

Explosion-Protected Wire Rope Hoists –
Operating and Maintenance Instructions

↘ EN

⊠ II 3 D (ATEX) - Zone 22

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 the manufacturer's service engineers 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 SHex for dust ignition protection Zone 22 and its equipment are constructed according to European norms (ATEX). Work on these components may only be carried out by skilled personnel that has been especially trained on explosion protection.



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.

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.

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.

1.4 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.
- Manipulating the overload cut-off, apart from corrections as described on page 52.
- 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/Zone 22 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.
- 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.
- 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 (ATEX 137).

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, see page 2.

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 rapidly and professionally by our trained personnel.

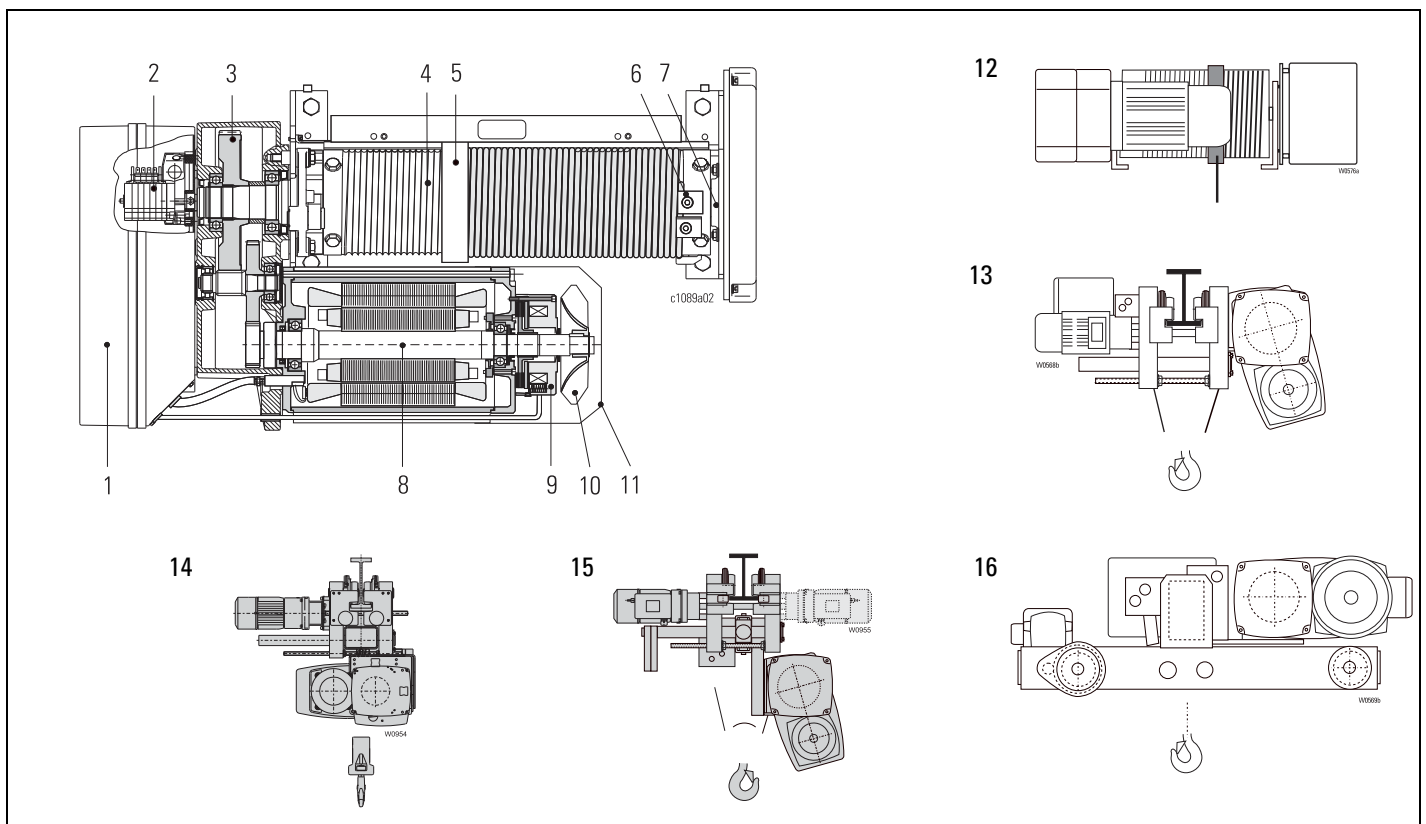


The modular concept of our series of wire rope hoists permits a multitude of variations on the basis of series components.

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 22 wire rope hoist is designed for use in Zone 22 in accordance with EC directive 99/92/EC. The equipment category in accordance with EC directive 94/9/EC is Ⓔ II 3 D Ex tD A22 IP66 T120°C for the electrical components and Ⓔ II 3 D c k T120°C for the .

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!

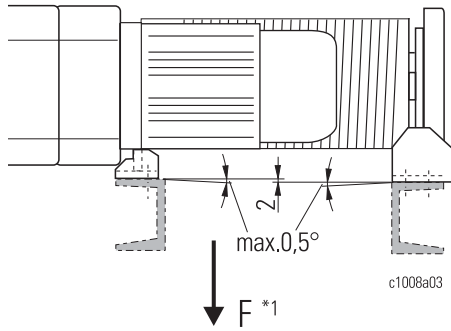


- 1 Ex connection and panel box for Zone 22
- 2 Gear limit switch
- 3 Gear
- 4 Rope drum
- 5 Rope guide with rope tensioner
- 6 Clamps for rope anchorage
- 7 Rope drum bearing
- 8 Ex Zone 22 hoist motor
- 9 Ex Zone 22 brake
- 10 Fan
- 11 Fan cover
- 12 Stationary hoist, hoist for installation
- 13 Hoist with "short headroom" monorail trolley
- 14 Wire rope hoist with "standard headroom" monorail trolley
- 15 Wire rope hoist with "articulated" monorail trolley
- 16 Wire rope hoist with double rail crab

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).



M_T (rope drum torque)

SH 3: $M_T = 0.5 \times F \times 126 \text{ mm}$

SH 4: $M_T = 0.5 \times F \times 167 \text{ mm}$

SH 5: $M_T = 0.5 \times F \times 219 \text{ mm}$

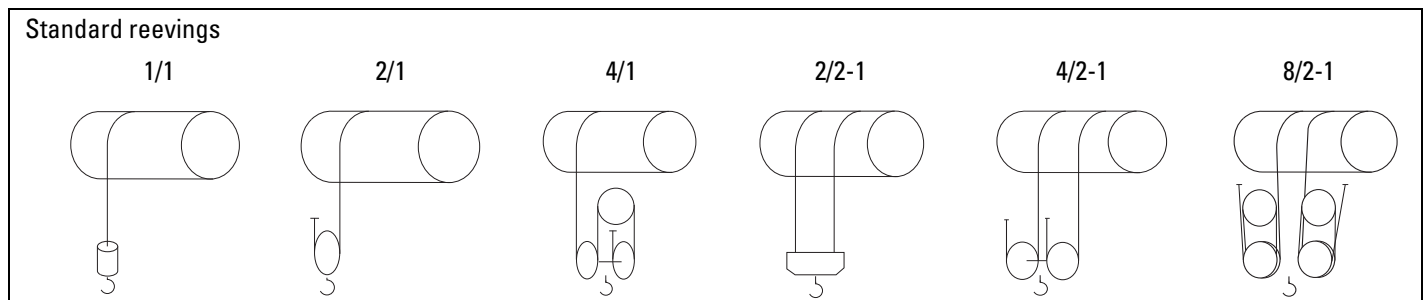
SH 6: $M_T = 0.5 \times F \times 356 \text{ mm}$

The SH 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

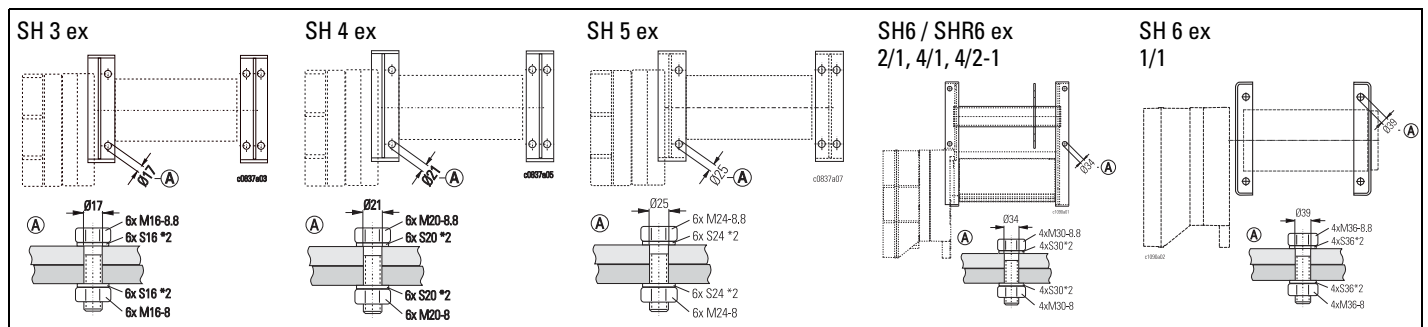
If possible, install the hoist in the **preferred installation position *****, see page 10.

- 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 58.

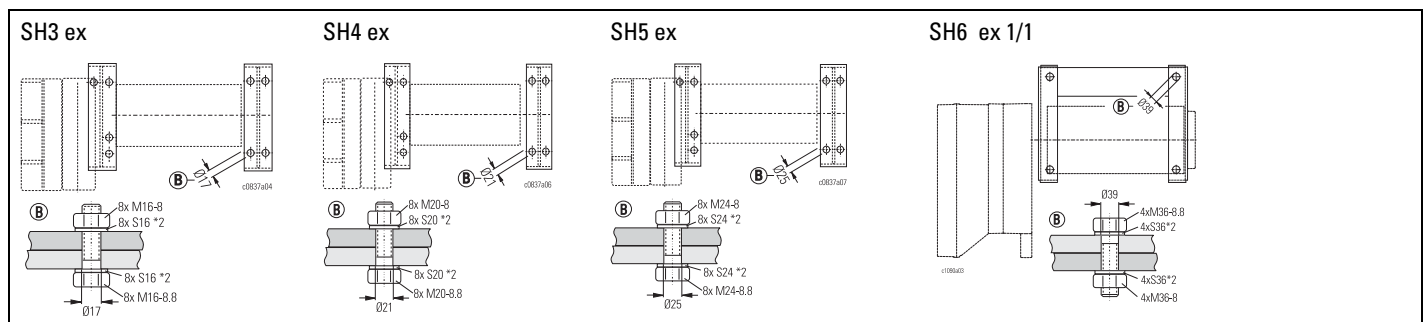
Standard reevings



3.1.1 Feet at bottom



3.1.2 Feet at top



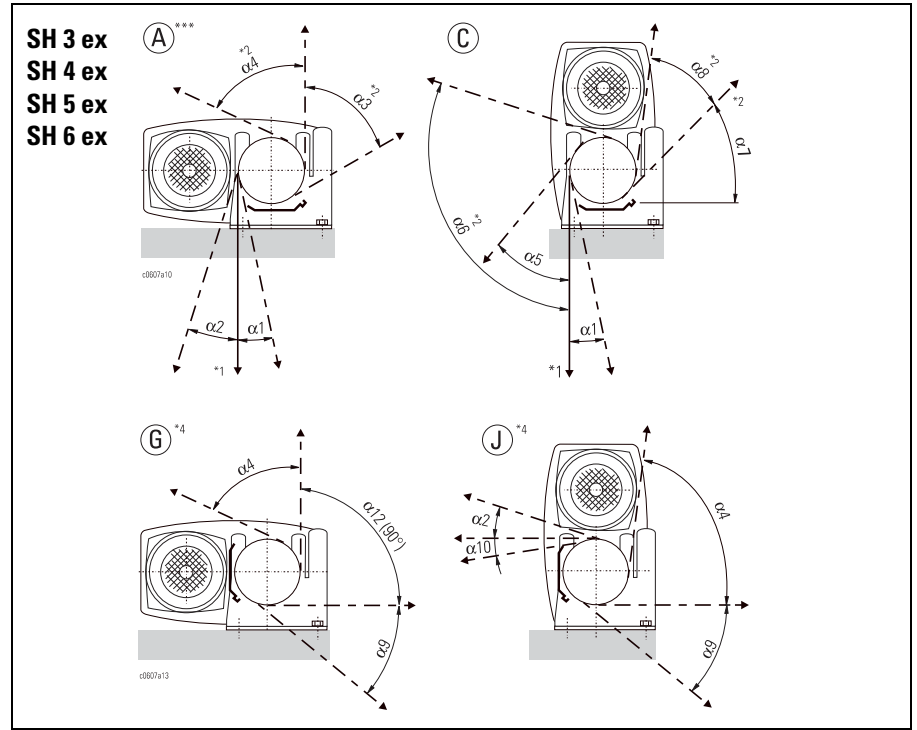
*1 Traction on drum
*2 Lock washer (Schnorr)

3.1 Stationary wire rope hoist (continued)

3.2 Fleet angles

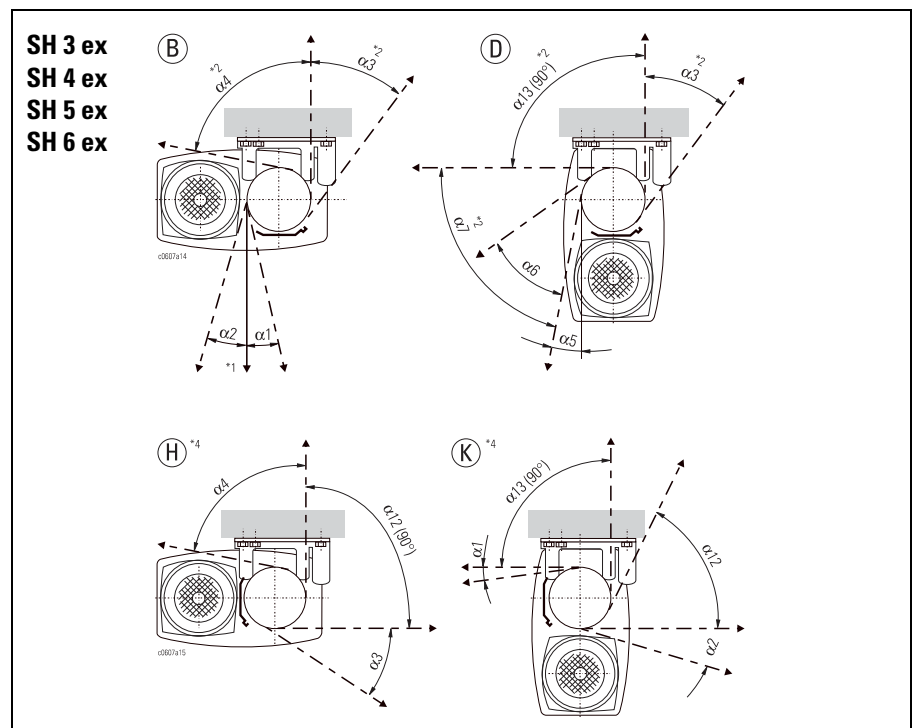
3.2.1 Feet at bottom

	1/1, 2/2			
	SH 3 ex	SH 4 ex	SH5 ex	SH6 ex
α_1	4°	5°	8°	8°
α_2	23°	13°	20°	18°
α_3	27°	30°	30°	30°
α_4	74°	73°	76°	80°
α_5	30°	30°	30°	25°
α_6	113°	103°	110°	108°
α_7	83°	81°	60°	60°
α_8	11°	12°	18°	20°
α_9	24°	26°	30°	12°
α_{10}	7°	7°	8°	8°
α_{12}	90°	90°	90°	-



3.2.2 Feet at top

	1/1, 2/2			
	SH 3 ex	SH 4 ex	SH5 ex	SH6 ex
α_1	4°	5°	8°	8°
α_2	23°	13°	20°	18°
α_3	27°	30°	30°	12°
α_4	74°	73°	76°	80°
α_5	16°	17°	14°	-
α_6	34°	32°	36°	-
α_7	74°	73°	76°	-
α_{12}	90°	90°	90°	8°
α_{13}	90°	90°	90°	30°



*** Preferred installation position


*1 Standard

*2 By turning rope guide.

