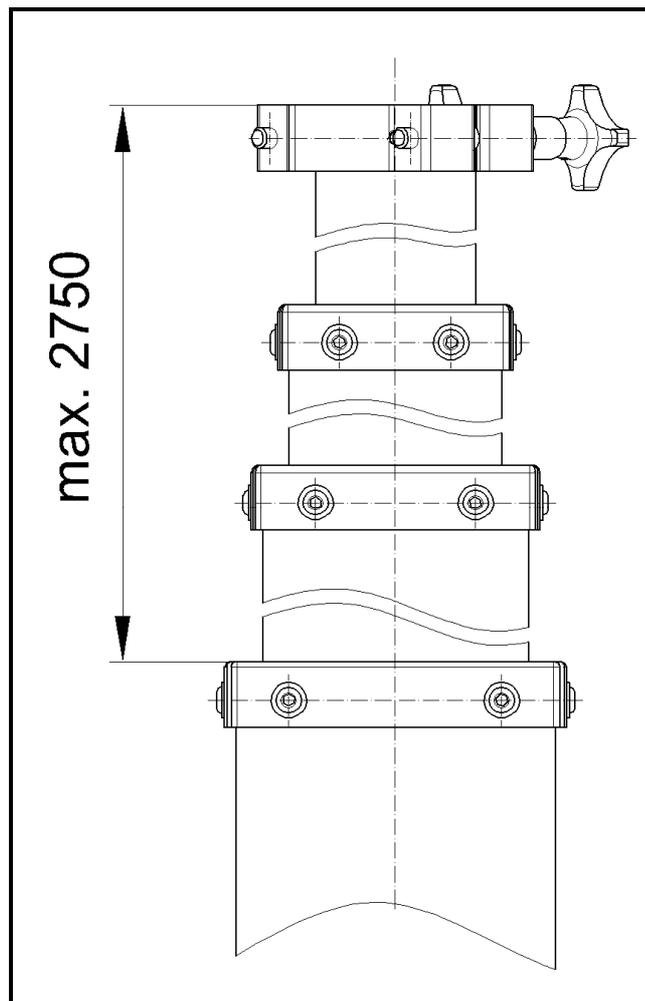


figure 3

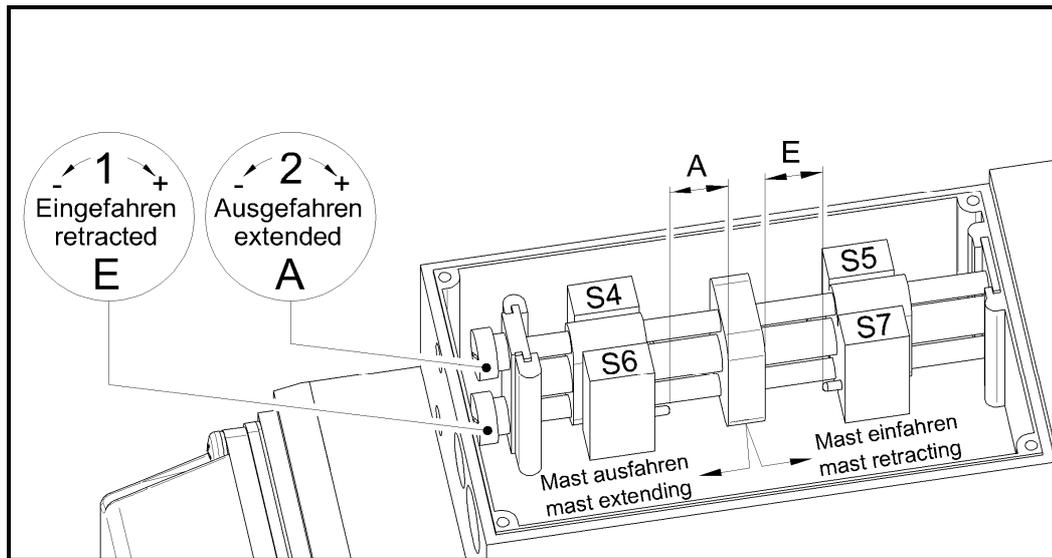


figure 4

## 2.5 Safety Note

Before the mast is put into operation, make sure you have read and completely understood the operation and safety instructions. For your own safety, always follow the instructions.

### 3. Operation

**Make sure the safety notes in chapter 1 are adhered to!  
Otherwise the mast should not be operated.**

#### 3.1 **Mast**

##### **Caution:**

- The moving telescoping tubes might cause personal injury when touched! Do not touch the telescoping tubes during the retracting and the extension processes.
  - The safety winch is fitted with an automatic load pressure brake to keep the mast in its adjusted position. Do not remove the safety winch if the mast is not fully retracted as this would result in uncontrollable retraction of the mast.
- a) Insert mast head for mounting antennas into last mast stage and fasten star handles (figure 1/position 4) as required by the overall construction of the mast assembly, mounting other required parts such as antennas, cables etc., as supplied by the vehicle manufacturer.
  - b) Extending the mast:  
Press the extension button to extend the mast. You can stop the extension of the mast at any length. The extension will stop automatically, when the mast has reached maximum length.
  - c) Retracting the mast:  
Press the retraction button to retract the mast. You can also stop the retraction of the mast at any length.
  - d) **Retracting the mast when formations of ice have built up on its surface:**

##### **Warning!**

When retracting the mast in icy condition, particles of dropping from the telescoping tubes might cause personal injury. Always wear protection gloves and a helmet when retracting the mast in icy condition.

