ZX10 “DT” MODEL
ELECTRIC WIRE ROPE HOIST

INSTALLATION, OPERATION AND MAINTENANCE

Street

D3055_E

This manual has been carefully prepared to assist you in the installation, maintenance, and safe operation of the Street Crane equipment as described in the manual. It is in the interest of all parties involved with the use of this equipment to ensure that procedures are followed efficiently and safely.

Before installing, using, or starting any maintenance work on the hoist, study this manual carefully. Obtain a complete understanding of the hoist and its controls in order to ensure the safe and efficient use of the hoist. Ensure that all persons involved in the operation are suitably qualified and trained in its safe operation.

Provided that the recommended operation, maintenance and lubrication procedures are followed, the Hoist's life expectancy will be maximised and have trouble free service.

Anyone working with or on the equipment should also be aware of their relevant responsibilities under the Factories Act, the Health and Safety at Work Act 1974 and Lifting Operations and Lifting Equipment Regulations (LOLER) 1998. The user has the responsibility for ensuring that the equipment is properly inspected, maintained, and is safe to use.
NOTE: Other national regulations may apply for other countries.

In Great Britain codes of practice exist for the "Safe Use of Cranes". This standard, BS 7121, also covers inspection, testing and examination. The user should be familiar with its contents and it is advisable to have a copy of this standard kept alongside this manual. BS 7121 covers the following subjects:-

- Safe systems of work
- Management of the lifting operation
- Planning of the lifting operation, risk assessments and method statements
- Selection and duties of personnel, and their minimum attributes
- Maintenance of cranes
- Inspection, Testing and Examination

In addition, management and supervision have an initial role to play in any safety programme by ensuring that:-

- The equipment is suitable for the job intended
- The equipment has been thoroughly examined and is safe to use
- A safety procedure is adopted for emergency situations i.e. power failure
- A safe system of work is adopted for maintenance personnel

It should be emphasised that the safety advice and maintenance details included in this document should be made available where they can be most effective. It is your responsibility to ensure that this information is made available at THE PLACE OF WORK.

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FIGURES

1 GENERAL SAFETY INSTRUCTIONS

1.1 SYMBOLS

WARNING/DANGER – This symbol draws attention to correct procedures, safety information and possible injury or risk of life.

WARNING OF ELECTRICAL POTENTIAL – This symbol is found on electrical enclosures. These should only be opened by qualified persons or suitably instructed personnel.

WARNING OF SUSPENDED LOAD – This symbol warns of the risk to life and limb from standing under a suspended load.

WARNING OF SEVERE DAMAGE TO HOIST DRIVE SYSTEM – This symbol warns of the risk to the drive system caused by poor maintenance.

1.2 PERSONNEL - Definitions and Attributes

The user should ensure that the person carrying out any task has appropriate practical and theoretical knowledge, experience of the equipment to enable them to perform the task safely, and be able to recognise any hazards associated with the work. They should be physically and mentally fit, trained in Safe Hoisting Practices, and the use of safety and access equipment. No work of any kind should be authorised to persons who are under the influence of narcotics, alcohol, or medication which affects their ability to react. Hazards can only be minimised by care, common sense, and being alert at all times.

Various personnel can be involved in the lifting operation, installation, and inspection and maintenance of the equipment: supervisors, coordinators, operators, slingers, signallers, erectors and maintenance personnel. The duties of these personnel and their minimum attributes are defined in BS 7121-1:2006. Also, ISO 15513 gives competency requirements for crane drivers (operators), slingers, signallers and assessors. In the text of this manual the following definitions apply:-

User – person or organisation that has control of the lifting operation and the crane operator, and has the responsibility to ensure the equipment is properly maintained and thoroughly examined by a competent person.

Competent Person – person who has practical and theoretical knowledge, along with mechanical and/or electrical experience of the crane/hoist, and the equipment used in the lifting operation to enable them to detect defects or weaknesses, and to assess their importance in relation to the safety and continued use of the lifting equipment.

Operator – trained person who is operating the crane/hoist for the purpose of positioning loads.

1.3 MAINTENANCE SAFETY PROCEDURE

When personnel are required to work on the crane/hoist for inspection, maintenance, or other reasons, a system should be in operation to ensure that they are not endangered by movement of the equipment, and that a secure working place is provided. Personnel should follow such a procedure. Where no formal procedure exists, Street Crane recommends the following:-

On commencing any maintenance work on the crane or hoist:-

1. Obtain the necessary authorisation / permit to work.
2. Park the crane or hoist in a designated maintenance position, clear of any personnel.
3. Follow the appropriate health and safety regulations and procedures.
4. Remove any loads or attachments from the hook and ensure that the bottom block is suitably supported to prevent accidental runaway.
5. Disconnect the mains switch, and safeguard against unauthorised powering up by placing locks and warning notices in the appropriate positions.

Some maintenance procedures are more effectively performed with power to the equipment. If work has to be carried out on live parts, an additional competent person must be available to actuate the power isolating switch in an emergency. Ensure that there is an effective manner of communication between personnel.

6. To avoid injuries, use only insulated tools and equipment.
7. On completion of any maintenance work, ensure all fixings, guards, covers, drip trays, etc are replaced.

1.4 MAINTENANCE AND INSPECTION ACCESS

The equipment itself may have no provision for maintenance access or it may be fitted with full or partial maintenance access platforms. Where no or only partial access has been provided, separate or additional access equipment will be required to service some of the components. These components should be accessed via a secure, mobile, or temporary structure e.g. tower scaffold, self-standing stair platforms, scissor-lift, or cherry picker. All access equipment should be assembled and operated by trained personnel, in accordance with the manufacturer's instructions following the appropriate health and safety regulations and procedures.
The following should be considered when choosing the most appropriate type of maintenance access equipment.

- Floor space available for the access equipment.
- Working height above floor level.
- Number of personnel who require access at high level.
- Total weight of any parts to be removed / replaced.
- Provision of safety harness anchor points

1.5 WARRANTY / REPLACEMENT PARTS

The warranty will become invalid if the instructions for installation, operation, and maintenance instructions contained in this manual are not followed.
Where replacement components are required use only genuine Street Crane parts. Modifications to the crane or any of its mechanisms should not be carried out without the approval of Street Crane Company Limited. Failure to adopt these recommendations will invalidate the warranty and could result in an unsafe condition.
Please dispose of electrical and electronic equipment in an approved and environmentally friendly manner.

1.6 PERIODIC TESTS

The hoist must be inspected by a competent person at least once a year. The competent person may consider shorter periods to be more appropriate depending on the duty of the hoist. A record of the results of the test should be kept in the hoist log book (section 8). As part of the annual test the remaining service life of the hoist should be established (see section 2.5).

1.7 STORAGE

If the hoist is to be placed in storage for any period of time ensure that:-

- The hoist is covered and stored indoors in a heated building.
- Pack the hoist clear of the floor. Raise the bottom block to its top position and ensure that there are no 'kinks' in the wire rope.
- Ensure all electrical switches are turned to the OFF position.
- Always fully inspect the hoist before installing and putting into service.

1.8 TRAINING AND AFTER SALES SERVICE

If required, Street Crane Company are able to provide trained service technicians to assist in inspection and maintenance procedures and provide operator training.

2 DESCRIPTION OF EQUIPMENT

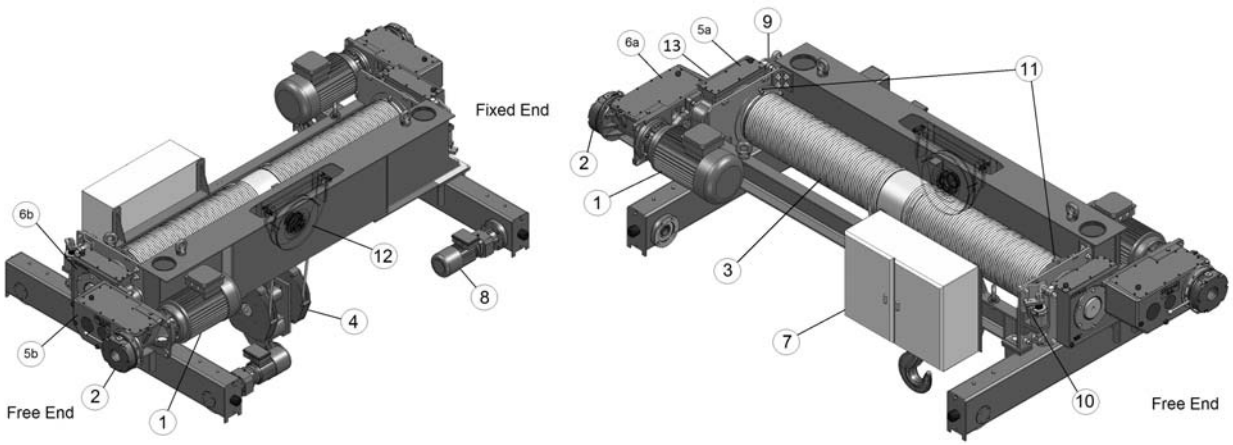
The ZX series hoist is of the electrically driven wire rope type. The hoist has a maximum load that it is permitted to lift. This is referred to as the Rated Capacity or Safe Working Load (SWL). The rated capacity is clearly marked on the hoist nameplate and the bottom block.

2.1 CONDITIONS OF USE

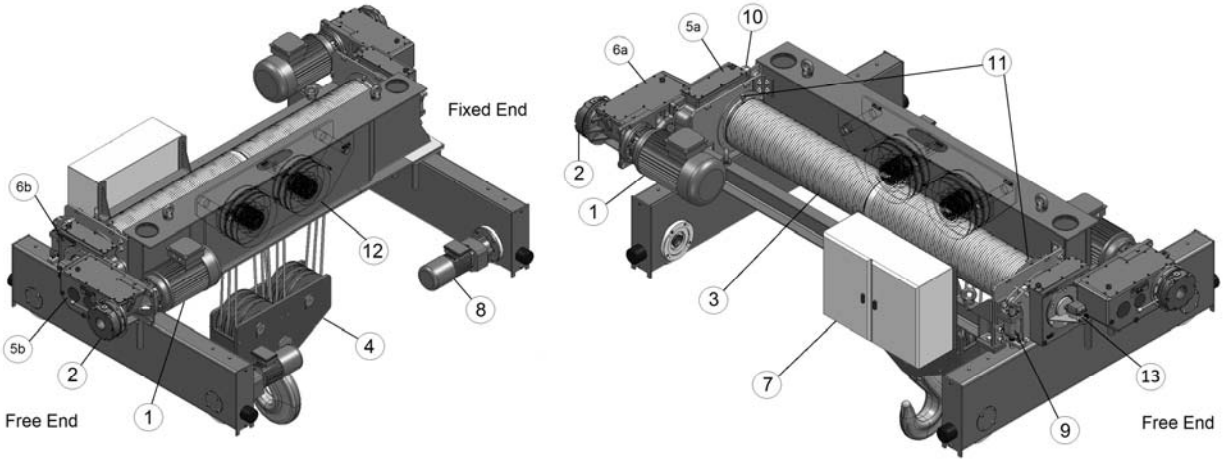
Standard ZX10 hoist units are designed to operate indoors, in an ambient temperature range of –10 to +40°C, at an altitude less than 1000m above sea level, and in an atmosphere of normal humidity free of contamination and harmful deposits. Equipment class of protection against dust and moisture is IP55.
For environments outside this range, i.e. outdoor, chemical pollution, offshore etc., consult Street Crane Co.

2.2 HOIST DESIGN

1	Hoist Motor	6a	Hoist Reduction Gearbox (Fixed End)	11	Rope Clamps
2	Hoist Brake	6b	Hoist Reduction Gearbox (Free End)	12	Sheave Assembly
3	Wire Rope	7	Control Panel	13	Rotary Limit Switch
4	Bottom Block	8	Travel Drive		
5a	Hoist Gearbox (Fixed End)	9	Rated Capacity Limiter / Overload SET1		
5b	Hoist Gearbox (Free End)	10	Protection SET2/SET3		



ZX10 DT 4 FALL PERPENDICULAR CRAB



ZX10 DT 8/12 FALL PERPENDICULAR CRAB (12 Fall model shown)

2.3 HOIST NAMEPLATE

The hoist nameplate is located on the hoist beam end plate and contains the following information:

- The hoist model code
- The manufacturers name.
- The serial number.
- The year of manufacture.
- Hoist classification.
- Mechanism classifications.

The information on this nameplate will be required when ordering replacement parts, and when assessing the remaining service life of the hoist. Further information on the hoist model code can be found in section 2.4.

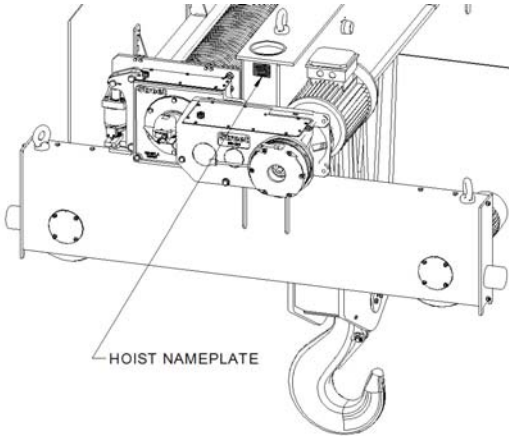


Figure 1 – Hoist Nameplate Location

2.4 HOIST MODEL CODE

The hoist model code is built up of different characters which identify individual components on the hoist. An example and break-down of each part of the code is given below.
The hoist model code complete with other information on the hoist nameplate (refer to 0) will be required when ordering replacement parts and when assessing the remaining service life of the hoist.