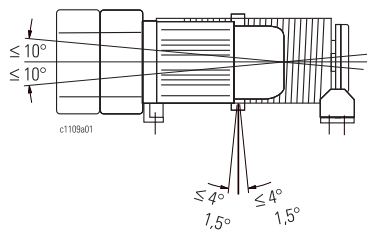
*4 By turning rope guide and grease pan; version G, H not possible for SH 6

3.1 Stationary wire rope hoist (continued)

3.2.3 Fleet angle

Typ	
	γ
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 γ



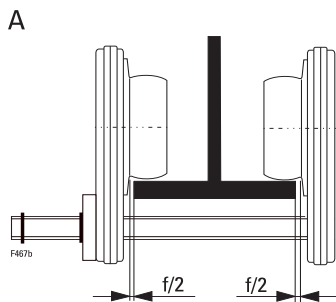
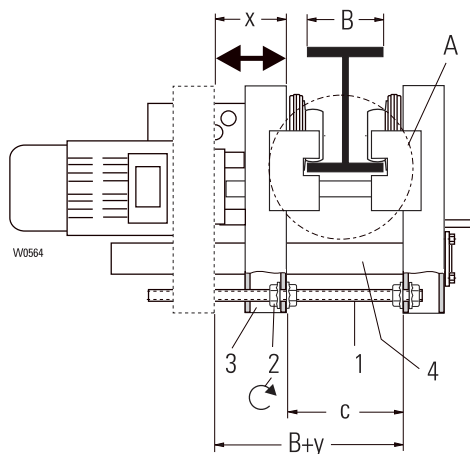
3.2.4 Angle of installation

- 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 and higher temperatures and sparks at the point of contact that must be avoided at all costs in Ex areas.



3.3 Trolleys/crabs

3.3.1 Monorail trolley



with SH 3 ex, SH 4 ex, SH 5 ex, SHR 6 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.
- 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 mm	Trolley	I				c	f/2	x	y	Nm
			INP	IPE	IPB	"					
SH 3 ex	80	KE-S33	B= 90...500				B+67*1	1.5	70	137	210
SH 4 ex	100	KE-S44	B= 90...500				B+67*1	1.5	80	147	210
SH 5 ex	140	KE-S65	B= 119...500				B+67*1	1.5	95	162	210
SH 6 ex	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 (KE-S33 - KE-S65 trolleys)

- 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.

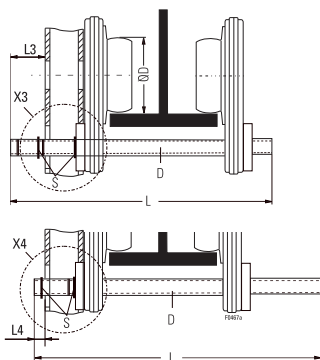


Table 3

ØD [mm]	L3 ±2 [mm]	L4 ±2 [mm]
80	96,4	46,4
100	96,4	46,4
140	124,6	46,4

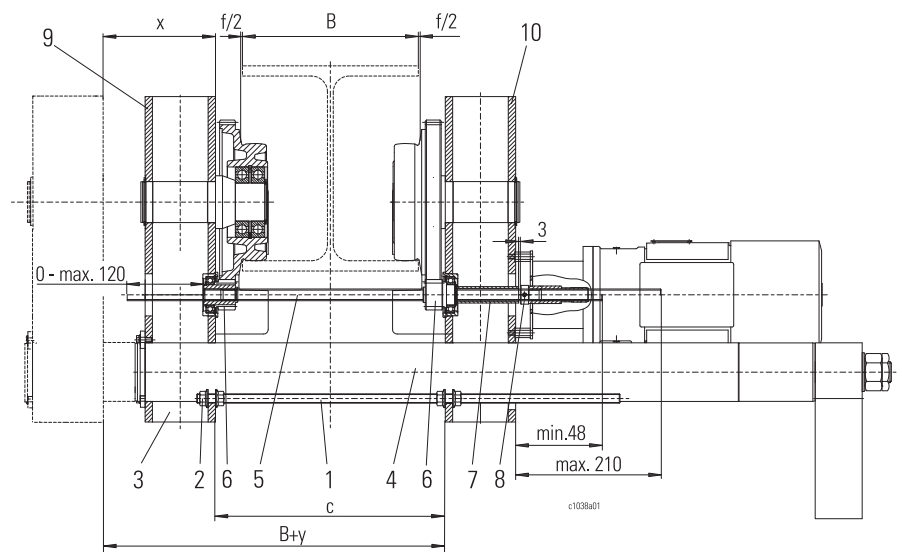
*1 for INP beams: -2 mm

Tabelle 2

ØD [mm]	B [mm]	Durchtrieb			
		L [mm]	Einbaulage		
80 100	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	siehe Seite 13		
	221 - 400				740
	401 - 500				780

Drive shaft for trolley drive (KE-S76 trolley)

- The drive shaft is suitable for girder flange widths "B" from 124 to ≤ 220 , >221 to ≤ 400 and >401 to 500 mm; see table 2, page 11 for length "L".
- 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 the shaft end projects by between "min. 0 mm" and "max. 120 mm" beyond the drive pinion (6) 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 play of approx. "3 mm" to adjusting ring (8).
- After fitting travel drive, check drive shaft (5) for ease of movement.

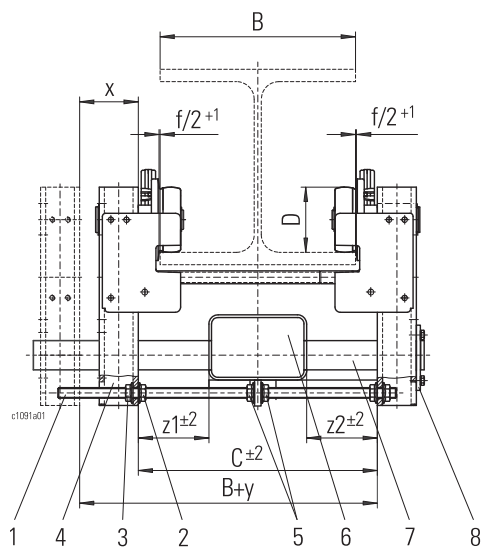


Dimensions B, c, $f/2$, x and y see tables 1 and 2, page 12



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 wire rope 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 " $B+y$ 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. 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.

∅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.

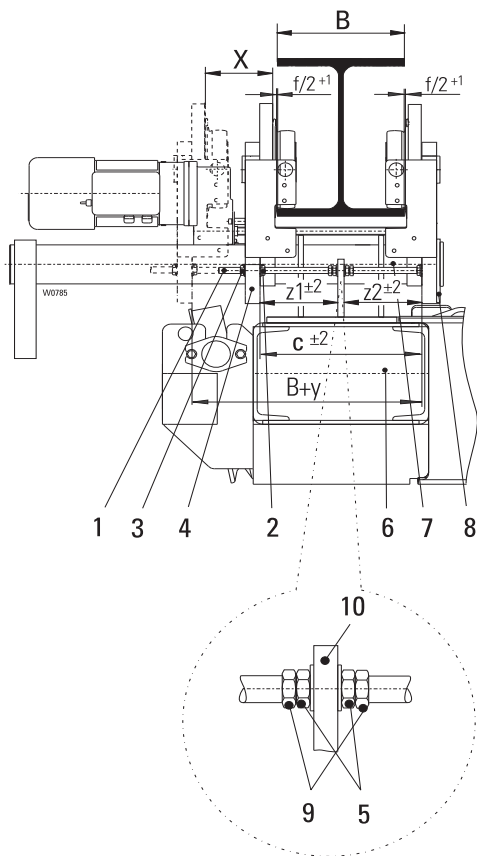
Connecting bolt and drive shaft

- 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 6 ex, 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.
-

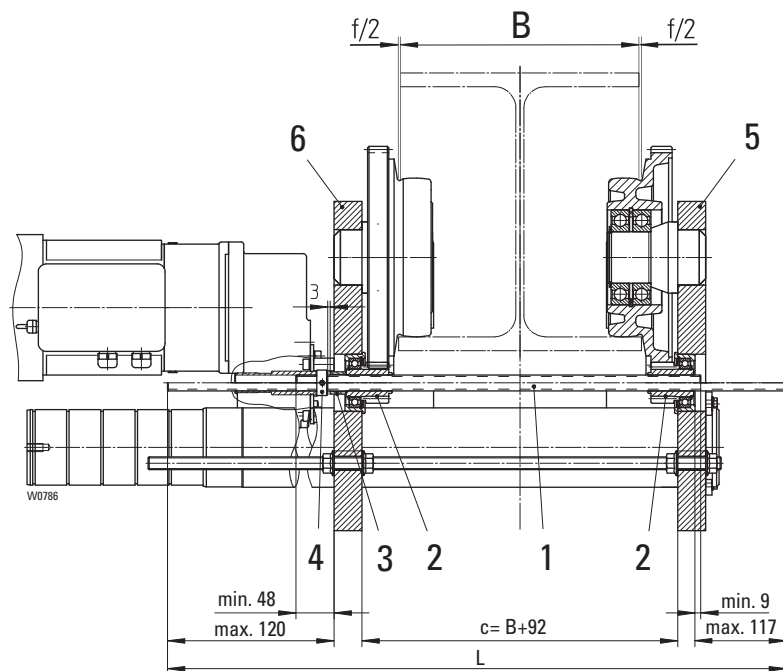
$\emptyset D$	Trolley	I	I	I II	I	c	f/2	x	y	↻
mm		INP	IPE	IPB	"		mm			Nm
200	UE-S776	B= 124....500				B+92	1.5	95	187	210

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)

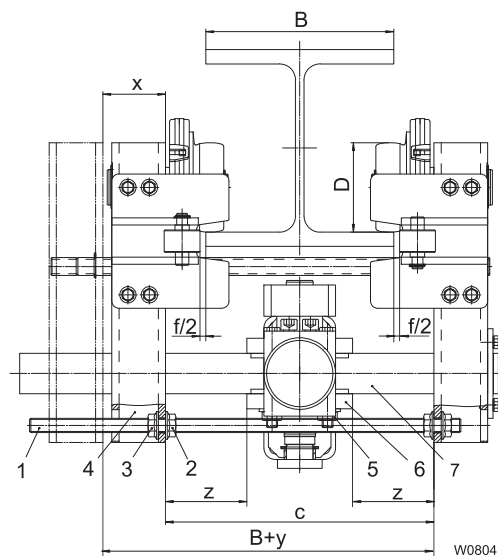
- The drive shaft is suitable for girder flange widths "B" from 124 to 500 mm; see table for length "L".
- Insert drive shaft (1) into the two drive pinions (6) from the counterweight side, then assemble spacer tube (3) and adjusting ring (4).
- Adjust drive shaft (1) to dimension L1, dimension L2 must 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 [mm]	L [mm]	L1 [mm]	L2 [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 dimensions 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.

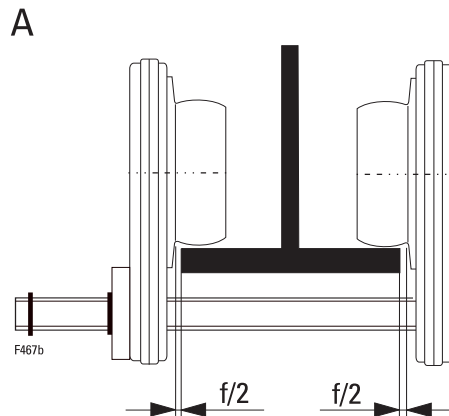
Hoist	ØD	Trolley	B	f/2	c	x	y	Nut (3)	Nut (5)
	[mm]								
SH 3 SH 4	100	DKE-S 4	90 - 220	1.5	B+80	67	147	215	85
SH 5	140	DKE-S 6	119 - 300	1.5	B+84	75	159	215	85

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).

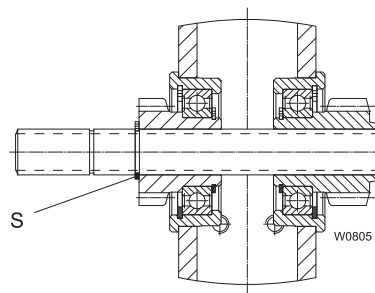
ØD [mm]	B [mm]	Drive shaft	
		L [mm]	L4 ±2 [mm]
100	90 - 128	390	46.4
	129 - 220	495	
140	119 - 280	495	
	281 - 300	710	



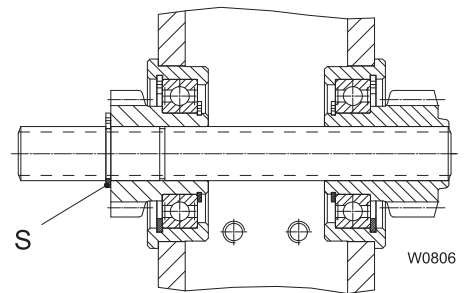
Trolleys with two travel drives

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

ØD100



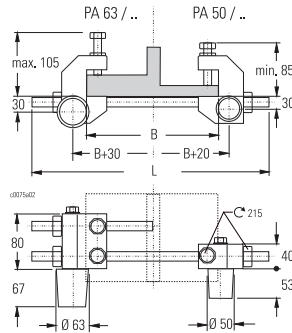
ØD 140







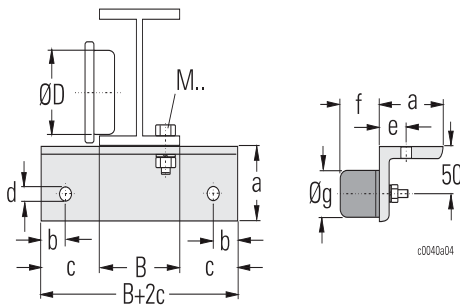
End stops



- 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	 max	E max	 *1	ØD	Order No.
	mm	mm	kg	*3	kg	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 Travel speed V max = 20 m/min.

