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## Explosion-Protected Wire Rope Hoists – Operating and Maintenance Instructions

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↘ EN

⊕ II 2 G (ATEX) - Zone 1

⊕ II 2 D (ATEX) - Zone 21

**STAHL**  
CraneSystems



## ***Fundamental information***

You have purchased a product manufactured by STAHL CraneSystems GmbH. This wire rope hoist has been constructed in compliance with the applicable standards and regulations.

**Inspect hoist for damage caused in transit immediately upon delivery.**

Report damage caused in transit and after consulting the manufacturer/supplier repair or have repaired before installation and commissioning.  
Do not install or commission a damaged hoist!

- **Assembly**
- **installation**
- **commissioning**
- **tests**
- **maintenance and elimination of faults**

**may only be carried out by an Ex-specialist**

### **Terms employed**

#### **User**

Whoever uses and employs the wire rope hoist or has it operated by suitable trained personnel is considered to be the user (employer/company).

#### **Trained personnel**

Trained personnel are persons who have been instructed and trained in the duties with which they are entrusted and the risks which may arise from incorrect behaviour, have been advised on the necessary protective devices, precautions, applicable regulations, accident prevention regulations and prevailing conditions and have proven their ability.

#### **Skilled electrician**

A skilled electrician possesses knowledge and experience on electrical equipment arising from specialist training and, with knowledge of the applicable standards and regulations, is able to assess the work with which he is entrusted and detect and avoid possible risks.

#### **Definition of a qualified person:**

A qualified person is one with the necessary qualification, based on theoretical and practical knowledge of hoists, in particular with regard to explosion protection, for the required activities as listed in the operating instructions.

The person must be in a position to assess the safety of the installation in conjunction with the application.

Persons with the authority to undertake certain maintenance work on our products include service engineers of manufacturer and trained fitters with the corresponding certification.

#### **Seminars:**

Comprehensive understanding of material handling products is a prerequisite for the correct use of equipment. Competent and practically oriented, we impart the specialist knowledge required for the correct use, monitoring and care of your installation. Please ask for our seminar programme.

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## 1.1 Symbols



### Transport

The wire rope hoist is delivered on a special pallet. This enables the hoist to be loaded and unloaded safely with a fork-lift truck.

If the wire rope hoist is to be transported suspended, it must be attached by the **suspension lugs** provided, see sketch.

### Explosion protection

The explosion-protected wire rope hoist complies with EC directive 94/9/EC (ATEX 100a) and is constructed according to the corresponding European standards. The components are certified by a designated institute (PTB). Mechanical explosion protection is designed and manufactured in accordance with the EN standards 13 463 presently in preparation. The documents are filed in a designated place. Certification has been ensured by means of a quality management system.



Components bearing this symbol are explosion-protected (protection class Ex, e: e.g. connection boxes and Ex, d: e.g. panel boxes for electrical equipment, motors and brakes). Work on these components may only be carried out by skilled personnel that has been especially trained on explosion protection. This applies also to work performed on mechanical components → mechanical explosion protection in accordance with ATEX.



### Safety at work

This symbol marks all information on safety at work where risks to life and limb are entailed.



### Warning of electrical voltage

Covers such as hoods and caps which are marked with this symbol may only be opened by "qualified persons or suitably instructed personnel".



### Warning of suspended load

It is forbidden for persons to stand under suspended loads. This entails risks to life and limb!



### Safety in operation

Information marked with this symbol must be observed to avoid damage to the wire rope hoist or the goods transported.

In these operating instructions, these symbols mark particularly important information on risks and safety in operation.

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## 1.2 Mechanical components

"Mechanical explosion protection" refers to all mechanical sub-assemblies (non-electrical sub-assemblies).

These include for example:

- 1) Rope drive with drum and load suspension equipment
- 2) Gear
- 3) Trolley and crane wheels

These sub-assemblies have been manufactured in such a way, relating to the specific order, that they do not present any risks when used for the intended purpose. To ensure lifetime safety, these sub-assemblies must be inspected and serviced carefully in accordance with these operating instructions.

## 1.3 Operating instructions

Follow the operating instructions. The operating instructions are required by the EC Machinery Directive and EC Directive 94/9. The operator is legally required inter alia by EC Directive 99/92 to observe them.

## 1.4 Use for intended purpose



- Wire rope hoists are intended for lifting freely movable and guided loads that cannot tilt. Depending on their design, they are for stationary or mobile use. If loads are to be towed horizontally, or in the case of guided loads, automatic operation, continual deadweight or constantly repeated hoisting motions, the individual application must be assessed. Please contact the manufacturer in case of doubt.
- Do not carry out any alterations or modifications. Additional fitments must be authorised by the manufacturer. The declaration of conformity may be invalidated.

### Not permitted:

- Exceeding the safe working load
- Transporting persons
- Pulling loads at an angle
- Pulling loads loose
- Pulling or towing loads if the wire rope hoist has not been especially designed for this application.
- Altering the overload cut-off.
- Operating the hoist with slack rope.
- If the hoist forms "part of a machine," the person placing it on the market must ensure that the hoist meets the specific regulations of the application

## 1.5 Safety-conscious operation



The SH ex wire rope hoists are constructed according to the state of the art and equipped with an overload cut-off. In spite of this, dangers may arise from incorrect use or use for an unintended purpose.

- The user is responsible for ensuring that work is carried out with safety in mind and avoiding risks. (EC Directive 99/92/EC, decree on safety in operation).
- Read the operating instructions before starting to work with the wire rope hoist.
- Observe the "Duties of crane operator", see page 31.
- Before starting work, find out where the EMERGENCY STOP button is (usually in the control pendant).
- **Do not** place your hand between edges which may pinch or cut. see sketch
- Do not use the emergency limit switch (ultimate limit switch for highest and lowest hook position) as an operational limit switch.
- Report damage and defects to the wire rope hoist (abnormal noises, impaired braking function, deformations, ...) to the person responsible immediately. Do not use the wire rope hoist until the faults have been eliminated.
- Do not remove information plates from the wire rope hoist. Replace illegible or damaged plates.
- Have hoist inspected by the relevant authority before commissioning.

## 1.6 Organisational safety precautions



- Only direct persons to operate the hoist if they have been trained or instructed in its use. Observe the legal minimum age!
- At regular intervals, check that work is being carried out in a safety-conscious manner.
- Observe the intervals specified for periodic tests. File the test reports in the test log book.
- Store the operating instructions within easy reach where the wire rope hoist is operated.

## 1.7 General regulations



- Safety regulations and accident prevention regulations.
- National regulations
- Statutory regulations relating to EC Directive 99/92.

## 1.8 Installation, commissioning, maintenance and repairs

- **Installation, commissioning, maintenance and repairs may be carried out by qualified persons only**, see page 2.
- We recommend having installation carried out by trained personnel commissioned by the manufacturer.
- Use only **original spare parts** for repairs, otherwise the guarantee will become invalid.
- Do not carry out any alterations or modifications.
- Additional fitments must be approved by the manufacturer.

If the wire rope hoist is constantly operated out of doors and exposed to the elements without protection, we recommend fitting a small roof or at least "parking" the hoist under a roof.

## 1.9 Warranty

- The warranty will become invalid if these operating instructions are not observed for installation, operation, inspection and maintenance.
- Repairs and elimination of faults within the scope of the warranty may only be performed by qualified personnel (see page 2) after the manufacturer/supplier has been consulted and has given his approval.  
The warranty will become invalid if the hoist is modified or original spare parts not used

## 1.10 Periodic tests



Hoists and cranes must be inspected by a **qualified person** see page 2 at least once a year. The results of the test must be recorded and filed in the test log book. The remaining service life of the hoist acc. to FEM 9.755 must also be established during this inspection. The periodic tests must be adapted to the hoist's use. Intensive use entails shorter maintenance intervals.

**All tests must be initiated by the user.**



The components ensuring explosion protection must be checked every 3 years at the latest. As a rule, some of these are checked during the annual inspection (e.g. installation, attachment...) If the ambient conditions are severe, the intervals between the periodic tests must be shortened as necessary.

## 1.11 After sales service

With the purchase of this wire rope hoist, you have decided on a high-quality piece of lifting equipment. Our after sales service will give you advice on its correct use.

In order to maintain the safety and constant availability of your wire rope hoist, we recommend concluding a maintenance agreement on the basis of which we will undertake the "periodic tests" on your behalf.

Repairs will be carried out professionally and quickly by our trained personnel.



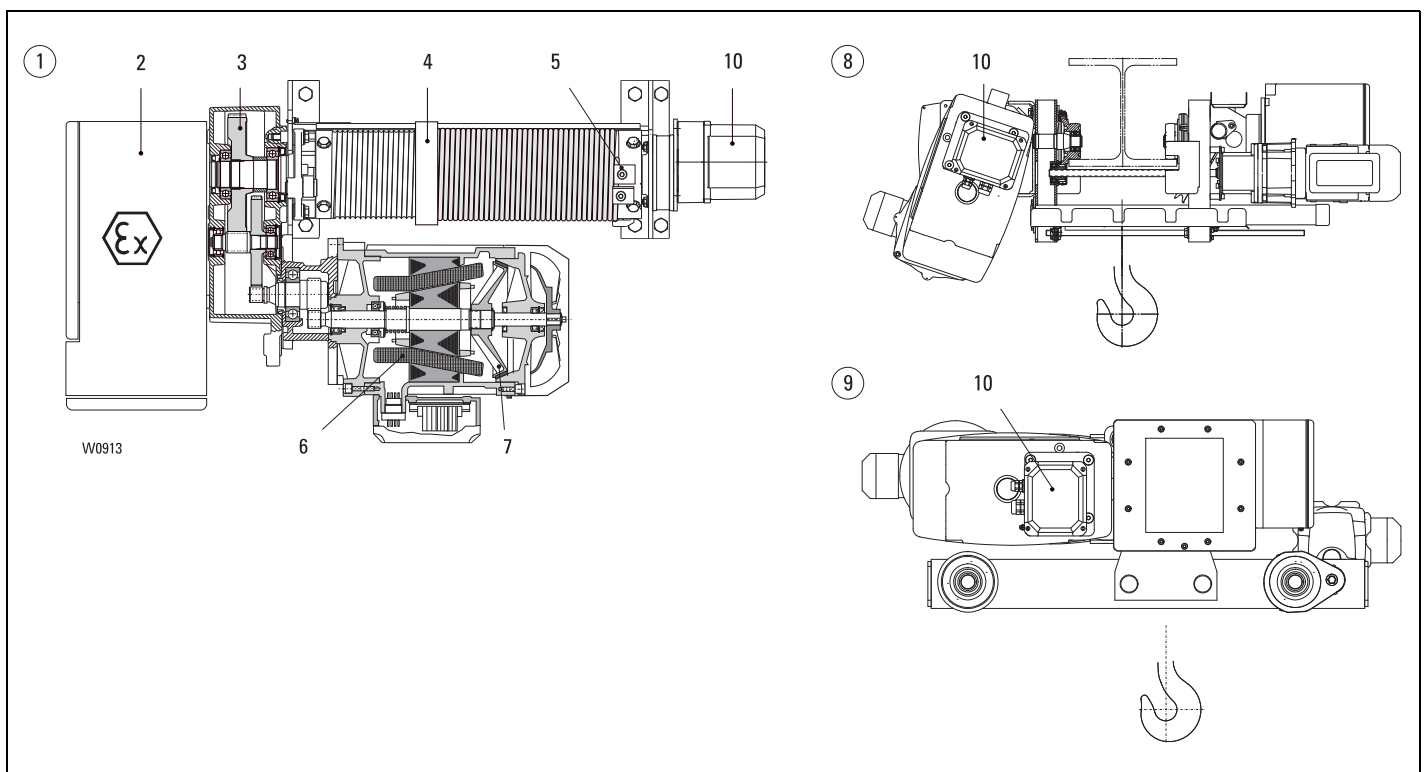
The modular concept of our series of wire rope hoists permits a multitude of variations on the basis of series components.

Our certified quality assurance system to DIN ISO 9001/EN 29001 and our special in-house process inspection to EC directive 94/9/EC guarantee consistently high quality.

**The SHex/Zone 1 wire rope hoist is designed for use in Zone 1 in acc. with EC directive 99/92/EC. The equipment category in acc. with EC directive 94/9/EC is ⊕ II 2 G.**

**The SHex/Zone 21 wire rope hoist is designed for use in Zone 1 in acc. with EC directive 99/92/EC. The equipment category in acc. with EC directive 94/9/EC is ⊕ II 2 D.**

If you have any questions, for example on hoists modified to customers' specific applications, please contact one of our branches or subsidiaries. We will be pleased to advise you!



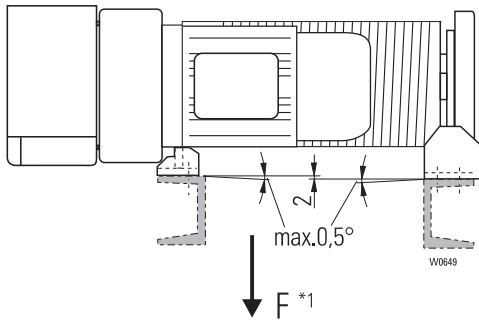
- 1 Stationary wire rope hoist, hoist for installation
- 2 Ex connection box in "increased safety" (Ex e) or "flameproof enclosure" (Ex d) and flameproof panel box
- 3 Gear
- 4 Rope guide with tensioning spring
- 5 Clamps for attaching wire rope
- 6 Ex sliding rotor brake motor
- 7 Brake
- 8 Wire rope hoist with "short headroom" monorail trolley S"
- 9 Wire rope hoist with double rail crab
- 10 Gear limit switch



## 3.1 Stationary wire rope hoist

### Possible fixing positions and rope lead-off

Feet "at bottom," and "at top" are possible for designs with bottom hook block (rope lead-off vertically downwards).



The SH ex wire rope hoist with 1/1 and 2/2 rope lead-off can be installed in various positions. The fleet angles possible can be seen from the sketches.

If possible, install the hoist in the **preferred installation position \*\*\***, see page 10.

- Use the fixing elements specified, see sketches and tables.
- Take care that no distortion arises from unevenness, etc. (see sketch, max. 0.5°, max. 2mm)
- The customer's substructure must take up the torque  $M_T$  from the rope drum. It must therefore be torsion resistant.
- Support bar required in the case of lateral forces
- Tightening torques see page 54

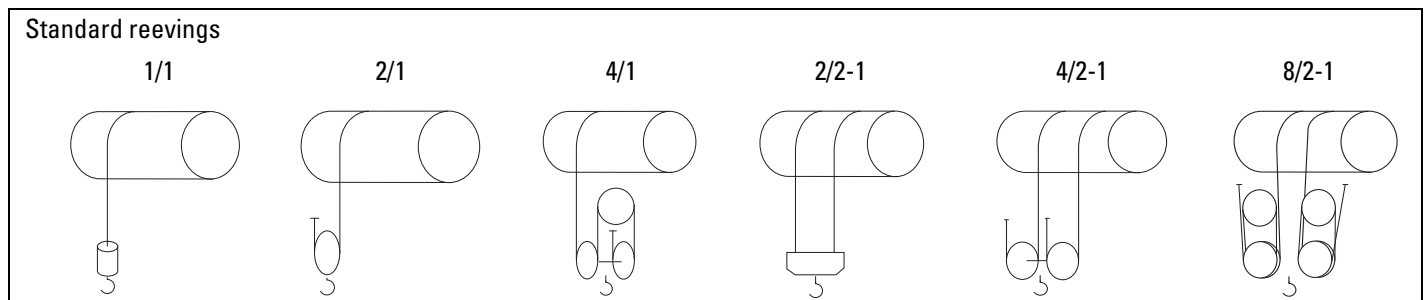
$M_T$  (rope drum torque)

SH 3 ex  $M_T = 0,5 \times F \times 126 \text{ mm}$

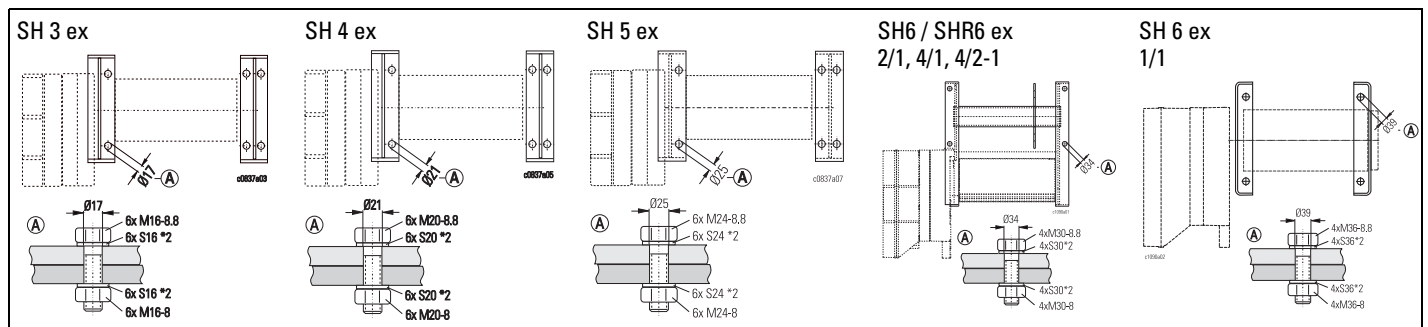
SH 4 ex  $M_T = 0,5 \times F \times 167 \text{ mm}$

SH 5 ex  $M_T = 0,5 \times F \times 219 \text{ mm}$

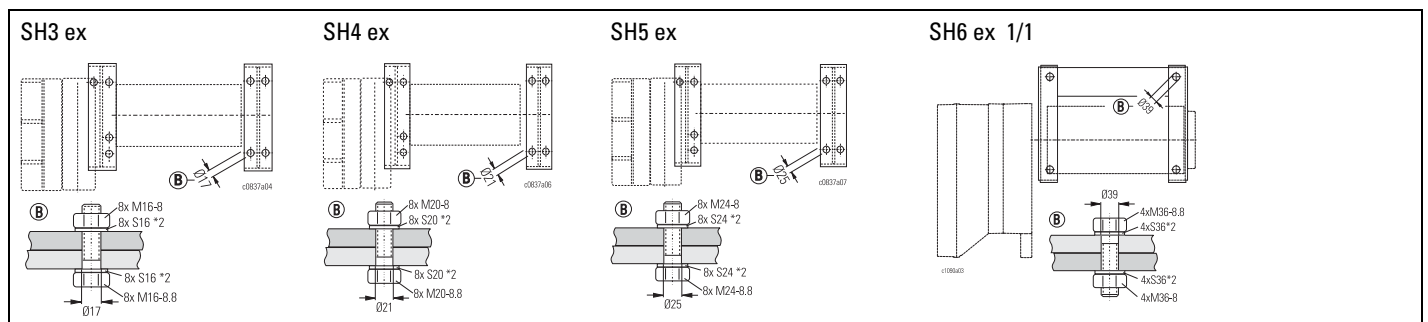
SH 6 ex  $M_T = 0,5 \times F \times 356 \text{ mm}$



### 3.1.1 Feet at bottom



### 3.1.2 Feet at top



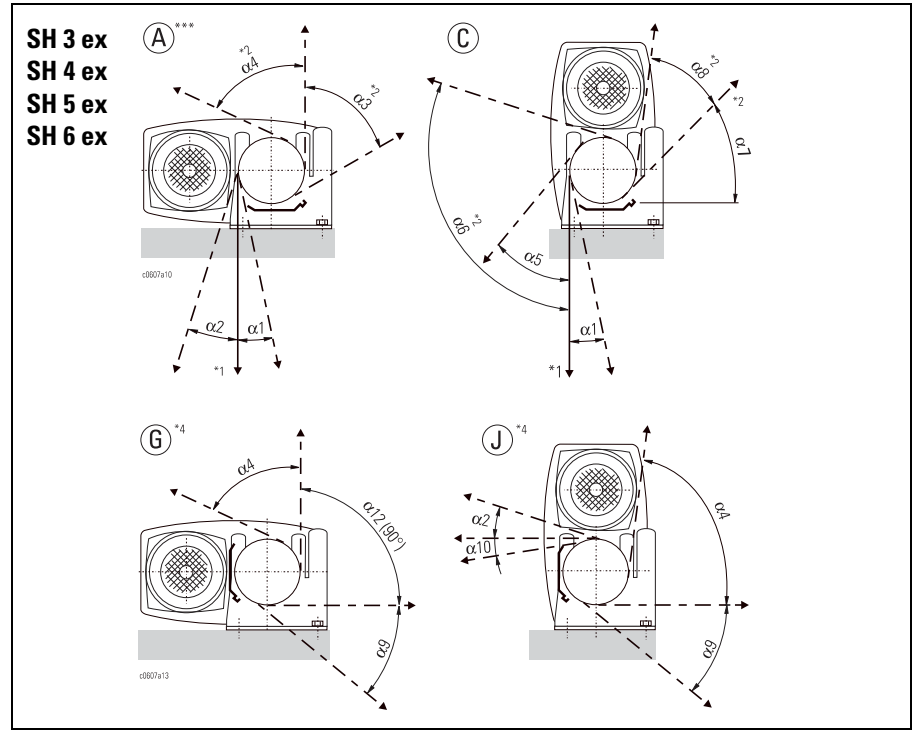
\*1 Traction on drum  
 \*2 Lock washer (Schnorr)

## 3.1 Stationary wire rope hoist (continued)

## 3.2 Fleet angles

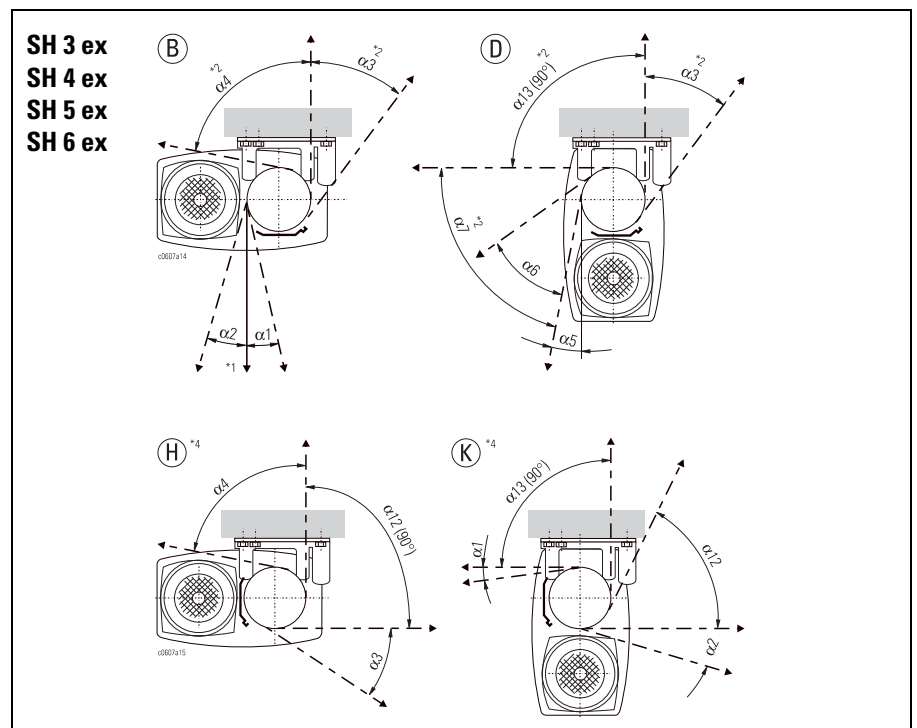
### 3.2.1 Feet at bottom

|               | 1/1, 2/2 |         |        |        |
|---------------|----------|---------|--------|--------|
|               | SH 3 ex  | SH 4 ex | SH5 ex | SH6 ex |
| $\alpha_1$    | 4°       | 5°      | 8°     | 8°     |
| $\alpha_2$    | 23°      | 13°     | 20°    | 18°    |
| $\alpha_3$    | 27°      | 30°     | 30°    | 30°    |
| $\alpha_4$    | 74°      | 73°     | 76°    | 80°    |
| $\alpha_5$    | 30°      | 30°     | 30°    | 25°    |
| $\alpha_6$    | 113°     | 103°    | 110°   | 108°   |
| $\alpha_7$    | 83°      | 81°     | 60°    | 60°    |
| $\alpha_8$    | 11°      | 12°     | 18°    | 20°    |
| $\alpha_9$    | 24°      | 26°     | 30°    | 12°    |
| $\alpha_{10}$ | 7°       | 7°      | 8°     | 8°     |
| $\alpha_{12}$ | 90°      | 90°     | 90°    | -      |



### 3.2.2 Feet at top

|               | 1/1, 2/2 |         |         |         |
|---------------|----------|---------|---------|---------|
|               | SH 3 ex  | SH 4 ex | SH 5 ex | SH 6 ex |
| $\alpha_1$    | 4°       | 5°      | 8°      | 8°      |
| $\alpha_2$    | 23°      | 13°     | 20°     | 18°     |
| $\alpha_3$    | 27°      | 30°     | 30°     | 12°     |
| $\alpha_4$    | 74°      | 73°     | 76°     | 80°     |
| $\alpha_5$    | 16°      | 17°     | 14°     | -       |
| $\alpha_6$    | 34°      | 32°     | 36°     | -       |
| $\alpha_7$    | 74°      | 73°     | 76°     | -       |
| $\alpha_{12}$ | 90°      | 90°     | 90°     | 8°      |
| $\alpha_{13}$ | 90°      | 90°     | 90°     | 30°     |




\*\*\*Preferred installation position

\*1 Standard

\*2 By turning rope guide

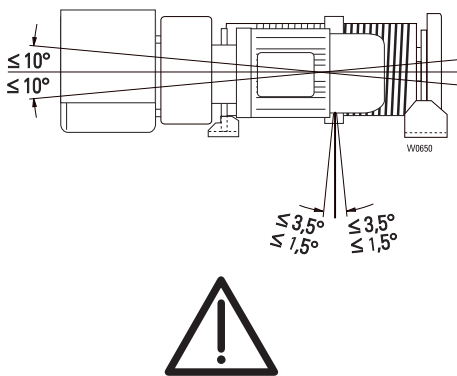
\*4 By turning rope guide and grease pan; version G, H not possible for SH 6 ex

#### 3.2.3 Fleet angles

| Type    |  |
|---------|---|
|         | $\gamma$  |
| SH 3 ex | 53°   |
| SH 4 ex | 60°   |
| SH 5 ex | 53°   |
| SH 6 ex | 53°   |

The rope guide must be adjusted to the fleet angle. Observe also the radial rope exit angle  $\gamma$ .