ZX10	04	-	4	Aa	N	8	C	M5	F	10	7	-	S	S	-	CRE	20	B	2	7	-	400	50	E	1	4	X
HOIST TYPE																											
NUMBER OF FALLS OF ROPE																											
HOIST MOTOR SPEED RATIO																											
GEARBOX																											
BARREL LENGTH																											
ROPE DIAMETER																											
BARREL PCD																											
HOIST DUTY																											
RATED CAPACITY																											
HOIST MOTOR DESIGNATION																											
HOIST BRAKE SIZE																											
No HOIST GEARBOXES																											
REEVING ARRANGEMENT																											
HOIST CONSTRUCTION																											
CRAB GAUGE																											
CRAB WHEEL TREAD WIDTH																											
TRAVERSE MOTOR SPEED																											
TRAVERSE DUTY																											
SUPPLY POTENTIAL																											
SUPPLY FREQUENCY																											
COMPLIANCE																											
CONTROL POTENTIAL																											
MAX AMBIENT TEMPERATURE																											
SPECIAL FEATURES																											

HOIST MODEL TYPE: **ZX10**

NUMBER OF FALLS OF ROPE: **2**, **4**, **6, 8, 12** or **16**

HOIST MOTOR SPEED RATIO:

4	Dual speed, 4:1 ratio

GEARBOX:

Ao	(143:1 ratio – 25mm Brake Shaft)
Aa	(143:1 ratio – 35mm Brake Shaft)
Bo	(165:1 ratio – 25mm Brake Shaft)
Ba	(165:1 ratio – 35mm Brake Shaft)
Co	(169:1 ratio – 25mm Brake Shaft)
Ca	(169:1 ratio – 35mm Brake Shaft)
Do	(195:1 ratio – 25mm Brake Shaft)
Da	(195:1 ratio – 35mm Brake Shaft)
Eo	(204:1 ratio – 25mm Brake Shaft)
Ea	(204:1 ratio – 35mm Brake Shaft)
Fo	(230:1 ratio – 25mm Brake Shaft)
Fa	(230:1 ratio – 35mm Brake Shaft)
Go	(235:1 ratio – 25mm Brake Shaft)
Ga	(235:1 ratio – 35mm Brake Shaft)
Ho	(265:1 ratio – 25mm Brake Shaft)
Ha	(265:1 ratio – 35mm Brake Shaft)
Io	(272:1 ratio – 25mm Brake Shaft)
Ia	(272:1 ratio – 35mm Brake Shaft)
Jo	(313:1 ratio – 25mm Brake Shaft)
Ko	(327:1 ratio – 25mm Brake Shaft)
Lo	(377:1 ratio – 25mm Brake Shaft)

BARREL LENGTH:

S	Short barrel
N	Normal barrel
L	Long barrel
E	Extra long barrel
V	Very long barrel
X	Extremely long barrel
Z	Exceptionally long barrel

ROPE DIAMETER:

3	13mm
6	16mm
8	18mm

BARREL PCD:

A	251mm using 13mm rope
B	323mm using 13mm rope
C	324.4mm using 18mm rope
D	326mm using 16mm rope
G	406mm using 16mm rope
J	450mm using 16mm rope
K	449.2mm using 13mm rope

HOIST DUTY: **M1**, **M2**, **M3**, **M4**, **M5**, **M6**, **M7**, **M8**

RATED CAPACITY:
t = metric tonne
T = short Ton (2000lbs)

A	5 t/T	**H**	15 t/T	**O**	40t/T
B	6 T	**I**	16 t	**P**	45 t/T
C	6.3 t	**J**	20 t/T	**Q**	50 t/T
D	7.5 t/T	**K**	25 t/T	**R**	55 T
E	8 t	**L**	30 t/T		
F	10 t/T	**M**	32 t		
G	12.5 t/T	**N**	35 t/T		

HOIST MOTOR DESIGNATION:	**06**	H6
	07	H7
	08	H8
	09	H9
	10	H10
HOIST BRAKE SIZE:	**1**	Type 12/46/20/180
	2	Type 14/60/20/180
	3	Type 14/60/25/180
	4	Type 14/60/25/103
	5	Type 16/80/25/103
	6	Type 18/150/25/103
	7	Type 20/315/35/103
	8	Type 20/170/25/103
	9	Type 20/315/25/103
No HOIST GEARBOXES:	**S**	Single
	D	Double
REEVING ARRANGEMENT:	**S**	Standard
	T	True Vertical Lift
HOIST CONSTRUCTION:	**FTM**	Foot mounted
	CRE	Crab with hoist perpendicular to beam
CRAB GAUGE:	**00**	None
	14	1400mm gauge
	20	2000mm
	26	2600mm
	30	3000mm
	32	3200mm
	36	3600mm
	38	3800mm
	50	5000mm
CRAB WHEEL TREAD WIDTH:	**0**	None
	A	40mm
	B	50mm
	C	60mm
	D	65mm
TRAVERSE MOTOR SPEED:	**0**	No traverse drive fitted (Foot mounted)
	1	20/2 m/min (inverter)
	2	20/5 m/min (standard 2 speed)
TRAVERSE DUTY:	**5**	M5
	7	M7
SUPPLY POTENTIAL:	**230**	230V (±6%) AC
	380	380V (±10%) AC
	400	380V ±6% - 415V±6% AC
	460	460V (±6%) AC
	480	480V (±6%) AC
	575	575V (±6%) AC
SUPPLY FREQUENCY:	**50**	50Hz (±1%)
	60	60Hz (±1%)
COMPLIANCE:	**E**	European directives (CE)

	U	North America
	N	Canada (CSA) Imperial
	D	Canada (CSA) Metric
	C	China (CCL)
	B	Brazil
CONTROL POTENTIAL:	**4**	48V AC
	1	110V AC
MAX AMBIENT TEMPERATURE:	**4**	40°C
	5	50°C
SPECIAL FEATURES:	**X**	Consult Street Crane
	V	Galvanising environment
	A	Aggressive environment

2.5 PROCEDURE FOR ESTIMATING REMAINING SERVICE LIFE

The following gives a procedure for estimating the remaining service life of the hoist.
The hoist is classified into groups (M3 to M8) according to the desired service life and the conditions of loading (L1 to L4) to which it will be subjected.

1. Calculate or estimate the state of loading for the hoist (L?). If detailed information on the loading conditions is available, the competent person may be able to calculate the state of loading accurately by following the guidelines given in BS 466, FEM 1.001 or EN/ISO4301. If such information is not available then the competent person can estimate the state of loading using following descriptive guidelines.

L1 (light)	Mechanisms subjected very rarely to their maximum load and normally to very light loads.
L2 (moderate)	Mechanisms occasionally subjected to their maximum load and normally to rather light loads.
L3 (heavy)	Mechanisms frequently subjected to their maximum load and normally to loads of medium magnitude.
L4 (very heavy)	Mechanisms regularly subjected to their maximum load.

2. Ascertain the classification of the hoist (M?). The group classification of your equipment can be found on the equipment nameplate. Refer to section 0 for nameplate and 2.4 for hoist model code.

3. Knowing the state of loading and the hoist classification, determine the life expectancy of the hoist measured in hours, from the following table.

State of Loading	Mechanism Classification					
	M3	M4	M5	M6	M7	M8
L1 (light)	3200	6300	12000	25000	50000	>50000
L2 (moderate)	1600	3200	6300	12000	25000	50000
L3 (heavy)	800	1600	3200	6300	12000	25000
L4 (very heavy)	400	800	1600	3200	6300	12000

The hoist is provided with a 'hours-in-service' meter. This meter records the actual hours run by the hoist. This reading should be compared with the expected service life as determined from the above procedure. When the meter reading approaches 95% of the expected service life, the user should consider replacing the hoist or including a major overhaul as part of the immediate maintenance procedure.
If meter reading exceeds the calculated service life, the life expectancy of the hoist has been exceeded and the hoist should be taken out of service.

Example. A hoist with a design classification of M5 and a calculated / estimated state of loading of L2 has an expected service life of 6300 hours.

2.6 NOISE LEVELS

The mean sound pressure level was measured in accordance with BS EN ISO 3744:1994.

For measurement purposes the hoist unit was operated under normal loading conditions for a full operating cycle.

Distance from Sound Source (metres)	Mean Sound Level dB(A)
	ZX10
1	80
2	77
4	74
8	71
16	68

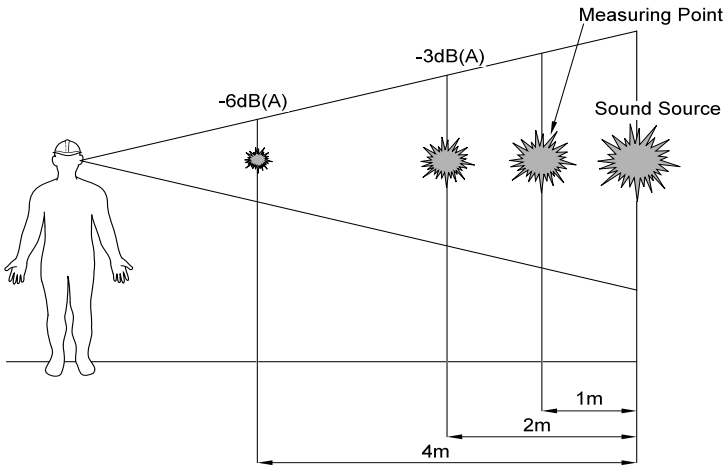


Figure 2 – Sound Pressure Levels

The sound pressure level is reduced by approx. 3dB(A) each time the distance from the sound source is doubled.

2.7 LIMITING DEVICES

Each hoist is fitted with upper and lower limits, and a rated capacity limiter (RCL). These are essential items for the safe operation of the hoist. Additional limiting devices may be fitted if deemed necessary by the risk assessment.

2.7.1 Hoisting and Lowering limits

A 'Rotary limit switch' is fitted to all hoists, to provide limit switching upon hoisting and lowering to prevent the hook from going too high and damaging the hoist, and from going too low so as to allow the ropes to go slack. This is a safety device and should **NOT** be used as a normal method of stopping the hoist. Movement in the opposite direction, at the speed selected by the operator (slow or fast) is still possible after the normal limit has been triggered.

Certain crane configurations allow the upper hook position to be set at a higher level than the underside of the bridge girders (double girder cranes). In such instances the operator must take extreme care when lifting to ensure that adequate clearance is maintained between the load or lifting attachment and the hoist or crane structure.

An optional second hoist upper limit or ultimate limit may also be fitted if deemed necessary by the user risk assessment.

The ultimate limit is an emergency limit employed only if the normal upper limit fails. Once tripped, the limit must be manually reset by service or maintenance personnel and will require the hook block to be lowered manually, and the limit reset. If the second hoist upper limit operates, the hoist should be taken out of service until the reason for the normal upper limit switch failure has been investigated. The failure should be rectified before putting the hoist back into service.

The second hoist upper limit, when tripped, will prevent movement from all hoist and traverse motions. The travel motion (long travel) will remain fully operable.

A red warning light on the base of the control panel will illuminate to indicate when the second ultimate limit has been activated.

2.7.2 Rated Capacity Limiter (RCL)

All hoist units are fitted with a rated capacity limiter (RCL) to prevent the lifting of loads beyond the capacity of the hoist / crane. If the RCL is tripped the hoist motion will stop. It will be possible to move in the lower direction only until reset.

2.7.3 Hoist Gearbox Protection

The hoist is equipped with a gearbox protection system that uses the RCL in conjunction with three protection devices (SET1, SET2, and SET3). These devices are factory preset and should not be adjusted (see section 3.8.2).

If the gearbox protection system actuates, a warning light will illuminate, the hoist stops, and no further operation is possible. Prior to resetting the system, the cause of activation should be identified by using the fault finding chart in section 6.3. A reset of the system can be achieved by removing power to the hoist, followed by operating the unlatch mechanism fitted in the hoist panel. If repeated tripping occurs then contact a Street Crane Service Agent.

2.7.4 Hoist Brake Release Switches (Optional)

In addition to the hoist gearbox protection system (2.7.3), the hoist can be fitted with brake release switches. These switches are able to detect a fail situation, whereby the brake does not release. For resetting, follow instructions in section 2.7.3.

2.7.5 Travel / Traverse Limits (Optional)

Limit switches at the extremes of long and cross travel are optional based on the user's risk assessment. There are three types:-

1. On reaching the limit the crane or hoist travel motion will stop altogether.
2. On reaching the limit the crane or hoist will change from fast to slow speed and proceed at slow speed until the end stop is reached.
3. If a two stage limit is fitted, on reaching the first stage the motion will reduce to slow speed. On reaching the second stage the motion will stop.

Operation of the limit does not have any effect on other crane motions. Movement in the opposite direction, at the speed selected by the operator (slow or fast) is still possible after the limit has been triggered.

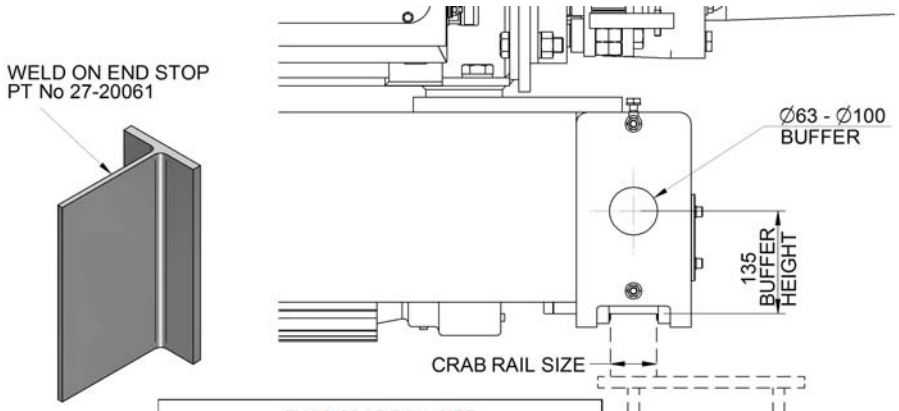
3 INSTALLATION AND COMMISSIONING INSTRUCTIONS

Installation and commissioning of the hoist must be carried out by a competent person(s). We recommend that installation and commissioning are carried out by Street Crane Company or their approved agents.

Immediately report any damage which may have occurred during transit. Consult with the manufacturer / supplier and repair the equipment before installation. Do not install damaged equipment. Use only original Street Crane spare parts for repairs. Do not carry out any alterations or modifications to the hoist either prior to or during installation.
If the hoist is located outdoors we recommend that a small cover (roof) is fitted to the runway beam to protect the hoist at its parking position.

3.1 TRAVERSE END STOPS

Double girder crab units are supplied fitted with rubber buffers. Suitable end stops should be positioned at either end of the crab rails. Weld on end stops can be provided by Street Crane Part No. 27-20061.



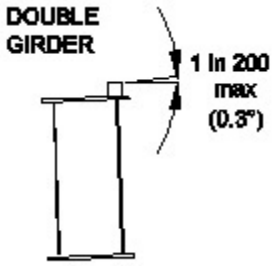
ZX10 CRAB RAIL SIZE				
	ZX10 4F	ZX10 8F	ZX10 12F	ZX10 16F
Ø160 WHEEL	60	-	-	-
Ø200 WHEEL	60	60	-	-
Ø250 WHEEL	-	60	60	60
Ø315 WHEEL	-	-	60	-

Figure 3 – Double Girder Crab Traverse End Stops

3.2 RUNNING & MOUNTING SURFACE TOLERANCES AND FINISHES

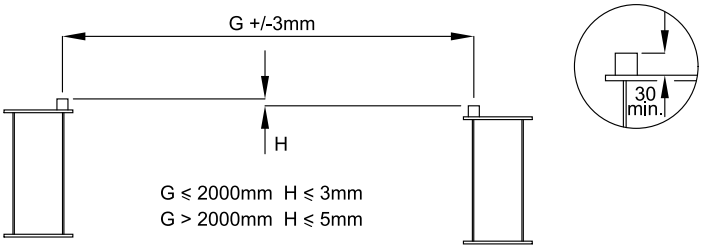
3.2.1 Tolerances on the Inclination of the Running Surface

The angle of inclination of the running surface for the hoist should not exceed the values shown.