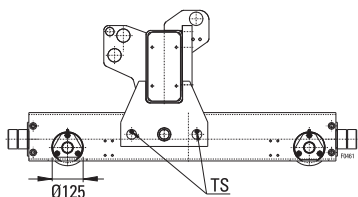
*3 $E = 0.1415 \cdot mka \cdot v^2 \cdot x$ (Nm) mka (t), v (m/min)

x = with travel limit switch: 0.72

x = without travel limit switch: 1.0

*4 Brackets by customer

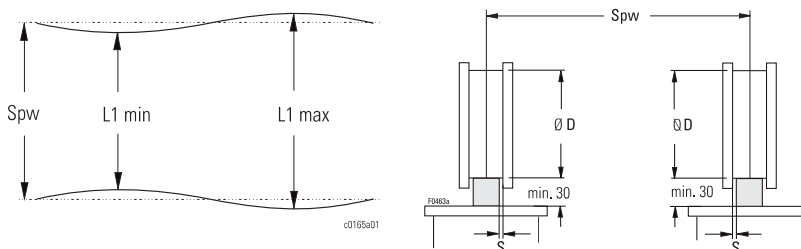
3.5 Double rail crab (OE-S)



- Check track gauge Spw on crab and rail.
- L1 max - L1 min = 5 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.



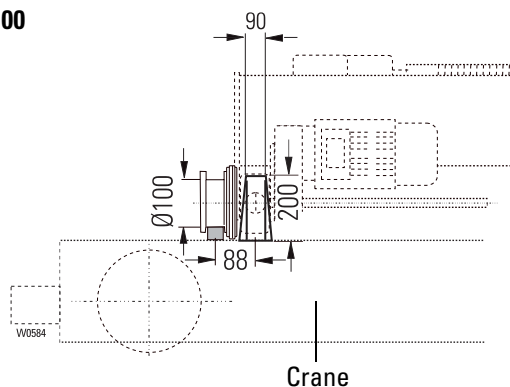
Check that the crab runs smoothly over the whole runway without jamming or increased friction at the wheel flanges. Increased friction at the flanges due to poor beam quality or incorrect crab adjustment may lead to temperature rise or increased wear. This must be avoided at all costs.



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

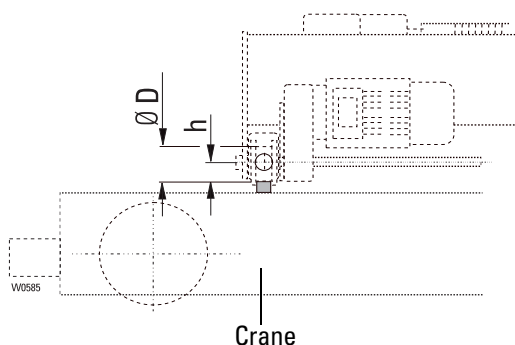
End stops

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 (1 two-way switch, 2 ramps).
2. Pre-switching and limit switching in both directions of travel (1 two-way switch, 4 ramps).

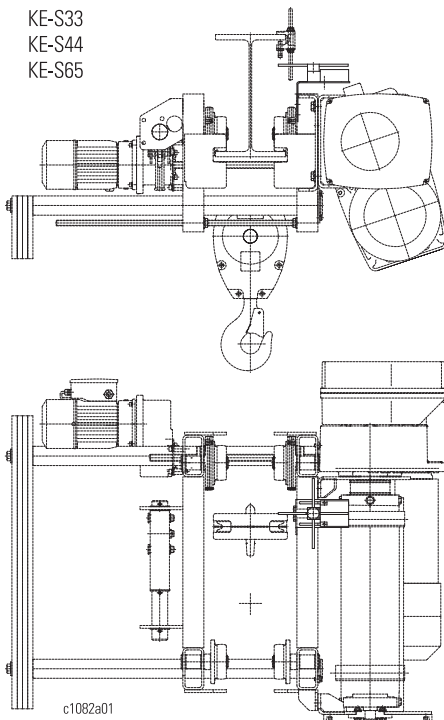
The speed is switched over from "fast" to "slow" before the end of the runway is reached, and is cut off at the end of the runway.



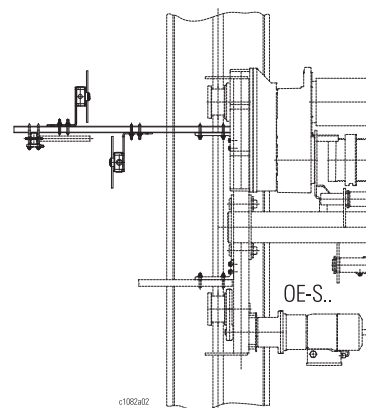
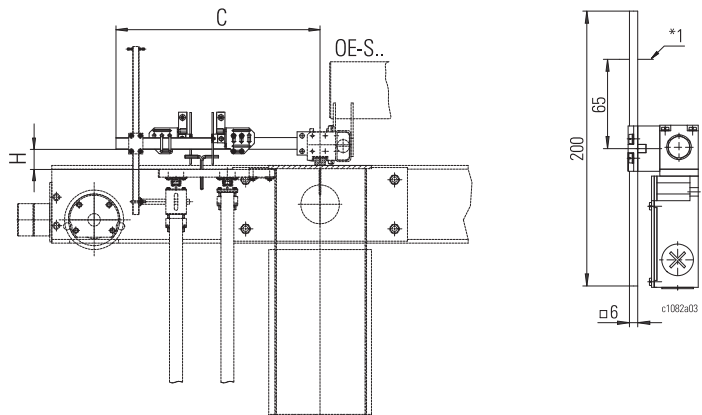
X = stop, left
Y = stop, right
Z = fast / slow

Monorail trolley

KE-S33
KE-S44
KE-S65



Double rail crab



Typ	H	C
	[mm]	
OE-S 04	77	795
OE-S 05	85	915
OE-S 06	87	915
OE-S 07	107	915

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 3 D for Zone 22 or II 2 D for Zone 21).

3.7.1 Supply cable

- As fixed installed cables:
 NYY, NYM
- As flexible cables:
 H07RN-F or NGFLGöu, or equivalent cables.
- see page 57 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 54, 55.
- 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.

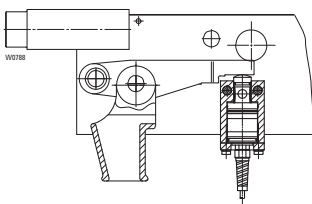
3.7.5 Disconnecting switch

- 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

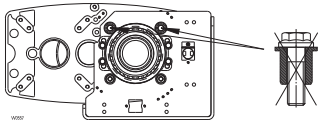
- prevents an overload being lifted. If an overload has been established, the load can only be lowered. The switch is set in the factory. Corrections are only permissible in special cases, see page 41.
In certain applications, wire rope hoists may also be used without an overload cut-off. **However in 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 LET electronic sensor

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

Load measurement at gear**With LEI electronic sensor**

The overload cut-off is set to rated load +10% overload.

On **stationary** SH4 and SH5 wire rope hoists, remove the transport anchor screws marked in **red** after installation and **before** commissioning.

**3.7.7 Mains connection**

Before a connection box or panel box is opened, the apparatus must be disconnected. Avoid the ingress of dust into these boxes.

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

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 effect 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.

3.7.9 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 2004/ 108/EC

3.8 Reeving rope

The wire rope is wound onto the drum in the factory. If not, see page 44, "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 27-29 (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 (SH3 ex - SH6 ex)

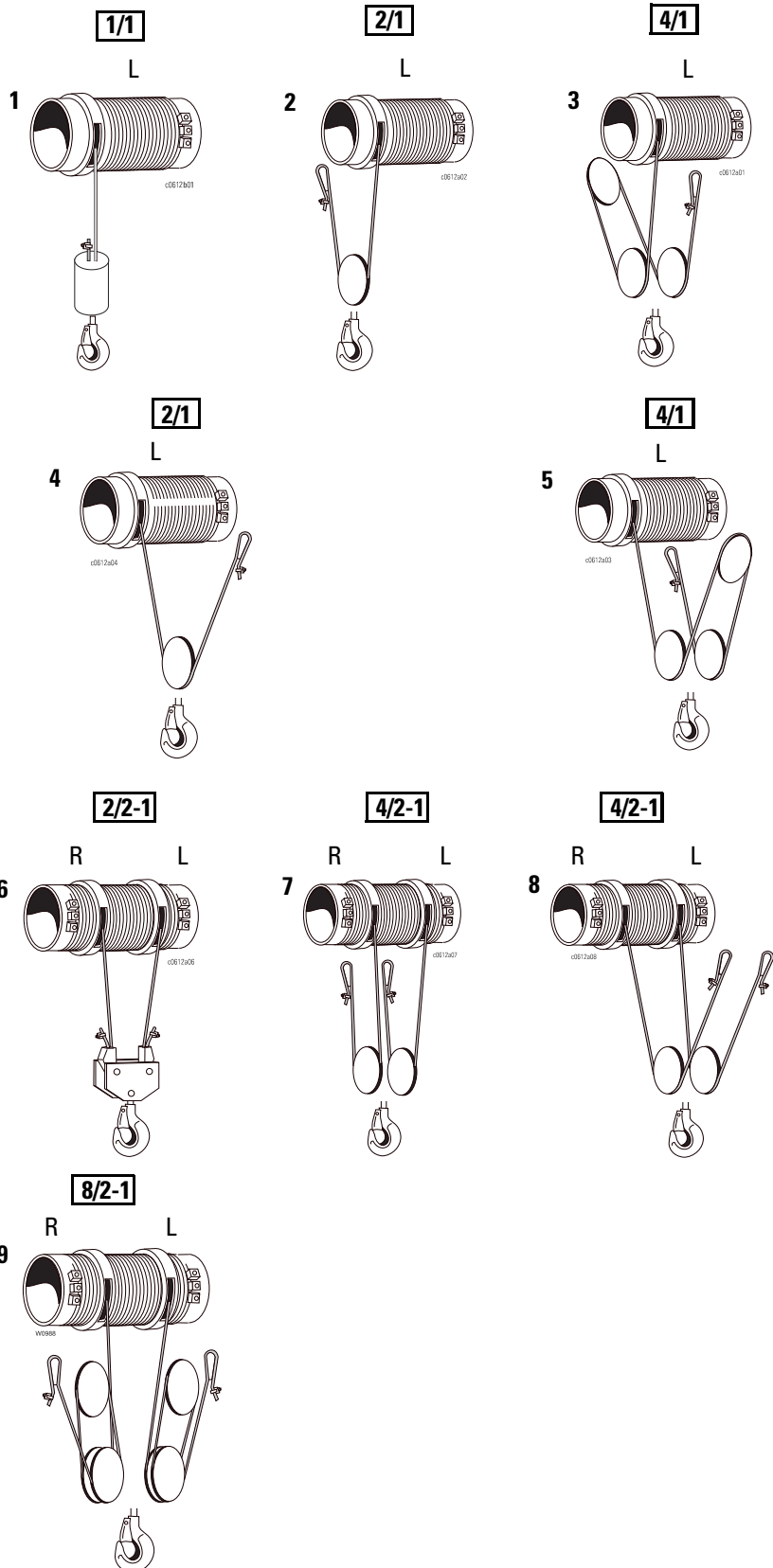
Reeve the rope as shown in the schematic drawings and attach the end of the rope at the rope anchorage.

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

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

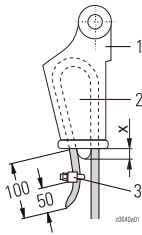
	SH3 - SH5 ex	SH6 ex
	4	4
	5	5
	8	8

	SH3 - SH5 ex	SH6 ex
	4	4
	5	5
	8	8
	-	9



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

11

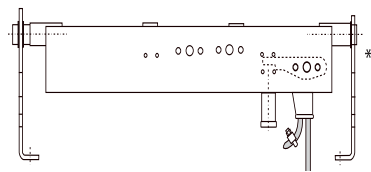


Rope anchorage (SH3 ex - SH6 ex)

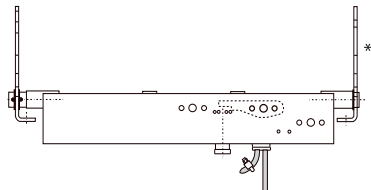
- Note information plate at rope anchorage.
- Insert end of rope into rope anchorage according to reeving, see sketches 11-34 and tables on pages 26, 28, 29.
- Place rope around rope wedge (2) and pull it into the tapered rope recess (1) until the loose end of the rope projects by approx. 100 mm.
- Secure loose end of rope with rope clamp (3) approx. 50 mm from the end of the rope. Tightening torque [Nm] see table
- Max. projection of rope wedge SH 3 - SH 4 ex $x_{max.} = 6mm$;
SH 5 - 6 ex $x_{max.} = 15mm$
- Replace split pin (4) after dismantling; bend up ends of split pin.

Rope-Ø [mm]	M..	Tightening torque [Nm]
5-6,5	M6	3,5
7-8	M8	6,0
8,5-10	M8	9,0
12-12,5	M12	30
14-15	M14	45
20	M16	100

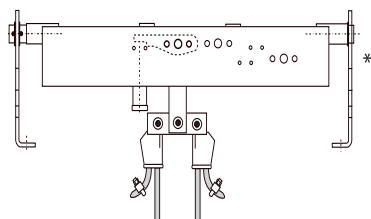
12



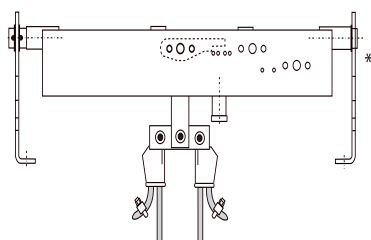
14



17



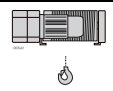

18

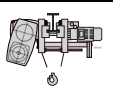



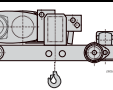

*1 Gear side

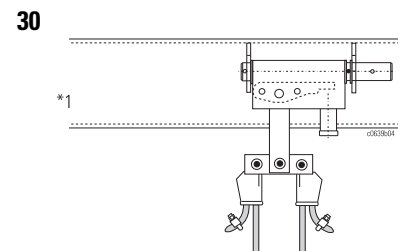
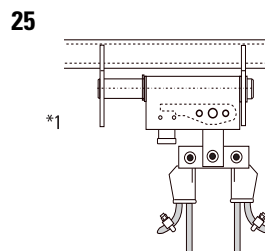
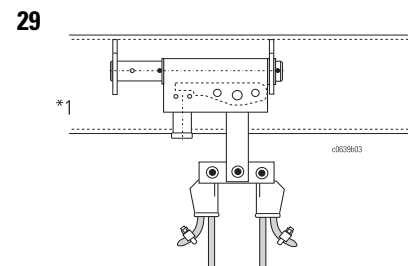
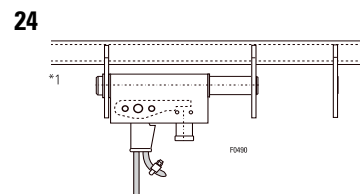
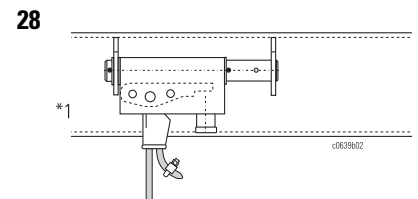
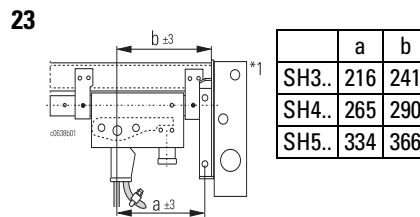
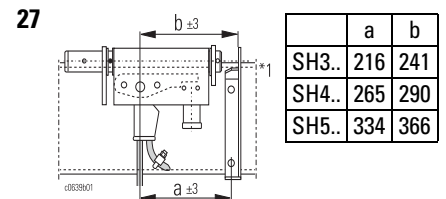
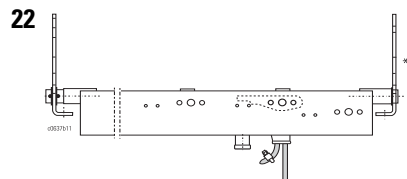
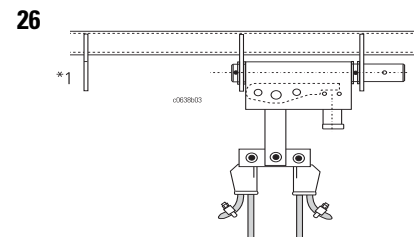
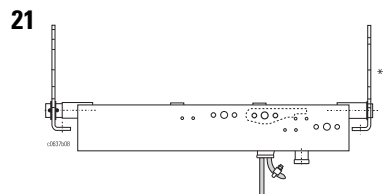
3.8 Reeving rope (continued)