### 3.2 Transport

Always check the following conditions before transportation:

- The mast must be fully retracted.
- The antennas and all additional equipment (depending on the mounting and the equipment supplied by the manufacturer of the vehicle) must be secured or removed.

### 3.3 Emergency Drive

To use emergency drive, attach safety winch to the right end of the drive shaft. Make sure that the gearwheel safely locks into the catch. Use locking ring included to secure hand winch.

Remove the three fastening screws and dismount motor drive (fig.1/pos.5). When re-mounting motor, the limit switches will have to be re-adjusted as described in paragraph 2.4.

#### 4. Maintenance/Check up

The mast does not require extensive maintenance, as polymethyleneoxide guides are used with the telescoping tubes. The gear shafts and the rope drums in the tube heads and inside the mast are equipped with self-lubricating bearings.

Action	Time interval	Description
Cleaning and re-lubricating	every 12 months	4.2
Checking the retraction rope	every 12 months *	4.3 a)
Re-tensioning the retraction rope	as required	4.3 b)
Safety check-up	every 12 months	4.4/1.5

\* for a new mast see 4.3

##### 4.1 Removing Mast from Vehicle Mounting Device

Various maintenance tasks require the mast to be removed from the vehicle. To do this, follow the steps explained in 2.3 b) and c) in reverse order.

#### **Warning!**

- Hazardous situations and personal injury might be caused by faulty mounting of the mast.
- Electrical cable connections must be set up by qualified engineering staff!

Before dismounting the mast from the vehicle, the motor drive must be separated. The motor drive must be removed from the mast while it can be kept in the vehicle and its electrical connections may be retained.

In order to extend or retract the mast while it is dismantled, you should attach the safety winch for manual operation, as described in 3.3.

#### **Caution:**

The safety winch is fitted with an automatic load pressure brake to keep the mast in its adjusted position. Do not remove the safety winch if the mast is not fully retracted as this would result in uncontrollable retraction of the mast. When attaching the safety winch, you must make sure that the gearwheel of the winch safely locks into the catch. Secure safety winch against sliding from wrist pin.

When mounting the mast, follow the description in 2.3 b). Make sure to follow the instructions in 2.4 to correctly adjustment of the final switches.

## 4.2 Cleaning and Re-lubricating

Depending on the site and environmental circumstances, the mast should be cleaned in regular intervals. The life of the mast is affected by dirt, dust and gumming oil.

In normal operational conditions it is recommended to clean the mast every twelve months. Operating the mast in particular environmental circumstances, however, might necessitate more frequent cleaning.

- a) For removing the mast from the vehicle, see 4.1
- b) Bring the mast in its horizontal position and crank the handle to release it. The top of the mast must be positioned beneath the bottom to avoid draining of the cleaning liquid into the mast. Slightly support the top of the mast when cranking. Support the released mast at the top end, in the centre and at the bottom end.
- c) Clean the telescoping tubes using petroleum ether. Thoroughly clean the telescoping tubes from dirt and gumming oil using a cloth or a soft brush.

### **Warning!**

When working with petroleum ether, make sure the appropriate regulations for the prevention of accidents are adhered to.

- d) Re-lubricating

### **Caution!**

When cranking while the cover of the gear is open, the gear should not be touched, as this might cause personal injury!

- Remove the cover of the gear.

### **Re-lubricating the gear and the telescoping tubes:**

Lubricated item(s)	Fig.5/Pos.:	Lubricant
Rope sheaves	1	IFAA010 Nova PTFE OIL
Rope on the rope drum *	2	IFAA001 Molykote BR 2
Tubes in extended condition	-	IOAA001 TECHLON Oil UN 3295 3 (II)

\* in released as well as re-loaded condition

- Re-attach the gear cover.
- e) Lubricate the star handle screws (figure 1/position 4) for mounting the top of the mast using machine oil.
  - f) When fitting the mast to the vehicle, please observe the warnings in 4.1.

### 4.3 Re-tensioning of Retraction Rope

Due to the persistent tension - even if the mast is not stressed - the ropes inside the mast stretch differently. Therefore the tension of the retraction ropes in the gear must be checked regularly.

When using a new mast, it is recommended to carry out the first check of the retraction rope's tension after approximately 100 rope operations or 8 weeks, respectively.

#### **Caution!**

The safety winch is fitted with an automatic load pressure brake to keep the mast in its adjusted position. Do not remove the safety winch if the mast is not fully retracted as this would result in uncontrollable retraction of the mast.

a) Checking the tension of the retraction rope

- Remove the gear cover.

#### **Caution!**

When cranking while the cover of the gear (protection cap) is open, the gear should not be touched, as this might cause personal injury!