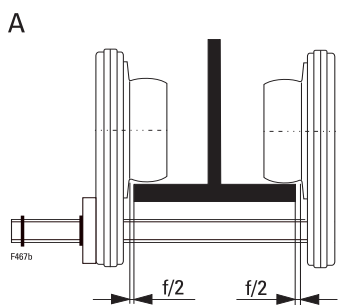
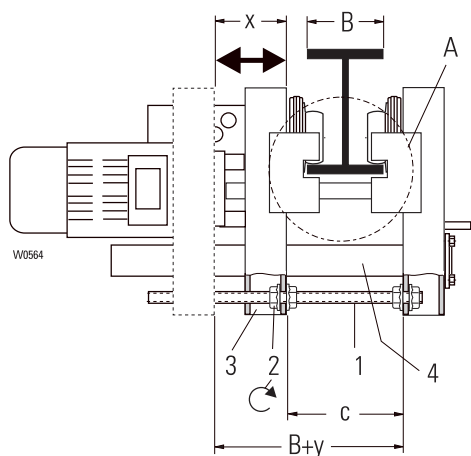
#### 3.2.4 Angles of installation



- Install the wire rope hoist within the permissible range of angles. Hoists with rope drives with bottom hook blocks must always be installed horizontal to their longitudinal axis.
- The max. permissible rope exit angle acc. to standard is 4° for non-twist-free wire ropes, 1.5° for twist-free wire ropes. However at these angles a reduction in service life is to be expected. The wire rope must not touch the rope guide or structural elements. This could lead to increased wear and damage.

## 3.3 Trolleys/crabs

### 3.3.1 Monorail trolley



with SH 3 ex, SH 4 ex, SH 5 ex, SH 6 ex wire rope hoists

- Check flange width "B" and clearance "c" against the table and set trolley to beam width if necessary.
- **Caution!** If the flange width is altered (by customer), it may be necessary to alter the counterweight to prevent the trolley canting. Please have it checked by our after-sales service.

#### Installation if end of runway is freely accessible

- Slide trolley onto end of runway and check play f/2.

#### Installation if end of runway is not accessible

- Unscrew nuts (2) on threaded bolts (1) and slide trolley side cheek (3) outwards by approx. "x" mm or until dimension "B+y" is reached (table 1).
- Push hoist side of trolley onto lower flange of runway beam and secure against slipping.
- Push trolley side cheek (3) towards the runway beam on support bolt (4).
- Adjust dimension "c" with nuts (2), tighten nuts (2).
- Check track gauge "c" and play "f/2".
- Tighten nuts (2) with torque spanner.
- Tightening torques see table 1.

Table 1

| Hoist | ØD<br>mm | Trolley | I            |     |     |   | c      | f/2 | x  | y   | Nm  |
|-------|----------|---------|--------------|-----|-----|---|--------|-----|----|-----|-----|
|       |          |         | INP          | IPE | IPB | " |        |     |    |     |     |
| SH 3  | 80       | KE-S33  | B= 90...500  |     |     |   | B+67*1 | 1,5 | 70 | 137 | 210 |
| SH 4  | 100      | KE-S44  | B= 90...500  |     |     |   | B+67*1 | 1,5 | 80 | 147 | 210 |
| SH 5  | 140      | KE-S65  | B= 119...500 |     |     |   | B+67*1 | 1,5 | 95 | 162 | 210 |
| SH 6  | 200      | KE-S76  | B= 124...500 |     |     |   | B+92*1 | 1,5 | 95 | 187 | 210 |

Ensure that the trolley runs smoothly over the whole runway without jamming or increased friction at the wheel flanges. Increased friction at the flanges due to poor beam quality or incorrect trolley adjustment may lead to temperature rise and increased wear. This must be avoided at all costs.

#### Drive shaft for travel drive (trolleys KE-S33 - KE-S65)

- Fit drive shaft in mounting position X3 or X4 depending on flange width (B) of runway beam and length (L) of drive shaft (D).
- Fit circlips (S).
- See sketch and table 2.

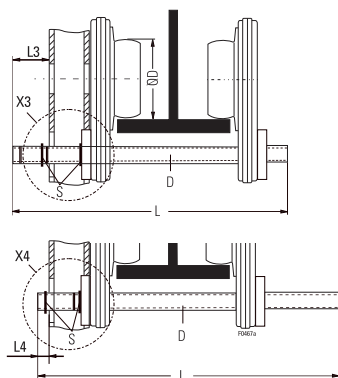


Table 3

| ØD<br>[mm] | L3 ±2<br>[mm] | L4 ±2<br>[mm] |
|------------|---------------|---------------|
| 80         | 96,4          | 46,4          |
| 100        | 96,4          | 46,4          |
| 140        | 124,6         | 46,4          |

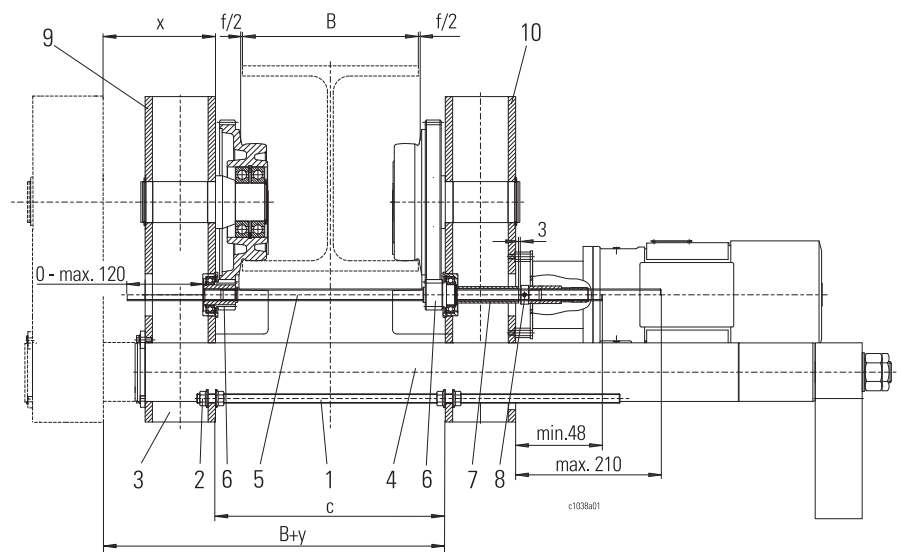
Tableau 2

| ØD<br>[mm] | B<br>[mm] | Drive shaft |               |    |     |
|------------|-----------|-------------|---------------|----|-----|
|            |           | L [mm]      | Mounting pos. |    |     |
| 80<br>100  | 90 - 145  | 390         | X3            | -  |     |
|            | 146 - 195 |             | -             | X4 |     |
|            | 196 - 250 | 495         | X3            | -  |     |
|            | 251 - 306 |             | -             | X4 |     |
|            | 301 - 350 | 595         | 3             | -  |     |
|            | 351 - 399 |             | -             | X4 |     |
|            | 400 - 450 | 695         | X3            | -  |     |
|            | 451 - 500 |             | -             | X4 |     |
| 140        | 119 - 145 | 505         | X3            | -  |     |
|            | 146 - 200 |             | -             | X4 |     |
|            | 201 - 250 | 505         | X3            | -  |     |
|            | 251 - 305 |             | -             | X4 |     |
|            | 330 - 400 | 710         | X3            | -  |     |
|            | 401 - 500 |             | -             | X4 |     |
| 200        | 124 - 220 | 510         | see page 13   |    |     |
|            | 221 - 400 |             |               |    | 740 |
|            | 401 - 500 |             |               |    | 780 |

\*1 for INP beams: -2 mm

#### Drive shaft for trolley drive (trolley KE-S76)

- The drive shaft is suitable for girder flange widths "B" from 124 to  $\leq 220$ ,  $> 221$  to  $\leq 400$  and  $> 401$  to 500 mm; length "L" see table 2, page 11.
- Insert drive shaft (5) into the two drive pinions (6) from the counterweight side, then assemble spacer tube (7) and adjusting ring (8).
- Adjust drive shaft (5) so that on the hoist side [trolley side cheek (9)] the shaft end at the drive pinion (6) projects by between "min. 0 mm" and "max. 120 mm" and
- on the counterweight side the shaft end projects by between "min. 48 mm" and "max. 160 mm" beyond the trolley side cheek (10).
- Lock adjusting ring (8) with adjusting screw so that on spacer tube (7) lying against drive pinion (6) there is a clearance of approx. "3 mm" to adjusting ring (8).
- After fitting travel drive, check drive shaft (5) for ease of movement.

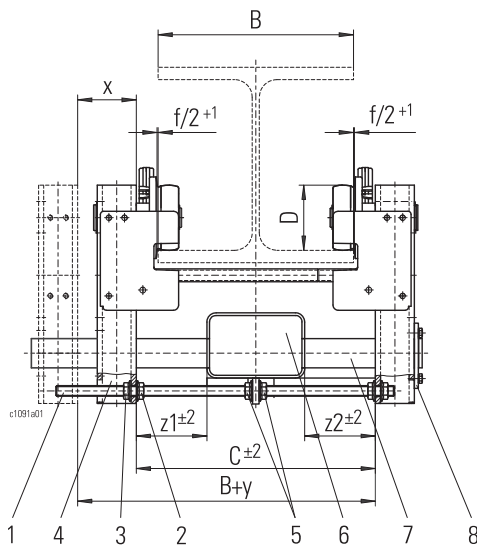


For dimensions B, c, f/2, x and y see tables 1 and 2, page 12



Check that the trolley runs smoothly over the whole runway without jamming or increased friction at the wheel flanges. Increased friction at the flanges due to poor beam quality or incorrect trolley adjustment may lead to temperature rise or increased wear. This must be avoided at all costs.

#### 3.3.2 Monorail trolley (UE-S4)



#### with SH 4 ex, SH 5 ex 1/1 hoists (single-fall)

- Check flange width "B" and clearance " $c \pm 2$ " against the table and set trolley to beam width if necessary. Ensure that the connection piece (square tube) (6) is in the centre (of dimension "c") between the trolley side cheeks (" $z1 = z2$ ").
- After unscrewing nuts (3) together with nuts (2), adjust clearance " $c \pm 2$ " and tighten nuts (3).
- Tighten nuts (3) with torque spanner. Tightening torques see table.
- Clearance "c" results in a flange play of " $f/2+1$ " on each side. If necessary, correct flange play by means of clearance "c".

#### Installation if end of runway is freely accessible


- Slide trolley onto end of runway and check play  $f/2$ .

#### Installation if end of runway is not accessible

- Loosen nuts (3) on threaded bolts (1) in the square tube of the trolley side cheeks (4) and unscrew by dimension "x".
- Push trolley side cheeks (4) apart in parallel up to the unscrewed nuts (3) until dimension " $B+y + c+x$ " is reached, and lift trolley onto runway from below.
- Slide trolley onto the bottom flange of the runway beam on the axle keep plate side (8) and secure against shifting.
- Push trolley side cheeks (4) back to nuts (2), retighten nuts (3).
- Check track gauge " $c \pm 2$ " and play of guide rollers " $f/2$ ".
- Tighten nuts (3) with torque spanner. Tightening torques see table

#### Centering connection piece

- Loosen nuts (5) and shift connection piece (6) on connecting bolt (7) so that dimensions " $z1$ " and " $z2$ " between trolley side cheeks (4) and connection piece (6) are equal on both sides.
- Tighten nuts (5) with torque spanner. Tightening torques see table.

| $\emptyset D$ | Trolley | I           | I   | I II | I | c      | f/2 | x  | y   |  |
|---------------|---------|-------------|-----|------|---|--------|-----|----|-----|---|
| mm            |         | INP         | IPE | IPB  | " | mm     |     |    |     | Nm  |
| 100           | UE-S4   | B= 90...500 |     |      |   | B+67*1 | 1,5 | 75 | 142 | 210   |



Check that the trolley runs smoothly over the whole runway without jamming or increased friction at the wheel flanges. Increased friction at the flanges due to poor beam quality or incorrect trolley adjustment may lead to temperature rise or increased wear. This must be avoided at all costs.

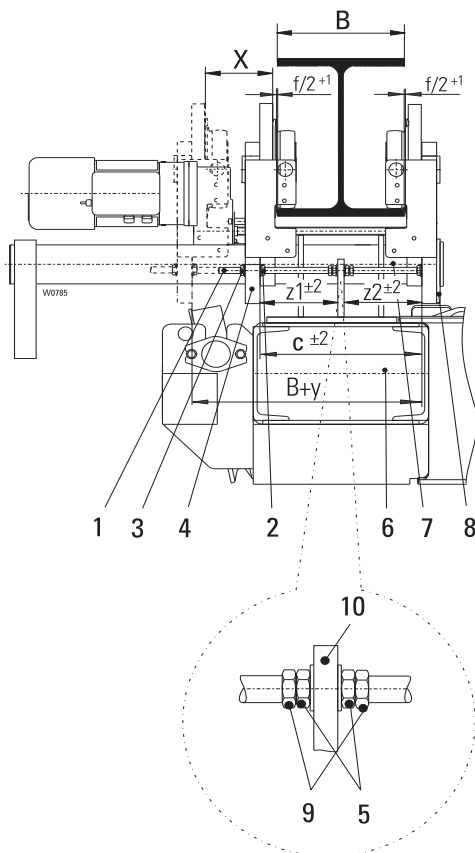
#### Connecting bolt and drive shaft

- Use connecting bolt and drive shaft suitable for beam range "B". (For dimensions, see sketch and table 2, page 12).

\*1 for INP beams: -2 mm

#### 3.3.3 Monorail trolley (UE-S776)

with SH 6ex, 4/1 wire rope hoists (four-fall)



- Check flange width "B" and clearance " $c \pm 2$ " against the table and set trolley to beam width if necessary. Ensure that the connection piece (square tube) (6) is in the centre (of dimension "c") between the trolley side cheeks (" $z1 = z2$ ").
- After unscrewing nuts (3) together with nuts (2), adjust clearance " $c \pm 2$ " and tighten nuts (3).
- Do **not** distort plate (10)! Tighten nuts (5) lightly and then unscrew by a quarter turn. Lock nuts 9 against nuts 5 with a torque spanner. See table for tightening torques.
- Tighten nuts (3) with torque spanner. See table for tightening torques.
- Clearance "c" results in a flange play of " $f/2+1$ " on each side. If necessary, correct flange play by means of clearance "c".

#### Installation if end of runway is freely accessible

- Slide trolley onto end of runway and check play  $f/2$ .

#### Installation if end of runway is not accessible

- Loosen nuts (3) on threaded bolts (1) in the square tube of the trolley side cheeks (4) and unscrew by dimension "x".
- Push trolley side cheeks (4) apart in parallel up to the unscrewed nuts (3) until dimension " $B+y$  or  $c+x$ " is reached, and lift trolley onto runway from below.
- Slide trolley onto the bottom flange of the runway beam on the axle keep plate side (8) and secure against shifting.
- Push trolley side cheeks (4) back to nuts (2), retighten nuts (3).
- Check track gauge " $c \pm 2$ " and play of guide rollers " $f/2$ ".
- Tighten nuts (3) with torque spanner. For tightening torques, see table

#### Centering connection piece

- Loosen nuts (5) and shift connection piece (6) on connecting bolt (7) so that dimensions " $z1$ " and " $z2$ " between trolley side cheeks (4) and connection piece (6) are equal on both sides.
- Tighten nuts (5) with torque spanner. For tightening torques see table.

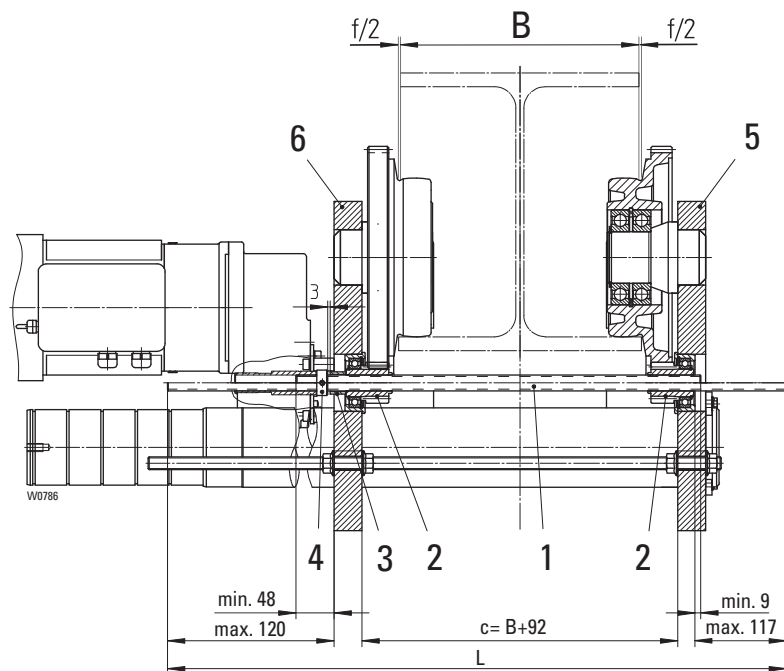
| $\emptyset D$ | Fahrwerk | I             | I   | I II | I | c    | f/2 | x  | y   | ↻   |
|---------------|----------|---------------|-----|------|---|------|-----|----|-----|-----|
| mm            |          | INP           | IPE | IPB  | " | mm   |     |    |     | Nm  |
| 200           | UE-S776  | B= 124....500 |     |      |   | B+92 | 1,5 | 95 | 187 | 210 |

#### Connecting bolt and drive shaft

- Use connecting bolt and drive shaft suitable for beam range "B". (For dimensions, see sketch on page 16).

#### Drive shaft for trolley drive (trolley UE-S776)

- The drive shaft is suitable for girder flange widths "B" from 124 to 500 mm; see table for length "L".
- Insert drive shaft (1) into the two drive pinions (6) from the counterweight side, then assemble spacer tube (3) and adjusting ring (4).
- Adjust drive shaft (1) to dimension L1, dimension L2 must lie between the values given in the table.
- Lock adjusting ring (4) with adjusting screw.
- After fitting travel drive, check drive shaft (1) for ease of movement. The axial play should be approx. 3 mm.

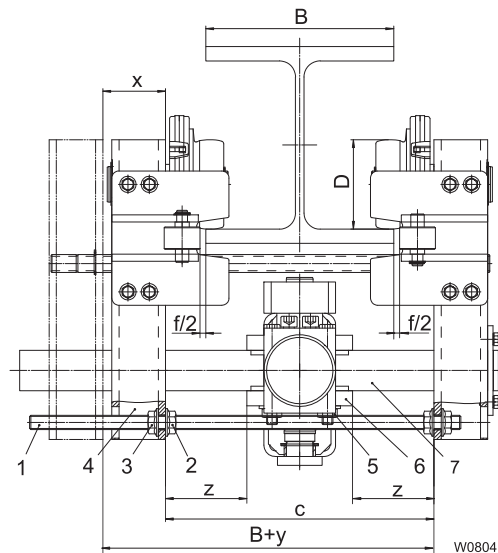


| B<br>[mm] | L<br>[mm] | L1<br>[mm] | L2<br>[mm] |
|-----------|-----------|------------|------------|
| 124 - 220 | 510       | 84         | 191 - 95   |
| 221 - 360 | 620       | 84         | 172 - 33   |
| 361 - 450 | 740       | 134        | 98 - 9     |
| 451 - 500 | 740       | 84         | 58 - 9     |

For dimension  $f/2$  see table on page 15



#### 3.4 Articulated trolley (DKE-S4 / DKE-S6)



#### with SH 3ex, SH 4ex, SH 5ex wire rope hoists

- Check flange width "B" and clearance "c" against the table and set trolley to beam width if necessary. Ensure that the connection piece (square tube) (6) is in the centre (of dimension "c") between the trolley side cheeks ("z1" = "z2").
- After unscrewing nuts (3) together with nuts (2), adjust clearance "c" and tighten nuts (3).
- Tighten nuts (3) with torque spanner.
- See table for tightening torques.
- Clearance "c" results in a flange play of "f/2" on each side. If necessary, correct flange play by means of clearance "c".

#### Installation if end of runway is freely accessible

- Slide trolley onto end of runway.

#### Installation if end of runway is not accessible

- Loosen nuts (3) on threaded bolts (1) in the square tube of the trolley side cheeks (4) and unscrew by dimension "x".
- Push trolley side cheeks (4) apart in parallel up to the unscrewed nuts (3) until dimension "B+y or c+x" is reached, and lift trolley onto runway from below.
- Lift trolley onto runway from below.
- Slide trolley onto the bottom flange of the runway beam on the hoist side and secure against shifting.
- Push trolley side cheeks (4) back to nuts (2), retighten nuts (3).
- Check track gauge "c" and play of guide rollers "f/2".
- Tighten nuts (3) with torque spanner.
- See table for tightening torques.

#### Centering bogie

- Loosen nuts (5) and shift bogie (6) on connecting bolt (7).
- Dimension "z" between trolley side cheeks (4) and bogie (6) is equal on both sides.
- Tighten nuts (5) with torque spanner.
- For tightening torques see table.