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

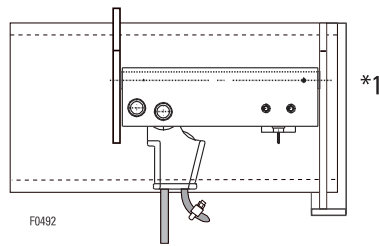
Rope anchorage

SH 6 ex		
	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

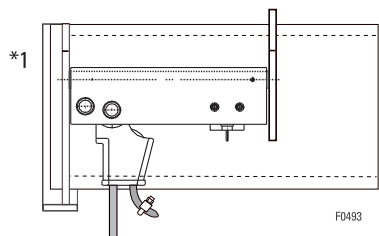
SH 6 ex		
	Length L	
2/1	L2-L5	32
4/1	L2-L5	31
4/2-1	L2-L5	34

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

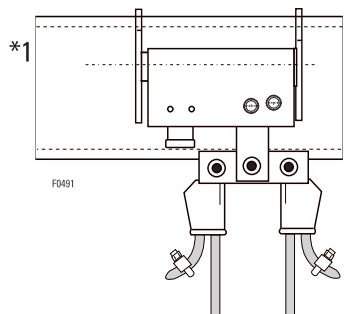
31



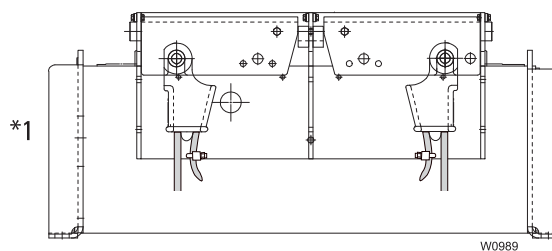
32



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...6 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, 15, 17, 58.
- 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 bridged (see 6.7, page 41) see circuit diagram.
- Run rope in under partial load (will improve service life).

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 (STAHL CraneSystems GmbH). 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.

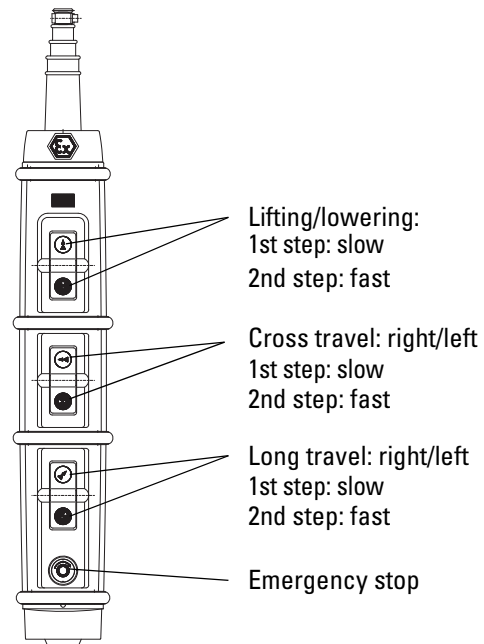
5.1 Duties of crane operator

**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!

- **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.

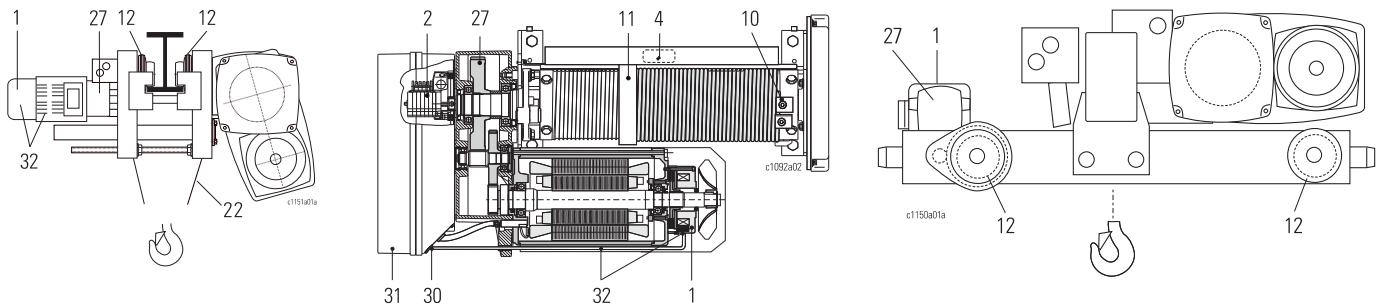
The operator is obliged to prevent a 5 mm layer of dust by observing the hoist and cleaning operations at suitable intervals.

- **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.
- Observe the requirements of the accident prevention regulations.
- 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.

Lubricants and lubrication points, see page 59.

6.1 Inspection intervals



6.1.1 Every day

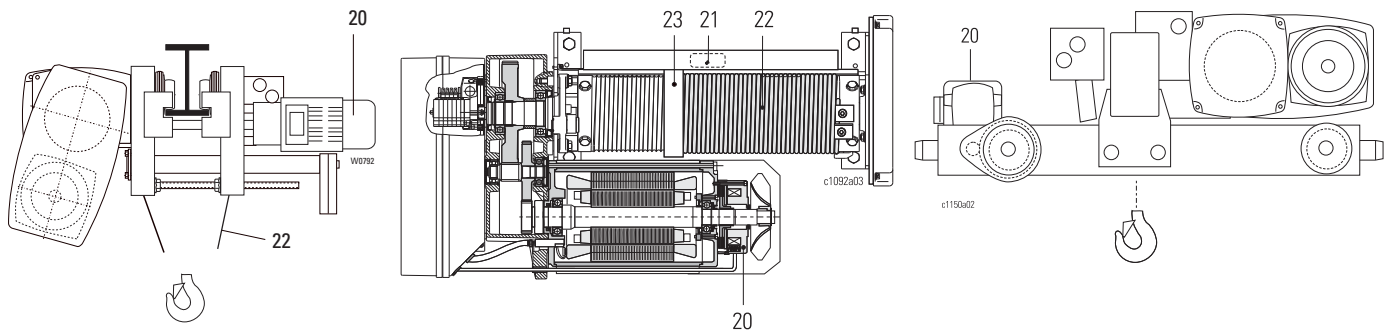
Before starting work

- Check function of brake(s), see pages 36, 37
- Emergency limit switch (2) if there is no operational limit switch, operational limit switch, if any, see page 38
- EMERGENCY STOP, crane switch, see page 22
- Rope (22), see page 42

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 (4), see page 41
- Disconnect switch and main isolator, see page 22
- PE connections and equipotential bonding
- Establish remaining service life, see page 49
- Rope attachment (10), see page 44, rope sheaves, see page 86
- Rope guide (11), see page 43, 45
- Drive parts (12), flanges, wheels etc., see page 47
- Screw connections, welds
- End stops, buffers
- Gear (27), see page 48
- Safety clearances
- Power supply cable
- Cable glands
- Switching functions
- Remove dust from cable glands (30) and tighten
- Remove cover (31), remove any dust present inside. If any dust was present, use a new gasket and check that cable glands are dust-tight; if necessary replace cable glands.
(Caution! May only be performed by an Ex specialist!)
- Remove dust from motor housing (32) and from brake if there are any deposits.

6.2 Maintenance intervals

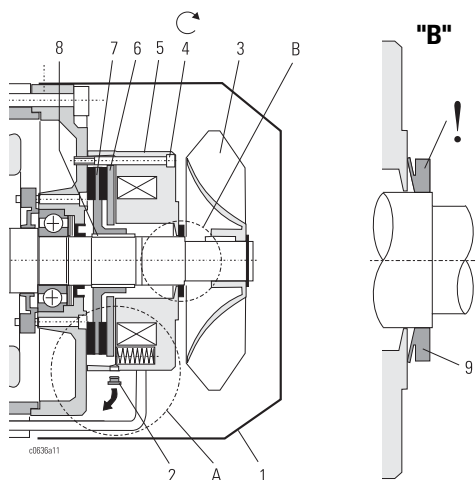


6.2.1 Once a year

- 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 59
 - Grease rope guide (23) with brush, see page 59
 - Tighten clamping points for electric cables
- Remove any dust present on and in electric devices if housings were opened during maintenance work.

6.3 Hoist brake

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

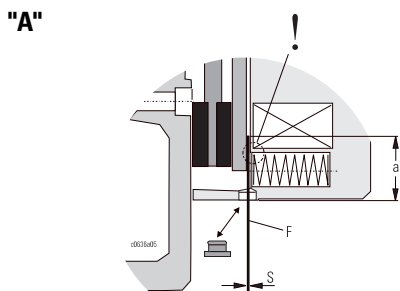


6.3.1 Checking brake

- Remove fan cover (1)
- Remove plug (2)
- Measure air gap (S) with feeler gauge (F). N.B.: When measuring, ensure that the feeler gauge is pushed in at least as far as depth "a" and does not catch on shoulder (!). See table for max. permissible air gap (S). The brake is not adjustable. If the max. permissible air gap (S) has been reached, the brake disc (brake rotor) must be replaced. Replacement must be performed by an Ex specialist.

6.3.2 Replacing brake disc (brake rotor)

- Remove fan cover (1)
- Pull off fanwheel (3), remove feather key
- Disconnect brake
- Unscrew fixing screws (4)
- Remove magnet piece (5) together with armature disc (6) and gasket (9)
- Remove brake disc (brake rotor) (7)
- Clean brake (wear a dust protection mask)
- Check friction surfaces for wear
- Push new brake disc (brake rotor) (7) onto hub (8) and check radial play. If there is increased play in the gearing between brake disc (7) and hub (8) the hub (8) must be pulled off the motor shaft and replaced. Before removing hub (8) please contact the manufacturer.



Replace in reverse order.

- Ensure that the check hole for measuring the air gap is underneath. Observe tightening torques.

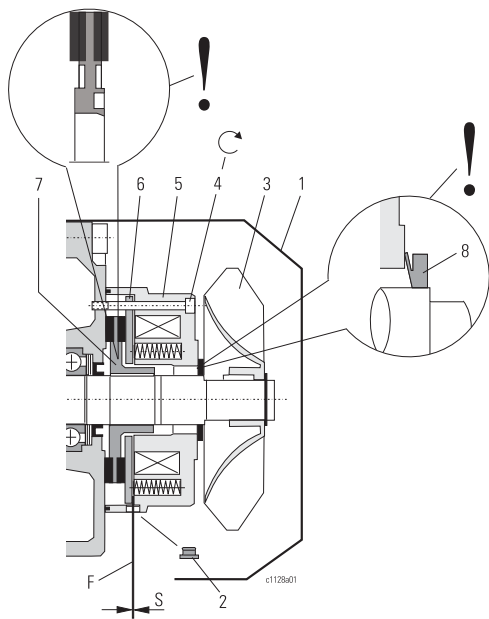
Ensure the correct fit and axial positioning of the gasket (9) in relation to the plane surface (see sketch, detail B)

Hoist motor type	Hoist brake	S min. [mm]	S max. [mm]	a [mm]	⌚ Nm
12/2H33	M16	0,35	0,8	25	9
12/2H42	M32	0,35	0,9	25	9
12/2H62	M 60	0,45	1,7	25	22
12/2H71	M100	0,5	1,8	30	22
12/2H72	M150	0,5	1,8	30	22
12/2H73	M150	0,5	1,6	25	22



Caution! If the max. value for permissible wear is not observed, an impermissible temperature rise may occur in the brake. Explosion protection is then no longer ensured. If hoist is subjected to excessive use, the maintenance intervals must be adapted accordingly. An air gap (S_{min}) which is too small may also cause an impermissible temperature rise due to the brake linings rubbing.

6.4 Trolley brake



6.4.1 Checking brake - SF ...

- Remove fan cover (1)
- Remove plug (2)
- Measure air gap with feeler gauge (F). See table for max. permissible air gap (S). The brake is not adjustable. If the max. permissible air gap (S) has been reached, the brake disc (brake rotor) must be replaced. Replacement must be carried out by an Ex specialist.

6.4.2 Replacing brake disc (brake rotor) - SF ...

- Remove fan cover (1)
- Pull off fanwheel (3), remove feather key
- Disconnect brake
- Unscrew fixing screws (4)
- Remove magnet piece (5) together with armature disc (6) and gasket (8)
- Remove brake disc (brake rotor) (7)

Replace in reverse order:

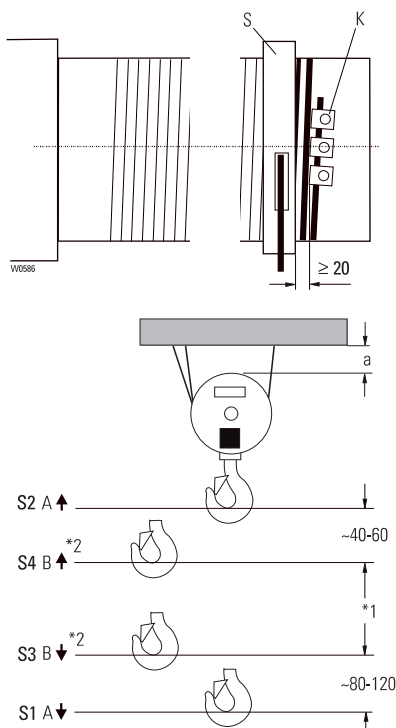
- Ensure that the check hole for measuring the air gap is underneath. Observe tightening torques.
- **Ensure the correct axial positioning of the gasket (8) in contact with the plane surface** (see sketch).

Type	Motor type	Brake	Braking torque [Nm]	S min. [mm]	S max. [mm]	(4)	⤵ [Nm]
SF xx xxx 123	8/2F12/2xx.223	FDW 08	1,3	0,2	2,0	3xM4	3
SF xx xxx 133	8/2F13/xx.233	FDW 08	2,5	0,2	1,6	3xM4	3
SF xx xxx 184	4F18/2xx.233	FDW 08	2,5	0,2	1,6	3xM4	3
SF xx xxx 313	8/2F31/2xx.423	FDW 13	5	0,3	2,0	3xM6	10
SF xx xxx 384	4F38/2xx.433	FDW 13	8	0,3	2,0	3xM6	10
SF xx xxx 423	8/2F42/2xx.433	FDW 13	8	0,3	2,0	3xM6	10
SF xx xxx 484	4F48/2xx.443	FDW 13	13	0,3	1,0	3xM6	10
SF xx xxx 523	8/2F52/2xx.523	FDW 15	13	0,3	2,0	3xM6	10



Caution! If the max. value for permissible wear is not observed, an impermissible temperature rise may occur in the brake. Explosion protection is then no longer ensured. If hoist is subjected to excessive use, the maintenance intervals must be adapted accordingly. An air gap (S_{min}) which is too small may also cause an impermissible temperature rise due to the brake linings rubbing.