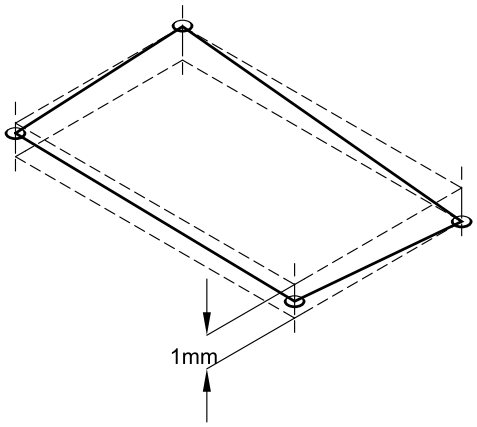
3.2.2 Tolerances on Crab Rail Gauge & Rail Height

The gauge shall not deviate from the nominal by more than 3mm. The difference in rail height shall not exceed 3mm for gauges up to and including 2000mm, or 5mm for gauges greater than 2000mm. Rail height should be a minimum of 30mm.



3.2.3 Tolerances on Mounting Surface for Foot Mounted Hoists

The vertical misalignment between all mounting holes shall not exceed 1mm.



3.2.4 Tolerance on Misalignment of rail joints, wheel running surfaces and guidance surfaces

The running surface for the hoist wheels should be free from obstructions and left unpainted. These surfaces should also be free from damage, pitting, weld beads, or other surface defects.

Surfaces should be aligned to provide a smooth transition path for the wheels between track sections.

- Gaps in any joints ('J') should be no greater than 2mm.
- There should be no step in the running or guidance surface ('h') greater than 0.5mm.
- Lateral misalignment in double girder rail joints ('L1') should not exceed 1mm.

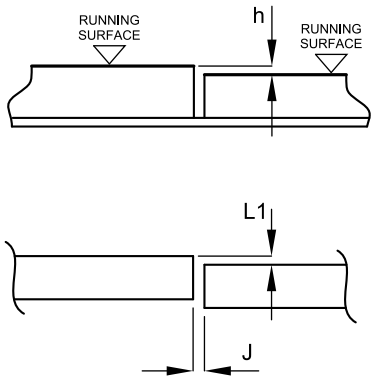


Figure 4 – Double Girder Runway Tolerances

3.3 HOIST LIFTING POINTS, WEIGHTS AND "C" DIMENSIONS

3.3.1 Lifting Points - Foot Mount

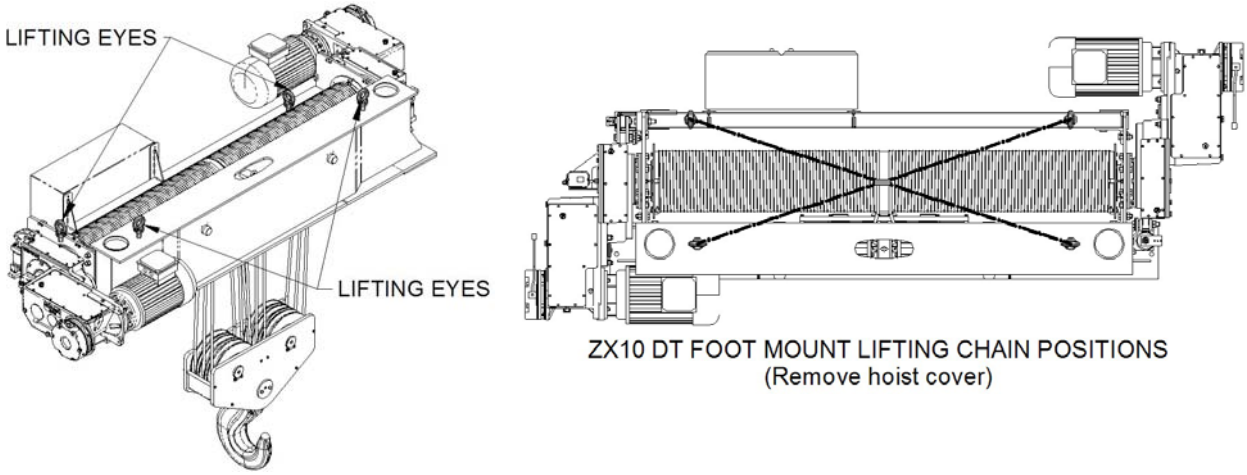


Figure 5 – Foot Mount Lifting Eyes- 4, 8 & 12 fall units

Foot Mount hoist units 4, 8 & 12 falls should be lifted using the lifting points as shown (Figure 5).
To allow access to two of the lifting eyebolts, the removal of the hoist cover/covers is required. Remove the M8 setscrews and washers (Figure 6).
After lifting is completed, refit the hoist cover/covers and tighten the M8 setscrews to 15Nm.

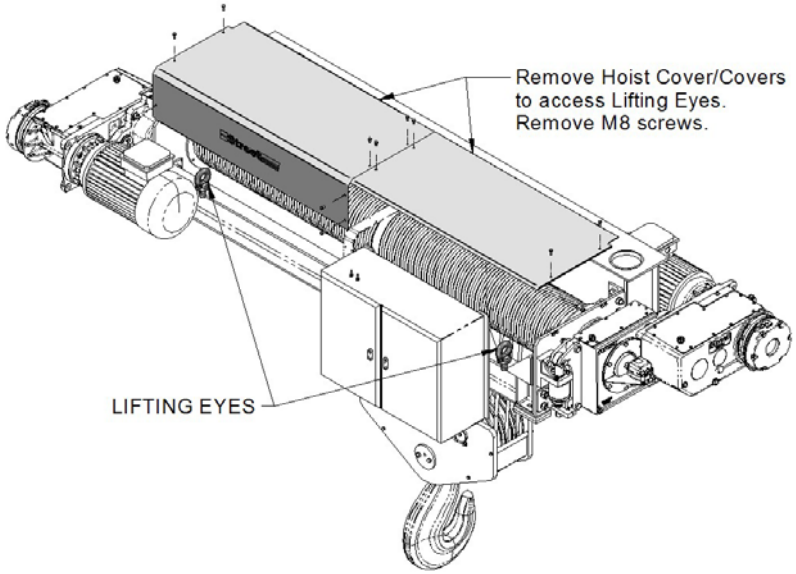


Figure 6 – Removing Hoist Cover/Covers on 4, 8 & 12 fall Foot Mount and Double Girder Crabs

3.3.2 "C" Dimension – Foot Mount

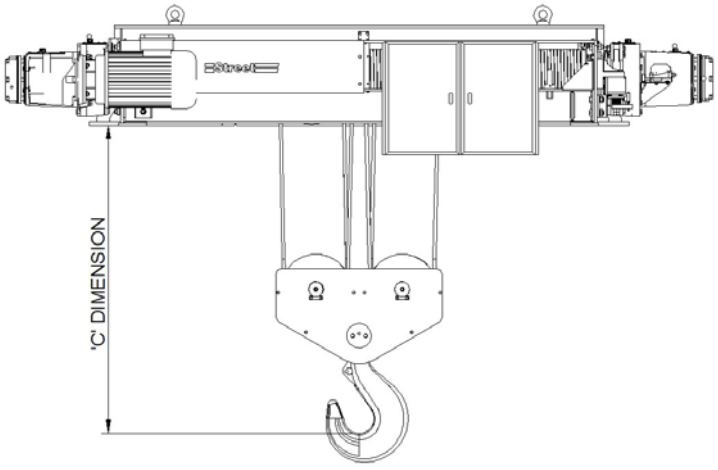


Figure 7 – Foot Mounted Hoist (C Dimension)

3.3.3 Hoist Data – Foot Mount

3.3.3.1 Hoist Data- ZX10 4 Fall True Vertical Lift Double Gearbox Foot Mount Hoist (FTM)

REF CODE	SWL RANGE (Tonnes)	HOL (m)	PCD (mm)	ROPE (mm)	BARREL	SELF MASS (kg)	C DIM
ZX1004-***N6D******-DT-FTM00***-********	0-20	19	326	16	N	2152	1049
ZX1004-***L6D******-DT-FTM00***-********	0-20	28	326	16	L	2425	1049
ZX1004-***V6D******-DT-FTM00***-********	0-20	43	326	16	V	2889	1049
ZX1004-***N6G******-DT-FTM00***-********	0-20	24	406	16	N	2107	1031
ZX1004-***L6G******-DT-FTM00***-********	0-20	35	406	16	L	2353	1031
ZX1004-***V6G******-DT-FTM00***-********	0-20	53	406	16	V	2705	1031
ZX1004-***N6GM7****-DT-FTM00***-********	0-12.5	24	406	16	N	2251	1013
ZX1004-***L6GM7****-DT-FTM00***-********	0-12.5	35	406	16	L	2497	1013
ZX1004-***V6GM7****-DT-FTM00***-********	0-12.5	53	406	16	V	2849	1013

3.3.3.2 Hoist Data- ZX10 8 Fall True Vertical Lift Double Gearbox Foot Mount Hoist (FTM)

REF CODE	SWL RANGE (Tonnes)	HOL (m)	PCD (mm)	ROPE (mm)	BARREL	SELF MASS (kg)	C DIM **(i)**
ZX1008-***N6D******-DT-FTM00***-********	0-32	11	326	16	N	2524	1230
ZX1008-***L6D******-DT-FTM00***-********	0-32	15	326	16	L	2845	1230
ZX1008-***V6D******-DT-FTM00***-********	0-32	23	326	16	V	3459	1230
ZX1008-***N6G******-DT-FTM00***-********	0-32	14	406	16	N	2550	1332
ZX1008-***L6G******-DT-FTM00***-********	0-32	19	406	16	L	2925	1369
ZX1008-***V6G******-DT-FTM00***-********	0-32	28	406	16	V	3497	1360
ZX1008-***L6GM7****-DT-FTM00***-********	0-20	19	406	16	L	3254	1393
ZX1008-***V6GM7****-DT-FTM00***-********	0-20	28	406	16	V	3827	1385

(i) = Big Hook Option stamped 16V, adds 54mm to 'C' Dimension (standard hook is 12V).

3.3.3.3 Hoist Data- ZX10 12 Fall True Vertical Lift Double Gearbox Foot Mount Hoist(FTM)

REF CODE	SWL RANGE (Tonnes)	HOL (m)	PCD (mm)	ROPE (mm)	BARREL	SELF MASS (kg)	C DIM **(ii)**
ZX1012-***N6D******-DT-FTM00***-********	0-50	7	326	16	N	2819	1403
ZX1012-***L6D******-DT-FTM00***-********	0-50	10	326	16	L	3128	1403
ZX1012-***V6D******-DT-FTM00***-********	0-50	15	326	16	V	3779	1403
ZX1012-***N6G******-DT-FTM00***-********	0-50	9	406	16	N	2996	1591
ZX1012-***L6G******-DT-FTM00***-********	0-50	13	406	16	L	3373	1585
ZX1012-***V6G******-DT-FTM00***-********	0-50	19	406	16	V	4105	1585
ZX1012-***L6GM7****-DT-FTM00***-********	0-32	13	406	16	L	3842	1610
ZX1012-***V6GM7****-DT-FTM00***-********	0-32	19	406	16	V	4575	1610

(ii) = Big Hook Option stamped 20V, adds 51mm to 'C' Dimension (standard hook is 16V).

3.3.4 Lifting Points - Double Girder Crab

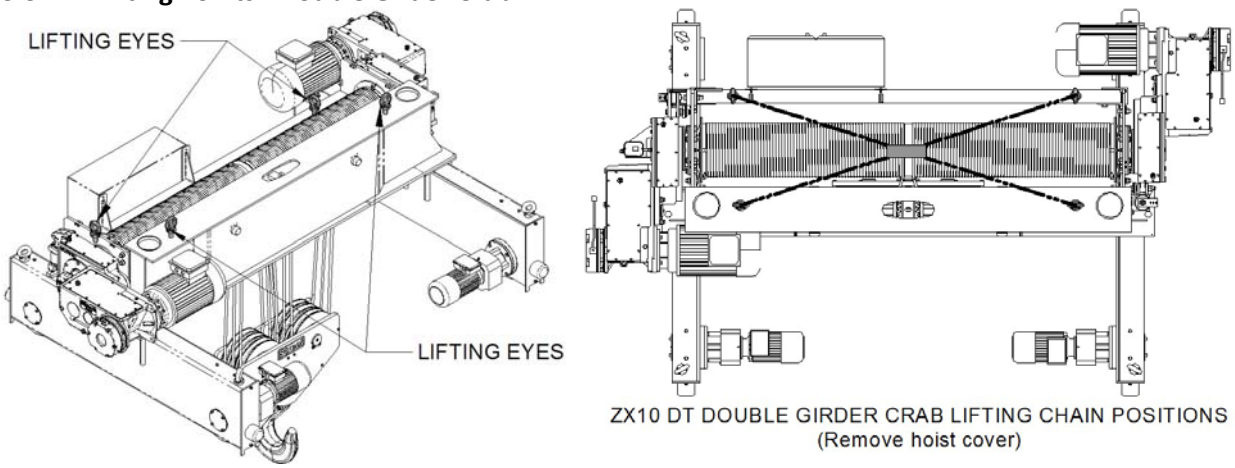


Figure 8 – Double Girder Crab Lifting Eyes- 4,8 & 12 fall units

Double girder crab units 4, 8 & 12 falls should be lifted using the lifting points as shown (Figure 8).

To allow access to two of the lifting eyebolts, the removal of the hoist cover/covers is required. Remove the M8 setscrews and washers (Figure 6).
After lifting is completed, refit the hoist cover/covers and tighten the M8 setscrews to 15Nm.