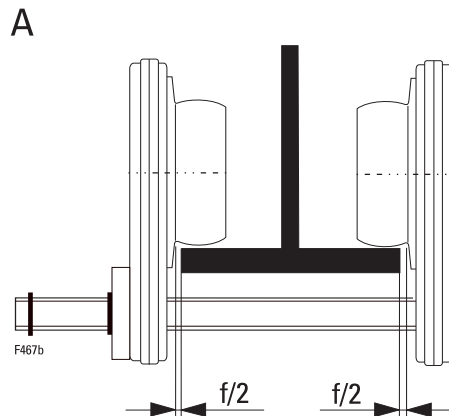
| Hoist        | ØD   | Trolley | B         | f/2 | c    | x  | y   | Nut (3) | Nut (5) |
|--------------|------|---------|-----------|-----|------|----|-----|---------|---------|
|              | [mm] |         |           |     |      |    |     |         |         |
| SH 3<br>SH 4 | 100  | DKE-S 4 | 90 - 220  | 1.5 | B+80 | 67 | 147 | 215     | 85      |
| SH 5         | 140  | DKE-S 6 | 119 - 300 | 1.5 | B+84 | 75 | 159 | 215     | 85      |

## Drive shaft for travel drive (DKE-S4 / DKE-S6)

### Trolleys with one travel drive

- Mount a drive shaft of a length (L) suitable for the beam width (B)
- Fit lockwashers (S) acc. to dimension L4
- The mounting position of the drive shaft does not change over the corresponding beam range (B).

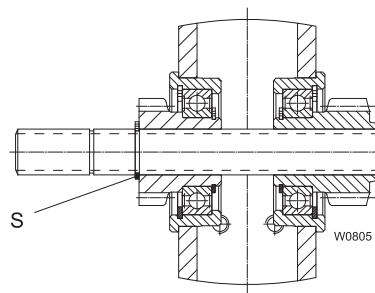
| ØD<br>[mm] | B<br>[mm] | Drive shaft |               |
|------------|-----------|-------------|---------------|
|            |           | L<br>[mm]   | L4 ±2<br>[mm] |
| 100        | 90 - 128  | 390         | 46.4          |
|            | 129 - 220 | 495         |               |
| 140        | 119 - 280 | 495         |               |
|            | 281 - 300 | 710         |               |



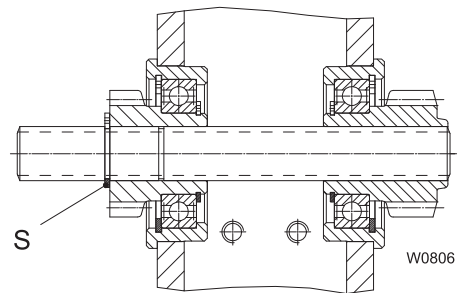
### Trolleys with two travel drives

- Drive shaft is completely independent of the beam width
- Mount lockwashers (S) acc. to sketch

ØD100



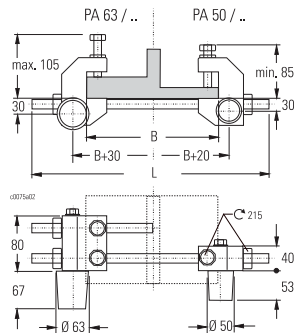
ØD 140





#### End stops

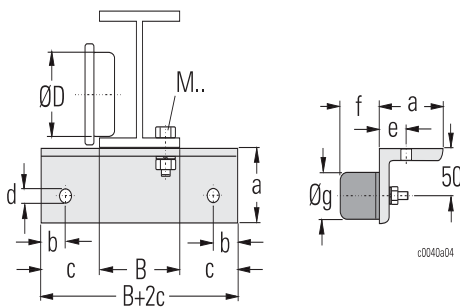




- Fit end stops with rubber buffers at end of runway.  
If the stops are not fitted with rubber buffers in adverse conditions sparking when the trolley hits the end stop cannot be ruled out. This must be avoided at all costs!



| Type      | B   | L   |  | E max |  | ØD  | Order No.      |
|-----------|-----|-----|---|-------|---|-----|----------------|
|           | max | mm  | kg  | *3    | *1  | mm  |                |
| PA 50/200 | 200 | 350 | 3200  | 200   | 700   | 63  | 01 740 24 27 0 |
| PA 50/300 | 300 | 450 |   |       |   | 80  | 01 740 25 27 0 |
| PA 50/500 | 500 | 650 |   |       |   | 100 | 01 740 26 27 0 |
| PA 63/200 | 200 | 350 | 10000   | 440   | 3200  | 100 | 01 740 27 27 0 |
| PA 63/300 | 300 | 450 |   |       |   | 140 | 01 740 28 27 0 |
| PA 63/500 | 500 | 650 |   |       |   | 140 | 01 740 29 27 0 |

#### Suggestion for solution by customer



| ØD  |  *4 | b  | c    | d  | e  | f  | g  | M..     |  |
|-----|---|----|------|----|----|----|----|---------|--|
| mm  |   |    |      |    |    |    |    | *2      | Bestell-Nr   |
| 80  | L80x80x10   | 30 | 34   | 9  | 32 | 34 | 40 | M10,M12 | 577 985 0  |
| 100 | L80x80x10   | 30 | 57,5 | 9  | 32 | 34 | 40 | M10,M12 | 577 985 0  |
| 125 | L80x80x10   | 30 | 68,5 | 11 | 32 | 42 | 50 | M10,M12 | 577 971 0  |
| 160 | L80x80x10   | 30 | 68,5 | 11 | 32 | 42 | 50 | M10,M12 | 577 971 0  |
| 200 | L80x80x10   | 40 | 95   | 11 | 32 | 53 | 63 | M10,M12 | 577 992 0  |
|     | L100x100x10   | 50 | 105  | 14 | 36 | 66 | 80 |         | 577 993 0  |

\*1 Weight of trolley incl. counterweight

\*2 ≤ I 140: M10.., ≥ I 160: M12..

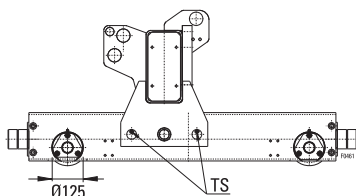
\*3  $E = 0.1415 \cdot mka \cdot v^2 \cdot x$  (Nm) mka (t), v (m/min)

x = with travel limit switch: 0.72

x = without travel limit switch: 1.0

\*4 bracket by customer

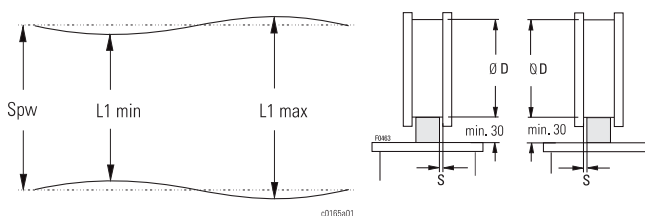
## 3.5 Double rail crab (OE-S)



- Check track gauge Spw on crab and rail.
- $L1 \text{ max} - L1 \text{ min} = 5 \text{ mm}$ , see sketch.
- Check lateral play between rail and flange, see sketch.
- Bolt rubber buffers to crab or runway end stop.
- Fit suitable stops. Dimensions see sketch and table.
- Remove transport anchor screw TS (only on crabs with wheel Ø 125).
- The runway must meet the requirements of DIN 4132.
- The rail joints must be even on both running and guide surfaces; grind down if necessary.



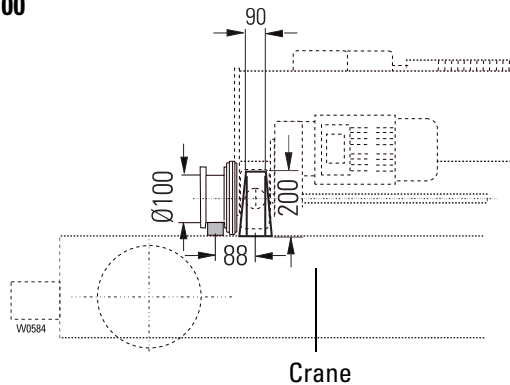
Check that the crab runs smoothly over the whole runway without jamming or increased friction at the wheel flanges. Increased friction at the flanges due to poor beam quality or incorrect crab adjustment may lead to temperature rise or increased wear. This must be avoided at all costs.



S as per table if crab is positioned symmetrically on runway. If asymmetrically,  
 $S_{\text{left}} + S_{\text{right}} = 2 \times S$

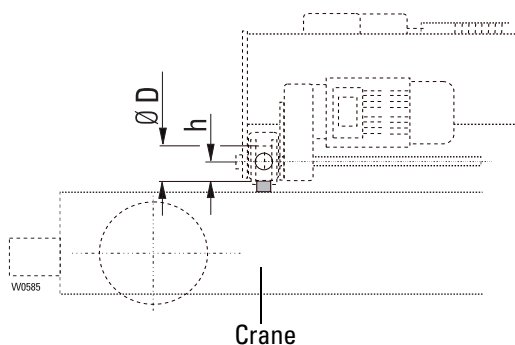
### End stops

#### Ø100



| Ø D | S     |
|-----|-------|
| 100 | 2.5-5 |
| 125 | 2.5-5 |
| 160 | 3.5-6 |
| 200 | 4.5-7 |

#### Ø125 - Ø200



| Ø D | h   |
|-----|-----|
| 100 | 45  |
| 125 | 97  |
| 160 | 100 |
| 200 | 100 |

## 3.6 Travel limit switch

### 3.6.1 Monorail trolley

The travel limit switches are mounted on the trolley.

### 3.6.2 Double rail crab

The travel limit switch assembly is supplied ready-wired but not mounted and must be secured to the towing arm for the power supply.

The switching contacts are designed for control current.

Switching functions:

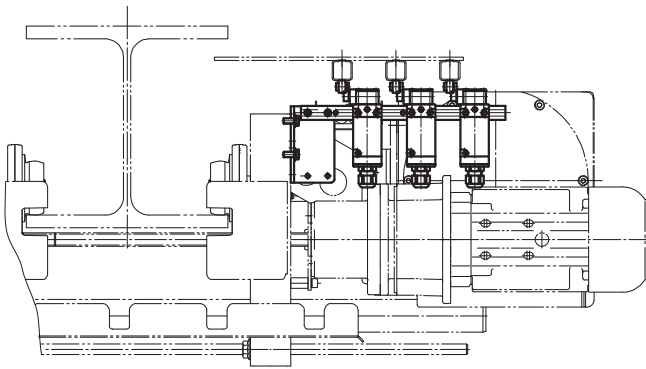
1. Limit switching in both directions of travel (2 switches).
2. Pre-switching and limit switching in both directions of travel (3 switches).

The speed is switched over from "fast" to "slow" before the end of the runway is reached, and is cut off at the end of the runway.

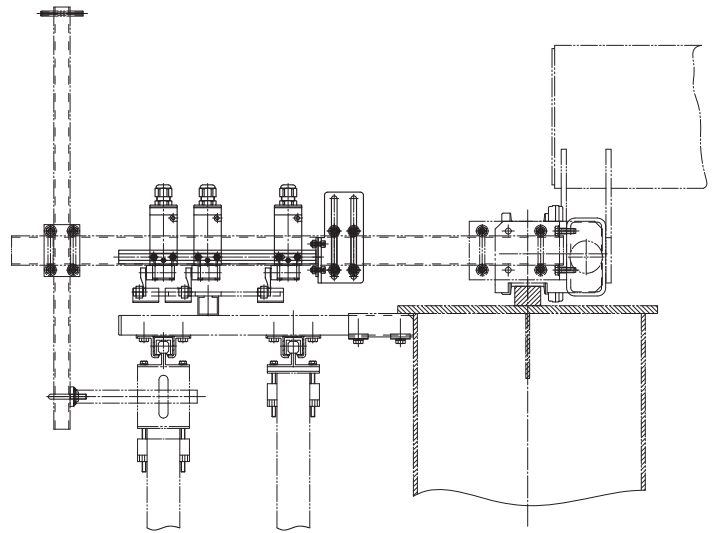


X = stop, left  
 Y = stop, right  
 Z = fast / slow

KE-S .. monorail trolley



OE-S .. double rail crab



## 3.7 Electrical equipment



For the sake of safety, have the wire rope hoist connected by a skilled electrician. Observe the relevant safety and accident prevention regulations! The skilled electrician must be acquainted with permissible clearances in air and creepage paths, and with cable glands in hazardous areas. Only electrical equipment approved for use in the relevant Ex Zone may be used! (Equipment category II 2 G for Zone 1, II 2 D for Zone 21)

### In addition for Zone 21:

EN 50281-1-2 must be observed for installation.

#### 3.7.1 Supply cable

- As fixed installed cables:  
NYY, NYM
- As flexible cables:  
H07RN-F or NGFLGöu, or equivalent cables.
- see page 53 for minimum cross-section and max. length of supply cable.

#### 3.7.2 Fusing

- NEOZED, DIAZED or NH fuses in operating class gL/gG, see page 52.
- Observe the correct fuse sizes so that the crane switch contacts do not weld if there is a short circuit and overload protection of lead is ensured!

#### 3.7.3 EMERGENCY STOP

It must be possible to disconnect the system electrically from the operating position. This function can be provided by:

- EMERGENCY STOP button in the control pendant in conjunction with the crane switch contactor,
- main isolator, if this is directly accessible and positioned close to the operating position.

#### 3.7.4 Main isolator

- must disconnect the wire rope hoist on all poles,
- must be lockable in OFF position,
- must be installed in an easily accessible place in the system,
- must be marked as such to avoid mistakes.

#### 3.7.5 Disconnecting switch

- is necessary if more than one floor-operated hoist is supplied with power,
- must be lockable in OFF position.

#### 3.7.6 Overload cut-off

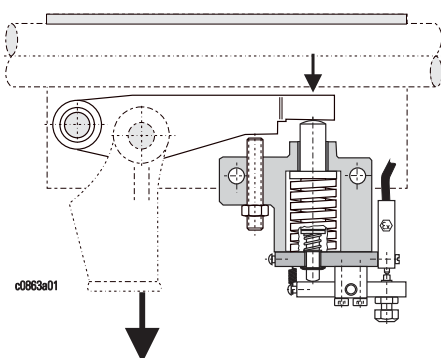
##### Description of system

- prevents an overload being lifted. If an overload has been established, the load can only be lowered. The switch is set in the factory. Corrections are only permissible in special cases, see page 39.
- In certain applications, wire rope hoists may also be used without an overload cut-off. **However in this case they do not meet the requirements of the EU directives and are not marked with the CE symbol.**

##### Load measurement at rope anchorage

##### With mechanical sensor

The overload cut-off is set to rated load +15%.



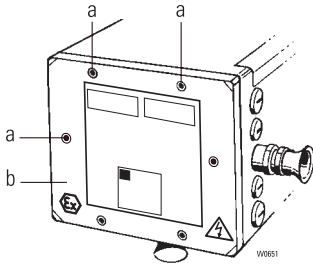


#### 3.7.7 Mains connection

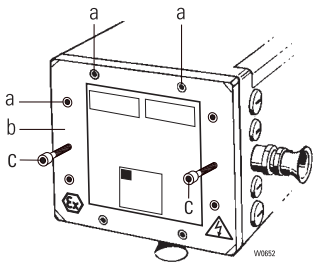
Before a connection box or panel box is opened, the apparatus must be disconnected.

**Caution! Pay attention to the explosion hazard. If necessary call in site safety representative!**

Ex e connection box



Ex d connection box



#### Opening and closing connection box

- Remove socket head cap screws (a).
- Lift off cover (b) with gasket (Ex e enclosures).
- Remove socket head cap screws (a), press cover (b) off using screws (c), avoid canting (Ex d enclosures).
- Clean Ex joints (Ex d enclosures) only with a rag or with detergent. If any damage is ascertained, they must be checked by the manufacturer. Do not commission equipment.
- Insert cover (b) into joint. (Do not forget gasket on Ex e!).
- Tighten all screws.

**All socket head cap screws must be grade 8.8.**

#### 3.7.8 Cable glands

Cable glands are an important constituent of the explosion protection and must therefore be fitted and maintained by qualified personnel.

In accordance with EN 50014 (and EN 50018 in the case of flameproof enclosed connection boxes), tested and certified cable glands must be used for the entry of flexibly installed cables in explosion-protected connection boxes. To avoid kinking, the cable glands must be specially shaped and provide effective strain relief (clip). Corresponding Ex tested and Ex certified cable glands must be used for fixed installed cables. The cables must be fastened down immediately in front of the gland, e.g. by means of a clip.

Cable glands for cables moved frequently must be secured with Loctite 275.

The power supply (supply cable) may be round or flat cable. In both cases the glands must meet the above requirements.

## 3.7 Electrical equipment (continued)

## 3.7.9 Connecting to mains

- Compare existing mains voltage and frequency with the information on the rating plate.
- Route cables into the hoist connection box through the Ex cable glands.
- Connect according to the circuit diagrams supplied.
- Do not connect any live lead to the temperature sensors! Damaged temperature sensors cannot protect the motor.
- Check that the direction of rotation of the rope drum corresponds to the symbols on the control pendant : Press "**slow up**" button on control pendant. **Never press down button first!** If the hook moves upwards or does not move because the limit switch has disconnected in top hook position, the phase connection is correct. Crosscheck by pressing "**slow down**" button on control pendant.

**If the movement of the hook does not correspond to the symbols on the control pendant, interchange two phase conductors of the supply cable.**

Measure control voltage. If the measured value exceeds the rated control voltage by more than 10%, a different tapping point must be selected on the primary side of the control transformer.

**Caution!** Risk of accident! If this is not observed, serious accidents or damage to the hoist may occur!



## 3.7.10 Test before first commissioning

- obliges the operator to have the installed, modified or repaired electrical equipment or electrical equipment combined into systems tested according to a special test in order to establish its proper condition as regards erection, installation and operation.

A comprehensive functional test and safety inspection must be performed after installation to ensure safety in operation.

This test is often subject to specific national regulations. After completion, the test must be recorded in the test log book.

- Faults must be eliminated before commissioning.

We recommend having this test performed by the manufacturer.

**Controls by others (option)****(Only after consulting the manufacturer)**

- If the controls are supplied by others, all electrical components must be wired according to our connection diagrams.
- Control components installed on our hoists in hazardous areas by the operator or a control engineer engaged by the operator are the responsibility of the operator or control engineer. STAHL CraneSystems accepts no liability for these.
- Work on controls (**explosion-protected electrical equipment**) beyond the mere connection of cables may only be performed by companies with a certified quality assurance system (EC Directive 94/9/EC), We recommend purchasing the complete control from manufacturer STAHL CraneSystems.

**The CE conformation will only be valid if the complete crane is Acc. to the following rules and regulations:**

- EC directive on explosion protection 94/9/EC (ATEX)
- EC machinery directive 98/37/EC
- EC EMC directives 89/336/EC



### 3.8 Reeving rope

The wire rope is wound onto the drum in the factory. If not, see page 45, "Fitting wire rope".

If the bottom hook block is not fitted, proceed as follows:

- Gripper pliers hold the rope securely.
  - The wire rope hoist must be switched on in order to reeve the rope. All work must therefore be carried out with extreme care: for your safety and for troublefree functioning of the wire rope hoist!
0. Lay out the end of the rope not wound on the drum, or let it hang freely.
  1. Check that the wire rope lies snugly on the rope drum, tighten if necessary. **Avoid slack rope on the drum! Slack rope can destroy the rope guide and the wire rope.**
  2. Colour code the beginning of the rope on one side.
  3. Reeve the end of the rope into the rope sheave(s) of the bottom hook block and return pulley(s), see page 26. **Do not twist the rope**; the colour coding facilitates checking.
  4. Fasten the end of the rope in the rope anchorage, see page 26-28 (12-35).
  5. Perform several runs over the full height of lift without load.
  6. Repeat with increasing loads.
  7. Make any twisting in the rope visible by sticking on a paper tag. Severe twisting is shown by the bottom hook block's turning, especially when not under load.
  8. If any twisting should occur, remove the wire rope and untwist by letting it hang freely or laying it out. Twisting in the wire rope prejudices safety and service life.



**Any twisting should therefore be removed before subjecting the hoist to any further load. The rope could otherwise be permanently distorted and might have to be replaced!**

## 3.8 Reeving rope (continued)

### Reeving rope (SH3ex - SH6ex)

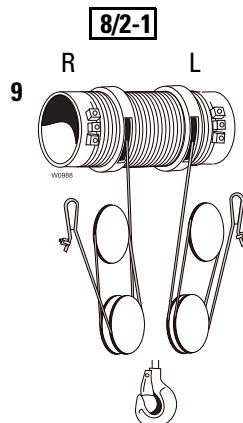
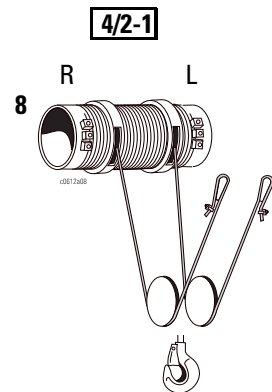
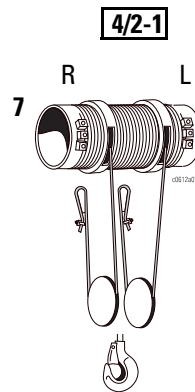
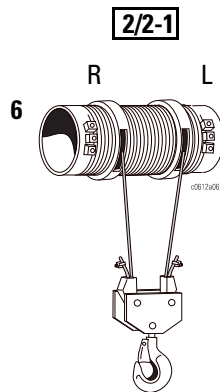
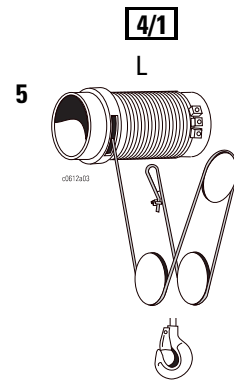
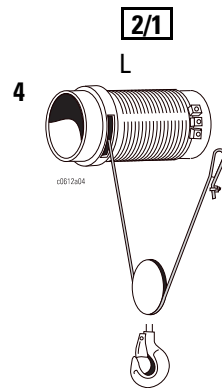
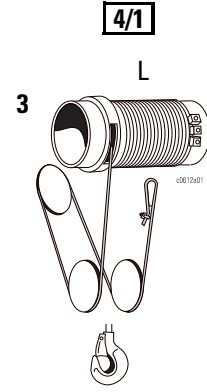
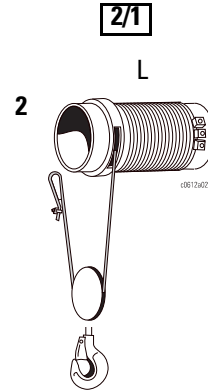
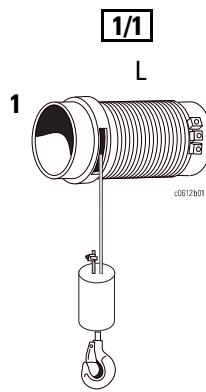
Reeve the rope as shown in the schematic drawings and attach the end of the rope at the rope anchorage.