6.5 Hoist limit switch



		a [mm]	
		50 Hz	60 Hz
	1/1 2/2-1	130	150
	2/1 4/2-1	70	80
	4/1 8/2-1	40	50



6.5.1 Description of system

The wire rope hoist is equipped as standard with an **emergency limit switch** for disconnecting in top and bottom hook position. (Switching points A↑ and A↓). The gear limit switch (GE-S) is installed in the panel box on the gear. If original STAHL CraneSystem controls/circuit diagrams are used, the corresponding hoisting direction and cross and long travel are disabled when the limit switch is activated. The opposing hoisting direction is clear.

An additional **operational limit switch** *2 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 pendant includes a lockable, self-resetting key switch (override button U) for checking the emergency 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 Safety notes

The limit switch is constructed according to the state of the art and is safe in operation. However dangers may arise if it is used incorrectly and not for its intended purpose.

6.5.3 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.

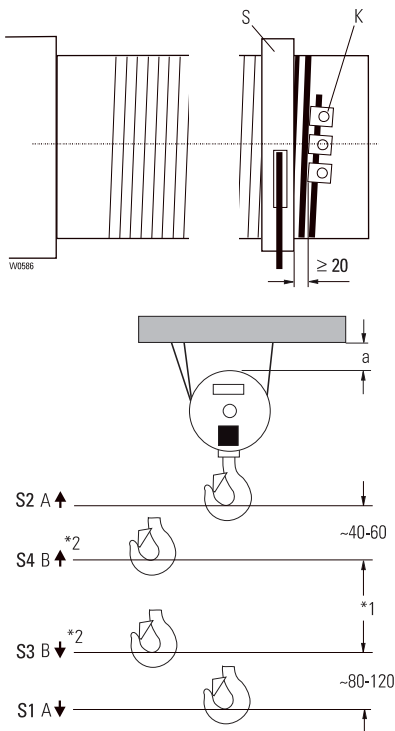
6.5.4 Testing combined operational and emergency hoist limit switch

- 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" see table.
 - 4 Press **"down" button** and check bottom hook position in the same way.
 - 5 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.

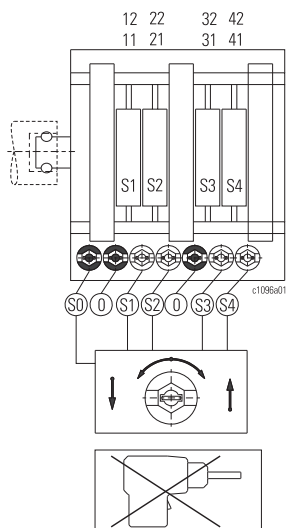
*1 Effective hook path with operational limit switch

*2 Option

6.5 Hoist limit switch (continued)



	a [mm]	
	50 Hz	60 Hz
1/1 2/2-1	130	150
2/1 4/2-1	70	80
4/1 8/2-1	40	50



6.5.5 Setting limit switch

No work may be carried out on live parts in areas exposed to explosion hazard.

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

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. The black setscrews marked (0) have no function.

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 limit switch:

1. A↑ (S2)
2. A↓ (S1)

Combined operational and emergency limit switch:

1. A↑ (S2)
2. B↑ (S4)
3. A↓ (S1)
4. 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

6.5.5 Setting 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).

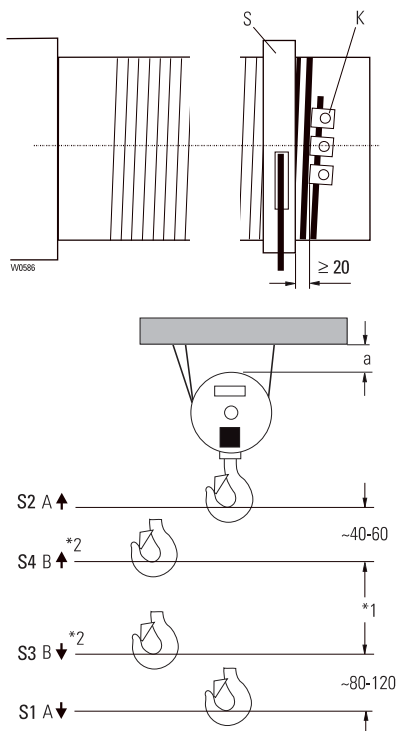
- Lower bottom hook block 2/1 to 120 mm, or 60 mm for 4/1, above desired hook position, if necessary turn setscrew (S1) to the left beforehand.
- Turn setscrew (S1) to the right until contact S1 switches audibly.
- Check cut-off point in main and creep hoist.

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
	8/2-1		

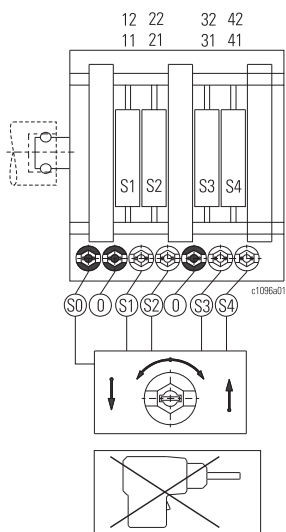
Safety note:
Incorrectly set limit switches may cause serious accidents!

6.5.6 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.

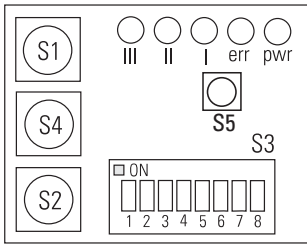
Any dust deposits that may be visible when the housing is opened must on no account be removed with compressed air as this would force the dust into the contacts and impair the switching function.

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



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

6.6 Overload cut-off



6.6.1 Description of system

The Load Monitor SLE21 / Multicontroller SMC21 with its electronic sensors is set in the factory. Corrections are only permitted in special cases, see page 52. The factory settings are shown on a sketch under the front cover of the evaluation device.

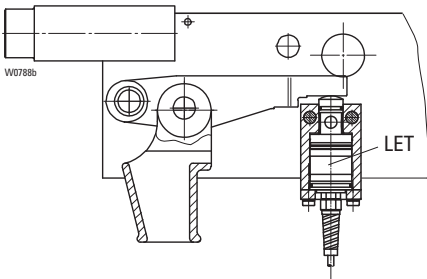
6.6.2 Testing overload cut-off

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.

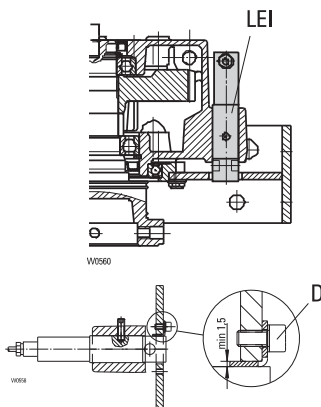
6.6.3 Maintenance of LET overload cut-off

After removing load from hoist, check all moving parts (A) for ease of movement. Clean without dismantling and grease from the outside with a thin-bodied lubricant. See page 22 for a description of the system.



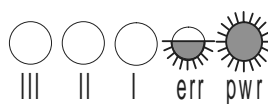
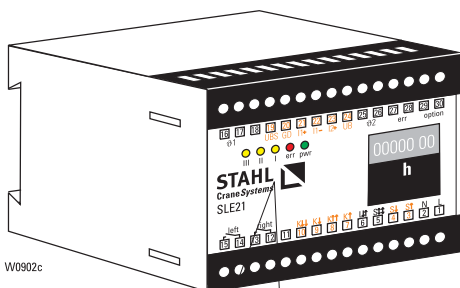
6.6.4 Maintenance of LEI overload cut-off

- Check thickness of plate (min. 1.5 mm). If necessary, replace plate after removing screw (D). See page 22 for a description of the system.



6.7 Crane test

1. Carefully remove front cover of SLE21 / SMC21.
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 45 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 44, "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 43, table.

The rope must be free of load for testing to facilitate detecting any broken wires when bending the rope by hand (approximately by radius of rope sheave).

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: $\geq 1/3 \times$ 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.

Risk of accident!

In case of doubt please contact the manufacturer.



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 (FEM 9.661) 2m - 4m	4	4	5	5	5	6
	8	8	10	10	10	11
over a length of [mm]	33	42	54	72	84	120
or						
Broken wires visible 1Bm, 1Am (FEM 9.661) 2m - 4m	8	8	10	10	10	11
	16	16	16	19	19	22
over a length of [mm]	165	210	270	360	420	600

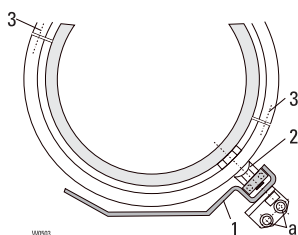
Non-twist-free wire rope

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 (FEM 9.661) 2m - 4m	5	6	6	6	9	6	6	12
	10	13	13	13	18	18	13	24
over a length of [mm]	33	42	54	54	72	75	84	120
or								
Broken wires visible 1Bm, 1Am (FEM 9.661) 2m - 4m	10	13	13	13	18	13	13	24
	19	26	26	26	35	26	26	48
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

SH3 - SH5



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.

SH6

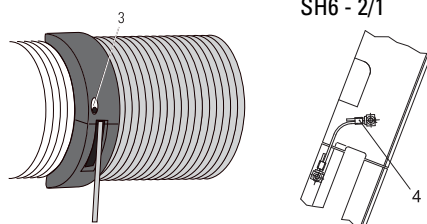


2nd method

- 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.

SH6 - 2/1



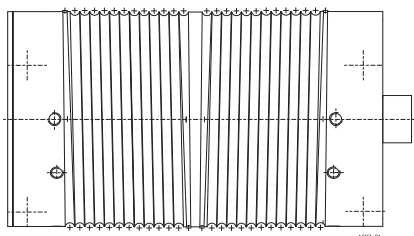
6.8.4 Replacing wire rope

SH 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.



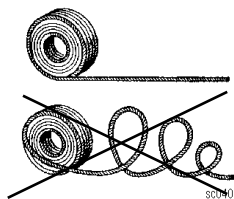
In the case of 2 wire ropes with different lays

- 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).



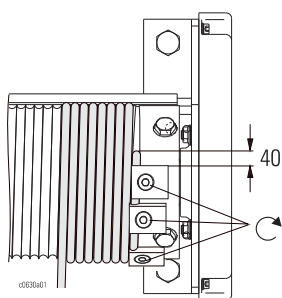
Removing rope

- 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 59.
- Fit rope guide, see page 45 "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.

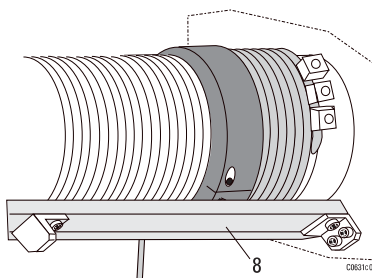
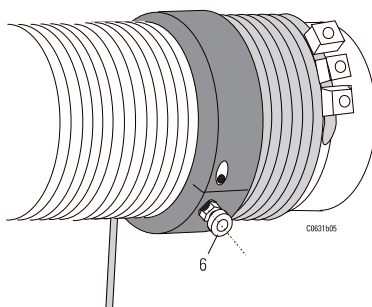
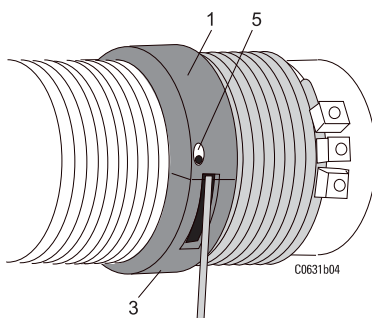
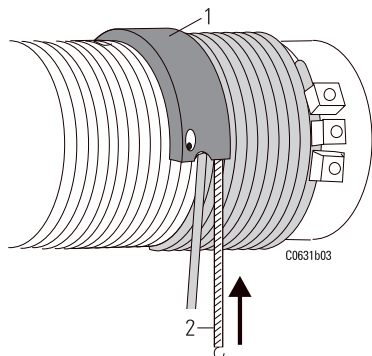
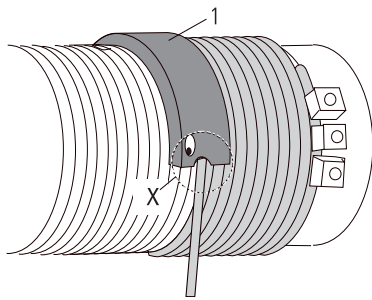


Caution! Risk of accident!

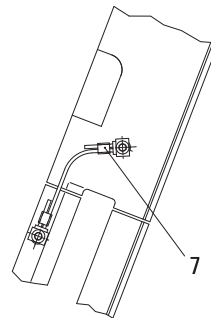
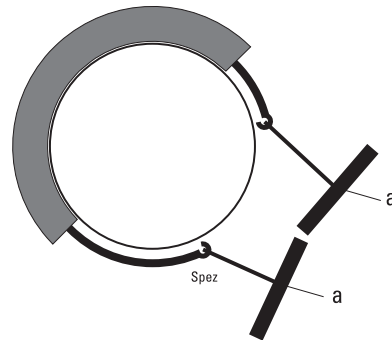
- After fitting a new rope, or shortening the old one, reset the hoist limit switch. See page 39, "Setting hoist limit switch".
- If the new rope twists after some time in operation, untwist the rope immediately. See page 25, "Reeving rope" and "Removing rope".

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

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

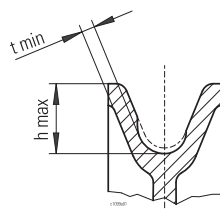
- Check rope sheaves for wear. We recommend having them checked by personnel trained by us. They should also be checked for easy running, indicating that the ball bearings are in good condition.

Wear on rope sheave

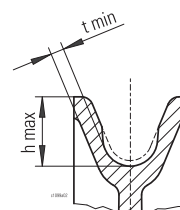
Notes on limits for wear

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	154	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

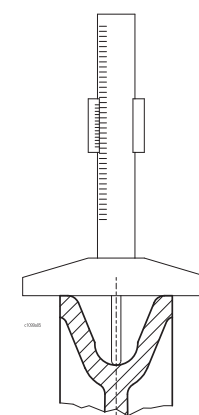
on one side and at base



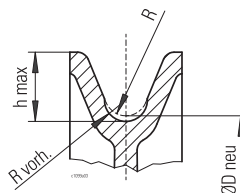
on both sides and at base



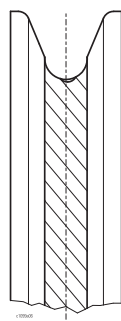
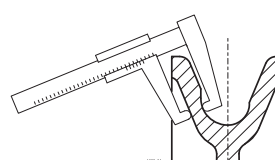
Measuring depth of base of groove with depth gauge



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 source of danger. 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.

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 removed.



6.8 Rope drive (continued)

6.8.7 Checking load hook

RSN. 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 _{min.}	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.