3.3.5 "C" Dimension – Double Girder Crab

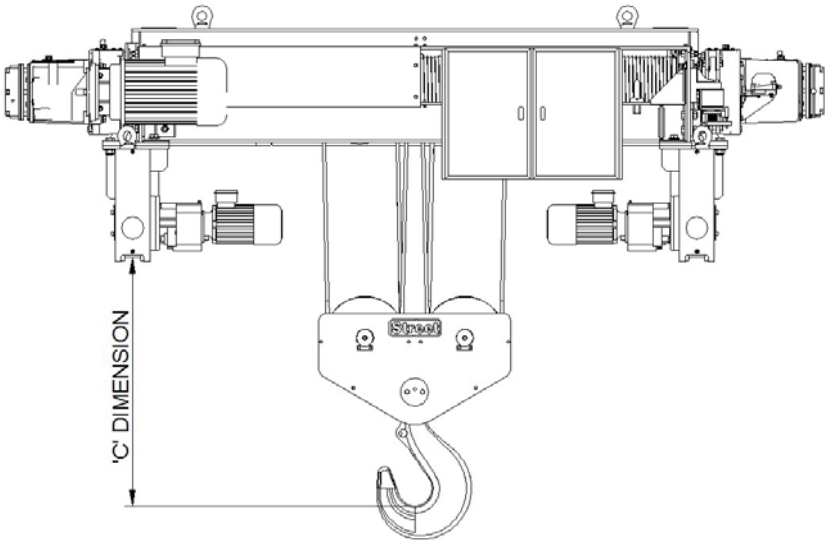


Figure 9 – Double Girder Crab (C Dimension)

3.3.6 Hoist Data – Double Girder Crab

3.3.6.1 Hoist Data- ZX10 4 Fall True Vertical Lift Double Gearbox Perpendicular Crab (CRE)

REF CODE	SWL Range (Tonnes)	HOL (m)	PCD (mm)	ROPE (mm)	Barrel	Gauge (mm)	Traverse Duty	Wheel Dia ('W' mm)	Self Mass (kg)	C Dimension
ZX1004-***N6D******-DT-CRE20**5-********	0-20	19	326	16	N	2000	M5	200	2592	769
ZX1004-***N6D******-DT-CRE20**7-********	0-20	19	326	16	N	2000	M7	200	2592	769
ZX1004-***L6D******-DT-CRE26**5-********	0-20	28	326	16	L	2600	M5	200	2830	769
ZX1004-***L6D******-DT-CRE26**7-********	0-20	28	326	16	L	2600	M7	200	2830	769
ZX1004-***V6D******-DT-CRE36**5-********	0-20	43	326	16	V	3600	M5	200	3299	769
ZX1004-***V6D******-DT-CRE36**7-********	0-20	43	326	16	V	3600	M7	200	3299	769
ZX1004-***N6G******-DT-CRE20**5-********	0-20	24	406	16	N	2000	M5	200	2516	751
ZX1004-***N6G******-DT-CRE20**7-********	0-20	24	406	16	N	2000	M7	200	2516	751
ZX1004-***L6G******-DT-CRE20**5-********	0-20	35	406	16	L	2600	M5	200	2760	751
ZX1004-***L6G******-DT-CRE20**7-********	0-20	35	406	16	L	2600	M7	200	2760	751
ZX1004-***V6G******-DT-CRE20**5-********	0-20	53	406	16	V	3600	M5	200	3167	751
ZX1004-***V6G******-DT-CRE20**7-********	0-20	53	406	16	V	3600	M7	200	3167	751
ZX1004-***N6GM7******-DT-CRE20**5-********	0-12.5	24	406	16	N	2000	M5	200	2659	733
ZX1004-***N6GM7******-DT-CRE20**7-********	0-12.5	24	406	16	N	2000	M7	200	2659	733
ZX1004-***L6GM7******-DT-CRE20**5-********	0-12.5	35	406	16	L	2600	M5	200	2903	733
ZX1004-***L6GM7******-DT-CRE20**7-********	0-12.5	35	406	16	L	2600	M7	200	2903	733
ZX1004-***V6GM7******-DT-CRE20**5-********	0-12.5	53	406	16	V	3600	M5	200	3309	733
ZX1004-***V6GM7******-DT-CRE20**7-********	0-12.5	53	406	16	V	3600	M7	200	3309	733

3.3.6.2 Hoist Data- ZX10 8 Fall True Vertical Lift Double Gearbox Perpendicular Crab (CRE)

REF CODE	SWL Range (Tonnes)	HOL (m)	PCD (mm)	ROPE (mm)	Barrel	Gauge (mm)	Traverse Duty	Wheel Dia ('W' mm)	Self Mass (kg)	C Dimension **(i)**
ZX1008-***N6D******-DT-CRE20**5-********	0-32	11	326	16	N	2000	M5	250	3119	850
ZX1008-***N6D******-DT-CRE20**7-********	0-32	11	326	16	N	2000	M7	315	3354	720
ZX1008-***L6D******-DT-CRE26**5-********	0-32	15	326	16	L	2600	M5	250	3440	850
ZX1008-***L6D******-DT-CRE26**7-********	0-32	15	326	16	L	2600	M7	315	3678	720
ZX1008-***V6D******-DT-CRE36**5-********	0-32	23	326	16	V	3600	M5	250	4057	850
ZX1008-***V6D******-DT-CRE36**7-********	0-32	23	326	16	V	3600	M7	315	4292	720
ZX1008-***N6G******-DT-CRE20**5-********	0-32	14	406	16	N	2000	M5	250	3142	952
ZX1008-***N6G******-DT-CRE20**7-********	0-32	14	406	16	N	2000	M7	315	3382	822
ZX1008-***L6G******-DT-CRE26**5-********	0-32	19	406	16	L	2600	M5	250	3641	989
ZX1008-***L6G******-DT-CRE26**7-********	0-32	19	406	16	L	2600	M7	315	3882	859
ZX1008-***V6G******-DT-CRE36**5-********	0-32	28	406	16	V	3600	M5	250	4069	981
ZX1008-***V6G******-DT-CRE36**7-********	0-32	28	406	16	V	3600	M7	315	4310	851
ZX1008-***L6GM7****-DT-CRE26**5-********	0-20	19	406	16	L	2600	M5	250	3971	1013
ZX1008-***L6GM7****-DT-CRE26**7-********	0-20	19	406	16	L	2600	M7	315	4212	883
ZX1008-***V6GM7****-DT-CRE36**5-********	0-20	28	406	16	V	3600	M5	250	4399	1005
ZX1008-***V6GM7****-DT-CRE36**7-********	0-20	28	406	16	V	3600	M7	315	4640	875

(i) = Big Hook Option stamped 16V, adds 54mm to 'C' Dimension (standard hook is 12V).

3.3.6.3 Hoist Data- ZX10 12 Fall True Vertical Lift Double Gearbox Perpendicular Crab (CRE)

REF CODE	SWL Range (Tonnes)	HOL (m)	PCD (mm)	ROPE (mm)	Barrel	Gauge (mm)	Traverse Duty	Wheel Dia ('W' mm)	Self Mass (kg)	C Dimension **(ii)**
ZX1012-***N6D******-DT-CRE20**5-********	0-50	7	326	16	N	2000	M5	315	3657	893
ZX1012-***L6D******-DT-CRE26**5-********	0-50	10	326	16	L	2600	M5	315	3967	893
ZX1012-***V6D******-DT-CRE36**5-********	0-50	15	326	16	V	3600	M5	315	4622	893
ZX1012-***N6G******-DT-CRE20**5-********	0-50	9	406	16	N	2000	M5	315	3873	1081
ZX1012-***L6G******-DT-CRE26**5-********	0-50	13	406	16	L	2600	M5	315	4346	1075
ZX1012-***V6G******-DT-CRE36**5-********	0-50	19	406	16	V	3600	M5	315	5009	1075
ZX1012-***L6GM7****-DT-CRE26**5-********	0-32	13	406	16	L	2600	M5	315	4817	1100
ZX1012-***V6GM7****-DT-CRE36**5-********	0-32	19	406	16	V	3600	M5	315	5481	1100

(i) = Big Hook Option stamped 16V, adds 54mm to 'C' Dimension (standard hook is 12V).

3.4 INSTALLATION OF FOOT MOUNTED HOIST

The ZX10 foot mounted hoist units are designed for mounting horizontally with the feet at the bottom of the unit. The hoists are not suitable for mounting suspended upside down or in any orientation other than as shown.

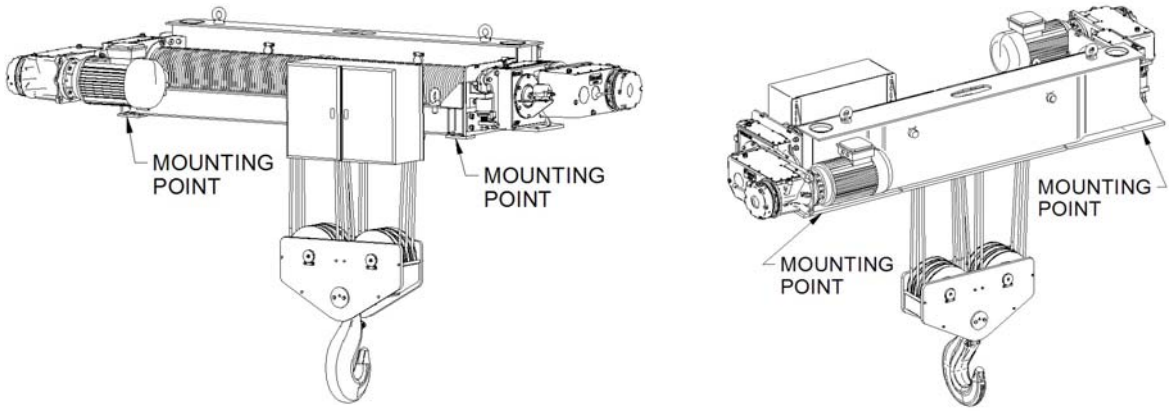


Figure 10 – Installation of Foot Mounted Hoist

Foot mounted hoist units are supplied with four mounting points. The main beam fabrication has three 26mm diameter holes at each end and the fabricated hoist frame channel has a single 26mm diameter hole at each end. They should be secured to a suitable supporting structure using eight M24 fixings with minimum grade of 8.8.

Transportation of the ZX10 DT hoist requires that the bottom block is loose and the barrel is not roped. Before proceeding, refer to section 5.13 for the roping of the barrel and reeving of the bottom block.

The supporting structure should be suitably designed to support the mass of the hoist unit together with its rated capacity plus dynamic effects. Tolerances on the mounting surface should be in accordance with section 3.2.3.

Before powering up and engaging hoist motion, ensure the hoist is securely fastened to a rigid structure.

3.5 SETTING THE ROTARY LIMIT SWITCH FOR UPPER AND LOWER LIMITS

Each ZX10 DT hoist is fitted with a Rotary Limit Switch for upper and lower level limit switching points. When the rotary limit switch is activated it will only allow hook travel in the opposite direction.

Incorrect setting of the rotary limit switch may cause serious accidents and damage to the hoist unit

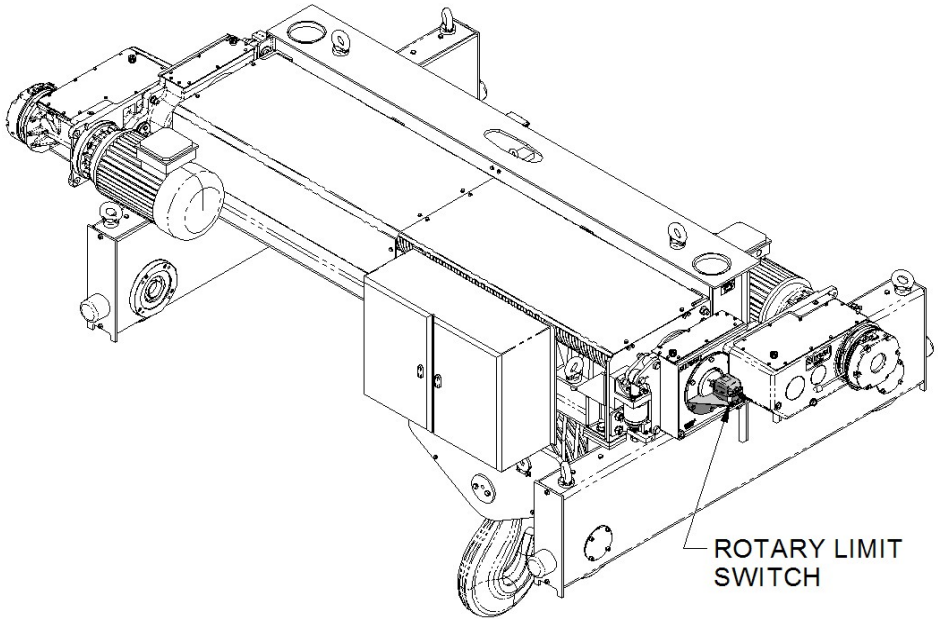


Figure 11 – Upper and Lower Limit Rotary Type

3.5.1 Setting the Upper Limit

The correct 'C' dimension must be obtained from the ZX10 DT Hoist Product Datasheet (see section 3.3), before proceeding to set the Upper Limit position.

Extreme care must be exercised when setting the upper limit switching position so as not to damage the hoist unit.

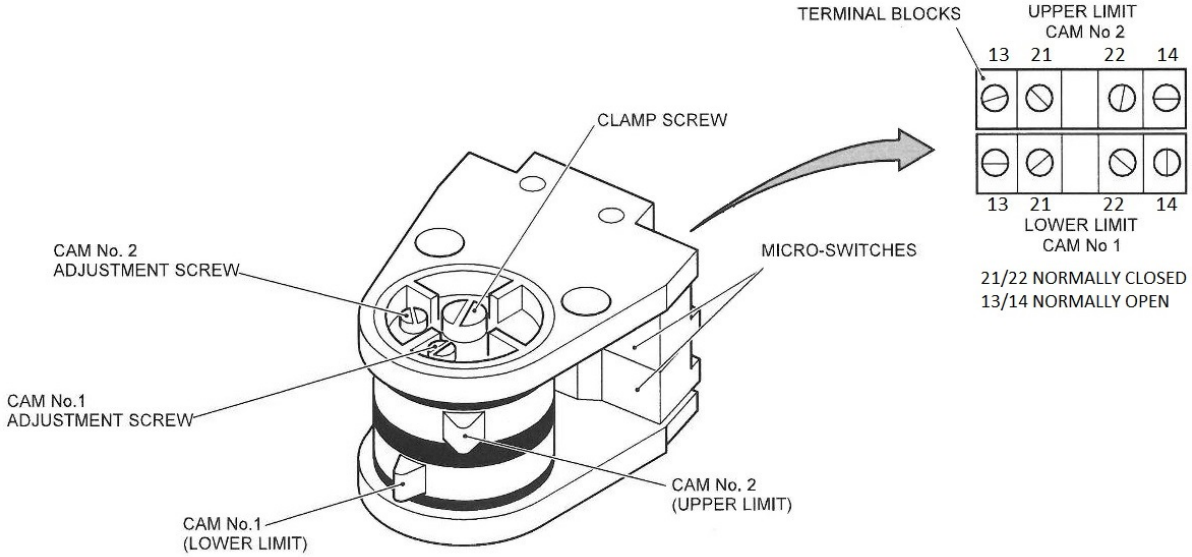


Figure 12 – Setting the Upper Limit Switch – Rotary Limit Switch

- Obtain the 'C' dimension for the hoist from its Datasheet (see section 3.3) and run the hoist until the bottom block is positioned at the 'C' dimension, taking care not to run beyond.
- Remove the plastic cover from the rotary limit switch to gain access to the 'Cam No2 Adjustment Screw'. This is for the upper limit adjustment (Figure 12).
- Loosen the centre clamp screw to allow adjustment of the adjusting screws.
- Adjust 'Cam No2 Adjustment Screw' until the cam activates the micro switch, taking care not to go beyond the micro switching point, at the point the switch audibly clicks.
- Run the bottom block down and back up to activate the switch, check the 'C' dimension and adjust if necessary. Test the switching position in slow speed at first and then repeat the test in fast speed.
- The centre clamp screw can be tightened, if necessary, prior to bottom limit position setting.

3.5.2 Setting the Lower Limit

- Run the hoist to lower the bottom block to the desired lowest operating position.
  Do not let the hook touch the floor such that it would cause a slack rope condition.

Check that there are at least three full wraps of rope at each end of the barrel when the hook is at its lowest position.