**Caution!** The bottom hook block must hang horizontally (./2-1)

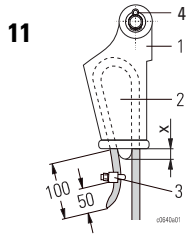
|       |           |     |
|-------|-----------|-----|
|       |           |     |
|       | SH3 - SH5 | SH6 |
|       |           |     |
| 1/1   | 1         | 1   |
| 2/1   | 2         | 4   |
| 4/1   | 3         | 5   |
| 2/2-1 | 6         | 6   |
| 4/2-1 | 7         | 8   |
| 8/2-1 | -         | 9   |

|       |           |     |
|-------|-----------|-----|
|       |           |     |
|       | SH3 - SH5 | SH6 |
|       |           |     |
| 2/1   | 4         | 4   |
| 4/1   | 5         | 5   |
| 4/2-1 | 8         | 8   |

|       |           |     |
|-------|-----------|-----|
|       |           |     |
|       | SH3 - SH5 | SH6 |
|       |           |     |
| 2/1   | 4         | 4   |
| 4/1   | 5         | 5   |
| 4/2-1 | 8         | 8   |
| 8/2-1 | -         | 9   |

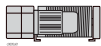


L = left-hand thread  
R = right-hand thread

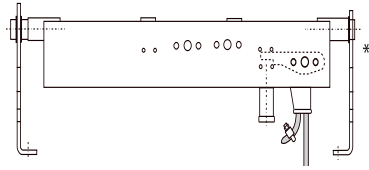


## Rope anchorage (SH3ex-SH6ex)

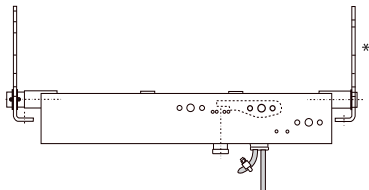
- Note information plate at rope anchorage.
  - Insert end of rope into rope anchorage according to reeving, see sketches 11-34 and tables on pages 27, 28, 29.
  - Place rope around rope wedge (2) and pull it into the tapered rope recess (1) until the loose end of the rope projects by approx. 100 mm.
  - Secure loose end of rope with rope clamp (3) approx. 50 mm from the end of the rope.
  - Max. projection of rope wedge SH 3 - SH 4 ex  $x_{max.} = 6\text{mm}$  ; SH 5 - 6 ex  $x_{max.} = 15\text{mm}$
- Replace split pin (4) after dismantling; bend up ends of split pin.

|       |  |      |      |      |
|-------|---|------|------|------|
|       | Length L  | SH 3 | SH 4 | SH 5 |
| 2/1   | L2  | 12   | 12   | 12   |
|       | L3  | 12   | 12   | 12   |
|       | L4  | -    | -    | -    |
| 4/1   | L2  | 21   | 14   | 22   |
|       | L3  | 21   | 14   | 22   |
|       | L4  | -    | -    | 22   |
| 4/2-1 | L2  | 17   | 18   | 17   |
|       | L3  | 17   | 18   | 17   |
|       | L4  | -    | -    | 17   |

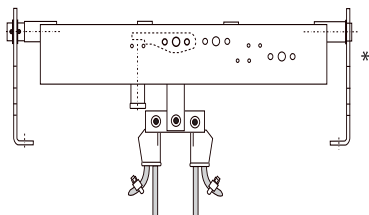
12



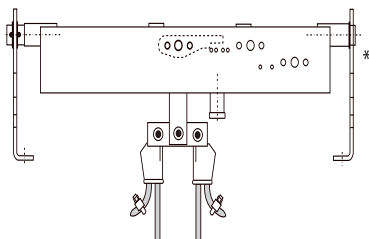
14



17





18

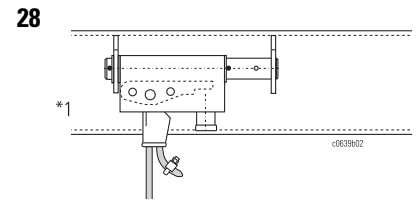
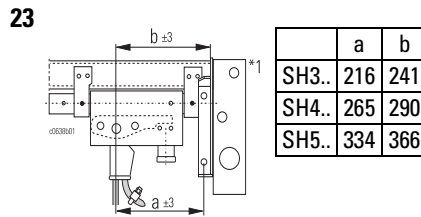
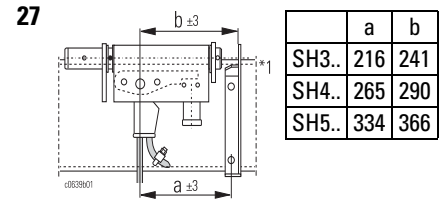
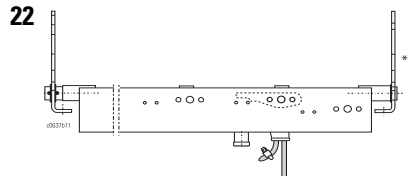
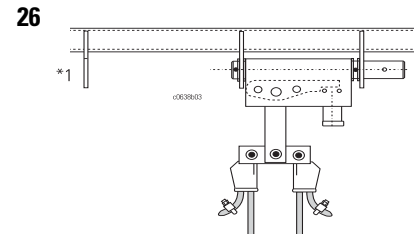
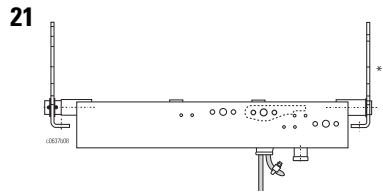




\*1 Gear side

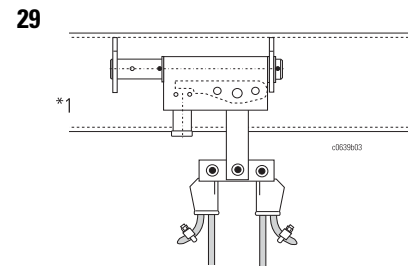
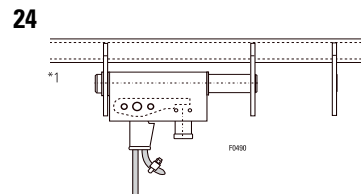
## 3.8 Reeving rope (continued)

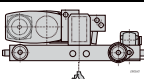

## Rope anchorage

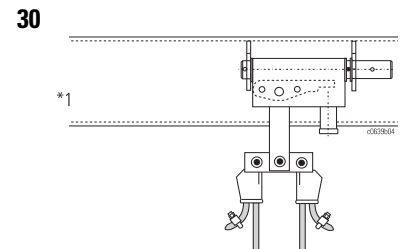
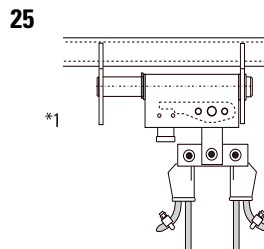
|       |   |  |         |         |    |  |
|-------|---|---|---------|---------|----|--|
|       |   |  |         |         |    |  |
|       |   | SH 3 ex   | SH 4 ex | SH 5 ex |    |  |
| 2/1   | 2 | L1  | -       | -       | -  |  |
|       |   | L2  | 12      | 12      | 12 |  |
|       |   | L3  | 12      | 12      | 12 |  |
|       |   | L4  | -       | -       | -  |  |
| 4/1   | 3 | L1  | -       | -       | -  |  |
|       |   | L2  | 21      | 14      | 22 |  |
|       |   | L3  | 21      | 14      | 22 |  |
|       |   | L4  | -       | -       | 22 |  |
| 4/2-1 | 7 | L1  | -       | -       | -  |  |
|       |   | L2  | 17      | 18      | 17 |  |
|       |   | L3  | 17      | 18      | 17 |  |
|       |   | L4  | -       | -       | 17 |  |



|       |   |  |         |         |    |  |
|-------|---|---|---------|---------|----|--|
|       |   |  |         |         |    |  |
|       |   | SH 3 ex   | SH 4 ex | SH 5 ex |    |  |
| 2/1   | 4 | 24  | 24      | 24      |    |  |
| 4/1   | 5 | 23  | 23      | 23      |    |  |
| 4/2-1 | 8 | L1  | -       | -       | -  |  |
|       |   | L2  | 25      | 25      | 25 |  |
|       |   | L3  | 26      | 26      | 26 |  |
|       |   | L4  | -       | -       | 26 |  |



|       |   |  |         |         |    |  |
|-------|---|---|---------|---------|----|--|
|       |   |  |         |         |    |  |
|       |   | SH 3 ex   | SH 4 ex | SH 5 ex |    |  |
| 2/1   | 4 | 28  | 28      | 28      |    |  |
| 4/1   | 5 | 27  | 27      | 27      |    |  |
| 4/2-1 | 8 | L1  | -       | -       | -  |  |
|       |   | L2  | 29      | 29      | 29 |  |
|       |   | L3  | 29      | 30      | 29 |  |
|       |   | L4  | -       | -       | 29 |  |



\*1 Gear side

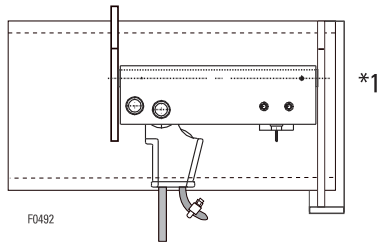
## Rope anchorage

|       |          |    |
|-------|----------|----|
|       |          |    |
|       |          |    |
|       | SH 6     |    |
|       | Length L |    |
| 2/1   | L2-L5    | 32 |
| 4/1   | L2-L5    | 31 |
| 2/2-1 |          | -  |
| 4/2-1 | L2-L5    | 34 |
| 8/2-1 | L3-L5    | 35 |

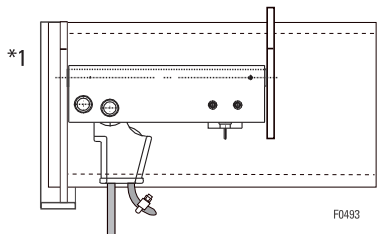
|       |          |    |
|-------|----------|----|
|       |          |    |
|       |          |    |
|       | SH 6     |    |
|       | Length L |    |
| 2/1   | L2-L5    | 32 |
| 4/1   | L2-L5    | 31 |
| 4/2-1 | L2-L5    | 34 |

|       |          |    |
|-------|----------|----|
|       |          |    |
|       |          |    |
|       | SH 6     |    |
|       | Length L |    |
| 2/1   | L2-L5    | 32 |
| 4/1   | L2-L5    | 31 |
| 4/2-1 | L2-L5    | 34 |
| 8/2-1 | L3-L5    | 35 |

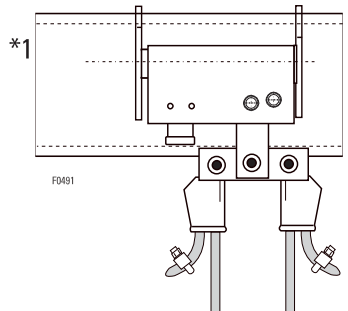
31



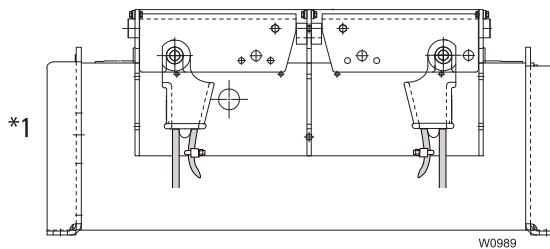
32



34



35



\*1 Gear side

### 4.1 Commissioning

The wire rope hoist has been subjected to a final inspection by the manufacturer in accordance with the EC Machinery Directive.

**Commissioning must be carried out by a qualified person**, see page 2.

The "Safety instructions" on page 4...7 must also be observed.

The following checks must be carried out:



- Check that the wire rope hoist is completed with the original accessories as supplied (e.g. bottom hook block), see page 25.
- Check correct selection and installation of all electrical equipment, see page 22, "Electrical equipment".
- The Ex symbol must be affixed to the hoist or crane.
- Electrical connection, see page 23.
- Check that the seating of fixing screws is firm and secure, see page 9, 12, 14, 17, 55.
- Check correct functioning of runway end stops.
- The direction of motion of the load hook must correspond to the symbols on the control pendant.
- Check the presence and correct functioning of all safety devices.
- Check emergency hoist limit switch or combined operational and emergency hoist limit switch, see page 38.
- Check overload cut-off, see page 41.
- Confirm that commissioning has been duly carried out in the test log book in section "Confirmation of commissioning".
- If the wire rope hoist in conjunction with a crane system is to be subjected to a test load during the acceptance test, the overload cut-off must be deactivated (see 6.7, page 42) see circuit diagram.

Any fundamental alterations and modifications to the wire rope hoist, such as e.g. welding on load-bearing components, structural alterations to load-bearing components, alteration of drives, alteration of speeds and motor outputs, replacing trolleys, etc. must be authorised by the manufacturer, otherwise the declaration of conformity is no longer valid.

Also any work on or additions to the control must be authorised by the manufacturer. The manufacturer cannot accept any liability for malfunctioning after unauthorised work on the control.

Our qualified personnel is available to perform a reacceptance test after authorised modifications.

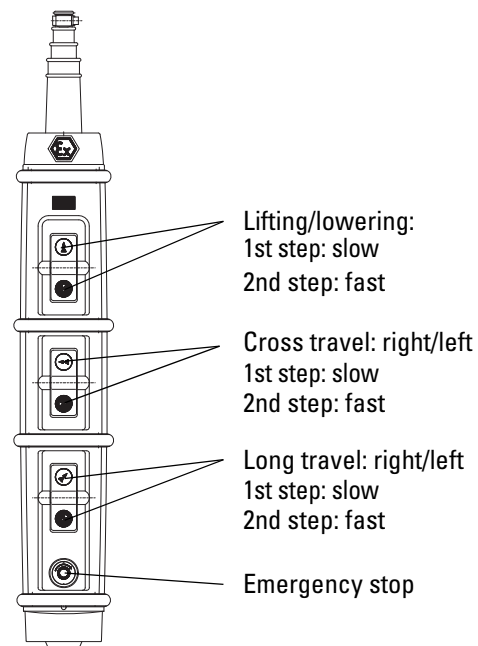
## 5.1 Duties of crane operator

**When working with wire rope hoists, the following points must be observed:**

- Every day before starting work, check brakes and limit switches and inspect the system for any visible defects.
- Stop working with the crane if there are any defects which might prejudice its safety in operation.
- At close of work, secure cranes which are exposed to wind with the wind safeguard mechanism.
- The rope drum must be free of coarse foreign matter.
- Do not move loads above people.
- Do not leave suspended loads unattended, the control pendant must be within easy reach.
- Do not use emergency limit switch during normal operation.
- Do not load above rated capacity.
- Pulling loads at angles, dragging loads, or towing vehicles with the load or load suspension equipment is forbidden!
- Do not heave up any loads which are jammed.
- Approach final positions for hoisting, lowering and travel in normal operation only if an operational limit switch is fitted.
- Inching operation (repeated brief activation of the motor to achieve small movements) is not permissible. Motors and brakes could be subjected to an impermissible temperature rise. This would lead to the temperature control disconnecting and the load could then not be set down for some time. Switchgear and motors could be damaged.
- Do not move in the opposite direction until the hoist has come to a stop.
- Observe the safety instructions, see page 4-7.
- Do not allow load and bottom hook block to hit machines or structural steelwork. In adverse conditions (rust, aluminium, high impact speed) there is a risk of sparking.
- Avoid trolley and crane wheels' slipping due to swinging of load or spinning of drive wheels. There is a risk of sparking and increased temperature rise.

## 5.2 Operating from control pendant

Standard design  
2-step



### Safety note

If the rocker switch is no longer depressed by the operator, it returns to the 0 position, the hoist motion is automatically stopped (dead man's control).  
If the hoist malfunctions, e.g. the actual motion does not correspond to the motion intended in activating the rocker switch, release the rocker switch immediately. If the motion continues, press the emergency stop button.

## 5.3 Emergency stop

Every hoist must have a means of disconnecting the power supply to all drives under load from the ground.

After an emergency stop, the operator must not restart the hoist /crane system until a qualified person has determined that the fault which led to this function being activated has been eliminated and no danger can arise from the continued operation of the system.



- The emergency stop button is on the control pendant.
- Press emergency stop, the system comes to a halt.
- To release the emergency stop: turn the button in the direction shown.



This section deals with operational reliability, availability, and maintaining the value of your wire rope hoist.

Although this wire rope hoist is practically maintenance-free, the components subject to wear (e.g. wire rope, brake) and components important for ensuring explosion protection must be inspected regularly. This is required by the accident prevention regulations.

Inspection and maintenance must be carried out by qualified persons who have received special training in explosion protection, see page 2.



### General information on inspection and maintenance

- Maintenance and repair work may only be carried out when the wire rope hoist is unloaded.
- Before starting, switch off and lock main isolator.

**It is not permitted to work on live parts in areas exposed to explosion hazards!**

### In addition for Zone 21:

- **Dust deposits over 5 mm thick are not permissible.**

If any dust is deposited, it must be removed from indentations, corners and surfaces in good time.

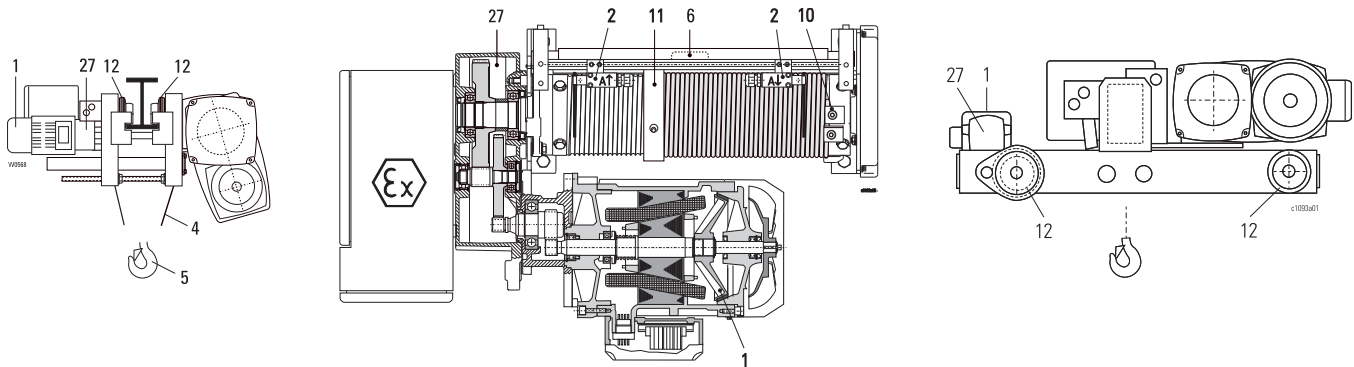
The electrical components (motor, control) and mechanical components (e.g. gear) have a surface temperature of max. 120°C during normal operation at an ambient temperature of 50°C.

A dust deposit of above 5 mm prevents the heat being dispersed sufficiently (insulation) and an impermissible temperature rise will occur on the surfaces and in the adjoining layer of dust.

The operator is obliged to prevent a 5 mm layer of dust by observing the hoist and cleaning operations at suitable intervals.

- **Remove any dust which may be present before carrying out maintenance work!**  
The dust must be removed to prevent it entering any open enclosures of the components during maintenance.
- Periodic tests including maintenance every 12 months, possibly earlier if so prescribed by national regulations, to be performed by a fitter engaged by the manufacturer.
- The specified testing and maintenance intervals apply under normal operating conditions. The testing and maintenance intervals must be adapted accordingly if one or more of the following conditions apply:
  - If after determining the actual use it can be foreseen that the theoretical useful life of the hoist will be less than 10 years
  - Multi-shift operation or heavy duty
  - Adverse conditions (dirt, solvents, temperature etc.)
- If abrasive dusts are present (foundry, cement industry, glass manufacture or processing, etc.) the maintenance intervals for the rope guide (cleaning, lubricating, checking and if necessary replacing tension spring, etc.) must be reduced.
- A general overhaul must be carried out after the useful lifetime has expired.

### 6.1 Inspection intervals



#### 6.1.1 Every day

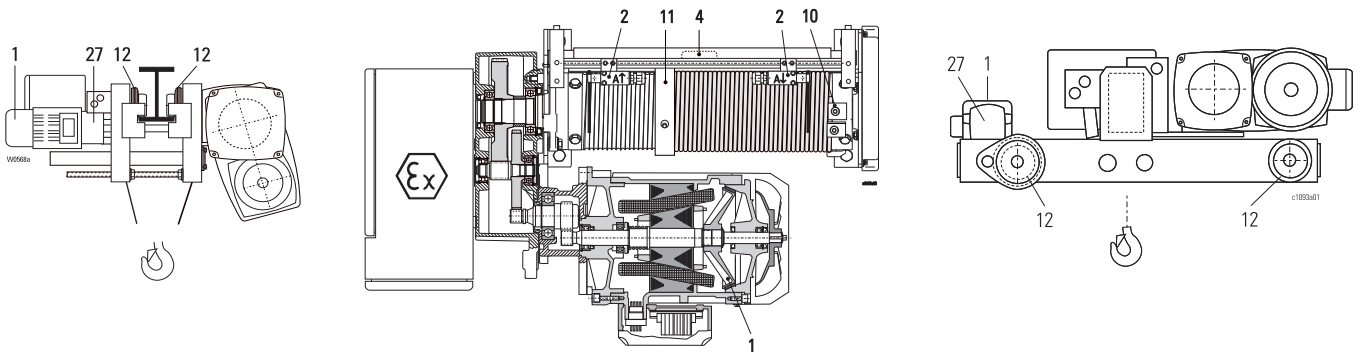
Before starting work

- Check function of brake(s), see pages 36, 37
- Emergency hoist limit switch (2) if there is no operational hoist limit switch, operational hoist limit switch, if any, see page 38
- EMERGENCY STOP, crane switch, see page 22
- Rope (4), see page 44

#### 6.1.2 Once a year

- Check suspension of control pendant (cable and steel wire must be correctly attached)
- Load hook (5), cracks, cold deformation, wear
- Overload cut-off (6), see page 41
- Disconnect switch and main isolator, see page 22
- PE connections and equipotential bonding
- Establish remaining service life, see page 50
- Rope attachment (10), see page 45, rope sheaves, see page 47
- Rope guide (11), see page 44, 46
- Drive parts (12), flanges, wheels etc., see page 48
- Screw connections, welds
- End stops, buffers
- Gear (27), see page 48
- Safety clearances
- Power supply cable
- Cable glands
- Switching functions

## 6.2 Maintenance intervals



### 6.2.1 Once a year

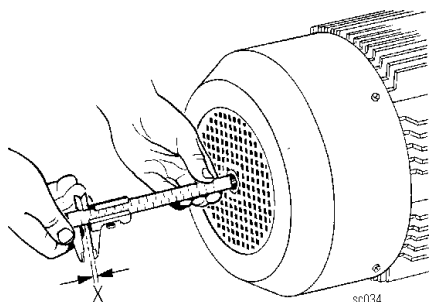
- Brake (20), measure air gap, replace brake disc if necessary, see page 36, 37
- Overload cut-off (21), see page 41
- Grease rope (22) with brush, see page 58
- Grease rope guide (23) with brush, see page 58
- Tighten clamping points for electric cables
- Connection of flameproof panel box, remove condensation if necessary, clean and grease Ex joint

## 6.3 Hoist motor brake

Check brake at regular intervals. The intervals must be adapted in accordance with the application. Too great a brake displacement will lead to a high temperature rise in the motor and mechanical damage.

**Carry out work on the hoist brake only when the hoist is unloaded and the bottom hook block has been set down.**

### 6.3.1 Checking brake

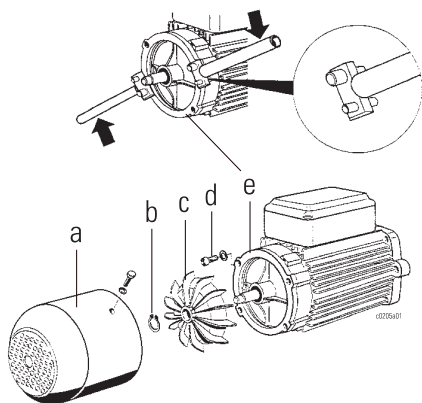


- Measure displacement of motor shaft, switching motor on briefly, see sketch.