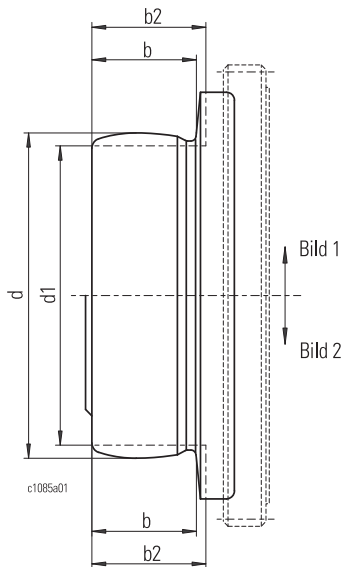


Fig.	Nominal value		Limit for wear	
	d [mm]	b [mm]	d1 [mm]	b2 [mm]
1	80	27.5	76	29.5
1	100	33	95	35
1	125	38	119	40
1	140	44.5	133	47
2		42.5		45
1	160	44.5	152	47
2	200	42.5	190	45

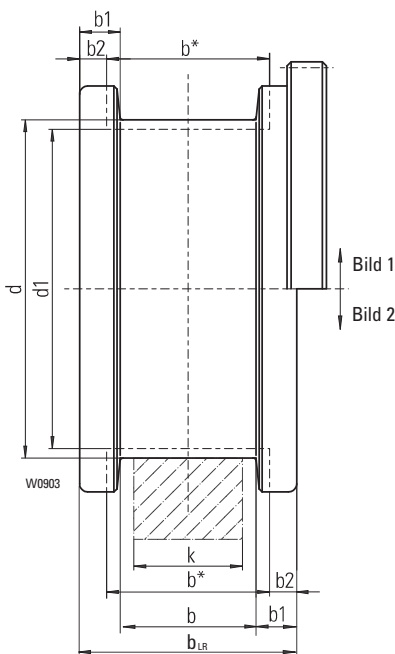


Fig.	d	Nominal value		Limit for wear							
		bLR	b	k		b1	d1	b2	max play = b*-k		
				min	max				kmin	kmax	
[mm]											
1	100	80	50	40	45	15	95	5.5	13	13	
		80	60	50	55	10			5.5	13	13
2	125	80	50	40	45	15	118.75	7	13	13	
		80	60	50	55	10			7	13	11
2	160	85	52	40	45	16.5	152	8	16	16	
		85	62	50	55	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.

() for machined faces

Wheels, wheel drive and runway (continued)

- 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 15) 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.

6.10 Gear

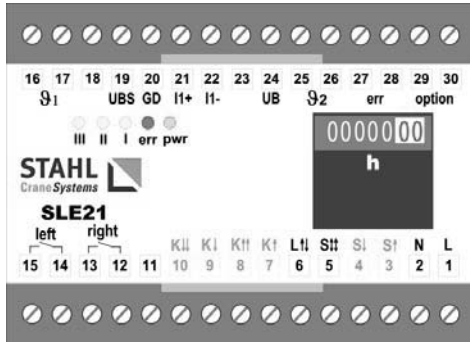
The gearing of SH hoists is hardened, hard-machined and has a high safety factor. With their minimum classification of 1 Am or 2 m to FEM 9.511 the gears have a long service life. All bearing points have roller bearings. The gearboxes are tightly closed (IP 66) and have no air vent screw; as this prevents 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, see page 2, 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. Various devices are used:



6.11.1 Operating hours counter in SLE21 load monitor

The operating hours counter in the load monitor 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 SMC21 Multicontroller (optional)

The operating time of the hoist and the full load operating hours are recorded in the SMC21. The SMC21 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 ex 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.



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

In particular the criteria important for the dust ignition 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 is to 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 Dismantle brake

7.1.3 Loud clicking when switching on

- Measure air gap, see page 36, 37.
- Replace brake disc if necessary, see page 36, 37.

7.1.4 Braking path too long

- Brake displacement too long.
- Brake lining worn.
- Replace brake disc, see page 36, "Hoist brake", see page 37, "Trolley brake",

7.1.5 Bottom hook block and rope rotate

- Rope is twisted.
- Untwist rope, see page 44, "Replacing rope".

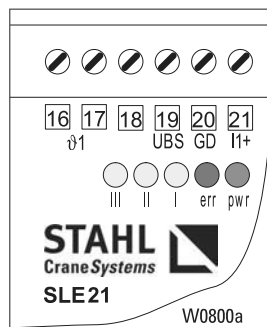
7.1.6 Cross travel not possible

- 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

- Operational hoist limit switch is defective.
- Emergency limit switch has reacted.
 - 1 Release override button on control pendant using the key supplied.
 - 2 Press override button and down button simultaneously.

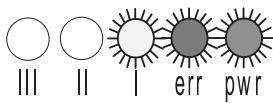
7.1 What is to be done if? (continued)



7.1.8 Load is not lifted

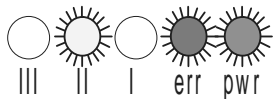
- SLE21 load monitor / SMC21 Multicontroller has been actuated or is faulty.
1. Check setting, see page 41.
 2. Actions for SLE21 / SMC21
LED I...III "on" and LED err => error.

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



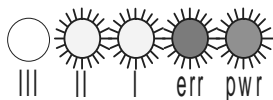
Error specification - Sensor current <1 mA or > 24 mA

- Elimination of error**
- Check voltage supply
 - Check sensor current (terminal 21)
 - Check sensor cable
 - Replace sensor



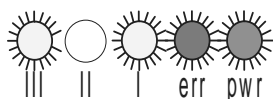
Error specification - Overload

- Elimination of error** - Remove load from hoist



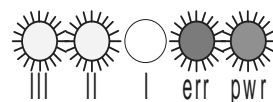
Error specification - Overtemperature (hoisting motion not possible)

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



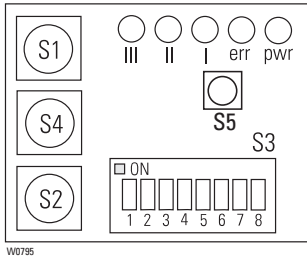
Error specification - Control error

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



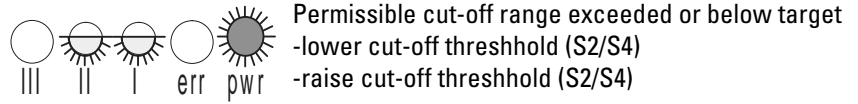
Error specification - System error

- Elimination of error**
- Check voltage (terminal 6)
 - Switch SLE21 / SMC21 off/on
 - Replace SLE21/SMC21



7.1.9 Correction of cut-off threshold for SLE21 with electronic sensor

- **Corrections to the cut-off threshold may be carried out by trained personnel only.** The load monitor will only accept alterations of -20% to +8% on the factory setting. If these limits are exceeded, I and II flash.



- Rough adjustment with S4, ~16%/ switching position,
- Fine adjustment with S2, ~1%/switching position, see page 41.


Caution: Do not exceed 110% nominal load

7.1.10 Correction of cut-off threshold for SMC21

A laptop and the Config Tool software is required for this.

8.1 FEM classification

Classification of mechanism, rope drive and motor in acc. with FEM for SH ex

					Type	FEM 9.661	FEM 9.511	FEM 9.683	Type	FEM 9.661	FEM 9.511	FEM 9.683
						Rope drive	Mechanism	Motor		Rope drive	Mechanism	Motor
1/1 2/2-1	2/1 4/2-1	4/1	6/1	8/1								
500	1000	2000			SH 3005-25 SH 3005-40	3m	4m	4m				
630	1250	2500			SH 3006-25 SH 3006-40	2m	3m	4m				
800	1600	3200			SH 3008-20 SH 3006-32	2m	2m	4m	SH 4008-25 SH 4008-40	3m	4m	4m
1000	2000	4000			SH 4010-25 SH 4010-40	2m	3m	4m				
1250	2500	5000			SH 4012-20 SH 4012-32	2m	2m	4m				
1600	3200	6300			SH 4016-16 SH 4016-25	1Am	1Am	4m	SH 5016-25 SH 5016-40	3m	4m	4m
2000	4000	8000			SH 5020-25 SH 5020-40	2m	3m	4m				
2500	5000	10000			SH 5025-20 SH 5025-32	2m	2m	4m	SHR 6025-20 SHR 6025-32 SHR 6025-40	2m	4m	4m
3200	6300	12500			SH 5032-16 SH 5032-25	1Am	1Am	4m	SHR 6032-16 SHR 6032-25 SHR 6032-40	2m	4m	4m
4000	8000	16000			SHR 6040-12 SHR 6040-20 SHR 6040-32	1Am	3m	4m	SH 6040-12 SH 6040-20	3m	3m	4m
5000	10000	20000			SH 6050-16 SH 6050-25	2m	2m	4m				
6300	12500	25000			SH 6063-12 SH 6063-20	1Am	1Am	4m				

8.2 Conditions of use

The hoist is designed for use in industry and for the ambient conditions usual in industry in non-hazardous areas.
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

Equipment group II
Category 3 D

Explosion protection

 II 3 D Ex tD A22 IP66 T120°C

 II 3 D c k T120°

Protection against dust and moisture in acc. with EN 60 529

IP66

Permissible ambient temperatures

-20°C ... +40°C (+60° as option)

8.3 Hoist

8.3.1 Pole-changing motors

Ex hoist		Motor *3	50 Hz										Mains fuse		
			kW	%DC	c/h	220...240 V		380...415 V		480...525 V		cos phi k	gL / gG *2		
						In [A]	Ik [A]	In [A]	Ik [A]	In [A]	Ik [A]		220... 240 V	380... 415 V	480... 525 V
SH 3005-25 SH 3006-25 SH 3008-20		12/2H33	0,4/2,4 0,5/3,0 0,5/3,0	20/50 20/40 20/40	360/180 240/120 240/120	7,0/10,6 7,0/11,8 7,0/11,8	8,3/43,0	4,0/6,1 4,0/6,8 4,0/6,8	4,8/25,0	3,2/4,9 3,2/5,4 3,2/5,4	3,8/20,0	0,82/0,91	16	10	10
SH 3005-40 SH 3006-40 SH 3008-32	SH 4008-25 SH 4010-25 SH 4012-20 SH 4016-16	12/2H42	0,6/3,9 0,7/4,8 0,7/4,8 0,7/4,8	20/50 20/40 20/40 20/40	360/180 240/120 240/120 240/120	8,7/15,7 8,9/17,4 8,9/17,4 8,9/17,4	13,0/82,0	5,0/9,0 5,1/10,0 5,1/10,0 5,1/10,0	7,5/47,0	4,0/7,2 4,1/8,0 4,1/8,0 4,1/8,0	6,0/38,0	0,79/0,87	25	16	16
	SH 4008-40 SH 4010-40 SH 4012-32 SH 4016-25	12/2H62	1,0/6,1 1,1/7,6 1,1/7,6 1,1/7,6	20/50 20/40 20/40 20/40	480/240 360/180 360/180 360/180	10,1/21,0 10,4/25,0 10,4/25,0 10,4/25,0	19,1/165	5,8/12,0 6,0/15,0 6,0/15,0 6,0/15,0	11,0/95,0	4,6/9,6 4,8/11,6 4,8/11,6 4,8/11,6	8,8/76,0	0,74/0,77	50	25	20
SH 5016-25 SH 5020-25 SH 5025-20	- SHR 6025-20 SHR 6032-16 SHR 6040-12 SH 6040-12	12/2H71	1,3/7,6 1,5/9,5 1,5/9,5 1,5/9,5 1,5/9,5	20/50 20/40 20/40 20/40 20/40	480/240 300/150 300/150 300/150 300/150	14,8/28,0 16,7/37,0 16,7/37,0 16,7/37,0 16,7/37,0	32,2/183	8,5/16,0 9,6/21,0 9,6/21,0 9,6/21,0 9,6/21,0	18,5/105	6,8/12,8 7,7/16,9 7,7/16,9 7,7/16,9 7,7/16,9	14,8/84,0	0,62/0,64	50	35	25
SH 5016-40 SH 5020-40 SH 5025-32 SH 5032-25	- SHR 6025-32 SHR 6032-25 SH. 6040-20 SH 6050-16 SH 6063-12	12/2H72 *1	1,9/12,0 2,4/15,5 2,4/15,5 2,4/15,5 2,4/15,5 2,4/15,5	20/50 20/40 20/40 20/40 20/40 20/40	480/240 240/120 240/120 240/120 240/120 240/120	19,5/43,0 23,0/59,0 23,0/59,0 23,0/59,0 23,0/59,0 23,0/59,0	45,2/304	11,2/25,0 13,4/34,0 13,4/34,0 13,4/34,0 13,4/34,0 13,4/34,0	26,0/175	9,0/20,0 10,7/27,0 10,7/27,0 10,7/27,0 10,7/27,0 10,7/27,0	20,8/140	0,62/0,64	80	50	35
	SHR 6025-40 SHR 6032-40 SH. 6040-32 SH 6050-25 SH 6063-20	12/2H73 *1	3,1/19,0 3,8/24,0 3,8/24,0 3,8/24,0 3,8/24,0	20/50 20/40 20/40 20/40 20/40	360/180 240/120 240/120 240/120 240/120	38,0/63,0 38,0/83,0 38,0/83,0 38,0/83,0 38,0/83,0	77,0/423	22,0/36,0 22,0/48,0 22,0/48,0 22,0/48,0 22,0/48,0	44,0/243	17,6/29,0 17,6/38,0 17,6/38,0 17,6/38,0 17,6/38,0	35,0/194	0,59/0,63	100	63	63

Motor currents at other voltages:

Formula

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

- *1 Operation only with special starting circuit via 12/24-pole winding
- *2 The 2-pole starting current for main hoist and the rated current for the travel motor were taken into consideration when selecting the main fuse.
- *3 The motors are designed for rated voltage ranges.
In accordance with EN 60034 a voltage tolerance of $\pm 5\%$ and a frequency tolerance of $\pm 2\%$ apply on top of the rated voltage ranges.
The maximum current occurring in the rated voltage range is given.