Check the tension of the retraction rope only when extending the mast. Gradually extend the retracted mast by cranking the handle and check the tension of the retraction rope continuously. The retraction rope must rest on the left rope pulley slightly tensioned (figure 5/position 1). The ropes must rest tightly side by side in the rope grooves of the winch drum and must not form slack loops. Otherwise the retraction rope must be re-tensioned.

b) Re-tensioning the retraction rope

The tension screw for re-tensioning of the retraction rope is located inside the **final mast stage** at the top (hexagonal socket screw SW 5, see figure 5/Position 3).

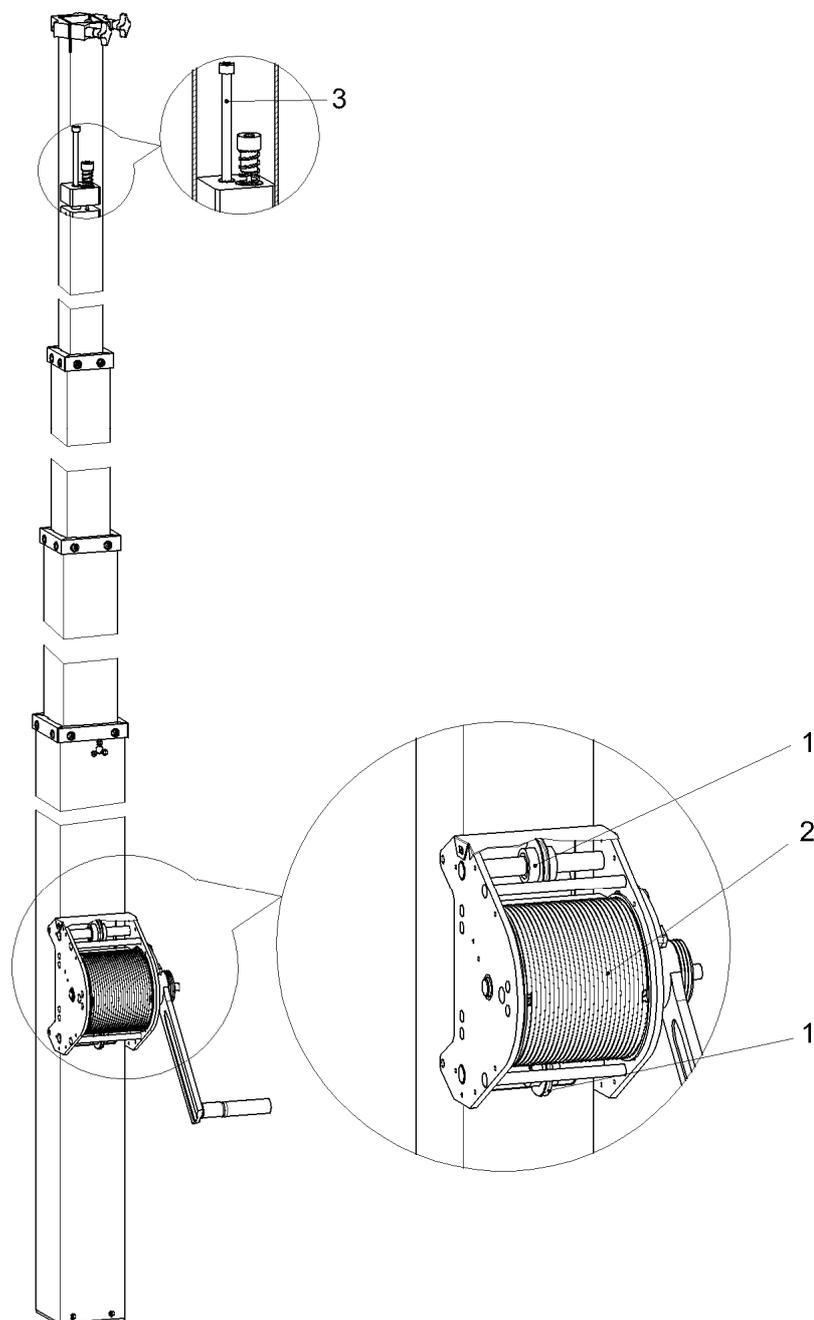
- Rotate the tension screw one or two turns to the right (clockwise) using a hexagonal socket key SW5 with 250 mm extension.
- Release and reload the mast by cranking the handle approximately three times and check the rope in the mast gear, as described in 4.3 a). If necessary, re-tension by one more turn of the screw and check again.
- Re-attach the gear cover.

c) When fitting the mast to the vehicle, please observe the warnings in 4.1.

#### 4.4 Safety Check

As set forth in the German regulations for the prevention of accidents BGV D8 (formerly VBG 8), winches, lifting and pulling devices must be checked by a qualified engineer prior to the initial operation and at least every half a year. These regulations apply to this mast both in Germany and, as a part of the terms and conditions for the purchase of the mast, in all other countries.

For more information on the extent and the procedures to be used in this checkup, please see the printed checklist attached.



**figure 5**