The displacement of the motor shaft is the difference between the dimension fan cover → motor shaft when running (L1) and fan cover → motor shaft when standing still (L2) ( $X = L1 - L2$ ). The dimensions L1, L2 differ for different motors. The minimum displacement must not be less than X min. to prevent the brake disc touching during normal operation. The max. displacement must not exceed X max..

|       | Hoist motor |      |      |
|-------|-------------|------|------|
|       | A2ex        | A4ex | A6ex |
| X min | 0.7         | 1.0  | 1.5  |
| X max | 2.5         | 2.5  | 3.0  |

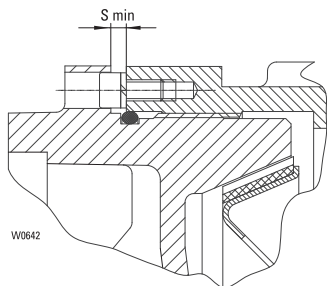
### 6.3.2 Adjusting brake



1. Measure displacement of motor shaft.
2. Remove fan cover (a), fanwheel (c) and unscrew screws (d).
3. Rotate motor cover (e) clockwise, keeping the holes aligned, until the minimum permissible brake displacement has been reached. One rotation of the motor cover reduces the brake displacement by 2 mm.
- Do not use force when rotating the cover. The Ex joints could be damaged!**
4. Replace motor cover with screws (d).
5. Push fanwheel (c) onto motor shaft and lock with lock washer (b).
6. Replace fan cover (a)

- We recommend using our special tool for rotating the motor cover. see sketch

- **If dimension S min. has been reached, replace brake disc.**



|       | Hoist motor |       |       |
|-------|-------------|-------|-------|
|       | A2 ex       | A4 ex | A6 ex |
| S min | 3,2         | 5     | 2.1   |

**All socket head cap screws must be grade 8.8.**

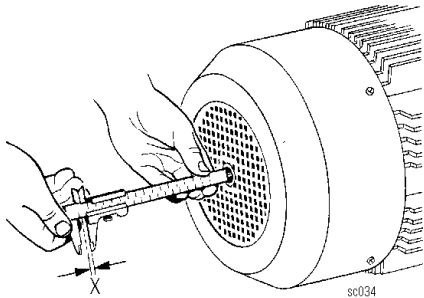
## 6.4 Travel motor brake

Check brake at regular intervals. The intervals must be adapted in accordance with the application. Too great a brake displacement will lead to a high temperature rise in the motor and mechanical damage.

- Move trolley into a secure position.

### 6.4.1 Testing brake

- Measure displacement of motor shaft, switching motor on briefly, see sketch



The displacement of the motor shaft is the difference between the dimension fan cover → motor shaft when running (L1) and fan cover → motor shaft when standing still (L2) ( $X = L1 - L2$ ). The dimensions L1, L2 differ for different motors. The minimum displacement must not be less than X min. to prevent the brake disc touching during normal operation. The max. displacement must not exceed X max..

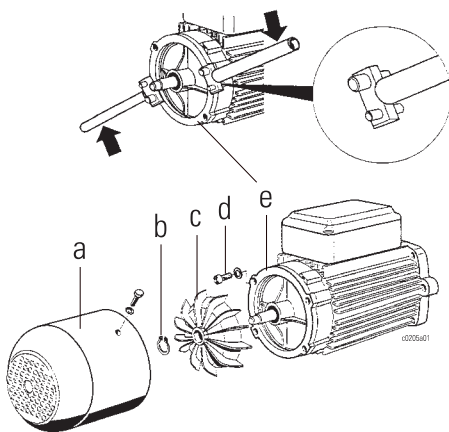
|       | Travel motor |       |      |
|-------|--------------|-------|------|
|       | A05          | A1 ex | A2ex |
| X min | 0.7          | 0.7   | 0.7  |
| X max | 2.5          | 2.5   | 2.5  |

### 6.4.2 Adjusting brake

1. Measure displacement of motor shaft.
2. Remove fan cover (a), fanwheel (c) and unscrew screws (d).
3. Rotate motor cover (e) clockwise, keeping the holes aligned, until the minimum permissible brake displacement has been reached. One rotation of the motor cover reduces the brake displacement by 2 mm.

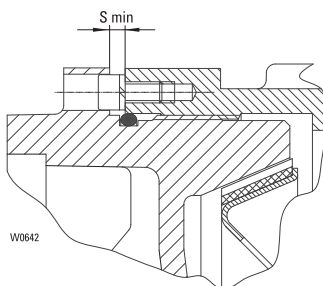
**Do not use force when rotating the cover. The Ex joints could be damaged!**

4. Replace motor cover with screws (d).
5. Push fanwheel (c) onto motor shaft and lock with lock washer (b).
6. Replace fan cover (a).



- We recommend using our special tool for rotating the motor cover. see sketch

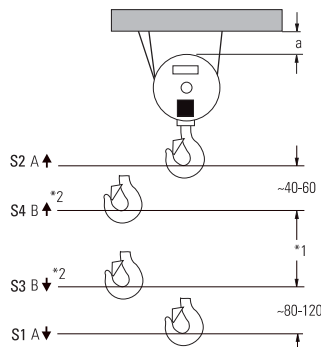
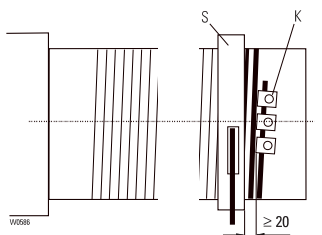
- If dimension S min. has been reached, replace brake disc.



|       | Travel motor |       |       |
|-------|--------------|-------|-------|
|       | A05 ex       | A1 ex | A2 ex |
| S min | 0.8          | 0.8   | 3.2   |

**All socket head cap screws must be grade 8.8.**

## 6.5 Hoist limit switch



|  | a [mm] |       |
|--|--------|-------|
|  | 50 Hz  | 60 Hz |
|  | 130    | 150   |
|  | 70     | 80    |
|  | 40     | 50    |



### 6.5.1 Description of system

The wire rope hoist is equipped as standard with an **emergency hoist limit switch** for disconnecting in top and bottom hook position. (Switching points A↑ and A↓). The gear limit switch (GE-SG ex) is installed on the bearing side of the rope drum on stationary wire rope hoists SH3 - SH5. On a stationary wire rope hoist SH6 and a wire rope hoist with trolley or crab it is mounted on the gear. If the original manufacturer's controls/circuit diagrams are used, the corresponding hoisting direction and the cross and long travel if any are disabled when the limit switch is activated. The opposing hoisting direction is clear.

An additional **operational hoist limit switch** for disconnecting in top and bottom hook position during normal operation can be fitted as an option. (Additional switching points B↑ and B↓).

The control includes a lockable self-resetting key switch (override switch U) for checking the emergency hoist limit switch.

If the operational limit switch fails, the hoist can only leave the end position by activating this key switch (U). The key must be kept separate.

### 6.5.2 Testing emergency hoist limit switch

- Test at fast and creep speed without load.
- 1 Activate the **"up" button** on the control pendant carefully, observing the hoisting motion, until the limit switch disconnects in top hook position (A↑).
  - 2 Minimum clearance "a" between bottom hook block and nearest obstacle, see table, if necessary reset the limit switch, see page 39.
  - 3 Press the **"down" button** and check bottom hook position in the same way.
  - 4 Minimum clearance between rope guide (S) and clamping claws (K) for rope anchorage = 20 mm, see sketch, if necessary reset limit switch, see page 39.

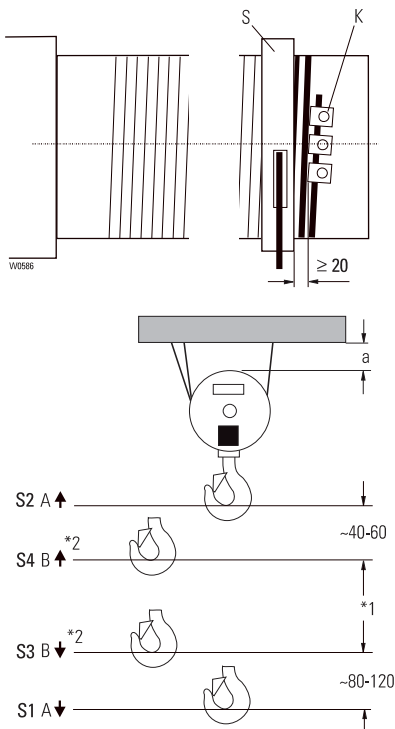
### 6.5.3 Testing combined operational and emergency hoist limit switch

- Test at fast and creep speed without load.
- 1 Activate the **"up" button** on the control pendant carefully, observing the hoisting motion, until the limit switch disconnects in the highest operational hook position (B↑).
  - 2 Press override button (U) on control pendant and at the same time the "up" button until the **emergency limit switch** disconnects (A↑). If the hoist does not continue to move, the emergency limit switch was activated in step 1 and the operational limit switch is not working.
  - 3 Minimum clearance "a" between bottom hook block and nearest obstacle, see table.
  - 4 Press **"down" button** and override button (U) to leave the end position.
  - 5 Press **"down" button** and check bottom hook position in the same way.
  - 6 Minimum clearance between rope guide (S) and clamping claws (K) for rope anchorage = 20 mm, see sketch, if this is not the case, reset limit switch.
- The clearances between the switching points for operational and emergency limit switches are set for normal operating conditions, however they can be adjusted if necessary.

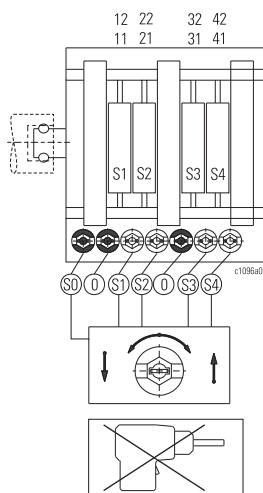
\*1 Effective hook path with operational limit switch

\*2 Option

## 6.5 Hoist limit switch (continued)



|  |              | a [mm] |       |
|--|--------------|--------|-------|
|  |              | 50 Hz  | 60 Hz |
|  | 1/1<br>2/2-1 | 130    | 150   |
|  | 2/1<br>4/2-1 | 70     | 80    |
|  | 4/1          | 40     | 50    |



## 6.5.4 Setting limit switch

The cover of the limit switch must be removed to set the contacts. This exposes live contact connections. There is thus a danger of contact with live parts!

**It is not permitted to work on live parts in areas exposed to explosion hazards!**

The limit switch can be adjusted at the setscrews (S1)-(S2) or (S1)-(S4):  
 Turning to the left: switching point is moved "downwards",  
 Turning to the right: switching point is moved "upwards".

### Adjusting en bloc

All the cam discs can be moved together with the aid of the black setscrew (S0). The settings of the individual contacts relative to one another remain unchanged.

**Set the limit switch using a screwdriver and without using excessive force. Do not use a power screwdriver or similar.**

- Adjust the switching points in the following sequence:

### Emergency hoist limit switch

- A↑ (S2)
- A↓ (S1)

### Combined operational and emergency hoist limit switch:

- A↑ (S2)
- B↑ (S4)
- A↓ (S1)
- B↓ (S3)

### Switching point A↑ (S2)

#### "Emergency limit switch top hook position"

- Lift bottom hook block 2/1 to a+10 mm or to a+5 mm for 4/1 (sketch, table).  
If necessary turn setscrew (S2) to the right beforehand.
- Turn setscrew (S2) to the left until contact S2 switches audibly.
- Check cut-off point in main and creep hoist

### Switching point B↑ (S4)

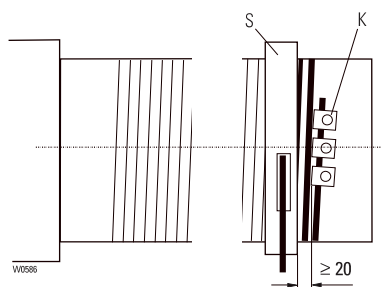
#### "Operational limit switch top hook position"

(Minimum clearance to A↑ 60 mm for 2/1, 40 mm for 4/1)

- Lift bottom hook block 2/1 to 10 mm, or to 5 mm for 4/1, below the desired cut-off point, if necessary turn setscrew (S4) to the right beforehand.
- Turn setscrew (S4) to the left until contact S4 switches audibly.
- Check cut-off point in main and creep hoist

\*1 Effective hook path with operational limit switch  
 \*2 Option

## 6.5.4 Setting hoist limit switch (continued)



### Switching point A↓ (S1)

#### "Emergency limit switch bottom hook position"

(Minimum clearance between rope guide (S) and clamping claws (K) for rope anchorage = 20 mm, see sketch)

Set bottom hook position so that the bottom hook block does not touch the ground (would cause slack rope).

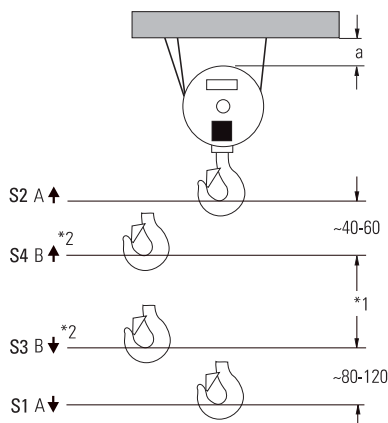
- Lower bottom hook block 2/1 to 120 mm, or 60 mm for 4/1, above desired hook position, if necessary turn setscrew (S1) to the left beforehand.
- Turn setscrew (S1) to the right until contact S1 switches audibly.
- Check cut-off point in main and creep hoist.

### Switching point B↓ (S3)

#### "Operational limit switch bottom hook position"

(Minimum clearance to A↑ 120 mm for 2/1, 80 mm for 4/1)

- Lower bottom hook block 2/1 to 120 mm, or 60 mm for 4/1, above desired hook position, if necessary turn setscrew (S3) to the left beforehand
- Turn setscrew (S3) to the right until contact S3 switches audibly
- Check cut-off point in main and creep hoist.



|  |       | a [mm] |       |
|--|-------|--------|-------|
|  |       | 50 Hz  | 60 Hz |
|  | 1/1   | 130    | 150   |
|  | 2/2-1 |        |       |
|  | 2/1   | 70     | 80    |
|  | 4/2-1 |        |       |
|  | 4/1   | 40     | 50    |

**Safety note:**  
Incorrectly set limit switches may cause serious accidents!

## 6.5.5 Servicing gear limit switch

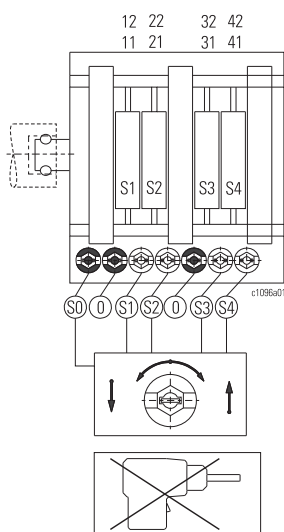
Maintenance work is restricted to checking the cut-off points. No maintenance or inspection is necessary for the gear limit switch itself.



Any dust deposits that may be visible when the housing is opened must on no account be removed with compressed air as this would force the dust into the contacts and impair the switching function and provoke an explosion.

**On no account must benzene or other solvents be used to clean the limit switch!**

Close hoist limit switch tightly after carrying out maintenance work!

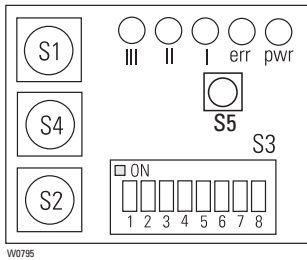


\*1 Effective hook path with operational limit switch

\*2 Option



## 6.6 Overload cut-off



### 6.6.1 Description of system

The SLE2 overload cut-off with mechanical sensor is set in the factory. Corrections are only permitted in special cases.

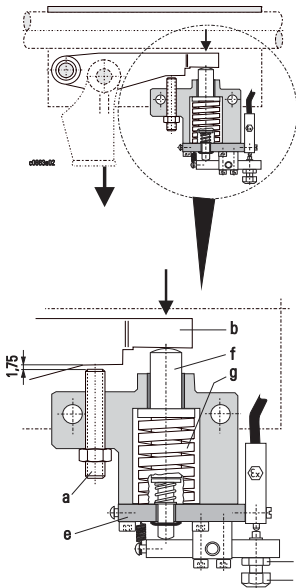
The factory settings are shown on a sketch under the front cover of the evaluation device.

### 6.6.2 Testing overload cut-off

If an overload is detected, the wire rope hoist is switched off in the upwards direction. Only lowering is then possible. Lifting is not possible until the wire rope hoist has been unloaded.

- Attach rated load +10% overload and take load up slowly. After the rope has been tautened the overload cut-off must disconnect the hoist.

### SH4 ex



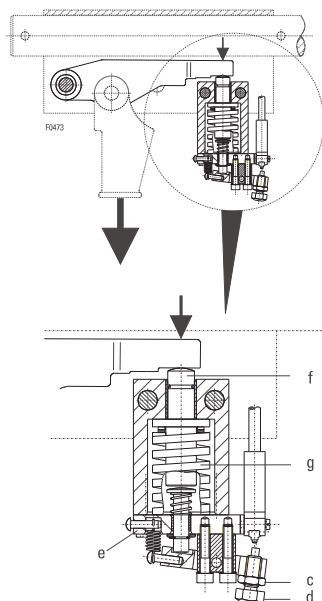
### 6.6.3 Maintenance of overload cut-off

- Clean, check and grease spring bolt guide (f).
- The setting of adjusting screws (a) and (d) must not be altered.

In the case of excessive deposits of dirt, the overload device must be dismantled.

- Unscrew spring plate (e)
- Remove spring bolt (f) and spring (g) from housing
- Clean and reassemble parts.
- The overload cut-off must then be reset.

### SH3 ex, SH5 ex, SH6 ex



### 6.6.4 Adjusting overload cut-off

1. Screw down stop screw (a) under load (110%) until it touches lever (b).
2. Unscrew stop screw (a) by 1 turn (1.75 mm) and lock with nut.
3. Unscrew nut (c).
4. Adjust overload cut-off with adjusting screw (d) so that it switches off at 10% overload.  
(Turning to the left = higher load, turning to the right = lower load).
5. Lock screw (d) with nut (c).
6. Check cut-off.
7. Mark the position of adjusting screw (d) and secure with lacquer.

## 6.7 Crane test

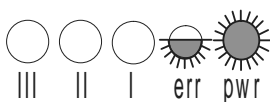
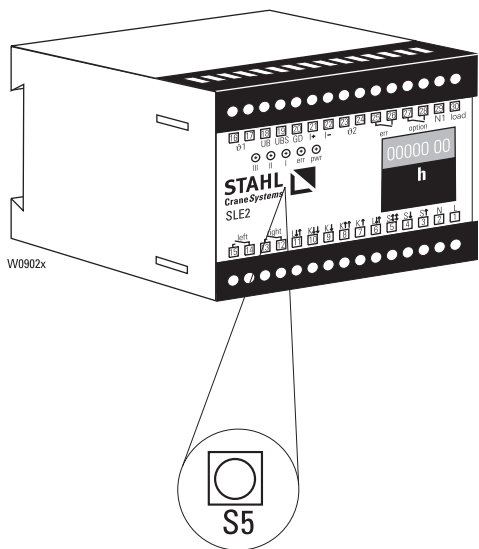
The SLE is mounted in the flameproof enclosure (Ex d).  
 Work on and in the Ex d enclosure may only be carried out by qualified personnel trained in explosion protection!

The Ex d enclosure is under the larger of the two covers on the panel box.


**Pay attention to explosion hazards, if necessary contact the site safety officer.**



1. Carefully remove front cover of evaluation device.
2. The cut-off point is increased by pressing button (S5) permitting the test load of 125% to be lifted.



Button (S5) pressed.  
 Cut-off threshold is raised.



**Safety note:**  
**Extremely heavy loads can be lifted.**  
**Risk of accident!**

The device automatically returns to the original cut-off point after 30 minutes.

### 6.8 Rope drive

#### 6.8.1 Rope and rope attachment

After commissioning a new wire rope hoist, or after replacing the rope, the rope of multi-fall hoists may twist. This can be seen from the bottom hook block turning, particularly when unloaded.

Twisting in the rope prejudices safety and service life.

#### Remove any twists!

- Regularly inspect the rope for twisting. To do so, run the hoist into highest and lowest hook positions without load.
- If any twisting is detected, untwist the rope immediately. see page 25, "Reeving rope" and see page 45, "Removing rope".
- Check rope. Take particular note of the sections of rope near rope pulleys, return pulleys or equalizing pulleys and in the region of the rope anchorage.
- If any of the following damage occurs, replace the rope immediately
- - 1 Excess visible wire fractures, see page 44, table.
  - 2 Nest of wire fractures or broken strand.
  - 3 Diameter reduced by 10% due to corrosion or wear (independent of breakage).
  - 4 Diameter reduced due to structural changes over considerable sections.
  - 5 Formation of baskets or loops, knots, necking, kinks or other mechanical damage.
  - 6 Corkscrew-type deformation. Divergence due to deformation:  $\geq 1/3x$  rope diameter.
  - 7 In addition, the rope must be replaced as required by DIN 15020, FEM 9.661 and ISO 4309.
  - 8 In certain applications (e.g. twist-free wire rope, constant deadweight, recurrent stopping position, automatic operation etc.) wire fractures may occur inside the rope without being visible from outside.



When checking the area of rope subject to the greatest use, bend the rope with a moderate radius of bend. The gap arising between the outer strands permits some of the inner strands to be seen. If any broken wires are ascertained on the inner strands, the rope must be replaced.

#### Risk of accident!

In case of doubt please contact the manufacturer.

## 6.8 Rope drive (continued)

### 6.8.2 Replacement of wire rope due to broken wires

#### Twist-free wire rope

|  |         |        |        |        |        |       |
|--|---------|--------|--------|--------|--------|-------|
| Rope diameter [mm]                                   | 5.5     | 7      | 9      | 12     | 14     | 20    |
| Number of external strands                           | 12      | 12     | 15     | 15     | 15     | 18    |
| Rope make-up *                                       | 18X7+SE | d1315z | d1315z | d1315z | d1315z | d1318 |
| Broken wires visible 1Bm, 1Am<br>(FEM 9.661) 2m - 4m | 4       | 4      | 5      | 5      | 5      | 6     |
| over a length of [mm]                                | 33      | 42     | 54     | 72     | 84     | 120   |
| or   |         |        |        |        |        |       |
| Broken wires visible 1Bm, 1Am<br>(FEM 9.661) 2m - 4m | 8       | 8      | 10     | 10     | 10     | 11    |
| over a length of [mm]                                | 165     | 210    | 270    | 360    | 420    | 600   |

#### Non-twist-free wire rope

|  |       |       |       |           |           |       |       |        |
|--|-------|-------|-------|-----------|-----------|-------|-------|--------|
| Rope diameter [mm]                                   | 5.5   | 7     | 9     | 9         | 12        | 12,5  | 14    | 20     |
| Number of external strands                           | 6     | 8     | 8     | 8         | 8         | 8     | 8     | 8      |
| Rope make-up *                                       | 6x19W | 8x19W | 8x19W | Alphalift | Turbolift | 8x19W | 8x19W | 8x36WS |
| Broken wires visible 1Bm, 1Am<br>(FEM 9.661) 2m - 4m | 5     | 6     | 6     | 6         | 9         | 6     | 6     | 12     |
| over a length of [mm]                                | 33    | 42    | 54    | 54        | 72        | 75    | 84    | 120    |
| or   |       |       |       |           |           |       |       |        |
| Broken wires visible 1Bm, 1Am<br>(FEM 9.661) 2m - 4m | 10    | 13    | 13    | 13        | 18        | 13    | 13    | 24     |
| over a length of [mm]                                | 165   | 210   | 270   | 270       | 360       | 375   | 420   | 600    |

\* See data sheet for rope make-up

#### 6.8.3 Removing rope guide

1st method (preferable!)

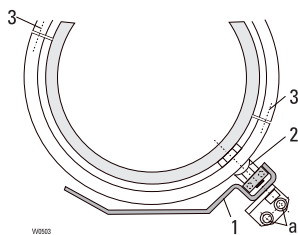
- Unscrew protective plate (1) under the rope drum at points (a). The rope guide can then be rotated freely. Do **not** unscrew stop with bearing (2)!
- Unscrew screws (3).
- Unscrew rope guide safety cable (4) (if any) on one side.
- Remove half-rings.
- Unhook rope tensioning spring.