8.3.2 Pole-changing hoist motors

Ex hoist		Motor *3	60 Hz									Mains fuse			
			kW	% DC	c/h	380...415 V		440...480 V		550...600 V		cos phi k	gL / gG *2		
						In [A]	Ik [A]	In [A]	Ik [A]	In [A]	Ik [A]		380... 415 V	440... 480 V	550... 600 V
SH 3005-25 SH 3006-25 SH 3008-20		12/2H33	0,4/2,9 0,6/3,6 0,6/3,6	20/50 20/40 20/40	360/180 240/120 240/120	4,6/7,0 4,6/7,8 4,6/7,8	5,5/29,0	4,0/6,1 4,0/6,8 4,0/6,8	4,8/25,0	3,2/4,9 3,2/5,4 3,2/5,4	3,8/20,0	0,82/0,91	16	10	10
SH 3005-40 SH 3006-40 SH 3008-32	SH 4008-25 SH 4010-25 SH 4012-20 SH 4016-16	12/2H42	0,7/4,7 0,9/5,8 0,9/5,8 0,9/5,8	20/50 20/40 20/40 20/40	360/180 240/120 240/120 240/120	5,8/10,4 5,9/11,5 5,9/11,5 5,9/11,5	8,6/54,0	5,0/9,0 5,1/10,0 5,1/10,0 5,1/10,0	7,5/47,0	4,0/7,2 4,1/8,0 4,1/8,0 4,1/8,0	6,0/38,0	0,79/0,87	20	16	16
	SH 4008-40 SH 4010-40 SH 4012-32 SH 4016-25	12/2H62	1,2/7,3 1,3/9,1 1,3/9,1 1,3/9,1	20/50 20/40 20/40 20/40	480/240 360/180 360/180 360/180	6,7/13,8 6,9/17,0 6,9/17,0 6,9/17,0	12,7/109	5,8/12,0 6,0/15,0 6,0/15,0 6,0/15,0	11,0/95,0	4,6/9,6 4,8/11,6 4,8/11,6 4,8/11,6	8,8/76,0	0,74/0,77	35	25	20
SH 5016-25 SH 5020-25 SH 5025-20	- SHR 6025-20 SHR 6032-16 SHR 6040-12 SH 6040-12	12/2H71	1,5/9,1 1,8/11,4 1,8/11,4 1,8/11,4 1,8/11,4	20/50 20/40 20/40 20/40 20/40	480/240 300/150 300/150 300/150 300/150	9,8/18,4 11,0/24,0 11,0/24,0 11,0/24,0 11,0/24,0	21,3/121	8,5/16,0 9,6/21,0 9,6/21,0 9,6/21,0 9,6/21,0	18,5/105	6,8/12,8 7,7/16,9 7,7/16,9 7,7/16,9 7,7/16,9	14,8/84,0	0,62/0,64	35	35	25
SH 5016-40 SH 5020-40 SH 5025-32 SH 5032-25	- SHR 6025-32 SHR 6032-25 SH. 6040-20 SH 6050-16 SH 6063-12	12/2H72 *1	2,3/14,4 2,9/18,6 2,9/18,6 2,9/18,6 2,9/18,6	20/50 20/40 20/40 20/40 20/40	480/240 240/120 240/120 240/120 240/120	12,9/29,0 15,4/39,0 15,4/39,0 15,4/39,0 15,4/39,0	29,9/201	11,2/25,0 13,4/34,0 13,4/34,0 13,4/34,0 13,4/34,0	26,0/175	9,0/20,0 10,7/27,0 10,7/27,0 10,7/27,0 10,7/27,0	20,8/140	0,62/0,64	50	50	35
	SHR 6025-40 SHR 6032-40 SH. 6040-32 SH 6050-25 SH 6063-20	12/2H73 *1	3,7/23,0 4,5/29,0 4,5/29,0 4,5/29,0 4,5/29,0	20/50 20/40 20/40 20/40 20/40	360/180 240/120 240/120 240/120 240/120	25,0/41,0 25,0/55,0 25,0/55,0 25,0/55,0 25,0/55,0	51,0/279	22,0/36,0 22,0/48,0 22,0/48,0 22,0/48,0 22,0/48,0	44,0/243	17,6/29,0 17,6/38,0 17,6/38,0 17,6/38,0 17,6/38,0	35,0/194	0,59/0,63	80	63	63

Motor currents at other voltages:

Formula

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

- *1 Operation only with special starting circuit via 12/24-pole winding
- *2 The 2-pole starting current for main hoist and the rated current for the travel motor were taken into consideration when selecting the main fuse.
- *3 The motors are designed for rated voltage ranges.
In accordance with EN 60034 a voltage tolerance of $\pm 5\%$ and a frequency tolerance of $\pm 2\%$ apply on top of the rated voltage ranges.
The maximum current occurring in the rated voltage range is given.

8.4 Trolley/crab

8.4.1 Pole-changing travel motors for monorail trolleys

kg				50 Hz			60 Hz		
				5/20 m/min	2,5/10 m/min	8/32 m/min	6,3/25 m/min	3,2/12,5 m/min	10/40 m/min
	1/1 2/2-1	2/1 4/2-1	4/1	Type kW 20/40%DC	Type kW 20/40%DC	Type kW 20/40%DC	Type kW 20/40%DC	Type kW 20/40%DC	Type kW 20/40%DC
500... ...3200	SH 3 SH 4 SH 5			SF 17113123 0,09/0,37	SF 17219123 0,09/0,37	SF 17109123 0,09/0,37	SF 17113123 0,11/0,44	SF 17219123 0,11/0,44	SF 17109123 0,11/0,44
1000... ...3200		SH 3 SH 4	SH 3 SH 4008						
1600... ...3200	SH 5 - L4			2x SF 17113123 2x 0,09/0,37	2x SF 17219123 2x 0,09/0,37	2x SF 17109123 2x 0,09/0,37	2x SF 17113123 2x 0,11/0,44	2x SF 17219123 2x 0,11/0,44	2x SF 17109123 2x 0,11/0,44
4000... ..6300			SH 4010 SH 4012 SH 4016	SF 17113123 0,09/0,37	SF 17219123 0,09/0,37	SF 17109133 0,13/0,55	SF 17113123 0,11/0,44	SF 17219123 0,11/0,44	SF 17109133 0,16/0,66
3200... ...4000		SH 5016 SH 5020		SF 17213123 0,09/0,37	SF 17219123 0,09/0,37	SF 17209123 0,09/0,37	SF 17213123 0,11/0,44	SF 17219123 0,11/0,44	SF 17209123 0,11/0,44
5000... ...6300		SH 5025 SH 5032 SHR 6025 SHR 6032	SH 5016			SF 17209133 0,13/0,55			SF 17209133 0,16/0,66
8000... ...10000		SHR 6040 SH 6040 SH 6050	SH 5020 SH 5025 SHR 6025	SF 17213133 0,13/0,55		SF 17209313 0,32/1,25	SF 17213133 0,16/0,66		SF 17209313 0,36/1,5
12500		SH 6063	SH 5032 SHR 6032	SF 17213313 0,32/1,25			SF 17213313 0,36/1,50		
16000			SHR 6040			-			-
16000... ...25000			SH 6	2x SF 17213133 2x 0,13/0,55	2x SF 17219123 2x 0,09/0,37	2x SF 17209313 2x 0,32/1,25	2x SF 17213133 2x 0,16/0,66	2x SF 17219123 2x 0,11/0,44	2x SF 17209313 2x 0,36/1,5

8.4.2 Pole-changing travel motors for double rail crabs

kg				50 Hz			60 Hz		
				5/20 m/min	2,5/10 m/min	8/32 m/min	6,3/25 m/min	3,2/12,5 m/min	10/40 m/min
	1/1 2/2	2/1 4/2	4/1	Type kW 20/40%DC	Type kW 20/40%DC	Type kW 20/40%DC	Type kW 20/40%DC	Type kW 20/40%DC	Type kW 20/40%DC
1000... ...3200		SH 3 SH 4	SH 3 SH 4008	SF 17213123 0,09/0,37	SF 17219123 0,09/0,37	SF 17209123 0,09/0,37	SF 17213123 0,11/0,44	SF 17219123 0,11/0,44	SF 17209123 0,11/0,44
4000... ...6300			SH 4010 SH 4012 SH 4016			SF 17209133 0,13/0,55			SF 17109133 0,16/0,66
3200... ...4000		SH 5016 SH 5020		SF 25226123 0,09/0,37	SF 25832133 0,13/0,55	SF 25222123 0,09/0,37	SF 25226123 0,11/0,44	SF 25832133 0,16/0,66	SF 25222123 0,11/0,44
5000... ...6300		SH 5025	SH 5016			SF 25222133 0,13/0,55			SF 25222133 0,16/0,66
		SHR 6025 SH 5032		SF 25228123 0,09/0,37	SF 25834133 0,13/0,55	SF 25224313 0,32/1,25	SF 25228123 0,11/0,44	SF 25834133 0,16/0,66	SF 25224313 0,36/1,5
8000			SH 5020	SF 25226133 0,13/0,55	SF 25832133 0,13/0,55	SF 25222313 0,32/1,25	SF 25226133 0,16/0,66	SF 25832133 0,16/0,66	SF 25222313 0,36/1,5
10000			SH 5025				SF 25226313 0,36/1,50		
6300... ...8000		SHR 6032 SHR 6040 SH 6040		SF 25228133 0,13/0,55	SF 25834133 0,13/0,55	SF 25224313 0,32/1,25	SF 25228133 0,16/0,66	SF 25834133 0,16/0,66	SF 25224313 0,36/1,50
10000... ...12500		SH 6050 SH 6063	SH 5032 SHR 6025 SHR 6032	SF 25228313 0,32/1,25			SF 25228313 0,36/1,50		
16000			SHR 6040			SF 25224423 0,50/2,0			SF 25224423 0,58/2,4
16000... ...20000			SH 6040 SH 6050	SF 35230313 0,32/1,25	SF 35836133 0,13/0,55	SF 35226423 0,50/2,0	SF 35230313 0,36/1,50	SF 35836133 0,16/0,66	SF 35226423 0,60/2,40
25000			SH 6063	SF 35230423 0,50/2,0			SF 35230423 0,60/2,40		

Further travel motor data

Index	Motor type	380...415 V, 50 Hz							380...415 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		%	
...123	8/2F12/220.223	0,09 0,37	590 2420	1,0 1,3	1,4 3,2	0,78 0,93	20 40	800	0,11 0,44	710 2900	1,2 1,5	1,6 3,7	0,78 0,93	20 40	800
...133	8/2F13/220.233	0,13 0,55	600 2540	1,2 1,6	1,6 4,5	0,72 0,92	20 40	500	0,16 0,66	720 3050	1,4 1,8	1,8 5,2	0,72 0,92	20 40	500
...313	8/2F31/210.423	0,32 1,25	660 2550	1,4 3,0	2,9 9,2	0,89 0,90	20 40	600	0,36 1,50	790 3060	1,6 3,5	3,3 10,67	0,89 0,90	20 40	600
...423	8/2F42/210.433	0,50 2,00	665 2680	1,8 4,0	4,4 16,0	0,87 0,90	20 40	360	0,60 2,40	800 3220	2,1 4,6	5,1 19,0	0,87 0,90	20 40	360

8.5 Cable cross sections and lengths of supply cable

1	2						3						4						5						6						7					
Hoist motor type	Stationary						Trolley/crab						Trolley/crab						Rising mains max. 10 m						Crane						Crane					
	Fixed installation in PVC conduit						Fixed installation in PVC conduit						Festoon cable in free air as flexible PVC-sheathed cable						Fixed installation in PVC conduit						Festoon cable in free air as flexible PVC-sheathed cable						Festoon cable in free air as flexible PVC-sheathed cable					
	Power supply to hoist						Power supply to infeed (customer's cable to beginning 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					
	Δ U ≤ 5%						Δ U ≤ 1%						Δ U ≤ 4% (4 + 5)						Δ U ≤ 1,5% (5 + 6)						Δ U ≤ 2,5%											
50 Hz																																				
	220-240 V		380-415 V		480-525 V		220-240 V		380-415 V		480-525 V		220-240 V		380-415 V		480-525 V		230 V		400 V		500 V		220-240 V		380-415 V		480-525 V		220-240 V		380-415 V		480-525 V	
	S	L1	S	L1	S	L1	S	L1	S	L1	S	L1	S	L1	S	L1	S	L1	S	S	S	S	S	S	L1	S	L1	S	L1	S	L1	S	L1	S	L1	
	[mm]²	[m]	[mm]²	[m]	[mm]²	[m]	[mm]²	[m]	[mm]²	[m]	[mm]²	[m]	[mm]²	[m]	[mm]²	[m]	[mm]²	[m]	[mm]²	[m]	[mm]²	[m]	[mm]²	[m]	[mm]²	[m]	[mm]²	[m]	[mm]²	[m]	[mm]²	[m]	[mm]²	[m]	[mm]²	[m]
12/2H33	6,0	57	2,5	72	1,5	68	10,0	18	4,0	22	2,5	21	6,0	37	2,5	48	1,5	44	10,0	4,0	2,5	10,0	17	2,5	14	2,5	22	6,0	27	2,5	34	1,5	32			
12/2H42	10,0	53	4,0	64	2,5	63	16,0	16	6,0	18	4,0	19	10,0	34	4,0	42	2,5	41	16,0	6,0	4,0	16,0	14	6,0	17	4,0	18	10,0	25	4,0	30	2,5	30			
12/2H62	16,0	48	6,0	54	4,0	56	25,0	14	10,0	17	6,0	16	16,0	31	6,0	36	4,0	37	25,0	10,0	6,0	25,0	12	10,0	16	6,0	15	16,0	23	6,0	26	4,0	27			
12/2H71	16,0	52	6,0	59	4,0	61	25,0	16	10,0	19	6,0	18	16,0	34	6,0	40	4,0	41	25,0	10,0	6,0	25,0	14	10,0	19	6,0	17	16,0	25	6,0	29	4,0	30			
12/2H72	25,0	49	10,0	59	6,0	55	35,0	13	16,0	18	10,0	18	35,0	44	10,0	40	6,0	40	35,0	16,0	16,0	35,0	10	16,0	18	6,0	13	25,0	24	10,0	29	6,0	27			
12/2H73	35,0	50	16,0	69	10,0	67	35,0	10	16,0	14	10,0	13	35,0	32	10,0	30	10,0	47	50,0	25,0	16,0	50,0	11	16,0	14	10,0	14	50,0	35	16,0	34	10,0	33			
60 Hz																																				
	380-415 V		440-480 V		550-600 V		380-415 V		440-480 V		550-600 V		380-415 V		440-480 V		550-600 V		400 V		460 V		575 V		380-415 V		440-480 V		550-600 V		380-415 V		440-480 V		550-600 V	
	S	L1	S	L1	S	L1	S	L1	S	L1	S	L1	S	L1	S	L1	S	L1	S	S	S	S	S	S	L1	S	L1	S	L1	S	L1	S	L1	S	L1	
	[mm]²	[m]	[mm]²	[m]	[mm]²	[m]	[mm]²	[m]	[mm]²	[m]	[mm]²	[m]	[mm]²	[m]	[mm]²	[m]	[mm]²	[m]	[mm]²	[m]	[mm]²	[m]	[mm]²	[m]	[mm]²	[m]	[mm]²	[m]	[mm]²	[m]	[mm]²	[m]	[mm]²	[m]	[mm]²	[m]
12/2H33	2,5	63	1,5	50	1,5	78	4,0	19	2,5	15	1,5	14	2,5	41	2,5	56	1,5	52	4,0	4,0	2,5	4,0	18	2,5	17	1,5	16	2,5	29	2,5	39	1,5	36			
12/2H42	4,0	56	4,0	74	2,5	72	6,0	16	4,0	14	2,5	14	4,0	40	4,0	49	2,5	48	16,0	6,0	4,0	6,0	20	4,0	14	2,5	14	4,0	26	4,0	35	2,5	34			
12/2H62	6,0	47	6,0	62	4,0	65	10,0	15	10,0	20	6,0	19	6,0	33	6,0	42	4,0	44	16,0	10,0	6,0	10,0	17	6,0	12	6,0	18	6,0	23	6,0	30	4,0	31			
12/2H71	6,0	51	6,0	68	4,0	70	10,0	17	10,0	22	6,0	21	6,0	34	4,0	31	2,5	30	10,0	10,0	6,0	10,0	15	6,0	14	4,0	14	6,0	25	6,0	33	4,0	34			
12/2H72	10,0	51	10,0	68	6,0	63	16,0	16	16,0	21	10,0	21	16,0	58	10,0	47	6,0	46	25,0	16,0	16,0	16,0	18	10,0	14	6,0	15	10,0	25	10,0	33	6,0	31			
12/2H73	16,0	60	10,0	49	10,0	77	16,0	12	10,0	10	10,0	15	16,0	41	10,0	35	6,0	33	25,0	25,0	16,0	16,0	11	10,0	11	6,0	10	16,0	29	16,0	39	10,0	38			

For larger cross-sections, the max. cable lengths are calculated as follows:

$$L^* = L \times S^* / S$$

S = Recommended cross-section for cable length stated

L1...L5 = Max. supply cable length of the individual types of power supply. Sum of voltage drops ≤ 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.