- Remove the plastic cover from the rotary limit switch to gain access to the 'Cam No1 Adjustment Screw' which is for the lower limit adjustment (Figure 12).
- Loosen the centre clamp screw to allow adjustment of the adjusting screws.
- Adjust 'Cam No1 Adjustment Screw' until the cam activates the micro switch, taking care not to go beyond the micro switching point, at the point the switch audibly clicks.
- Run the bottom block up and back down to activate the switch, check the position of the bottom block/hook and adjust if necessary. Test the switching position in slow speed at first and then repeat the test in fast speed.
- The centre clamp screw can now be tightened to set both the lower and upper limit switching points.
- Refit the plastic cover securing with two screws.

3.6 ULTIMATE UPPER LIMIT SWITCH - ROTARY (OPTIONAL)

When specified, an ultimate upper limit may be fitted to the hoist unit to prevent the bottom block from damaging the hoist should the normal upper limit switch fail. It should be set to activate at the upper level given in section 3.3. The normal upper limit should then be set to activate approximately 75-100mm below the ultimate limit. A red warning light on the base of the control panel will illuminate to indicate when the second ultimate limit has been activated

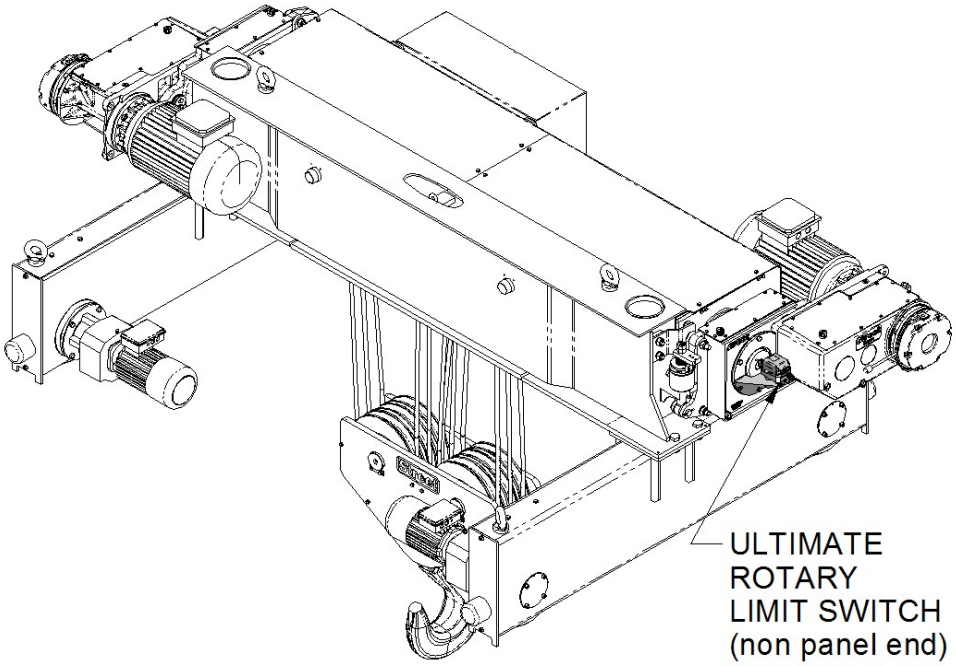


Figure 13 – Ultimate Upper Limit Switch – Rotary Type

3.6.1 Setting the Ultimate Upper Limit - ROTARY (OPTIONAL)

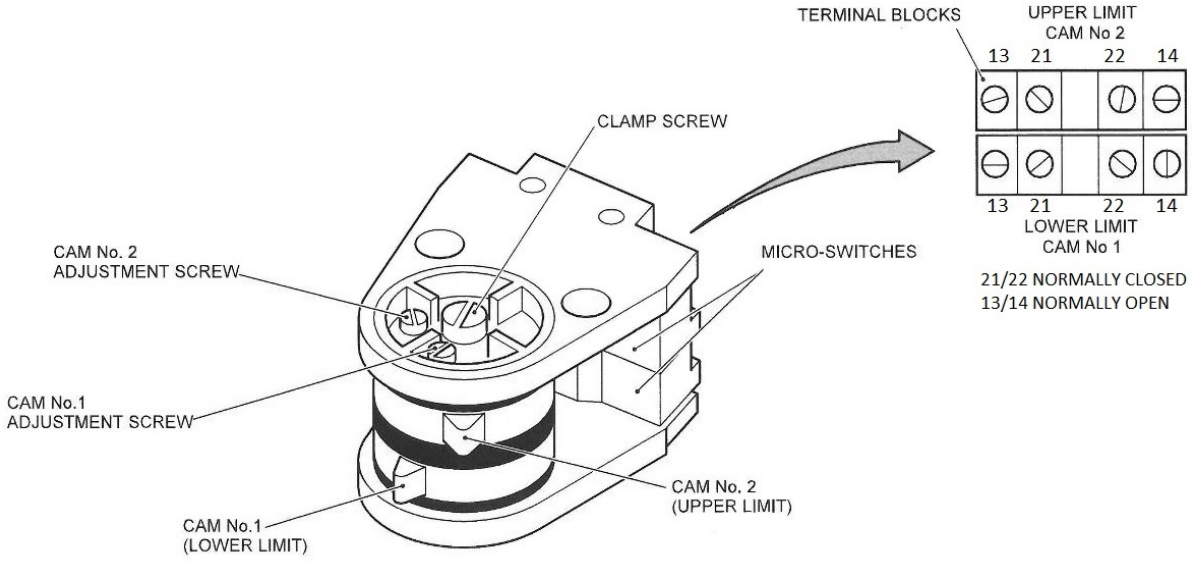


Figure 14 – Setting the Ultimate Upper Limit Switch – Rotary Type

Extreme care must be exercised when testing the ultimate limit switch as it is necessary to by-pass the normal upper limit.

- Reposition the normal upper limit such that the ultimate limit is the first to operate.
- Raise the hook to the desired operating position at slow speed with no load attached allowing an additional 50mm for a fast speed approach.
- Remove the lid from the second upper limit and loosen the central clamp screw (Figure 14).
- Turn ‘Cam No2 Adjustment Screw’ until the cam is positioned just before it operates the micro switch.
- Re-tighten the central clamp screw.
- Test the operating position in slow speed at first repeating the test in fast speed adjusting the trip position where necessary. Replace limit switch lid.
- Check that the red warning light in the base of the control panel illuminates.
- Set the normal upper limit so that it operates approximately 75-100mm below the ultimate upper limit.

3.7 ULTIMATE UPPER LIMIT SWITCH – HOOK BLOCK OPERATED (OPTIONAL)

When specified, an ultimate upper limit may be fitted to the hoist unit to prevent the bottom block from damaging the hoist should the normal upper limit switch fail. It should be set to activate at the upper level given in section 3.3. The normal limit should then be set to activate approximately 75-100mm below the ultimate limit. A red warning light on the base of the control panel will illuminate to indicate when the second ultimate limit has been activated.

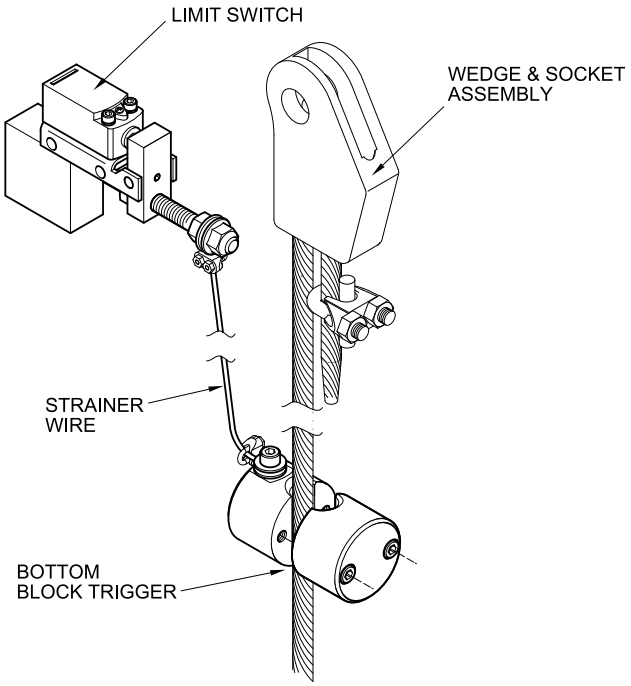


Figure 15 – Ultimate Upper Limit Switch – Hook Block Type

3.7.1 Setting the Ultimate Upper Limit

Extreme care must be exercised when testing the ultimate limit switch as it is necessary to bypass the normal upper limit.

- Reposition the normal upper limit to ensure the ultimate limit is the first to operate.
- Raise the hook to the desired operating position at slow speed with no load attached, allowing an additional 50mm for a fast speed approach.
- Remove the bottom block trigger fixings so that the bottom block trigger can be split in two.
- Position the bottom block trigger around the hoist rope.

The bottom block trigger must be positioned around the fixed rope on the reeving arrangement i.e. the rope which terminates at the wedge and socket (Figure 15).

- Replace the block trigger fixings.
- Adjust the length of the strainer wire, and position of the bottom block trigger to enable the limit switch to operate.
- In slow speed, test the operating position by raising / lowering the bottom block trigger. Repeat the test in fast speed.
- Trim or secure any excess strainer wire.
- Check that the red warning light, in the base of the control panel, illuminates.
- Set the normal upper limit so that it operates approximately 75-100mm below the ultimate upper limit.

3.8 CHECKING / ADJUSTING THE RATED CAPACITY LIMITER (RCL)

The rated capacity limiter is used to prevent the hoist from lifting a load in excess of the rated capacity (safe working load). If the hoist is overloaded, the limit switch will trip and the UP direction will become inactive. The hoist will be allowed to lower only. Once the load has been removed then the limit switch will automatically reset and all motions will become active again.

The rated capacity limiter is pre-set at the factory prior to despatch, and is set to rated capacity +7.5%. Checking the rated capacity limiter requires calibrated test weights equal to the rated capacity of the hoist, and rated capacity plus 10% (SWL and SWL+10%). Lift the load just clear of the floor with the test load attached.

The limit does not require any adjustment if the hoist picks up its rated capacity (SWL), but does not lift the rated capacity + 10% (SWL+10%). If the limit trips either below or above these limits, adjust the limit by turning the grub screw (Figure 16).

3.8.1 Adjusting the Rated Capacity Limiter for Proof Loading

For proof load testing of a hoist or crane at a load greater than the rated capacity:-

- Release the grub screw by approximately half a turn.
- Carry out the proof load tests on the hoist / crane as required.
- Attach a calibrated test load to the hook (Rated Capacity + 10%). Lift the load just clear of the floor and tighten the grub screw until the limit switch just operates.
- Lower the load to the floor and repeat the lift several times at slow hoisting speed, making sure that the limiter trips each time. Repeat the test at rated capacity, ensuring that the limiter does not activate.

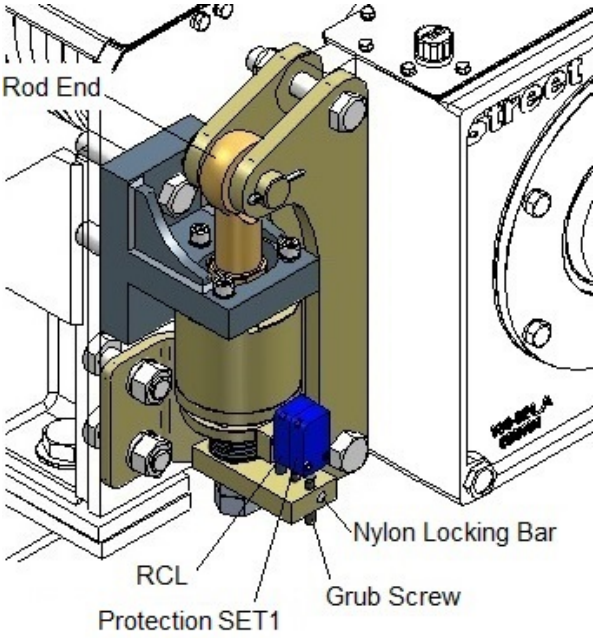


Figure 16 – Rated Capacity Limiter / Protection SET1

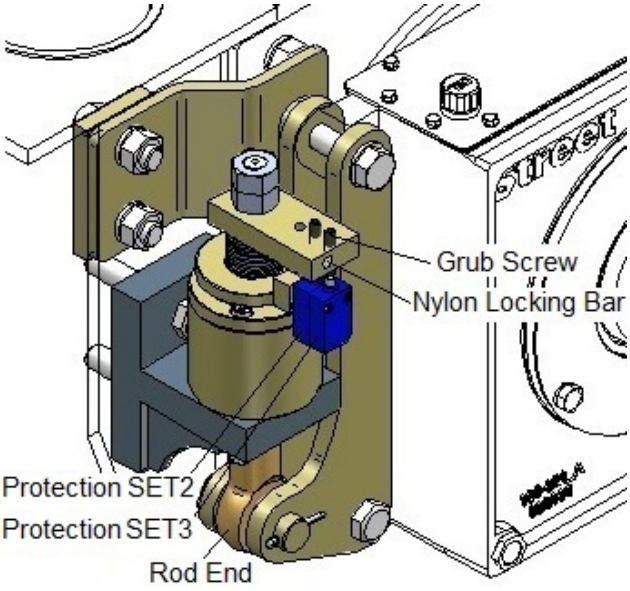


Figure 17 – Protection SET2 and SET3

Note: To assist in identification of the RCL or protection devices, the RCL is always situated where the rod end is facing up.

3.8.2 Checking / Adjusting Gearbox Protection System (SET1 to SET3)

The gearbox protection system is preset and no adjustment is possible. Preset settings are: SET1 = 90%, SET2 = 110%, and SET3 = 90%.

3.9 TRAVERSE LIMITS (OPTIONAL)

The traverse limit arrangement employs either a one or two stage cruciform switch depending on the type of stopping arrangement. Be sure of the type that is fitted to your hoist.

- A single stage limit switch (type PF33710100) is employed to stop the motion completely when the limit is reached, or to allow the hoist to proceed at slow speed only until the end stop is reached. The single stage limit employs one actuating arm at each end of travel.
- The two stage switch (type PF26755100) is employed firstly to slow the speed from fast to slow, and then to stop the motion completely on reaching the second stage. The two stage limit employs two actuating arms at each end of travel.

NOTE: On each of the above, when the limit is tripped, normal operation is available in the opposite direction. Reversing away from the stop is at the speed selected by the operator (slow or fast).

3.9.1 Setting Traverse Limits

To ensure reliable operation of the switch, the actuating arm should be positioned to strike the limit bar as shown in Figure 18. The arm should be positioned so that the switch rotates through 90° each time it passes an arm.
The short bar on the switch occupies the mid (0°) position when the switch is between the two actuating arms. The bar on the switch will then rotate through 90° clockwise or anti-clockwise each time it passes an actuating arm.

Failure to set the switch and actuating arms as shown in Figure 18 will result in permanent damage to the switch.