2nd method

- Unscrew stop with bearing (2) from rope guide. The rope guide can then be rotated freely. Continue as described under 1.

**Caution:** The stop with bearing (2) is locked with a conical spring washer DIN 6796. This must be refitted correctly.

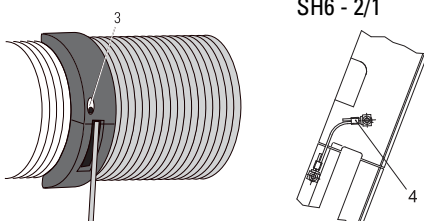
SH3 - SH5



SH6



SH6 - 2/1



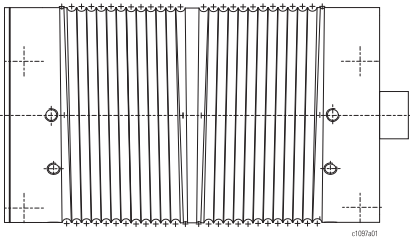
## 6.8.4 Replacing wire rope

SHex wire rope hoists have a special rope which is the optimum for the most common applications. The substitute rope must be equivalent to the original in terms of quality, strength and make-up. Please consult the works certificate or the rope certificate to see which rope is fitted.



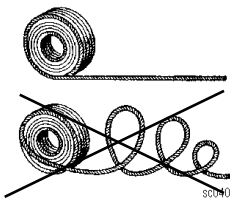
In the case of 2 wire ropes with different lays

- wire rope with right-hand lay (DS1) on rope drum with left-hand groove
- wire rope with left-hand lay (DS2) on rope drum with right-hand groove
- The direction of lay of the wire ropes makes a V-pattern (see sketch).



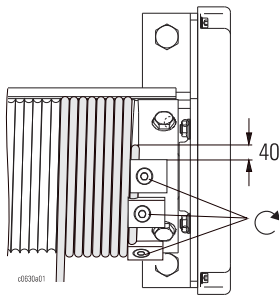
### Removing rope

- Lower bottom hook block to just above the lowest hook position and set it down on a firm support.
- Release end of wire rope in rope anchorage (rope clamp with rope wedge).
- Run the remaining rope off the drum.
- Unscrew the fixing screws in the clamping plates on the rope drum.




### Fitting rope

- Unroll new rope out straight if possible, without twists, kinks or loops. Protect rope from dirt.
- Attach rope to rope drum with all the clamping plates (do not forget the lock washers!) Allow the rope end to project by approx. 30-40 mm.
- Tightly wind about 5-10 turns onto the drum under power. Let the rope run through a greased rag. For type of grease see page 58.
- Fit rope guide, see page 46 "Fitting rope guide".
- Reeve the loose end of the rope according to the number of falls, fasten with the rope wedge and secure with a rope clamp, see page 27, "Rope anchorage".
- Retighten clamping plates. For tightening torques see table.
- Run rope in with partial load.



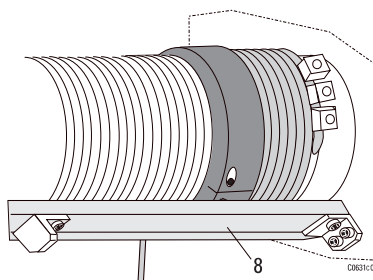
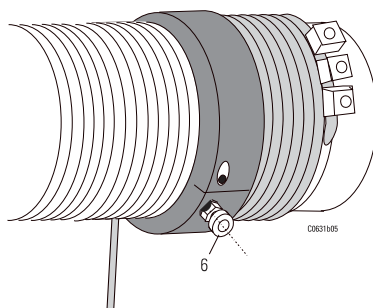
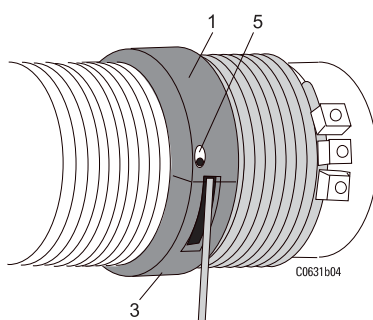
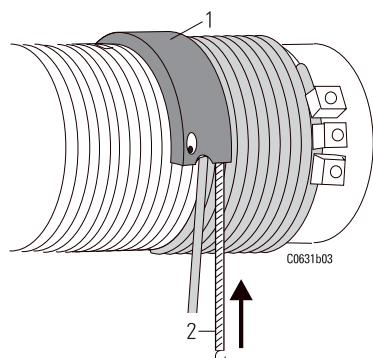
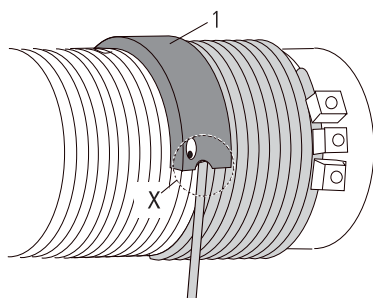
### Caution! Risk of accident!

- After fitting a new rope, or shortening the old one, reset the hoist limit switch. See page 38, "Setting hoist limit switch".
- If the new rope twists after some time in operation, untwist the rope immediately. See page 25, "Reeving rope" and "Removing rope".

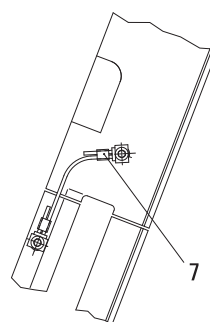
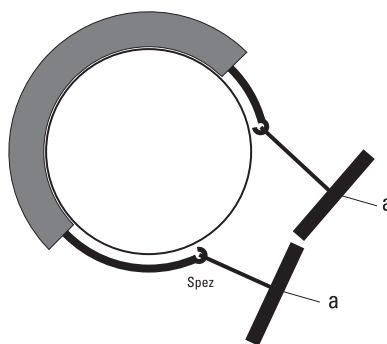
| Type | M.. |  |
|------|-----|---|
|      |     | Nm  |
| SH 3 | M6  | 10  |
|      | M10 | 40  |
| SH 4 | M10 | 50  |
| SH 5 | M10 | 50  |
|      | M12 | 87  |
| SH 6 | M12 | 87  |
|      | M16 | 210   |

## 6.8 Rope drive (continued)

### 6.8.5 Fitting rope guide



- Grease thread and rope guide groove thoroughly.
- Place the half-ring (1) with the short window section onto the rope drum next to the last rope winding so that the rope exits from the region of the window (x).
- Push rope tensioning spring (2) into the guide groove of the half-ring (1) and hook the ends of the spring together. A special tool (a), see sketch, will make this easier.
- Place the second half-ring (3) with the long rope exit window on the rope drum so that the rope exits from the drum groove through the window straight and without kinking. The second half-ring must lie flush against the first.
- Bolt the two half-rings together with pressure screws and bolts (5)
- **The rope guide must rest lightly on the drum and be able to be turned by hand. If this is not the case the guide has been fitted incorrectly or the rope drum is damaged.**
- Bolt stop with bearing and conical spring washer (6) to the rope guide.
- Fit rope guide safety catch (7) (SH6 - 2/1 L4-L5)
- Bolt on protective plate (8).



## 6.8.6 Inspection and maintenance of rope sheave

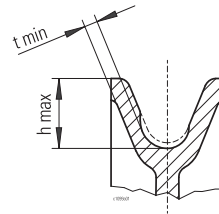
- Check rope sheaves for wear. We recommend having them checked by personnel trained by us. They should also be checked for easy running, indicating that the ball bearings are in good condition.

Wear on grooves in rope sheaves

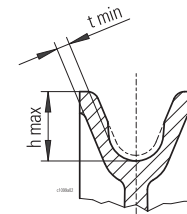
Notes on limits for wear

| Rope sheave    |       |       |       |       |
|----------------|-------|-------|-------|-------|
| Part number    | D new | t min | h max | h new |
| 01 430 01 53 0 | 98    | 4     | 13    | 11    |
| 01 430 04 53 0 | 100   | 4     | 13    | 10    |
| 01 430 00 53 0 | 125   | 4     | 14    | 12    |
| 22 330 00 53 0 | 140   | 4     | 16    | 14    |
| 01 430 06 53 0 | 152   | 4     | 21.5  | 19.5  |
| 03 330 20 53 0 | 160   | 4     | 19    | 16.5  |
| 24 330 00 53 0 | 200   | 5.5   | 24    | 21    |
| 01 430 05 53 0 | 218   | 5.5   | 26.5  | 24.5  |
| 01 430 03 53 0 | 225   | 5.5   | 24    | 21    |
| 03 330 40 53 0 | 250   | 5.5   | 28    | 25    |
| 25 330 00 53 0 | 375   | 6.5   | 37.5  | 34    |
| 25 330 03 53 0 | 375   | 6.5   | 36    | 32.5  |
| 46 330 00 53 0 | 400   | 7     | 33.5  | 30    |
| 26 330 01 53 0 | 450   | 10    | 39    | 35    |
| 09 430 00 53 0 | 450   | 10    | 39    | 35    |
| 46 330 01 53 0 | 480   | 10    | 36.5  | 32.5  |

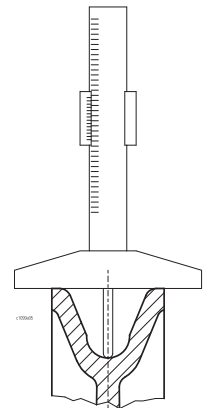
on one side and at base



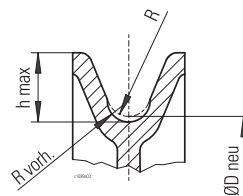
on both sides and at base



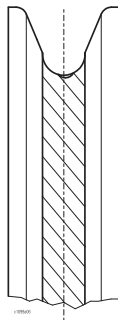
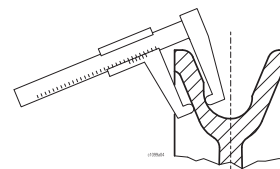
Measuring depth of base of groove with depth gauge



on both sides and at base



Measuring thickness of wall with special caliper gauge



The rope sheave must be replaced if the wall thickness as measured is  $< t_{min}$  or the groove depth as measured is  $> h_{max}$ . Furthermore, the rope sheave must be replaced when replacing the wire rope if the rope strands have dug into the base of the groove. Impressions of single wires are acceptable.

A rope sheave must also be replaced if the radius of the base of the groove  $R$  has become too small for the new rope due to reduction in diameter of the old rope or wear.

### N.B.

The negative profile of the rope in the base of the groove may provide optimum contact to the wire rope currently fitted.

Rope sheaves should be rotated without load on the rope to check the easy and concentric running of the bearings.

### Bottom hook blocks

The bottom hook block must be checked for damage. Deformations, cracks and cuts caused by impact must be assessed.

The damage can only be assessed by trained maintenance personnel.

The causes of damage indicating impact and friction stresses must be ascertained. If this type of stress is to be expected during normal operation of the hoist, measures must be taken to eliminate this risk. Retrofitting the bottom hook block with a low-sparking metal coating should be considered.

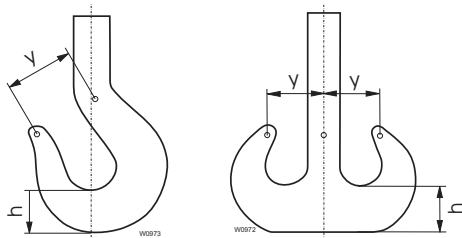
There is a risk of impact sparks if bottom hook blocks swing and hit structural steelwork. Rusty steelwork and/or light metal increases the risk.

### In addition for Zone 21:

There is a risk that dust may collect inside the protective covers of bottom hook blocks and may damage the roller bearings of the rope sheaves. This may lead to a temperature rise in the bearings. Dust deposits in bottom hook blocks must therefore be eliminated. Replace any bearings which have become stiff due to dust deposits.



6.8 Rope drive (continued)



6.8.7 Checking load hook

|                   |       |       |       |       |      |      |      |       |       |       |       |      |       |       |       |       |
|-------------------|-------|-------|-------|-------|------|------|------|-------|-------|-------|-------|------|-------|-------|-------|-------|
| RSN.<br>RS. RF    |       |       |       |       |      |      |      |       |       |       |       |      |       |       |       |       |
|                   | 0.25  | 0.4   | 0.5   | 0.8   | 1    | 1.6  | 2.5  | 4     | 5     | 6     | 10    | 2.5  | 4     | 5     | 6     | 10    |
|                   | [mm]  |       |       |       |      |      |      |       |       |       | [mm]  |      |       |       |       |       |
| h                 | 24    | 29    | 31    | 37    | 40   | 48   | 58   | 67    | 75    | 85    | 106   | 58   | 67    | 75    | 85    | 106   |
| h <sub>min.</sub> | 18.24 | 27.55 | 29.45 | 35.15 | 38.0 | 45.6 | 55.1 | 63.65 | 71.25 | 80.75 | 100.7 | 55.1 | 63.65 | 71.25 | 80.75 | 100.7 |

$y_{neu}$  see hook certificate

$y_{zul} \leq 1,1 \times y_{neu}$

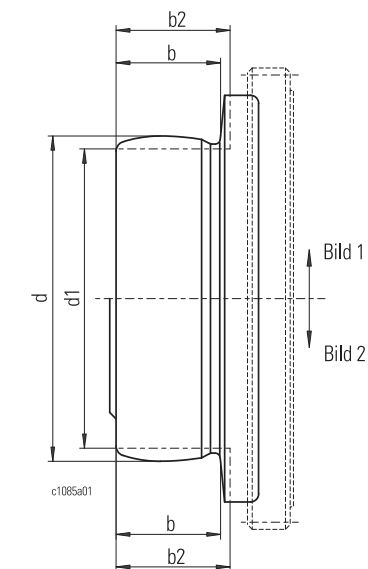
If value  $h_{min}$  and/or  $y_{zul}$  are reached → replace hook

6.9 Trolley/crab

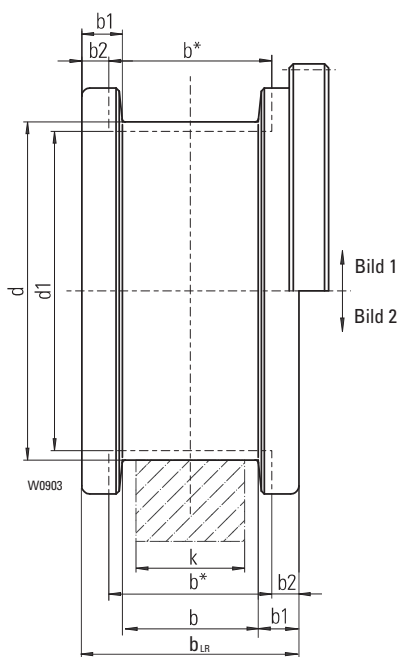
Wheels, wheel drive and runway

- Visual inspection of wheels for wear. See tables for limits for wear.
- Visual inspection of runway girder for wear.
- Visual inspection of wheel flanges for wear.

A high degree of wear on the flanges indicates that the trolley cants or is running with its weight heavily on one side. The causes of this must be ascertained and eliminated. The running characteristics can be improved by using a guide system. This avoids abrasion and the play of the track gauge can be reduced.



| Fig. | Nominal value |        | Limit for wear |         |
|------|---------------|--------|----------------|---------|
|      | d [mm]        | b [mm] | d1 [mm]        | b2 [mm] |
| 1    | 80            | 27.5   | 76             | 29.5    |
| 1    | 100           | 33     | 95             | 35      |
| 1    | 125           | 38     | 119            | 40      |
| 1    | 140           | 44.5   | 133            | 47      |
| 2    |               | 42.5   |                | 45      |
| 1    | 160           | 44.5   | 152            | 47      |
| 2    | 200           | 42.5   | 190            | 45      |



| Fig. | d   | Nominal value |    | Limit for wear |     |           |        |      |                 |      |
|------|-----|---------------|----|----------------|-----|-----------|--------|------|-----------------|------|
|      |     | bLR           | b  | k              |     | b1        | d1     | b2   | max play = b*-k |      |
|      |     |               |    | min            | max |           |        |      | kmin            | kmax |
| [mm] |     |               |    |                |     |           |        |      |                 |      |
| 1    | 100 | 80            | 50 | 40             | 45  | 15        | 95     | 5.5  | 13              | 13   |
|      |     | 80            | 60 | 50             | 55  | 10        |        | 5.5  | 13              | 13   |
| 2    | 125 | 80            | 50 | 40             | 45  | 15        | 118.75 | 7    | 13              | 13   |
|      |     | 80            | 60 | 50             | 55  | 10        |        | 7    | 13              | 11   |
| 2    | 160 | 85            | 52 | 40             | 45  | 16.5      | 152    | 8    | 16              | 16   |
|      |     | 85            | 62 | 50             | 55  | 11.5      |        | 13.5 | 18              | 18   |
| 2    | 200 | 100           | 54 | 40             | 45  | 23        | 190    | 10.5 | 18              | 18   |
|      |     | 100           | 64 | 50             | 55  | 18        |        | 10.5 | 18              | 18   |
|      |     | 100           | 74 | 60             | 65  | 13        |        | 10.5 | 18              | 14   |
| 2    | 315 | 115           | 54 | 40             | 45  | 30.5 (29) | 300    | 13.5 | 18              | 18   |
|      |     | 115           | 64 | 50             | 55  | 25.5 (24) |        | 13.5 | 18              | 18   |
|      |     | 115           | 74 | 60             | 65  | 20.5 (19) |        | 13.5 | 18              | 18   |
| 2    | 400 | 118.5         | 65 | 50             | 55  | 27.5 (26) | 385    | 16   | 20              | 20   |
|      |     | 118.5         | 75 | 60             | 65  | 22.5 (21) |        | 16   | 20              | 20   |
|      |     | 118.5         | 85 | 70             | 75  | 17.5 (16) |        | 16   | 16.5            | 11.5 |

If any one of the limits for wear d1, b2, (b\*-k) is attained, the part must be replaced.

( ) with machined surfaces



### 6.9 Trolley/crab (continued)

#### Wheels, wheel drive and runway

- Inspection of lower flange on cranes with sectional gider  
The running surface of the trolley wheels must be checked for uneven wear and the causes of any such wear ascertained. Driven wheels must not display any slippage to the running surface which would cause increased abrasion and temperature rise.
- Inspection of rails on cranes and crane runways  
The rails must be laid parallel within the permissible tolerances (see page 20) to prevent the crab or crane jamming. Rail joints must provide a smooth surface to avoid impact and deformation.
- Inspection of buffer and buffer stop.  
Ensure that the buffer impact is taken up by the centre of the stop elements provided and that the materials exhibit no detrimental characteristics, see page 19, 20.
- Check roller bearings in wheel for uneven running and abnormal noises. Move trolley/crab and spin wheels if possible.

### 6.10 Gear



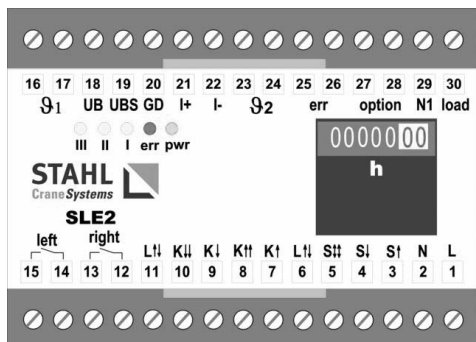
The gearing of SH ex hoists is hardened, hard-machined and has a high safety factor. With their minimum classification of 1 Am or 2 m to FEM 9.511 the gears have a long service life. All bearing points have roller bearings. The gearboxes are tightly closed (without air vent screw); as this prevents the exchange of air, the gear oil retains its full lubricity for a long time.

- During annual maintenance, check whether any oil has leaked (puddle of oil underneath the gear, drops of oil on the gearbox). If any loss of oil is ascertained, the oil must be changed and repairs scheduled if necessary.
- Note any gear noises from the hoist when under load and without load. Rough, noisy running, knocking sounds indicate possible faults. (See "Noise level" for information on normal noise level.)  
If any faults are detected, repairs must be scheduled. If there is any uncertainty, a fresh diagnosis can be made after consulting other experts, e.g. from the manufacturer.

## 6.11 Remaining service life

According to FEM 9.755, the operating mode and operating time must be established by the user and recorded in the test log book in order to calculate the remaining service life. After the service life has expired a general overhaul (S.W.P.) \*1 must be carried out.

Wire rope hoists are equipped ex factory with a suitable registration device.



### 6.11.1 Operating hours counter in SLE2 evaluation device

The operating hours counter in the evaluation device of the overload cut-off adds up the operating time of the hoist. In order to obtain the lifetime expired in full load hours, the operating hours must be calculated with load factor "k".

This is carried out by qualified personnel, see page 2, during the annual "periodic test".

If 90% of the theoretical full load lifetime has expired, a general overhaul (GO) must be scheduled and carried out at the earliest possible date..

### 6.11.2 STAHL SMC Multicontroller (optional)

The operating time of the hoist and the full load operating hours are recorded in the SMC. The SMC calculates the full load operating hours from the relevant hoisted load and the operating hours of the hoist.

The remaining service life is calculated with reference to the mechanism group and can be read off by means of a PC (laptop).

If the theoretical full load lifetime has expired, this is also indicated by an illuminated red LCD, a general overhaul must be scheduled and carried out.

Note:

Reading the full load operating hours does not replace the prescribed tests including inspecting the wearing parts (rope, return sheaves...)

## 6.12 General overhaul

|          |     |     |      |      |      |
|----------|-----|-----|------|------|------|
| FEM9.511 | 1Bm | 1Am | 2m   | 3m   | 4m   |
| D [h]    | 400 | 800 | 1600 | 3200 | 6400 |

The mechanism (motor and gear; not applicable to wearing parts) of the SH.. wire rope hoist is classified according to FEM 9.511. The theoretical full load lifetime in hours shown opposite (D) is applicable for normal hoist applications.

If the full load lifetime (D) minus the lifetime expired is nought, the wire rope hoist must be overhauled by the manufacturer.

The rope drive is classified according to FEM 9.611, see factory certificate.



Components which are in the power flux may only be overhauled by the manufacturer.

In particular, the criteria important for explosion protection must be observed.



As the service life of components such as gears is limited in accordance with the classification, it must be ensured that this is not exceeded. After the scheduled service life has expired hazards may arise, also with regard to explosion protection. Thus the operator must take the responsibility for the remaining service life and the necessity of a general overhaul. We cannot accept any liability for damage occasioned by non-observance.

\*1 Safe Working Period

## 7.1 What should be done if?

### 7.1.1 Wire rope hoist does not start, motor hums

- Not all power phases are present.
- 1 Check fuses,
  - 2 Check supply cable,
  - 3 Check control pendant and switchgear.

### 7.1.2 Wire rope hoist does not start after a long stoppage, or starts with difficulty, motor hums

- Hoist brake is stuck.
- 1 Remove fan cover
  - 2 Place a block on the end of the motor shaft and hit with a hammer.

### 7.1.3 Loud clicking when switching on

- Brake displacement too large.
- Adjust brake, see page 36, 37.

### 7.1.4 Bottom hook block and rope twist

- Rope is twisted.
- Untwist rope, see page 45, "Replacing rope".

### 7.1.5 Braking path too long

- Brake displacement too large.
- Brake lining worn.
- Adjust brake, see page 36, 37.