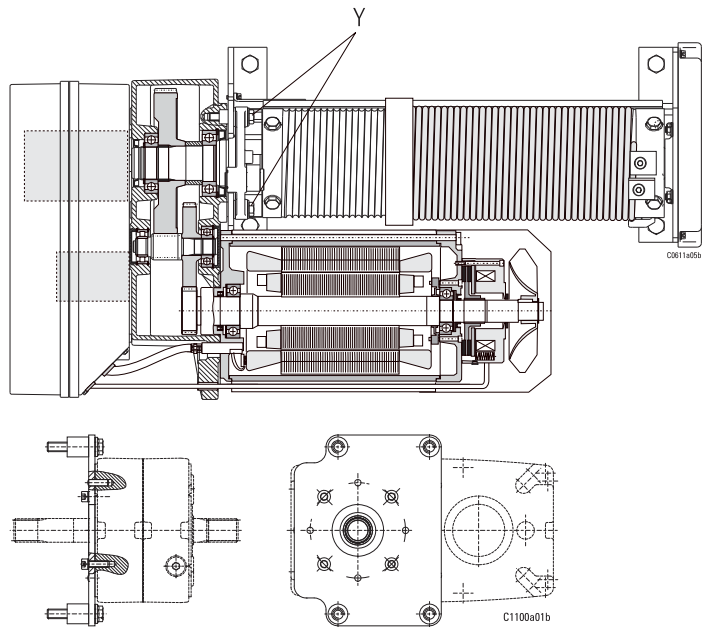
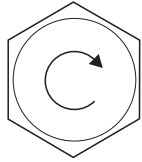
The cross-sections take into consideration the overload protection of the cables corresponding to the types of cable and installation.

Depending on the lengths of the individual sections, the percentual voltage drops given above may be distributed differently in particular cases to find an economical solution.

The cross-sections must be adapted in the case of longer cables and other types of power supply.

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.



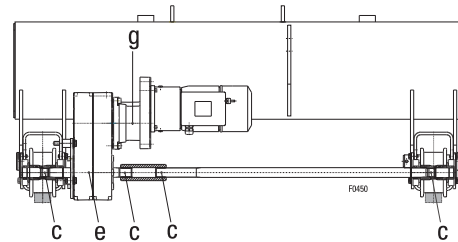
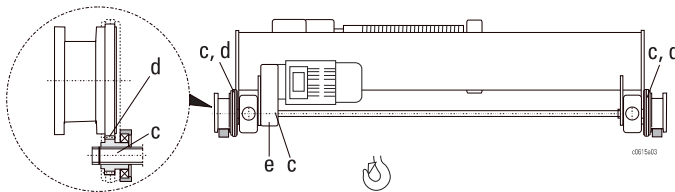
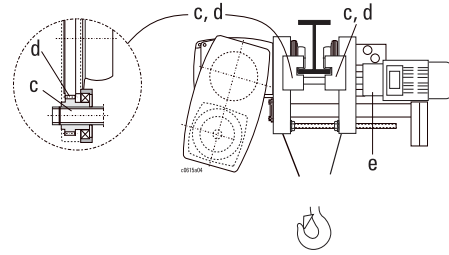
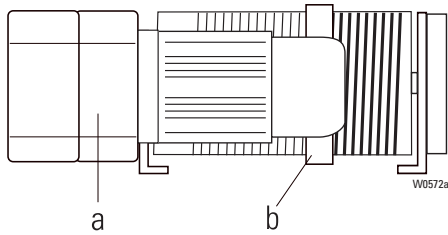
M..	Screw grade		
	8.8	10.9	10.9
	standard		Y
	[Nm]		[Nm]
M6	10	19	-
M8	25	42	-
M10	51	85	75
M12	87	130	87
M16	215	330	250
M20	430	-	-
M24	740	-	-
M30	1500	-	-
M36	2600	-	-

Other screw connections and applicable tightening torques

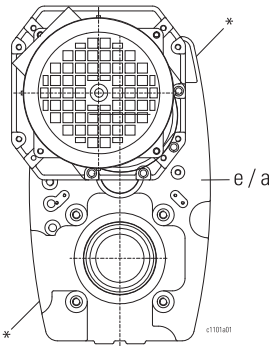
No.	Screw connection Part 1 / Part 2	Type	Screw connection		
			M..	Grade	MA [Nm]
1	Gear casing/panel box	SH 3 - SH 4	M6	8.8	6
2	Gear casing/support plate	SH 3	M10	100	75
		SH 4	M12	100	87
		SH 5	M16	100	310
3	Rope drum/gear drive shaft	SH 5	M12	100	130
4	Rope drum/clamping plate	SH 3	M6/8	8.8	10/25
5	Rope drum bearing journal/holding washer	SH 3	M8	100	42
		SH 4-SH 5	M10		75
		SH 6	M16		260
6	Rope drum flange bearing/support plate (fan side)	SH 3	M8	100	42
		SH 4-SH 5	M10		75
		SH 6	M16		215
7	Grease pan/guide rail	SH 6	M10	100	75
8	Support plate (fan side)/grease pan	SH 3-SH 4	M8	C45K	20
		SH 5	M8	RSt37	10
9	Support plate (gear side, fan side)/fixing tube (Dg)	SH 3-SH 4	M16	100	330
10	Axle holder/trolley side cheek (hoist side) (kBh-Dg)	SH 3-SH 5 (kBh)	M8	8.8	25
		SH 6 (kBh)	M8	100	42
		SH3-SH4 (Dg)	M8	8.8	20
		SH5 (Dg)	M8	100	42
11	Threaded bolt/trolley side cheek (hoist side/counterweight)	SH3-SH 6	M16	100	215
12	Return pulley bearing plate/bearing pedestal (kBh)	SH 6	M12	100	115
13	Suspension bearing plate/bearing pedestal (kBh)	SH 6	M12	100	115
14	Pivot pin/mounting bracket (Dg)	SH 3-SH 5	M12	8.8	85
15	Pivot pin/pivot pin (Dg)	SH 3-SH 5	M12	8.8	85
16	Guide roller holder/trolley side cheek (Dg)	SH 3-SH 5	M8	100	42

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

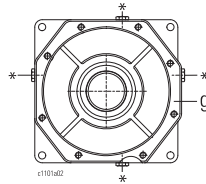
8.7 Lubricants



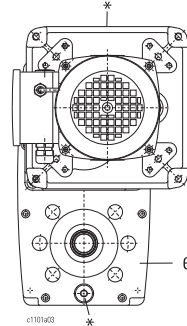
SF 35
SF 45
SH 30
SH 40
SH 50
SH 60
SHR 60



SH 50
SH 60



SF 25

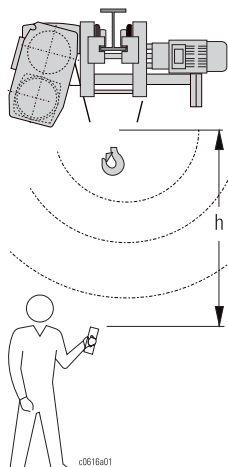


* Oil filling/oil drainage screw
Depending on installation position of gear, the filling screw is "at the top" and the drainage screw "at the bottom".

Position of lubrication point	Type of lubricant	Designation	Quantity of lubricant	Characteristics, makes	
a	Oil	CLP 460 (PG 220)	SH 30...: 1000 ml SH 40...: 2000 ml SH 50...: 6000 ml SH 60...: 16000 ml	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 : 100 g	2	
d	Oil	K3K (KE2N)	500 - 1000 g	5	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 1...: 100 g SF 17 2...: 200 g	4	
	Oil	CLP 460 (PG 220)	SF 25: 1000 ml SF 35: 1500 ml SF 45: 2000 ml	1	
g	Grease	KPFOK (GPON)	SH 30...: 100 g SH 40...: .. SF 25 8.. .. SF 35 8.. .. SF 45 8.. ..	4	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)
	Oil	CLP 460 (PG 220)	SH 50...: 2500 ml SH 60...: 2500 ml SHR60...: 2500 ml	1	5 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)

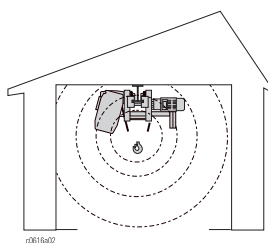
() Lubricants for low operating temperatures, -40 ... +40°C
* Factory filling
*1 SH60, motor at top

8.8 Noise level



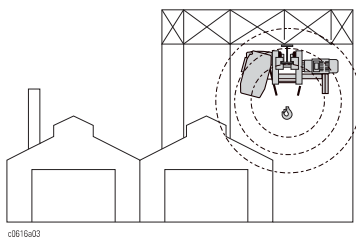
The noise level was measured at a distance of 1 m from the wire rope hoist. The mean noise level is calculated for one operating cycle (50% with nominal load, 50% without load).

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	78	75	72	69	66



2

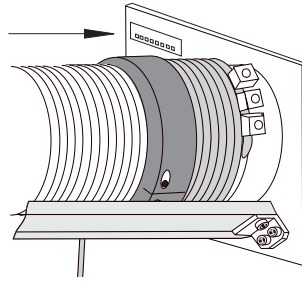
Type	[db (A)] +/- 3				
	h [m]				
	1 m	2 m	4 m	8 m	16 m
SH 30 ex	76	70	64	58	52
SH 40 ex	76	70	64	58	52
SH 50 ex	78	72	66	60	50
SH 60 ex	78	72	66	60	50

8.9 Circuit diagrams

See separate appendix.

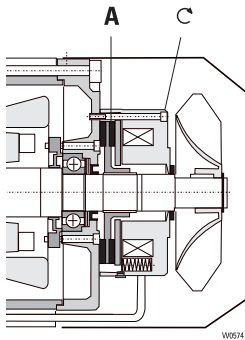
9.1 Serial number


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).



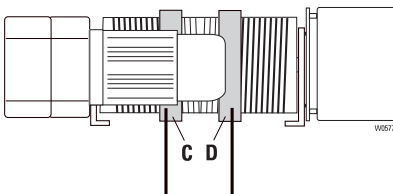
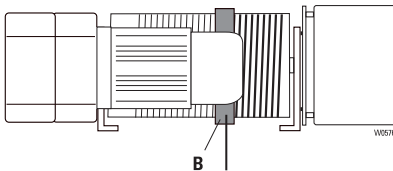
9.2 Hoist

Hoist brake

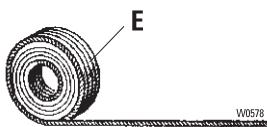


Hoist motor	Hoist brake		A
			Order No.
12/2H33	M16	9 Nm	04 430 00 65 0
12/2H42	M32	9 Nm	04 430 23 65 0
12/2H62	M60	22 Nm	04 430 40 65 0
12/2H71	M100	22 Nm	04 430 57 65 0
12/2H72	M150	22 Nm	04 430 67 65 0
12/2H73	M150	22 Nm	04 430 67 65 0

Rope guide



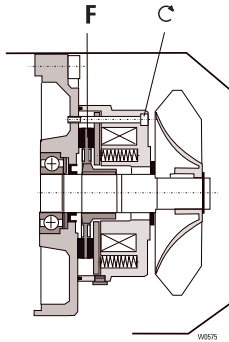
Hoist type	B	C	D
	Order No.	Order No.	Order No.
SH 30 ex	03 430 02 43 0	03 430 01 43 0	03 430 00 43 0
SH 40 ex	04 430 00 43 0	04 430 02 43 0	04 430 01 43 0
SH 50 ex	05 430 01 43 0	05 430 02 43 0	05 430 00 43 0
SH 60 ex - 2/1, L4 - L5	06 430 08 43 0	-	-
SH 60 ex	06 430 03 43 0	06 430 04 43 0	06 430 00 43 0




Wire rope (E)

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

9.3 Travel motor

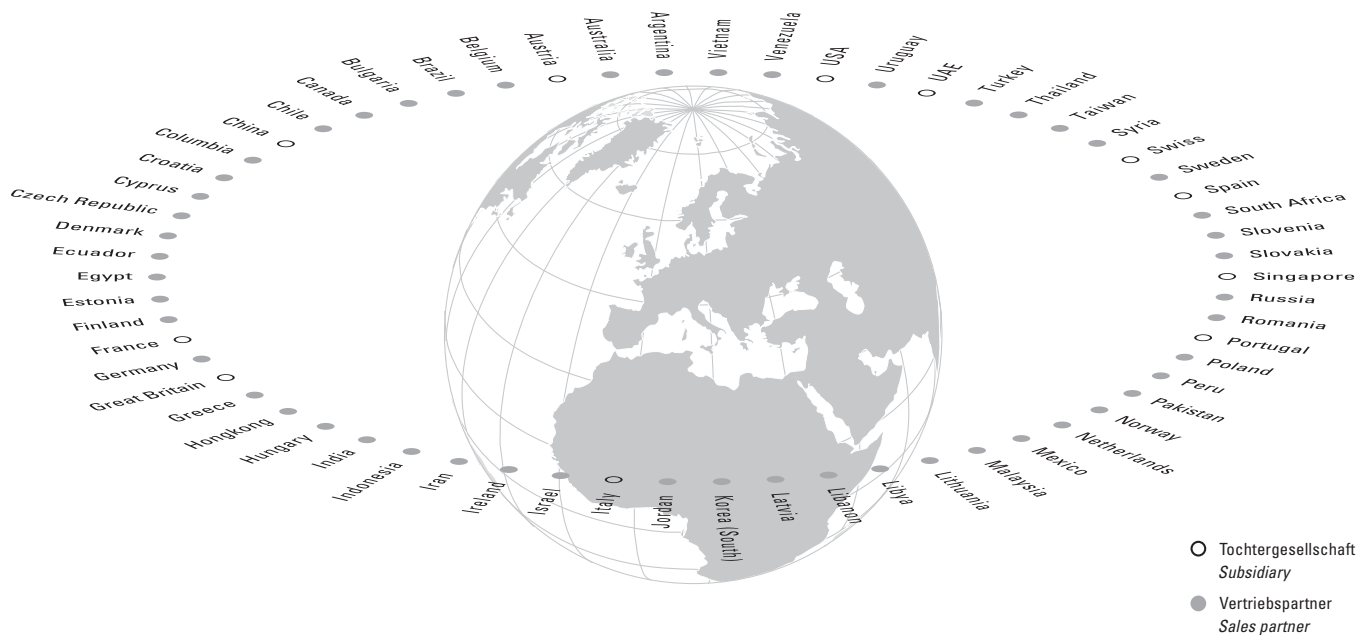


Travel motor brake

Travel motor type	Travel motor brake		F
			Order No.
SF ... 123	FDW 08	1,3 Nm	21 270 23 65 0
SF ... 133	FDW 08	2,5 Nm	21 270 23 65 0
SF ... 184	FDW 08	2,5 Nm	21 270 23 65 0
SF ... 313	FDW 13	5 Nm	21 270 36 65 0
SF ... 384	FDW 13	8 Nm	21 270 36 65 0
SF ... 423	FDW 13	8 Nm	21 270 36 65 0
SF ... 484	FDW 13	13 Nm	21 270 42 65 0
SF ... 523	FDW 15	13 Nm	21 270 42 65 0



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



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