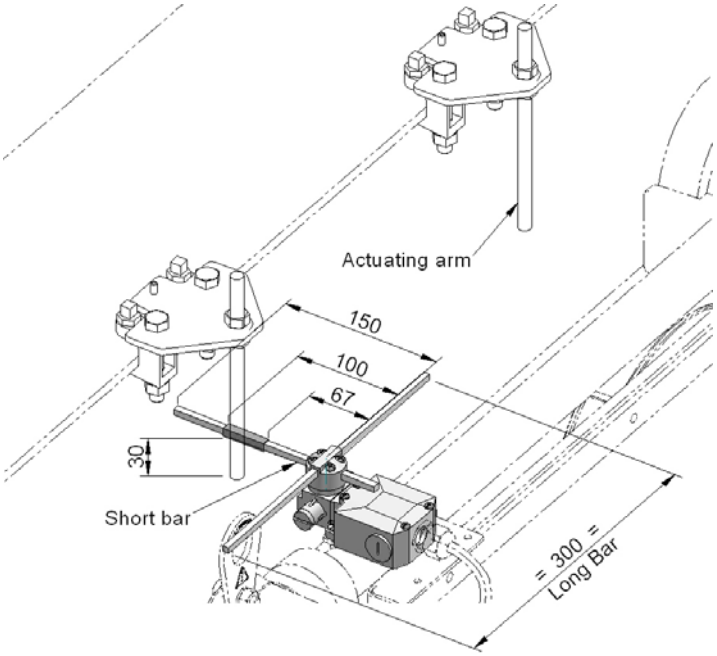


Figure 18 – Setting the Traverse Limit

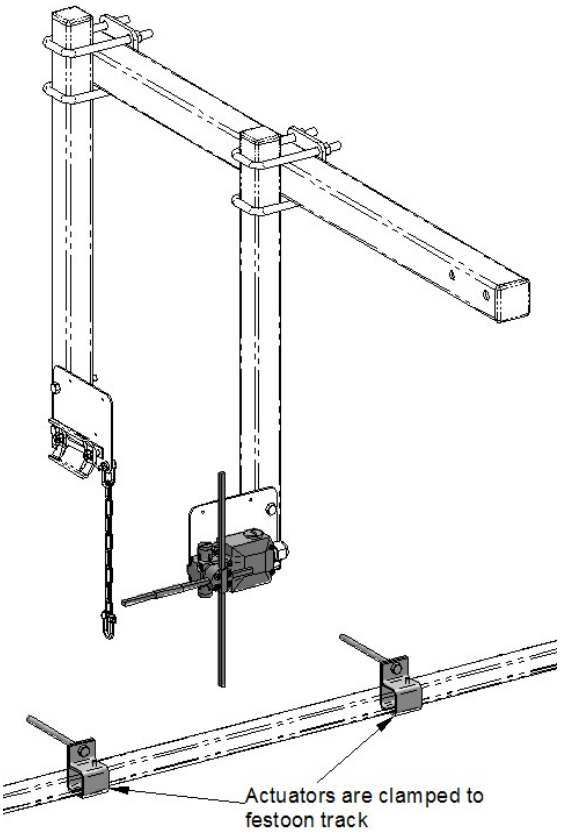


Figure 19 – Traverse Limit Double Girder arrangement
(See Figure 18 for setting dimensions)

When setting the point of operation for the limit switch, account should be taken of the hoist speed and the stopping distance. The point of operation should be set to allow a fully loaded crane / hoist to stop from fast speed before reaching the required position.

3.10 CONNECTING THE POWER SUPPLY

Connection of the power supply must be carried out by a competent person. Ensure that the supply to the hoist matches the information in the hoist technical data and on the hoist nameplate. Ensure that the supply has been correctly installed and protected, i.e. voltage, phase, frequency, fuse size, cable/conductor size. Check that the voltage at the point of supply is within the tolerance of ±5% and the nominal frequency is within the tolerance of ±1% of the rated values.

3.10.1 Supply Cables / Fuses

The size of the supply cables to the hoist must be selected in accordance with the table in section 7.2. Terminals must be of a size appropriate to the cable size, and securely fixed. Selection of a suitable size of mains fuse is given in section 7. Fuses of class gL/gG should be used (or type 'J' for CSA installations).

3.10.2 Main Isolator – Supply Switch (by others)

The main isolator (supply switch) must disconnect all phases of the supply to the hoist, be clearly marked and located in an easily accessible position. The switch should be capable of being locked in the OFF position whilst any maintenance work is being carried out. The main isolator, if reasonably accessible, may also be used for emergency stop or emergency off purposes. NOTE a separate emergency stop is located on the hoist controller see 4.5.3.

3.10.3 Connecting to the Mains Supply

Connect the cables in accordance with the circuit diagrams via the plug and socket located on the side of the hoist control panel.

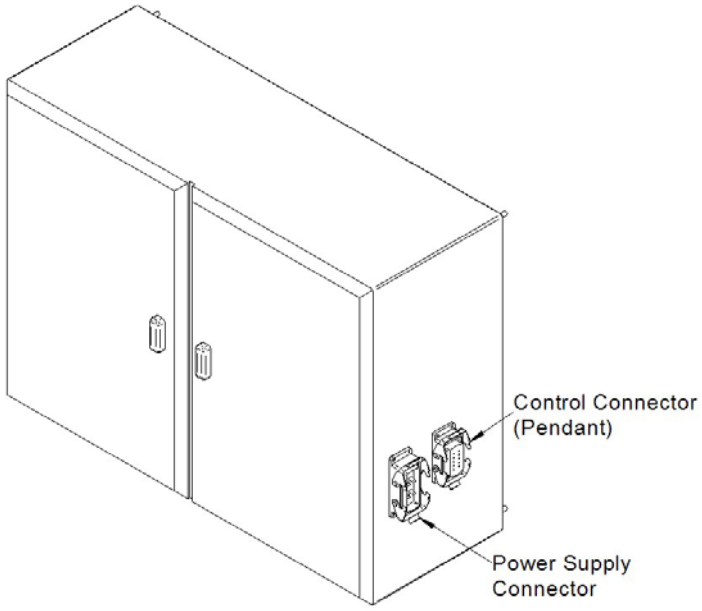
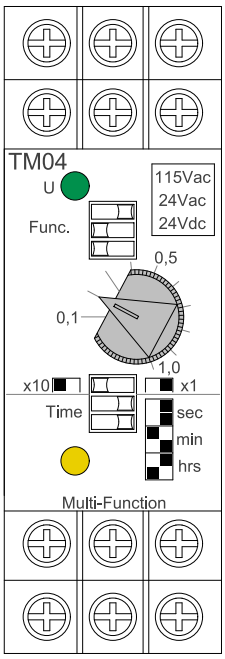


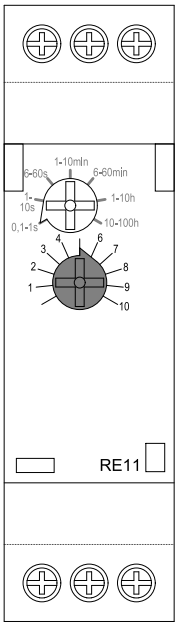
Figure 20 – Hoist Electrical Connections

Check the setting of both the Traverse "Fast to Slow", and Hoist "Slow to Fast" speed delay timers. These should correspond with the settings in

- Figure 21.
- Check the settings on the Phase Failure Relay correspond with Figure 22.
- Check that the connections to the control transformer match the supply voltage (Figure 23).
- Before switching the power on, carry out Earth continuity and insulation resistance tests on the completed installation.



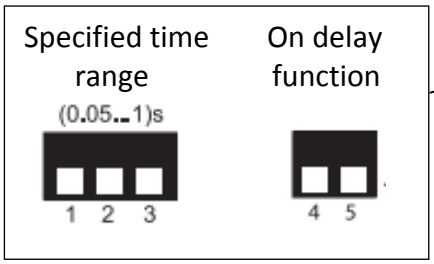
Traverse Fast-Slow

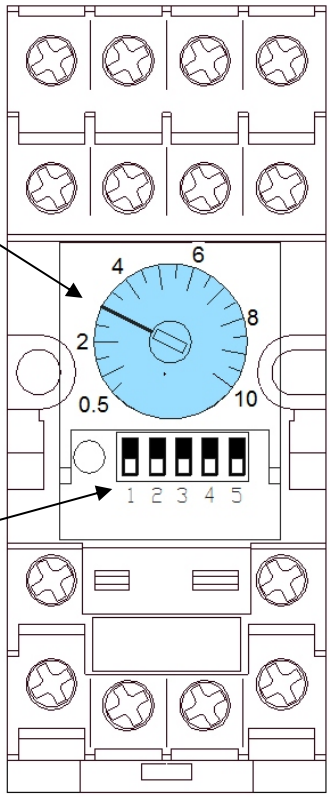


Hoist Slow-Fast

HOIST BRAKE SIZE CODE	HOIST BRAKE SIZE	DIAL POSITION	TIME DELAY (s)
3	14/60/25/180	3.0	0.3
4	14/60/25/103	3.0	0.3
5	16/80/25/103	3.0	0.3
6	18/150/25/103	3.0	0.3
7	20/315/35/103	3.0	0.3
8	20/170/25/103	3.0	0.3
9	20/315/25/103	3.0	0.3

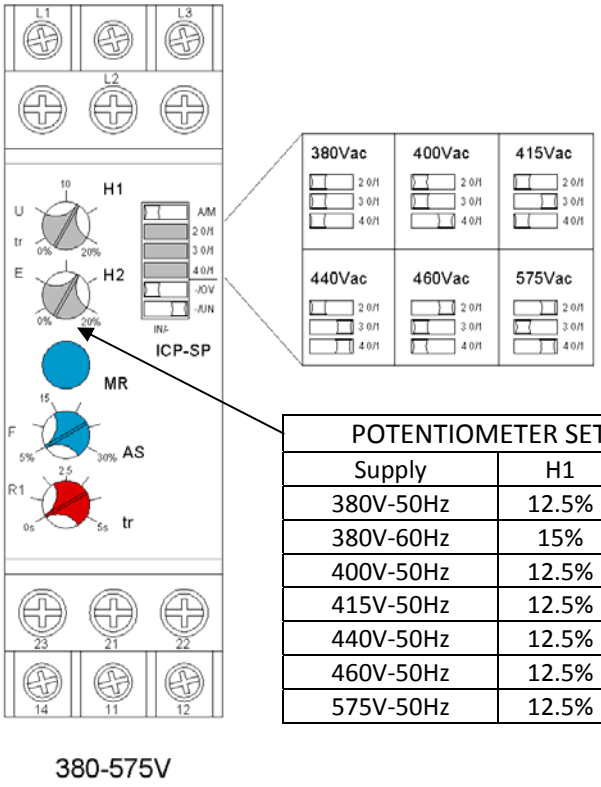
SWITCH DIAL TO BE PEN MARKED TO SHOW FACTORY SETTING





Brake Delay Timer

Figure 21 – Delay Timers



POTENTIOMETER SETTINGS		
Supply	H1	H2
380V-50Hz	12.5%	12.5%
380V-60Hz	15%	15%
400V-50Hz	12.5%	12.5%
415V-50Hz	12.5%	12.5%
440V-50Hz	12.5%	12.5%
460V-50Hz	12.5%	12.5%
575V-50Hz	12.5%	12.5%

Figure 22 – Phase Failure Relay

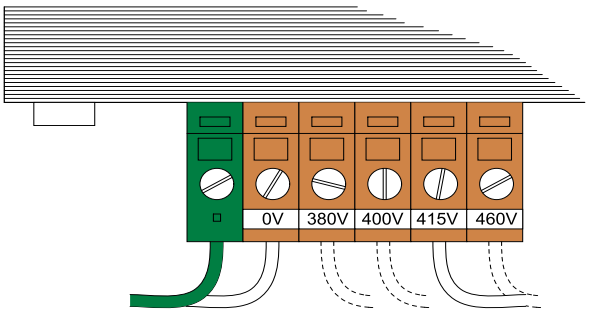


Figure 23 – Control Transformer Connections

3.10.4 Electro-Magnetic Compatibility

The hoist itself complies with the requirements of BS EN 61000-6-2/4 with regard to EMC. The user should take care to ensure that the remainder of the installation meets these requirements.

3.11 COMMISSIONING PROCEDURE

Checks to be carried out before switching on the power supply.

- Check that the hoist installation is complete and all fixing screws are secure.
- Check that the correct end stops are in place.
- Check that the electrical installation is complete and installed as section 3.10. Ensure that the Earth continuity and insulation resistance tests were satisfactorily carried out.
- Check for any alterations to the hoist motor wiring. If changes have been made beyond Street Crane supply, refer to section 5.9 to Establishing Dual Motor Rotations.

Once power supply is connected:-

- Check that the emergency stop functions correctly.
- Check each motion by first moving at SLOW speed and moving the minimum possible distance, ensuring that the direction of movements correspond to the legends on the controller.
- **Double Girder Only:** Travel the crab unit the full length of the crane to ensure that there is sufficient clearance between the wheel flanges and the rail.
- Check that the runway end stops function correctly.
- Set and check the upper and lower limits (section 0).
- Set the ultimate upper limit (rotary type, see section 3.6) and the traverse limit (section 3.9) if fitted.
- Check and adjust, if necessary, the rated capacity limiter (section 3.8). If the hoist is to be subject to a proof load test as part of a crane or runway installation, refer to the instructions for bypass of the RCL in section 3.8.1.
- Run the hoist several times under light load (approx 10% of SWL) and at slow speed to allow the wire rope to bed down and improve its service life. After the running in period, check that the wedge and rope has seated correctly in the socket. Remove any twist imparted in the rope during installation (see 5.13.2.4).

The hoist is now ready for proof load and performance testing as required.
Confirm that commissioning has been duly carried out and complete the test logbook in section 8.

3.12 DISMANTLING / REMOVAL OF THE HOIST

The following hoist dismantling and removal procedure assumes that the hoist is still in its original condition and working in the same environment.
If the hoist has been modified such that it no longer resembles the original installation, the competent person may decide on an alternative method of removal and dismantling.

- Raise the hook to its upper level. Alternatively the hook and rope may be removed if required (see 5.13.2.1)
- Electrically isolate the crane, and disconnect all electrical cables.
- Remove any attachments such as limit brackets, cable towing arms, pendant etc.
- Support the weight of the hoist at its appropriate lifting points (see 3.3).
- **Double Girder Crabs:** Can be lowered to the ground.
- **Foot Mounted Hoists:** Remove the foot bolts and check there is no adhesion of the foot plates before lowering to the ground.
- If the hoist is not to be re-used, dispose of in an environmentally friendly manner.

Any dismantling or removal of wiring between the Hoist Electrical Panel and either of the two the Hoist Motors will result in a loss of Motor Phase Direction. If not re-established correctly, gearbox failure can occur upon start-up (see 5.9).