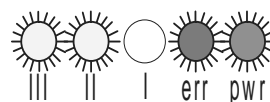
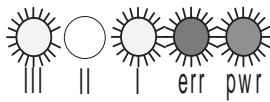
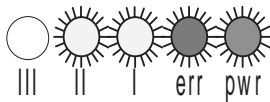
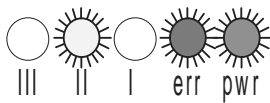
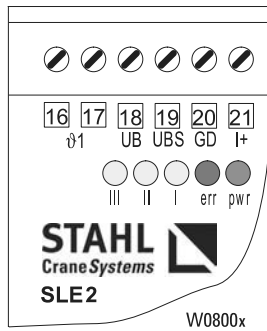
### 7.1.6 Cross travel not possible

- Hoist is in highest hook position, cross travel is disconnected.
- Lower bottom hook block until up motion is possible again

### 7.1.7 Lowering not possible

- Hoist is in bottom hook position
- Operational or emergency hoist limit switch is faulty
- Check hoist limit switch

## 7.1 What is to be done if? (continued)



### 7.1.6 Load is not lifted

- SLE2 overload cut-off has been actuated or is defective.
- 1 Check setting, see page 41.
  - 2 Actions for SLE2
    - LED I...III "on" and LED err => error

Actions to eliminate an error may only be performed by trained personnel.

**Error specification** - Overload

**Elimination of error** - Remove load from hoist

**Error specification** - Overtemperature

**Elimination of error** - Allow motor to cool down - check PTC thermistors

**Error specification** - Control error

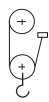
**Elimination of error** - Check wiring  
(lifting terminal 3 and lowering terminal 4 are activated simultaneously)

**Error specification** - System error

**Elimination of error** - Check voltage (terminal 6 and terminal 11)  
- Switch load monitor off/on  
- Replace load monitor

## 8.1 FEM classification

### Classification of mechanism, rope drive and motor acc. to FEM for SH ....-.. ex

|  |              |       |     |     | Type                           | FEM 9.661 | FEM 9.511 | FEM 9.683 | Typ                            | FEM 9.661 | FEM 9.511 | FEM 9.683 |
|---|--------------|-------|-----|-----|--------------------------------|-----------|-----------|-----------|--------------------------------|-----------|-----------|-----------|
|   |              |       |     |     |                                | Seiltrieb | Triebwerk | Motor     |                                | Seiltrieb | Triebwerk | Motor     |
| 1/1   | 2/1<br>4/2-1 | 4/1   | 6/1 | 8/1 | SH 3005-18 ex                  | 3m        | 4m        | 4m        |                                |           |           |           |
|   | 1000         | 2000  |     |     | SH 3006-14 ex                  | 2m        | 3m        | 4m        |                                |           |           |           |
|   | 1250         | 2500  |     |     | SH 3008-11 ex                  | 2m        | 2m        | 4m        | SH 4008-25 ex                  | 3m        | 4m        |           |
|   | 1600         | 3200  |     |     | SH 4010-25 ex                  | 2m        | 3m        | 4m        |                                |           |           |           |
|   | 2000         | 4000  |     |     | SH 4012-20 ex                  | 2m        | 2m        | 4m        |                                |           |           |           |
|   | 2500         | 5000  |     |     | SH 4016-16 ex                  | 1Am       | 1Am       | 4m        | SH 5016-16 ex<br>SH 5016-30 ex | 3m        | 4m        |           |
|   | 3200         | 6300  |     |     |                                |           |           |           |                                |           |           |           |
|   | 4000         | 8000  |     |     | SH 5020-20 ex<br>SH 5020-30 ex | 2m        | 3m        | 4m<br>3m  |                                |           |           |           |
|   | 5000         | 10000 |     |     | SH 5025-10 ex<br>SH 5025-24 ex | 2m        | 2m        | 4m<br>3m  |                                |           |           |           |
|   | 6300         | 12500 |     |     | SH 5032-8 ex<br>SH 5032-19 ex  | 1Am       | 1Am       | 4m<br>3m  |                                |           |           |           |
|   | 8000         | 16000 |     |     | SH 6040-15 ex                  | 3m        | 3m        | 3m        |                                |           |           |           |
|   | 10000        | 20000 |     |     | SH 6050-12 ex                  | 2m        | 2m        | 3m        |                                |           |           |           |
|   | 12500        | 25000 |     |     | SH 6063-9 ex                   | 1Am       | 1Am       | 3m        |                                |           |           |           |

## 8.2 Conditions of use

The hoist is designed for use in industry and for the ambient conditions usual in industry.

Special measures must be taken for particular applications such as e.g. high degree of chemical pollution, outdoor use, offshore application, etc.



The manufacturer will be pleased to advise you.



### Equipment classification

**Zone 1**  
 Equipment group II  
 Category 2G

**Zone 21**  
 Equipment group II  
 Category 2D

### Explosion protection

**Zone 1**  
 II 2 G Ex de IIB T4  
 II 2 G ck T4  
 (Ex de IIC T4)

**Zone 21**  
 II 2D tD A21 IP66 120°C  
 II 2D ck T120°C

### Protection against dust and humidity in acc. with EN 60 529

**Zone 1**  
 IP 54 (IP66)

**Zone 21**  
 IP66

### Permissible ambient temperatures

**Zone 1**  
 -20°C ... +40°C (+60° as option)

**Zone 21**  
 -20°C ... +40°C (+60° as option)

\*1 On request

## 8.3 Hoist

### 8.3.1 Pole-changing hoist motors

| Hoist  | Motor    | 50 Hz  |                                  |  |  |           |  |            |  |            |           | Main fuse |       |       |
|--|----------|--|----------------------------------|--|--|-----------|--|------------|--|------------|-----------|-----------|-------|-------|
|  |          | kW   | % DC                             | c/h                                      | 230 V  |           | 400 V  |            | 500 V  |            | cos phi k | 230 V     | 400 V | 500 V |
|  |          |  |                                  |  | In [A]                                       | Ik [A]    | In [A]   | Ik [A]     | In [A]   | Ik [A]     |           | [A]       | [A]   | [A]   |
| SH 3005-18ex<br>SH 3006-14ex<br>SH 3008-11ex                 | 2/12A2ex | 0.28/2.0                                     | 20/40                            | 240/240                                  | 9.1/11.6                                     | 10.2/48.4 | 5.2/6.7  | 5.9/27.8   | 4.2/5.3  | 4.7/22.3   | 0.53/0.87 | 16        | 10    | 10    |
| SH 4008-25ex<br>SH 4010-25ex<br>SH 4012-20ex<br>SH 4016-16ex | 2/12A4ex | 0.6/3.9<br>0.71/4.8<br>0.71/4.8<br>0.71/4.8  | 20/50<br>20/40<br>20/40<br>20/40 | 300/300<br>240/240<br>240/240<br>240/240 | 9.9/15.0<br>9.9/18.2<br>9.9/18.2<br>9.9/18.2 | 15.0/94.2 | 5.7/8.6<br>5.7/10.5<br>5.7/10.5<br>5.7/10.5      | 8.6/54.2   | 4.6/6.9<br>4.6/8.4<br>4.6/8.4<br>4.6/8.4         | 6.9/43.3   | 0.59/0.78 | 25        | 16    | 16    |
| SH 5016-16ex<br>SH 5020-12ex<br>SH 5025-10ex<br>SH 5032-8ex  | 2/12A4ex | 0.71/4.8<br>0.71/4.8<br>0.71/4.8<br>0.71/4.8 | 20/40<br>20/40<br>20/40<br>20/40 | 240/240<br>240/240<br>240/240<br>240/240 | 9.9/18.2                                     | 15.0/94.2 | 5.7/10.5   | 8.6/54.2   | 4.8/4  | 6.9/43.3   | 0.59/0.78 | 25        | 16    | 16    |
| SH 5016-30ex<br>SH 5020-30ex<br>SH 5025-24ex<br>SH 5032-19ex | 2/12A6ex | 1.5/9.7<br>1.9/12.0<br>1.9/12.0<br>1.9/12.0  | 20/40<br>20/40<br>20/40<br>20/40 | 240/240<br>240/240<br>240/240<br>240/240 | *1   | *1        | 18.1/24.7<br>18.1/26.6<br>18.1/26.6<br>18.1/26.6 | 24.7/170.1 | 14.4/19.8<br>14.4/21.3<br>14.4/21.3<br>14.4/21.3 | 19.8/136.0 | 0.42/0.53 | *1        | 50    | 50    |
| SHR 6025-23ex<br>SHR 6032-18ex<br>SHR 6040-15ex              | 2/12A6ex | 1.9/1.0                                      | 20/40                            | 240/240                                  | *1   | *1        | 18.1/26.6  | 24.7/170.1 | 14.4/21.3  | 19.8/136.0 | 0.42/0.53 | *1        | 50    | 50    |

| Hoist  | Motor    | 60 Hz  |                                  |  |  |            |  |            |  |            |           | Main fuse |       |       |
|--|----------|--|----------------------------------|--|--|------------|--|------------|--|------------|-----------|-----------|-------|-------|
|  |          | kW   | % DC                             | c/h                                      | 230 V  |            | 400 V  |            | 575 V  |            | cos phi k | 230 V     | 400 V | 575 V |
|  |          |  |                                  |  | In [A]   | Ik [A]     | In [A]   | Ik [A]     | In [A]   | Ik [A]     |           | [A]       | [A]   | [A]   |
| SH 3005-18ex<br>SH 3006-14ex<br>SH 3008-11ex                 | 2/12A2ex | 0.33/2.4                                     | 15/30                            | 180/180                                  | 6.8/8.0  | 7.6/33.3   | 5.2/6.7  | 5.9/27.8   | 4.8/5.6  | 5.3/23.1   | 0.53/0.87 | 16        | 10    | 10    |
| SH 4008-25ex<br>SH 4010-25ex<br>SH 4012-20ex<br>SH 4016-16ex | 2/12A4ex | 0.70/4.7<br>0.82/5.7<br>0.82/5.7<br>0.82/5.7 | 20/50<br>20/40<br>20/40<br>20/40 | 300/300<br>240/240<br>240/240<br>240/240 | 7.1/10.3<br>7.1/12.9<br>7.1/12.9<br>7.1/12.9     | 11.9/77.9  | 5.7/8.6<br>5.7/10.5<br>5.7/10.5<br>5.7/10.5      | 8.6/54.2   | 5.0/7.1<br>5.0/9.0<br>5.0/9.0<br>5.0/9.0         | 8.3/54.2   | 0.59/0.78 | 35        | 16    | 16    |
| SH 5016-16ex<br>SH 5020-12ex<br>SH 5025-10ex<br>SH 5032-8ex  | 2/12A4ex | 0.82/5.7<br>0.82/5.7<br>0.82/5.7<br>0.82/5.7 | 20/40<br>20/40<br>20/40<br>20/40 | 240/240<br>240/240<br>240/240<br>240/240 | 7.1/12.9   | 11.9/77.9  | 5.7/10.5   | 8.6/54.2   | 5.0/9.0  | 8.3/54.2   | 0.59/0.78 | 35        | 16    | 16    |
| SH 5016-30ex<br>SH 5020-30ex<br>SH 5025-24ex<br>SH 5032-19ex | 2/12A6ex | 1.9/12.0<br>2.3/15.0<br>2.3/15.0<br>2.3/15.0 | 20/40<br>20/40<br>20/40<br>20/40 | 180/180<br>150/150<br>150/150<br>150/150 | 21.9/29.5<br>21.9/32.3<br>21.9/32.3<br>21.9/32.3 | 29.5/204.3 | 18.1/24.7<br>18.1/26.6<br>18.1/26.6<br>18.1/26.6 | 24.7/170.1 | 15.2/20.5<br>15.2/22.5<br>15.2/22.5<br>15.2/22.5 | 20.5/142.1 | 0.42/0.53 | *1        | 50    | 50    |
| SHR 6025-23ex<br>SHR 6032-18ex<br>SHR 6040-15ex              | 2/12A6ex | 2.3/15.0                                     | 20/40                            | 150/150                                  | 21.9/32.3  | 29.5/204.3 | 18.1/26.6  | 24.7/170.1 | 15.2/22.5  | 20.5/142.1 | 0.42/0.53 | *1        | 50    | 50    |

Motor currents at other voltages:





Formula

$$I_{xV} = I_{400V} \cdot \frac{400V}{xV}$$





\*1 on request

## 8.4 Trolley/crab

### 8.4.1 Travel motor data for monorail trolleys, pole-changing

| <br>kg |  |  |  |  |                                 |                               | <b>50 Hz</b>                    |                                   |                                |  |  |  | <b>60 Hz</b> |  |
|---|---|--|--|---|---------------------------------|-------------------------------|---------------------------------|-----------------------------------|--------------------------------|---|--|--|--------------|--|
|   | 1/1   | 2/1<br>4/2-1                             | 4/1                                      | 5/20 m/min<br>kW<br>20/40% ED   | 2.5/10 m/min<br>kW<br>20/40% ED | 8/32 m/min<br>kW<br>20/40% ED | 6.3/25 m/min<br>kW<br>20/40% ED | 3.2/12.5 m/min<br>kW<br>20/40% ED | 10/40 m/min<br>kW<br>20/40% ED |   |  |  |              |  |
| 1000...2500   |   | SH 3...<br>SH 4008<br>SH 4010<br>SH 4012 | SH 3005<br>SH 3006                       | SF17213 503ex<br>0.06/0.32  | SF17219 503ex<br>0.06/0.32      | SF17209 503ex<br>0.06/0.32    | SF17213 503ex<br>0.08/0.39      | SF17219 503ex<br>0.08/0.39        | SF17209 503ex<br>0.08/0.39     |   |  |  |              |  |
| 3200...4000   |   | SH 4016<br>SH 5016<br>SH 5020            | SH 3008<br>SH 4008<br>SH 4010            | SF17213 113ex<br>0.15/0.68  |                                 | SF17209 113ex<br>0.15/0.68    | SF17213 113ex<br>0.18/0.82      |                                   | SF17209 113ex<br>0.18/0.82     |   |  |  |              |  |
| 5000...10000  |   | SH 5025<br>SH 5032<br>SH 6040<br>SH 6050 | SH 4012<br>SH 4016<br>SH 5016<br>SH 5020 |   |                                 | SF17209 103ex<br>0.25/1.20    |                                 |                                   | SF17209 103ex<br>0.32/1.45     |   |  |  |              |  |
| 10000...16000   |   | SH 6063                                  | SH 5025<br>SH 5032<br>SHR 60..           |   |                                 |                               |                                 |                                   |                                |   |  |  |              |  |

### 8.4.2 Travel motor data for double rail crabs, pole-changing

| <br>kg |  |  |                                |  |                                 |                               | <b>400 V, 50 Hz</b>             |                                   |                                |  |                             |                             | <b>400 V, 60 Hz</b> |  |
|---|---|--|--------------------------------|---|---------------------------------|-------------------------------|---------------------------------|-----------------------------------|--------------------------------|---|-----------------------------|-----------------------------|---------------------|--|
|   | 1/1   | 2/1<br>4/2-1                             | 4/1                            | 5/20 m/min<br>kW<br>20/40% DC   | 2.5/10 m/min<br>kW<br>20/40% DC | 8/32 m/min<br>kW<br>20/40% DC | 6.3/25 m/min<br>kW<br>20/40% DC | 3.2/12.5 m/min<br>kW<br>20/40% DC | 10/40 m/min<br>kW<br>20/40% DC |   |                             |                             |                     |  |
| 1000...2500   |   | SH 3...<br>SH 4008<br>SH 4010<br>SH 4012 | SH 3005<br>SH 3006             | SF17213 503ex<br>0.06/0.32  | SF17219 503ex<br>0.06/0.32      | SF17209 503ex<br>0.06/0.32    | SF17213 503ex<br>0.08/0.39      | SF17219 503ex<br>0.08/0.39        | SF17209 503ex<br>0.08/0.39     |   |                             |                             |                     |  |
| 3200...4000   |   | SH 4016                                  | SH 3008<br>SH 4008<br>SH 4010  | *1  |                                 | -                             | *1                              |                                   | -                              |   |                             |                             |                     |  |
| 5000...6300   |   |  | SH 4012<br>SH 4016             |   |                                 |                               |                                 |                                   |                                |   |                             |                             |                     |  |
| 3200...4000   |   | SH 5016<br>SH 5020                       |                                | SF25226 503ex<br>0.06/0.32  | SF25832 503ex<br>0.06/0.32      | SF25222 113ex<br>0.15/0.68    | SF25226 503ex<br>0.08/0.39      | SF25832 113ex<br>0.18/0.82        | SF25222 113ex<br>0.18/0.82     |   |                             |                             |                     |  |
| 5000...8000   |   | SH 5025                                  | SH 5016<br>SH 5020             | SF25226 113ex<br>0.15/0.68  |                                 | SF25222 103ex<br>0.25/1.20    | SF25226 113ex<br>0.18/0.82      |                                   | SF25222 103ex<br>0.32/1.45     |   |                             |                             |                     |  |
| 10000   |   |  | SH 5025                        |   |                                 |                               |                                 |                                   |                                |   |                             |                             |                     |  |
| 5000...8000   |   | SH 5032<br>SH 6040<br>SHR 60..           |                                | SF 25228 113ex<br>0.15/0.68   | SF 25834 113ex<br>0.15/0.68     | SF 25224 113ex<br>0.15/0.68   | SF 25228 113ex<br>0.18/0.82     | SF 25834 113ex<br>0.18/0.82       | SF 25224 113ex<br>0.18/0.82    |   |                             |                             |                     |  |
| 10000...12500   |   | SH 6050<br>SH 6063                       | SH 5032<br>SHR 6025<br>SHR6032 | SF 35228 103ex<br>0.25/1.20   |                                 | SF 25224 103ex<br>0.25/1.20   | SF 35228 103ex<br>0.32/1.45     |                                   | SF 25224 103ex<br>0.32/1.45    |   |                             |                             |                     |  |
| 16000   |   |  | SHR 6040                       |   |                                 | SF 35230 113ex<br>0.15/0.68   |                                 |                                   | SF 35836 113ex<br>0.15/0.68    | SF 35226 103ex<br>0.25/1.20   | SF 35230 113ex<br>0.18/0.82 | SF 35836 113ex<br>0.18/0.82 |                     |  |
|   |   |  | SH 6040                        |   |                                 |                               |                                 |                                   |                                |   |                             |                             |                     |  |

\* 15000 kg: 50 Hz = max. 4/16 m/min, 0,06/0,32 kW; 60Hz = max. 5/20 m/min, 0,08/0,39 kW  
 300 kg: 50 Hz = max. 3,2/12,5 m/min, 0,06/0,32 kW; 60Hz = max. 4/16 m/min, 0,08/0,39 kW

Further travel motor data

| Code     | Motor type   | 400 V, 50 Hz |          |         |          |           |       |     | 460 V, 60 Hz |          |         |          |           |       |     |
|----------|--------------|--------------|----------|---------|----------|-----------|-------|-----|--------------|----------|---------|----------|-----------|-------|-----|
|          |              | P            | n1       | In      | Ik       | cos phi k | DC    | Ac  | P            | n1       | In      | Ik       | cos phi k | DC    | Ac  |
|          |              | kW           | 1/min    | A       | A        |           | %     |     | kW           | 1/min    | A       | A        |           | %     |     |
| ...503ex | 2/8A05/505ex | 0.06/0.32    | 500/2540 | 1.0/1.1 | 1.1/3.4  | 0.79/0.89 | 20/40 | 540 | 0.08/0.39    | 670/3140 | 1.2/1.6 | 1.4/4.0  | 0.78/0.90 | 20/40 | 500 |
| ...113ex | 2/8A1/506ex  | 0.15/0.68    | 620/2840 | 1.6/2.5 | 2.1/10.3 | 0.79/0.87 | 20/40 | 300 | 0.18/0.82    | 756/3396 | 1.2/2.1 | 2.2/10.4 | 0.66/0.87 | 20/40 | 270 |
| ...103ex | 2/8A1/505ex  | 0.25/1.20    | 580/2780 | 1.6/2.6 | 2.5/13.5 | 0.74/0.77 | 20/40 | 360 | 0.32/1.45    | 750/3380 | 1.8/2.8 | 2.8/15.4 | 0.73/0.85 | 20/40 | 330 |
| ...203ex | 2/8A2/500ex  | 0.40/2.00    | 550/2760 | 2.7/4.8 | 4.2/21.9 | 0.66/0.77 | 20/40 | 350 | 0.50/2.40    | 680/3330 | 2.8/5.0 | 4.4/25.0 | 0.64/0.74 | 20/40 | 330 |

Ac (c:h) x s  
 cos phi k  
 DC  
 n1  
 Ik  
 n  
 P

Switching frequency factor  
 Power factor (short-circuit)  
 Duty cycle  
 Motor r.p.m.  
 Short-circuit current  
 Rated current  
 Motor output

8.5 Cable cross-section and length of supply cable

| 1                  | 2                                 |     |                   |     | 3  |     |                   |     | 4  |     |                   |     | 5   |     |                   | 6  |                   |     |                   | 7  |                   |     |                   |     |
|--------------------|-----------------------------------|-----|-------------------|-----|--|-----|-------------------|-----|--|-----|-------------------|-----|---|-----|-------------------|--|-------------------|-----|-------------------|--|-------------------|-----|-------------------|-----|
| Hoist motor type * | Stationary                        |     |                   |     | Crab / Crane   |     |                   |     | Crab   |     |                   |     | Rising mains max. 10 m                    |     |                   | Crane  |                   |     |                   | Crane  |                   |     |                   |     |
|                    | Fixed installation in PVC conduit |     |                   |     | Fixed installation in PVC conduit                                  |     |                   |     | Festoon cable in free air - flexible rubber-sheathed cable |     |                   |     | Fixed installation in PVC conduit         |     |                   | Festoon cable in free air - flexible rubber-sheathed cable   |                   |     |                   | Festoon cable in free air - flexible rubber-sheathed cable |                   |     |                   |     |
|                    | Power supply to hoist             |     |                   |     | Power supply to infeed (customer's cable to start of rising mains) |     |                   |     | From end of rising mains to hoist                          |     |                   |     | From main isolator to end of rising mains |     |                   | From end of rising mains along crane runway to crane control |                   |     |                   | Power supply along crane bridge to hoist                   |                   |     |                   |     |
|                    | $\Delta U \leq 5\%$               |     |                   |     | $\Delta U \leq 1\%$  |     |                   |     | $\Delta U \leq 4\% (4 + 5)$                                |     |                   |     | $\Delta U \leq 1,5\% (5 + 6)$             |     |                   | $\Delta U \leq 2,5\%$  |                   |     |                   |  |                   |     |                   |     |
| <b>50 Hz</b>       |                                   |     |                   |     |  |     |                   |     |  |     |                   |     |   |     |                   |  |                   |     |                   |  |                   |     |                   |     |
|                    | 230 V                             |     | 400 V             |     | 500 V  |     | 230 V             |     | 400 V  |     | 500 V             |     | 230 V                                     |     | 400 V             |  | 500 V             |     | 230 V             |  | 400 V             |     | 500 V             |     |
|                    | S                                 | L1  | S                 | L1  | S  | L1  | S                 | L2  | S  | L2  | S                 | L2  | S   | L3  | S                 | L3   | S                 | L3  | S                 | L4   | S                 | L4  | S                 | L5  |
|                    | [mm] <sup>2</sup>                 | [m] | [mm] <sup>2</sup> | [m] | [mm] <sup>2</sup>  | [m] | [mm] <sup>2</sup> | [m] | [mm] <sup>2</sup>  | [m] | [mm] <sup>2</sup> | [m] | [mm] <sup>2</sup>                         | [m] | [mm] <sup>2</sup> | [m]  | [mm] <sup>2</sup> | [m] | [mm] <sup>2</sup> | [m]  | [mm] <sup>2</sup> | [m] | [mm] <sup>2</sup> | [m] |
| ..A2ex             | 2,5                               | 22  | 1,5               | 41  | 1,5  | 64  | 2,5               | 4   | 1,5  | 7   | 1,5               | 12  |   |     |                   |  |                   |     |                   |  |                   |     |                   |     |
| ..A4ex             | 6                                 | 31  | 2,5               | 39  | 2,5  | 61  | 6                 | 6   | 2,5  | 7   | 2,5               | 12  |   |     |                   |  |                   |     |                   |  |                   |     |                   |     |
| ..A6ex             | 35                                | 85  | 16                | 117 | 10   | 114 | 35                | 16  | 16   | 23  | 10                | 22  |   |     |                   |  |                   |     |                   |  |                   |     |                   |     |
| <b>60 Hz</b>       |                                   |     |                   |     |  |     |                   |     |  |     |                   |     |   |     |                   |  |                   |     |                   |  |                   |     |                   |     |
|                    | 400 V                             |     | 460 V             |     | 575 V  |     | 400 V             |     | 460 V  |     | 575 V             |     | 400 V                                     |     | 460 V             |  | 575 V             |     | 400 V             |  | 460 V             |     | 575 V             |     |
|                    | S                                 | L1  | S                 | L1  | S  | L1  | S                 | L2  | S  | L2  | S                 | L2  | S   | L3  | S                 | L3   | S                 | L3  | S                 | L4   | S                 | L4  | S                 | L5  |
|                    | [mm] <sup>2</sup>                 | [m] | [mm] <sup>2</sup> | [m] | [mm] <sup>2</sup>  | [m] | [mm] <sup>2</sup> | [m] | [mm] <sup>2</sup>  | [m] | [mm] <sup>2</sup> | [m] | [mm] <sup>2</sup>                         | [m] | [mm] <sup>2</sup> | [m]  | [mm] <sup>2</sup> | [m] | [mm] <sup>2</sup> | [m]  | [mm] <sup>2</sup> | [m] | [mm] <sup>2</sup> | [m] |
| ..A2ex             | 2,5                               | 57  | 2,5               | 75  | 1,5  | 71  | 2,5               | 10  | 2,5  | 14  | 1,5               | 13  |   |     |                   |  |                   |     |                   |  |                   |     |                   |     |
| ..A4ex             | 6                                 | 65  | 4                 | 57  | 2,5  | 56  | 6                 | 12  | 4  | 11  | 2,5               | 11  |   |     |                   |  |                   |     |                   |  |                   |     |                   |     |
| ..A6ex             | 25                                | 152 | 16                | 129 | 10   | 126 | 25                | 30  | 16   | 25  | 10                | 24  |   |     |                   |  |                   |     |                   |  |                   |     |                   |     |

For larger cross-sections (S\*), the max. cable lengths (L\*) are calculated as follows:

S = Recommended cross-section for cable length given.