4 OPERATING INSTRUCTIONS

4.1 INTENDED USE

The crane / hoist is designed for lifting, moving and lowering loads up to the rated capacity of the equipment, by means of a hook or other similar load handling device. The equipment should not be modified or any additions made without the approval of Street Crane Co Ltd.

- The equipment is not intended for transporting persons, including suspended in a basket from the hoist, or travelling on the crane bridge.
- The crane / hoist is not intended for pulling loads at an angle, nor for towing or dragging loads along the floor. The hoist is designed for lifting a load in a vertical path only.
- Ensure that the hoist is always operated within its rated capacity (SWL). The weight of any lifting gear should be taken into account when assessing the load on the hoist. It may also be necessary to allow for any adhesion between the load and its supports.

Overloading can lead to a possible failure of some of the load carrying parts. Overloading the crane / hoist may start a defect, which could lead to future failure even at less than the rated capacity.

- Do not use the crane / hoist for pulling loads loose, i.e. pulling components from moulds. Always make necessary allowances for any adhesion between the load and its supports.
- The end of travel limits (hoist or traverse) are not intended to be a regular method of stopping the motion. They are safety devices and they should be approached with caution.
- The hoist is not intended to operate with a slack rope.

4.2 DAILY PRE-USE INSPECTIONS (at the start of each day/shift)

Part of the crane operator's training should be to make them aware of potential malfunctions requiring adjustments or repairs, and the need to bring these to the attention of the competent person for corrective action. The crane / hoist and associated equipment should undergo daily visual and functional checks to ensure that they operate correctly. These can be executed by the operator from floor level.

In the event of a malfunction of equipment or unusual occurrences, the operator should immediately REPORT the fault(s) to the competent person. The crane should be taken out of service until the fault(s) have been rectified by the appropriately qualified personnel.

1. Ensure that a "*Men Working Overhead*" or a "*Permit to Work*" is not in force.
2. Check all round visibility and carefully note both permanent and temporary hazards.
3. Check that the ropes are correctly seated in the rope grooves of the drum, and the sheaves and have not been displaced. The rope should be free of kinks, protrusions, broken wires and other obvious defects.
4. Check the safety latch on the hook for damage.
5. Check that no electrical equipment is exposed to contamination by oil, grease, water or dirt.
6. Check that any audible and visual warning devices operate correctly.
7. Be familiar with the way in which each controller functions. Ensure that each function button or joystick, including the emergency stop, performs its stated operation (without a load attached) and that each button or joystick returns to the neutral position when released (except emergency stop). Exercise caution whilst making these checks in case of a malfunction.
8. Check that the hoisting and lowering limit switch operates correctly. To do this, raise or lower the empty hook slowly into the limit position to test its operation.

Extreme care should be taken when performing this test. Should the upper limit fail then there is a possibility of damaging the hoist.

9. Check the operation of any traverse limit switches and drives.

Do not use ANY limit switch as a regular method of stopping the motion. They are intended as emergency devices, and are for the safety of personnel.

10. Check the operation of the hoist brake. To do this lift a load clear of the ground and release the UP pushbutton. The hook should remain in position with no run-back.

4.3 DUTIES OF THE OPERATOR / SAFE HOISTING PRACTICES

At the start of each working day or shift, carry out the daily pre-use checks (section 4.2). Do not work with any crane or hoist if any defects are found which may compromise safety.

The following information serves as a guide for safe hoisting practices. An operator adhering to these will quickly find that they are able to work both smoothly and quickly, without prejudicing safety and equipment.

1. Know where the safety, fire and first aid equipment is located and how to use it.
2. Ensure that no one is working on the crane track, crane platform (if fitted) or where they could be struck by the crane / hoist.
3. Before using the crane / hoist make a full visual inspection to ascertain that the equipment is in good working order, paying particular attention to the rope and hook (see 4.2 Daily pre-use inspections).
4. Do not use the crane for anything other than its intended purpose.
5. Ensure the crane is properly maintained and that all the necessary examination and maintenance records are up to date.
6. All relevant accident prevention, safe lifting and slinging procedures should be obeyed.
7. Constantly monitor all crane and hoist movements, and be ready to activate the emergency stop should any abnormal circumstances arise. Be especially aware of instances where the crane / hoist may fail to stop when the push button/joystick is released or if the crane / hoist moves unexpectedly.
8. Always operate the crane with care and consideration. Care should be taken to avoid the swinging of loads.
9. Ensure that the SWL data plates are clearly visible to the operator at all times.
10. Centre the hoist over the load before lifting. Do not side pull as this can damage the hoist and endanger the operator.
11. Do not lower the hook / bottom block so far as to allow the hoist ropes to become slack.

If this does happen, the operator should ensure that the rope is correctly reeved on the system of sheaves and hoist barrel before continuing to operate the crane.

12. Do not lift a load unless you can see it is securely slung with “suitable” lifting tackle.

Lifting tackle should only be deemed “suitable” if in accordance with LOLER 98. (Other national regulations may apply).

13. Always gently ‘*inch*’ the hoist into the load.

Running into the load at full hoist speed imposes excessive overloads on the hoist and could result in failure of parts and/or supporting structure.

14. Do not ‘inch’ the hoist unnecessarily. Excessive stopping and starting causes high temperatures in the motor and brake and may result in overheating or burnout of the component if continued to excess.
15. Do not try and move in the opposite direction until the crane/ hoist has come to a complete stop.

Do not stand below a suspended load or allow any other personnel to do so.

16. Prior to operating the travel or traverse motion, the operator should make personnel aware of approaching loads using audible warnings where necessary.

Do not move the loads over the heads of other personnel.

17. Do not run the hoist or crane into the travel stops at full speed. Ensure that the rubber buffer is in place and not damaged.
18. Ensure that adequate clearance is maintained between the load or lifting attachment and the hoist or crane structure (Figure 24).

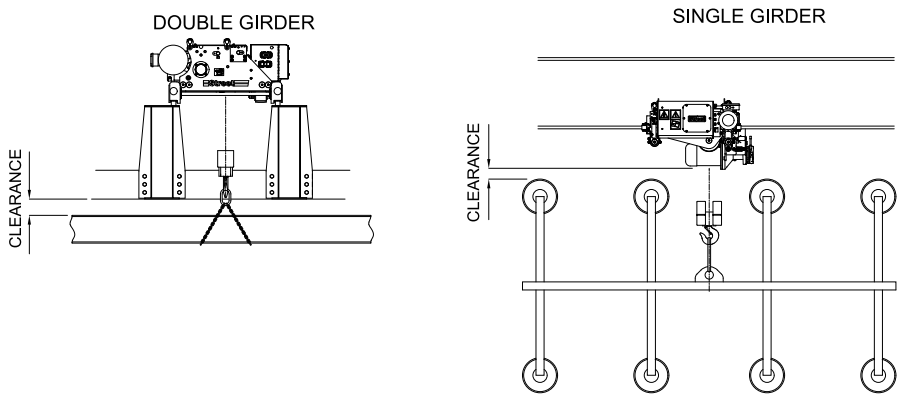


Figure 24 – Clearances to consider when lifting

19. Ensure that you can see the hook or load clearly at all times, or are receiving signals from someone who can. Ensure that both parties know the full meaning of the hand signals for operating the crane / hoist. Refer to Figure 25 for recommended hand signals.
20. Do not continue to travel or traverse once the crane or hoist has come to a stop against the endstops. This will cause localised damage to the rail or runway beam.
21. Never leave a load suspended in the air unsupervised.
22. Do not park the crane over fumes, steam or dangerous processes. For outdoor cranes/hoists, park in a sheltered area where possible.
23. Do not leave outdoor cranes/hoists unattended for long periods without applying the storm anchors.

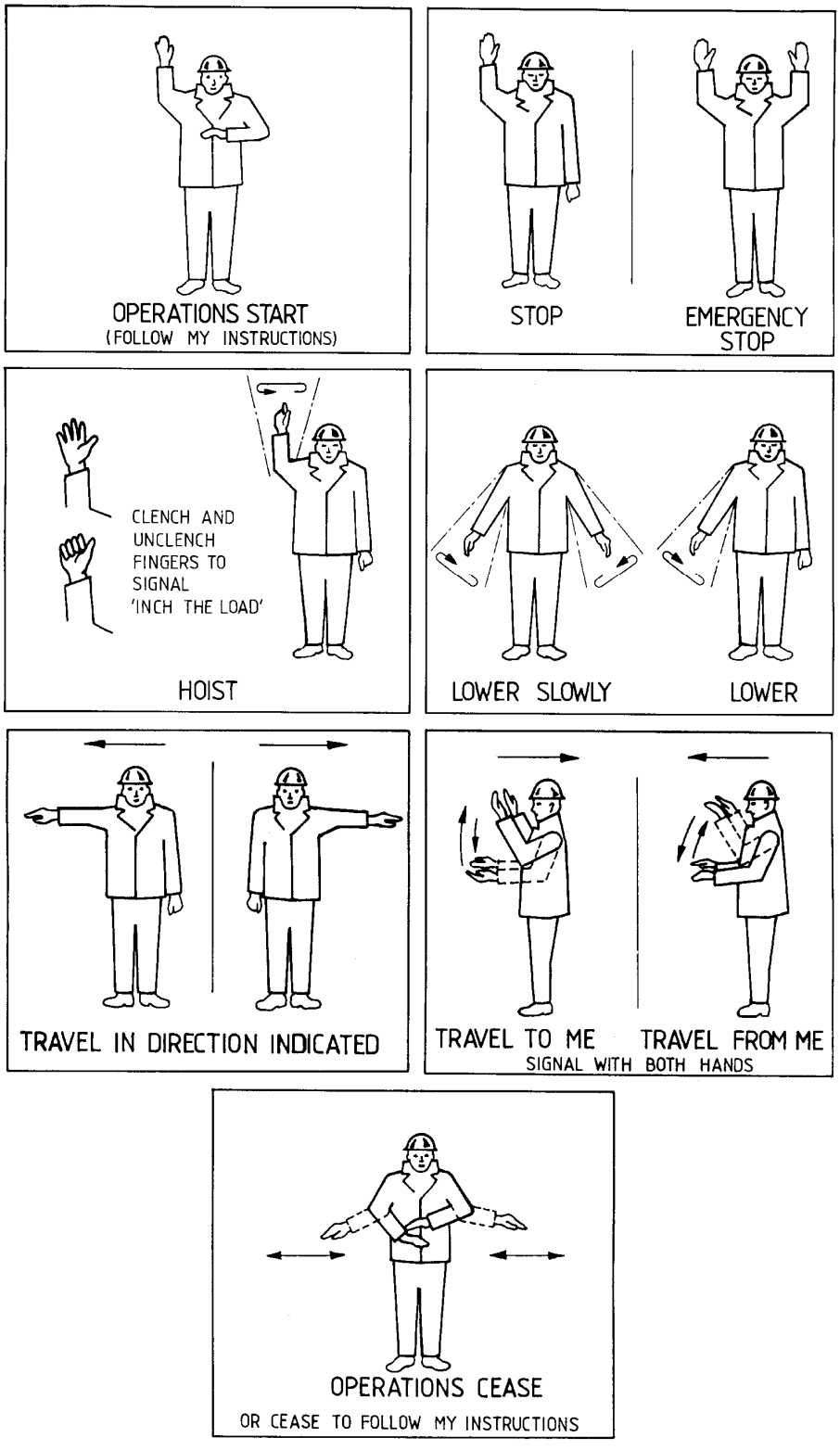


Figure 25 – Recommended Hand Signals

4.4 REMOTE CONTROLLED CRANES / HOISTS

To prevent unauthorised use, the operator should either retain the transmitter in their possession or remove the key from its key lock switch and, for short periods, retain the key in their possession. For longer periods, or when the crane is not in use, the transmitter should be deposited in a designated safe storage place.

When the transmitter is fitted with a belt or harness, the operator should be wearing the harness before switching the transmitter on. This will prevent accidental operation of the crane / hoist whilst fitting. The transmitter should also be switched off before removing the harness.

Ensure that the identification tag on the radio security key matches the identification number on the radio transmitter, and the identification number on the crane.

4.5 CONTROL STATION OPERATING INSTRUCTIONS

The control station may be fitted with either push buttons or joysticks. Pendants will be push button operated, remote control stations may be either push button or joystick. In all cases the push button or joystick is spring applied, which when released will return to the neutral position; the motion will stop and the relevant brake will automatically apply.

4.5.1 Legend Nomenclature

A legend corresponding to the direction of motion is located next to each of the control devices, (push button or joystick). The legend plates may be in either English (words) or International symbols.

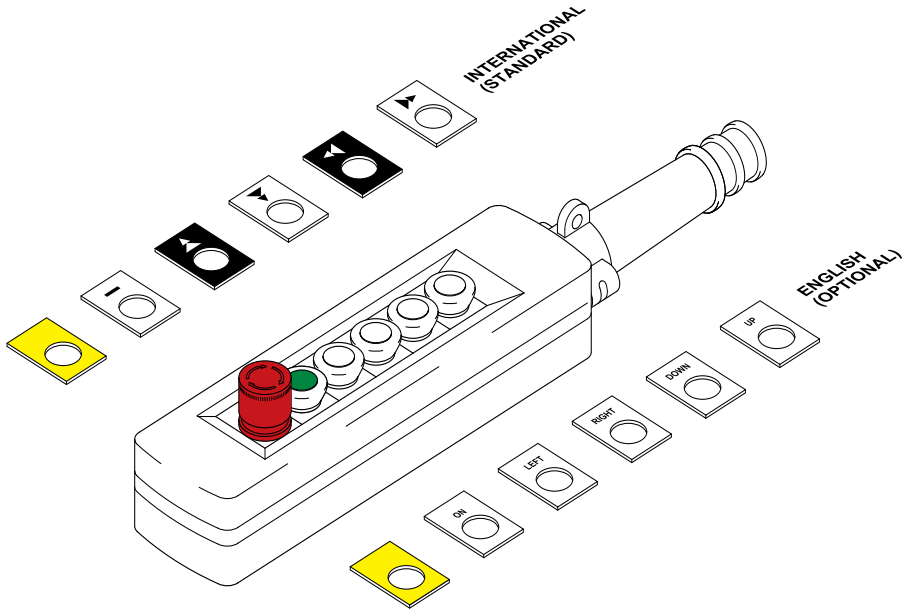


Figure 26 – Control Pendant Legends

To improve safety in operation, there are directional identification legends on the crane that correspond to the legends on the controller.

4.5.2 Switch ON

1. Establish power supply to the conductors via the main isolator (this may be located on a wall or supporting column).
2. Release the emergency stop button on the controller.
3. Momentarily depress the ON pushbutton. This will energise the crane / hoist main contactor and allow subsequent motions to take place.

4.5.3 Emergency Stop

Before starting work it is imperative to check the correct operation of the emergency stop button. It is important that the operator is constantly aware and is monitoring all crane and hoist movements. They should be ready to activate the emergency stop should any abnormal circumstances arise, or situations occur that may endanger the safety of personnel working in the vicinity. Be especially aware of instances where the crane / hoist may fail to stop when the push button / joystick is released, or the crane / hoist starts or moves unexpectedly.