L1...L5 = Max. supply cable length of the individual types of power supply. Sum of voltage drops  $\leq 5\%$ .

A loop impedance of max. 250 mΩ was taken as basis for coordinating the short circuit protection of the power contactors and calculating the cable lengths.

The cross-section of the supply cable takes into account the short-circuit protection and voltage drop of the cable.

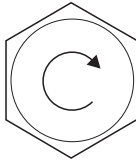
The voltage drop percentages may be distributed differently in special cases depending on the lengths of the individual sections in order to find an economical solution.

The cross-sections must be adapted for longer cable lengths and other types of installation.

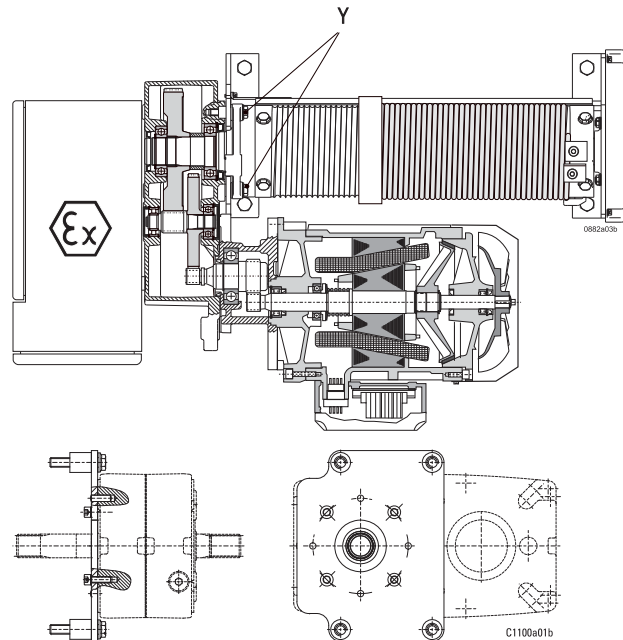


## 8.6 Tightening torques for screws

All screws should be tightened with a torque spanner. See table for the tightening torques generally applicable for screws grade 8.8 and 10.9. Values (Y) apply for the attachment of the mounting plate to the gear..



| M.. | Screw grade |      |      |
|-----|-------------|------|------|
|     | 8.8         | 10.9 | 10.9 |
|     | standard    |      | Y    |
|     | [Nm]        |      | [Nm] |
| M6  | 10          | 19   | -    |
| M8  | 25          | 42   | -    |
| M10 | 51          | 85   | 75   |
| M12 | 87          | 130  | 87   |
| M16 | 215         | 330  | 250  |
| M20 | 430         | -    | -    |
| M24 | 740         | -    | -    |
| M30 | 1500        | -    | -    |
| M36 | 2600        | -    | -    |

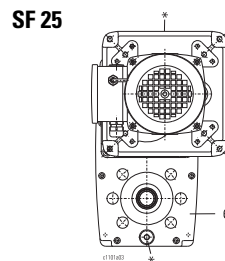
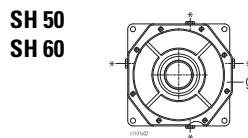
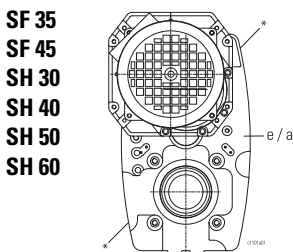
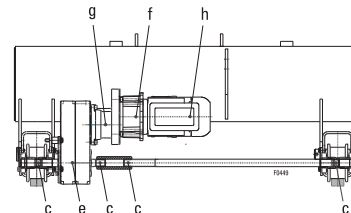
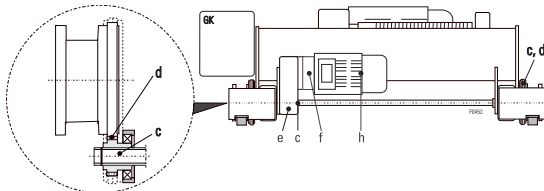
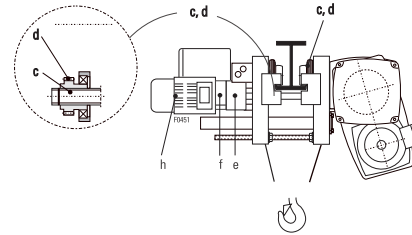
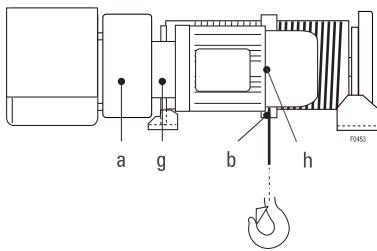


### Further screw connections and applicable tightening torques

| No. | Screw connection<br>Part 1 / Part 2                          | Type   | Screw connection     |                          |                                |
|-----|--|--|----------------------|--------------------------|--------------------------------|
|     |  |  | M..                  | Grade                    | MA [Nm]                        |
| 1   | Gear casing/panel box  | SH 3ex - SH 4ex  | M6                   | 8.8                      | 6                              |
| 2   | Gear casing/support plate                                    | SH 3ex<br>SH 4ex<br>SH 5ex   | M10<br>M12<br>M16    | 100<br>100<br>100        | 75<br>87<br>310                |
| 3   | Rope drum/gear drive shaft                                   | SH 5ex   | M12                  | 100                      | 130                            |
| 4   | Rope drum/clamping plate                                     | SH 3ex   | M6/8                 | 8.8                      | 10/25                          |
| 5   | Rope drum bearing journal/holding washer                     | SH 3ex<br>SH 4ex-SH 5ex<br>SH 6  | M8<br>M10<br>M16     | 100                      | 42<br>75<br>260                |
| 6   | Rope drum flange bearing/support plate (fan side)            | SH 3ex<br>SH 4ex-SH 5ex<br>SH 6ex  | M8<br>M10<br>M16     | 100                      | 42<br>75<br>215                |
| 7   | Grease pan/guide rail  | SH 6ex   | M10                  | 100                      | 75                             |
| 8   | Support plate (fan side)/grease pan                          | SH 3ex-SH 4ex<br>SH 5ex  | M8<br>M8             | C45K<br>RSt37            | 20<br>10                       |
| 9   | Support plate (gear side, fan side)/fixing tube (Dg)         | SH 3ex-SH 4ex  | M16                  | 100                      | 330                            |
| 10  | Axle holder/trolley side cheek (hoist side) (kBh-Dg)         | SH 3ex-SH 5ex (kBh)<br>SH 6ex (kBh)<br>SH3 ex-SH 4ex (Dg)<br>SH 5ex (Dg) | M8<br>M8<br>M8<br>M8 | 8.8<br>100<br>8.8<br>100 | 25<br>42<br>20<br>42           |
| 11  | Threaded bolt/trolley side cheek (hoist side/counterweight)  | SH 3ex-SH 6ex  | M16                  | 100                      | 215                            |
| 12  | Return pulley bearing plate/bearing pedestal (kBh)           | SH 6ex   | M12                  | 100                      | 115                            |
| 13  | Suspension bearing plate/bearing pedestal (kBh)              | SH 6ex   | M12                  | 100                      | 115                            |
| 14  | Panel box mounting bracket/return pulley bearing plate (kBh) | SH 3ex-SH 6ex  | M10                  | 100                      | 85                             |
| 15  | Panel box mounting plate/gear casing (stat)                  | SH 3ex<br>SH 5ex   | M10<br>M12/M16       | 100<br>10.9/8.8          | 85<br>115                      |
| 16  | Panel box mounting plate/crossbar face (Og)                  | SH 5ex-SH 6ex  | M8                   | 100                      | 42                             |
| 17  | Panel box mounting bracket/panel box mounting plate          | SH 3ex<br>SH 4ex<br>SH 5ex   | M8                   | 100                      | 40 (42: K-A02-kBh)<br>40<br>42 |
| 18  | Pivot pin/mounting bracket (Dg)                              | SH 3ex-SH 5ex  | M12                  | 8.8                      | 85                             |
| 19  | Pivot pin/pivot pin (Dg)                                     | SH 3ex-SH 5ex  | M12                  | 8.8                      | 85                             |
| 20  | Guide roller holder/trolley side cheek (Dg)                  | SH 3ex-SH 5ex  | M8                   | 100                      | 42                             |

kBh = "short headroom" trolley  
 Og = double rail crab  
 Dg = articulated trolley

8.7 Lubricants



SF 35  
SF 45  
SH 30  
SH 40  
SH 50  
SH 60

SH 50  
SH 60

SF 25

\* Oil filling/oil drainage screw  
Depending on installation position of gear, the filling screw is "at the top" and the drainage screw "at the bottom".

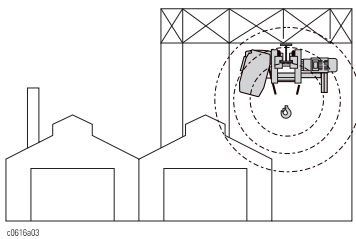
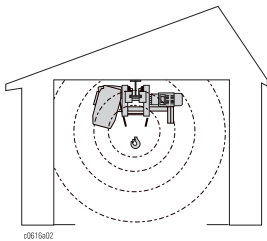
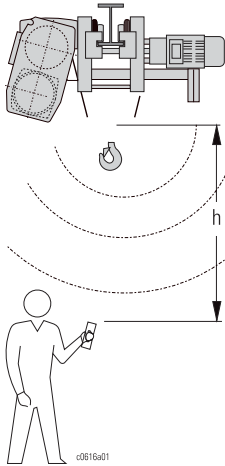
| Position of lubrication point | Type of lubricant | Designation      | Quantity of lubricant  | Characteristics, makes |   |
|-------------------------------|-------------------|------------------|--|------------------------|---|
| a                             | Oil               | CLP 460 (PG 220) | SH 30..: 1500 ml<br>SH 40..: 2000 ml<br>SH 50..: 6000 ml<br>SH 60..: 16000 ml<br>SH 60..: 18000ml *1 | 1                      | 1 Viscosity: 460 /s/40°C (220/s/40°C), pour point: -20°C (-40°C) flash point: +265°C (+320°C), e.g.: Fuchs Renolin CLP 460*, Aral Degol BG 460, BP Energol GR-XP 460, Esso Spartan EP 460, Mobil Gear 634, Tribol 1100/460, (Shell Tivela Oil WB)   |
| b                             | Grease            | G00F (GPG00K)    | 600 - 2500 g   | 3                      | 2 Soap base: Lithium + MoS2, dripping point: approx. 185°C penetration: 310-340, operating temperature: -20°to +120°C e.g.: Aralub PMD1*, BP Multi-purpose Grease L21M, Esso Multi-purpose Grease M, Mobilith SHC 460, Shell Retinax AM, STABYL L-TS 1 Mo   |
| c                             | Grease            | KPF1K            | SF 17 2...: 100 g  | 2                      |   |
| d                             | Oil               | K3K (KE2N)       | 500 - 1000 g   | 6                      | 3 Soap base: Synthetic (lithium), dripping point: approx 150°C penetration: 400-430 (400-430), operating temperature: -20°to +80°C (-35°to +130°C), e.g.: Aralub FDP00, BP Energrease HT-00 EP, Esso Liquid Gear Grease, Shell Special, Gear grease H*, Mobilux Liquid grease EP 004, (Tivela Compound A) |
| e                             | Grease            | KPFOK (GPGON)    | SF 17 2...: 200 g  | 4                      |   |
|                               | Oil               | CLP 460 (PG 220) | SF 25 .....: 1000 ml<br>SF 35 .....: 1500 ml<br>SF 45 .....: 2000 ml                                 | 1                      | 4 Soap base: Lithium + MoS2 (Synthetic + lithium), dripping point: approx. +180°C, penetration: 355-385 (400-430), operating temperature: -30°to +120°C (-35°to +130°C), e.g.: Aralub LFZ 0, Renolit FLM 0*, Tribol Molub-Alloy MPG 00, (Tivela Compound A)   |
| f                             | Grease            | KP2N (KSI2P)     | SF 17 2...: 100 g  | 5                      | 5 Soap base: Lithium, dripping point approx. 230°C, penetration: 265-295, operating temperature: -30°C to +60°C e.g. Fuchs Renolit Duraplex EP2*, Klüberlub BE 41-542, Shell Alvania EP Grease 2  |
|                               |                   |                  | SF 25 .....: 1000 ml<br>SF 35 .....: 1500 ml<br>SF 45 .....: 2000 ml                                 |                        |   |
| g                             | Grease            | KPFOK (GPON)     | SH 30..: 100 g   | 4                      | 6 Soap base: Lithium, dripping point: approx. +170°C (+260°), penetration: 220-250 (265-290), operating temperature: -20°to +120°C (-40°to +120°C), e.g.: Aralub HL3, BP Energrease RBB3, ESSO Roller Bearing Grease Andak C AC 205, Mobilux 3* (Mobil Mobilgrease 28)                                    |
|                               |                   |                  | SH 40..: ..<br>SF 25 8... ..<br>SF 35 8... ..<br>SF 45 8... ..                                       |                        |   |
| g                             | Oil               | CLP 460 (PG 220) | SH 50..: 2500 ml   | 1                      |   |
|                               |                   |                  | SH 60..: 2500 ml<br>SHR 60...: 2500ml  |                        |   |
| h                             | Grease            | KP2N (KSI2P)     | ./A05 ex<br>./A1 ex<br>./A2 ex<br>./A4 ex<br>./A6 ex   | 5                      |   |

( ) Lubricants for low operating temperatures, -40 ... +40°C  
\* Factory filling  
\*1 SH 6 motor at top

8.8 Sound pressure level

The sound pressure level was measured at a distance of 1 m from the wire rope hoist. The mean noise level is calculated for one operating cycle (50% with nominal load, 50% without load).

Instead of stating an emission value based on a workplace, the values from table 1 and 2 at measuring distance "h" can be used.



**1**

| Type        | [db (A)] +/- 3 |     |     |     |      |
|-------------|----------------|-----|-----|-----|------|
|             | h [m]          |     |     |     |      |
|             | 1 m            | 2 m | 4 m | 8 m | 16 m |
| SH 30 ex    | 76             | 73  | 70  | 67  | 64   |
| SH 40 ex    | 76             | 73  | 70  | 67  | 64   |
| SH 50 ex    | 78             | 75  | 72  | 69  | 66   |
| SH 60 ex    | 80             | 77  | 74  | 71  | 68   |
| SH 60 ex *1 | 91             | 88  | 85  | 82  | 79   |

**2**

| Type        | [db (A)] +/- 3 |     |     |     |      |
|-------------|----------------|-----|-----|-----|------|
|             | h [m]          |     |     |     |      |
|             | 1 m            | 2 m | 4 m | 8 m | 16 m |
| SH 30 ex    | 76             | 70  | 64  | 58  | 52   |
| SH 40 ex    | 76             | 70  | 64  | 58  | 52   |
| SH 50 ex    | 78             | 72  | 66  | 60  | 54   |
| SH 60 ex    | 80             | 74  | 68  | 62  | 56   |
| SH 60 ex *1 | 91             | 85  | 79  | 73  | 67   |

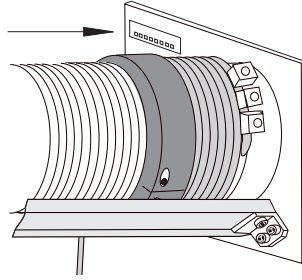
\*1 Sound pressure level under full load 60 Hz.  
Max. single value (not averaged)

8.9 Circuit diagrams

See separate enclosure.

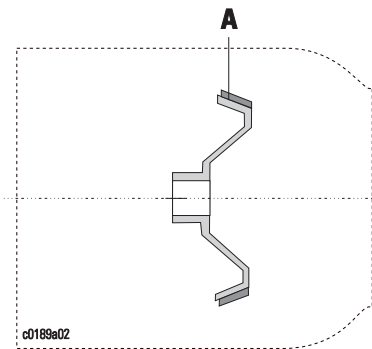
## 9.1 Serial number

When ordering original spare parts, please always indicate the serial number of the hoist. This is affixed to the inside of the bearing support plate (see sketch).



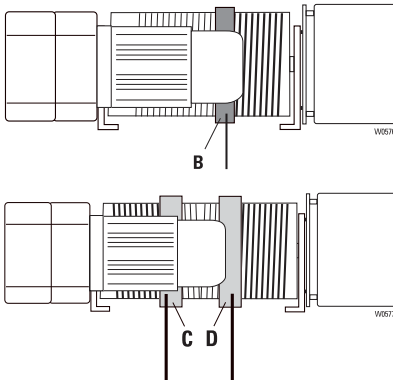
## 9.2 Hoist

### Hoist brake

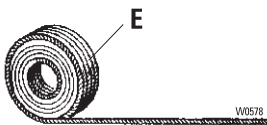


| Hoist type | Hoist motor | Brake disc A   |
|------------|-------------|----------------|
|            |             | Order No.      |
| SH 30 ex   | A2 ex       | 42 330 20 18 0 |
| SH 40 ex   | A4 ex       | 44 330 20 18 0 |
| SH 50 ex   | A4 ex       | 44 330 20 18 0 |
|            | A6 ex       | 46 330 20 18 0 |
| SH 60 ex   | A6 ex       | 46 330 20 18 0 |

### Rope guide



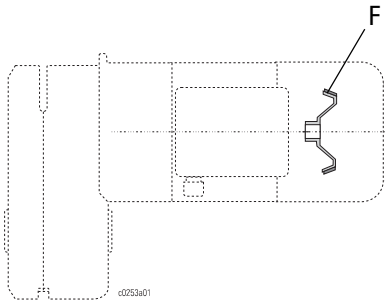
| Hoist type | B              | C              | D              |
|------------|----------------|----------------|----------------|
|            | Order No.      | Order No.      | Order No.      |
| SH 30 ex   | 03 430 02 43 0 | 03 430 01 43 0 | 03 430 00 43 0 |
| SH 40 ex   | 04 430 00 43 0 | 04 430 02 43 0 | 04 430 01 43 0 |
| SH 50 ex   | 05 430 01 43 0 | 05 430 02 43 0 | 05 430 00 43 0 |
| SH 60 ex   | 06 430 03 43 0 | 06 430 04 43 0 | 06 430 00 43 0 |



### Wire rope (E)

See works certificate or rope certificate for length and number of rope.

## 9.3 Travel motor



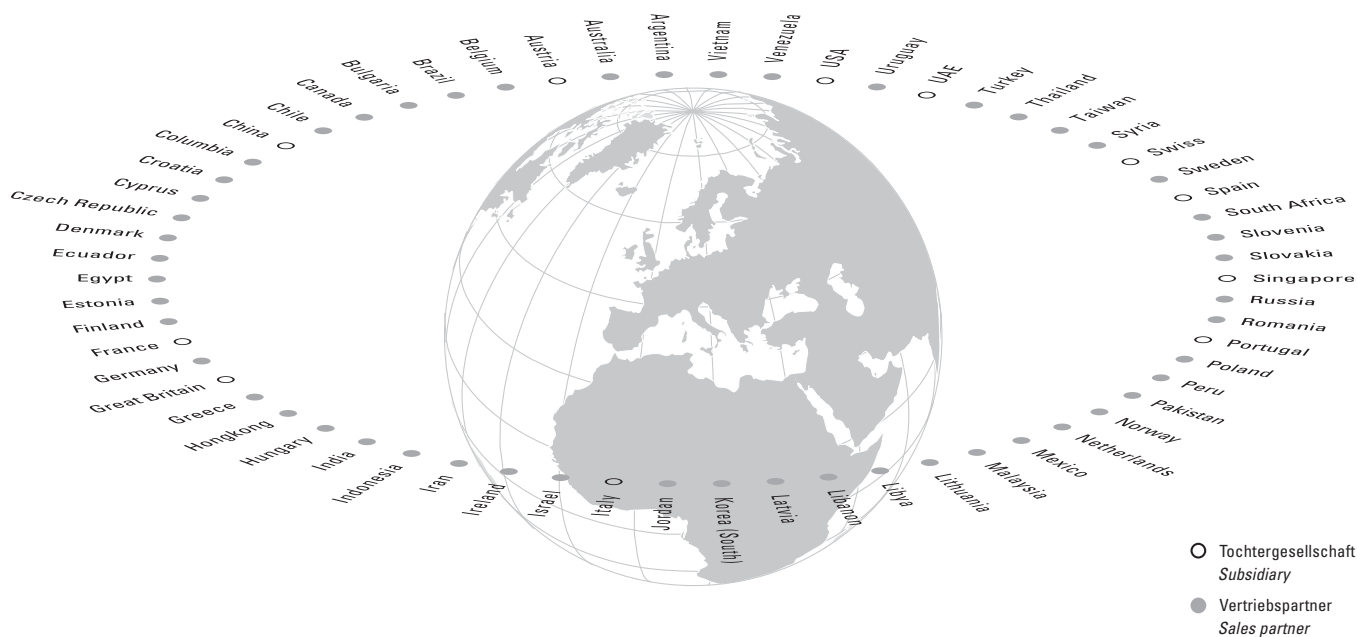
| Travel drive | Travel motor type | Brake disc F   |
|--------------|-------------------|----------------|
|              |                   | Order No.      |
| SF 172...    | A05 ex            | 35 330 20 18 0 |
| SF 252...    | A1 ex             | 41 330 20 18 0 |
| SF 352...    | A2 ex             | 42 330 20 18 0 |



Replacement and repairs may only be carried out by qualified personnel.







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