1. Depressing the **EMERGENCY STOP** push button will cause all motions to stop and all brakes to engage.
2. The emergency stop will lock all controls in the off position.
3. If the button is used in an emergency stop situation, ensure that any faults are reported and rectified before re-establishing the power supply.
4. Twist to release the **EMERGENCY STOP** button. No functions will be operative until the **EMERGENCY STOP** is unlatched and the **ON** pushbutton operated.

4.5.4 Pushbutton Operation

1. The operating controls (push button) must **never** be mechanically blocked in an **ON** position.
2. All opposing functions are interlocked e.g. hoist function cannot be operated at the same time as the lower function.
3. All control pendants are fitted with dual pressure, two stage, pushbuttons to control hoist and crane motions. For push button operation depress the required pushbutton and the crane/hoist will move in the corresponding direction.
   - Select the direction of motion required.

   Single Speed
   - Press the button to either the first or second pressure.

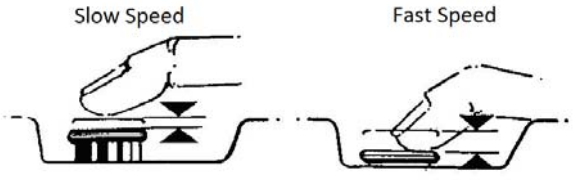
   Dual Speed motion (Switchgear Control)
   - **Slow Speed:** Press the button in to the first stage.
   - **Fast Speed:** Press the button fully in (i.e. to the second stage).
   - **Change Speed - Slow to Fast:** To change from slow speed to fast speed push the button fully in to the second stage.
   - **Change Speed - Fast to Slow (Traverse motion):** To change from fast speed to slow speed, reduce pressure on push button and allow it to come out to the first stage. The motion will first stop and then continue at slow speed.
   - **Change Speed - Fast to Slow (Hoist motion):** To change from fast speed to slow speed, release pressure on push button completely and then engage slow speed. The motion will first stop and then continue at slow speed.

   Dual Speed motion (Inverter Control – Standard Dual Speed)
   - **Slow Speed:** Press the button in to the first stage.
   - **Fast Speed:** Press the button fully in (i.e. to the second stage).
   - **Change Speed - Slow to Fast:** To change from slow speed to fast speed push the button fully in to the second stage. The motion will accelerate until it reaches maximum speed.
   - **Change Speed - Fast to Slow:** To change from fast speed to slow speed, reduce pressure on the pushbutton and allow it to come out to the first stage. The motion will decelerate to slow speed.

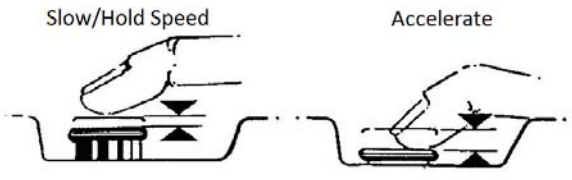
   Variable Speed (Inverter Control – 2 Stage Ramp and Hold)
   - **Slow Speed:** Whilst the motion is stopped, press the button in to the first stage.
   - **Fast Speed:** Press the button fully in (i.e. to the second stage).
   - **Maintain Speed:** When the motion is active, press the button in to the first stage.
   - **Change Speed - Slow to Fast:** To change from slow speed to fast speed push the pushbutton fully in to the second stage. The motion will accelerate toward maximum speed.
   - **Hold Speed:** To maintain desired speed, reduce pressure on the pushbutton and allow it to come out to the first stage.
   - **Reduce Speed – From Fast speed:** To reduce speed, release pressure on the pushbutton completely and re-engage to first stage when the motion decelerates to the desired speed. The motion will maintain speed.
   - **Change Speed - Fast to Slow:** To change from fast speed to slow speed, release pressure on the pushbutton completely and wait for motion to stop, then engage slow speed.

4. To maintain the selected motion the pushbutton must be held depressed. Releasing the pushbutton will stop the motion.
5. Press the **EMERGENCY STOP** pushbutton if no further actions are to be taken.

DUAL SPEED MOTION



RAMP AND HOLD



4.5.5 Joystick Operation

1. The operating controls (joystick) must **never** be mechanically blocked in an **ON** position.
2. All opposing functions are mechanically interlocked e.g. hoist function cannot be operated at the same time as the lower function.
3. Control joysticks normally have two stages to control the hoist and crane motions, the first stage being slow speed and the second stage fast speed. However, three or four stage units may be supplied as an option. Move the required joystick forward and the crane/hoist will move in the corresponding direction. The speed of the motion will be proportional to the stage selected.
   - Select the direction of motion required.

   Single Speed
   - Move the lever or joystick fully.

   Dual Speed motion (Switchgear Control)
   - **Slow Speed:** Move the joystick to the first stage.
   - **Fast Speed:** Move the joystick directly to the second stage.
   - **Change Speed - Slow to Fast:** To change from slow speed to fast speed move the joystick fully to the second stage.
   - **Change Speed - Fast to Slow (Traverse motion):** To change from fast speed to slow speed, reduce pressure on the joystick and allow it to come out to the first stage. The motion will first stop and then continue at slow speed.
   - **Change Speed - Fast to Slow (Hoist motion):** To change from fast speed to slow speed, release pressure on the joystick completely and then engage slow speed. The motion will first stop and then continue at slow speed.

   Dual Speed motion (Inverter Control – Standard Dual Speed)
   - **Slow Speed:** Move the joystick to the first stage.
   - **Fast Speed:** Move the joystick directly to the second stage.
   - **Change Speed - Slow to Fast:** To change from slow speed to fast speed move the joystick fully to the second stage. The motion will accelerate until it reaches maximum speed.
   - **Change Speed - Fast to Slow:** To change from fast speed to slow speed, reduce pressure on the joystick and allow it to come out to the first stage. The motion will decelerate to slow speed.

   Variable Speed (Inverter Control – 2 Stage Ramp and Hold)
   - **Slow Speed:** Whilst the motion is stopped, move the joystick to the first stage.
   - **Fast Speed:** Move the joystick directly to the second stage.
   - **Maintain Speed:** When the motion is active, push the joystick to the first stage.
   - **Change Speed - Slow to Fast:** To change from slow speed to fast speed, move the joystick fully to the second stage. The motion will accelerate toward maximum speed.
   - **Hold Speed:** To maintain desired speed, reduce pressure on the joystick and allow it to come out to the first stage.
   - **Reduce Speed – From Fast speed:** To reduce speed, release pressure on the joystick completely and re-engage to first stage when the motion decelerates to the desired speed. The motion will maintain speed.
   - **Change Speed - Fast to Slow:** To change from fast speed to slow speed, release pressure on the joystick completely and wait for motion to stop, then engage slow speed.

4. To maintain the selected motion the joystick must be held in the selected position. Releasing the joystick will stop the motion.
5. Press the **EMERGENCY STOP** pushbutton if no further actions are to be taken.

4.6 LEAVING THE CRANE / HOIST UNATTENDED

It is essential that a crane / hoist operator is present when a load is suspended from a hoist. When the crane / hoist are left unattended, even for a short period, it is essential that:-

1. The crane / hoist is parked away from any local sources of heat, fumes, condensation or damp conditions.
2. Any slings or lifting tackle have been removed from the hook and the hook is raised to a safe position.
3. The **Remote control** transmitter (where fitted)
   - Should always be kept in the authorised storage place when not required for immediate use.
   - The transmitter key must always be turned OFF when not in use and the key removed.
   - For short periods, the operator should either retain the transmitter in their possession or remove the key from its key lock switch and retain the key in their possession.
4. The **Pendant control** : -
   - Should be left in a safe location.
   - Must always be turned OFF by pressing the emergency stop button.
5. The **Joystick control ('ride-on' or cab)** :-
   - The cab must be parked at the authorised access / egress point.
   - Must always be turned OFF by pressing the emergency stop and removing the key. For short periods, the operator should either retain the key in their possession or for longer periods, the key should be placed at the authorised storage point.
6. For long periods and for out-of-service conditions, switch the mains isolator to the OFF position.
7. For outdoor cranes / hoists, attach the storm anchors.

4.7 POWER FAILURE

The appointed person should establish a safe operating procedure in the event of a power failure. If the appointed person does not have such a procedure the following is recommended: -

1. Switch off the power supply to the crane / hoist at the main isolator until the electrical supply is restored.
2. If a load is suspended from the hoist, fence off a safe area immediately below / around the load and clear all personnel from that area.
3. A load left suspended in mid-air is considered to be a hazard it should be lowered to the floor using the hand brake release lever.
   - Fence off and clear all personnel from the area under the load.
   - Follow the appropriate Health and Safety regulations and procedures.
   - Obtain the necessary authorisation / permit for access to the hoist brake.
   - Carefully lower load to the floor using the hand release on the hoist brake.

The load must be lowered under strict control only a few inches at a time before re-applying the brake. Serious damage and subsequent failure of the gearbox may result if the load is allowed to 'run away'.

- When load is firmly supported at ground level, re-apply the brake mechanism.

When the electrical supply is restored, re-establish the crane power supply and carry out the daily pre-use inspections in section 4.2.

5 INSPECTION AND MAINTENANCE INSTRUCTIONS

To ensure that your hoist and / or overhead travelling crane continues to be safe in operation and operates as efficiently as possible, a regular planned inspection and preventative maintenance programme of the equipment is essential. Preventative maintenance, including lubrication, should be undertaken at pre-set intervals, depending on the crane / hoist duty, with the objective of keeping the equipment in a serviceable condition.

5.1 REPORTING OF DEFECTS AND INCIDENTS

The competent person should have a recognised procedure for reporting defects and incidents. The procedure should include the immediate notification of the following:-

1. Any defects found during the daily checks.
2. Defects found at any other time.
3. Incidents or accidents, however slight.
4. Shock loads however they occur.
5. Dangerous occurrences or reportable incidents.

5.2 SPECIAL KNOWLEDGE

Some equipment, such as a frequency inverter, may be fitted to the crane / hoist. This equipment requires special knowledge and should only be maintained by persons who are trained and competent in the use of such equipment.

5.3 KEEPING OF RECORDS

Accurate recording of the crane / hoist performance can provide useful information in regulating maintenance procedures and control of replacement stock. Record the date and reading on the hours-in-service meter each time a component is replaced, and the reason for replacement (see section 8.2).

5.4 HOISTS THAT HAVE BEEN UNUSED FOR AN EXTENDED PERIOD

In cases where the crane / hoist has been out of use for an extended period of time, the user should ensure that the competent person specifies a special programme of pre-use checks. The extent of the checks depends on the length of time the crane has been out of service and the location of the crane during that period.
As a minimum the pre-use checks should include the daily pre-start inspections (see section 4.2) plus the following:-

1. Check all ropes for signs of corrosion / degradation and damage and that there is still adequate rope lubricant. Check the entire length of the rope.
2. Check that the RCL (rated capacity limiter) is functioning correctly.
3. Check for corrosion on the structure and mechanisms.
4. Check for damage and missing components or legends.
5. Test every motion for several minutes without load ensuring all brakes work satisfactorily.

The extended period of time should be determined by the competent person and will depend on the conditions and location. As a minimum, we would recommend that operations 1 to 4 above are carried out at least once every 6 months, and operation 5 is carried out monthly.

5.5 INSPECTION AND MAINTENANCE INTERVALS

In addition to the pre-use inspections listed above, a regular thorough inspection and maintenance programme is important. The following recommended intervals may vary depending on any other statutory requirements, environmental conditions or results of previous examinations. The competent person may deem it necessary to reduce these recommended periods between examinations.

INSPECTION AND MAINTENANCE INSTRUCTION	Duty	INTERVAL				
		A	B	C	D	E
WIRE ROPE The rope is regarded as an expendable item requiring replacement when examination shows its strength to have diminished to the point where its further use would be unwise. The entire length of rope should be inspected with particular attention to areas where deterioration will be at its highest, for example where the rope enters or leaves sheaves, and at rope anchor points. **Assessment of Wire Rope Condition** The continued safe use of wire ropes depends on assessment of the condition. Instructions on wire rope examination and discard criteria can be found in BS ISO 4309:2004 and BS 7121:Part 2:2003.	M3			*		
	M4			*		
	M5			*		
	M6		*			
	M7		*			
	M8		*			
WIRE ROPE ANCHOR Rope terminations are as important as the rope itself. Check for mechanical damage to clevis pins, elongation of holes and damage to rope thimbles. Inspect wedge and socket anchorages for rope damage as it emerges from the socket, the condition of the socket, and the security and tightness of the wedge fitting. Check the security of the rope anchors on the barrel. Replace any damaged parts.	M3			*		
	M4			*		
	M5			*		
	M6		*			
	M7		*			
	M8		*			
ROPE GUIDE Examine for signs of wear or damage particularly around the rope exit/entry point. Check security of split retention bracket. Ensure that the split retention bracket travels freely along the full length of travel (see section 3.5).	M3				*	
	M4				*	
	M5				*	
	M6			*		
	M7			*		
	M8			*		
BOTTOM BLOCK Check for cracks, cold deformation, wear, and freedom of rotation of the sheaves and hook. Ensure hook safety catch operates correctly. Check security of the hook nut, and the securing grub screw. Replace any covers that may be damaged. Ensure the information labels are still legible (See section 5.14).	M3				*	
	M4				*	
	M5				*	
	M6				*	
	M7			*		
	M8			*		
TRAVERSE BRAKE Carry out a functional (load) check of each of the motion brakes to ascertain that they operate efficiently. Check the output from the brake rectifier. Clean the brake, check the air gap, and adjust and renew worn parts where necessary. In particular check wear on the rotor (disc), and the condition of the spline on the rotor and hub. Check the condition of the hub key and keyway.	M3				*	
	M4				*	
	M5				*	
	M6			*		
	M7			*		
	M8			*		
HOIST BRAKE Carry out a functional (load) check of each of the motion brakes to ascertain that they operate efficiently. Check the output from the brake rectifier. Clean the brake, check the air gap and adjust and renew worn parts where necessary. In particular check wear on the rotor (disc), and the condition of the spline on both rotor and hub. Also check the condition of the hub key and keyway.  The air gap difference between the two hoist brakes must not exceed 0.2mm. Failure to comply with this requirement may cause severe damage to the hoist drive system.	M3			*		
	M4			*		
	M5			*		
	M6		*			
	M7		*			
	M8		*			

Inspection and Maintenance Intervals: - A = Weekly, B = Monthly, C = 6 Monthly, D = Annually, E = Every 5 Years

INSPECTION AND MAINTENANCE INSTRUCTION	Duty	INTERVAL				
		A	B	C	D	E
HOIST AND TRAVERSE GEARBOX Inspect around gearbox casing, filler, drain plugs, and around oil seals for signs of lubrication seepage. Clean ventilation plug. Check security of fixings and renew seals if necessary. Apply gasket glue to hoist gearbox seal. When gearbox oil is drained during oil replacement, remove the gearbox inspection cover and visually check the gear teeth for wear. Check keys and keyways for security.	M3				*	
	M4				*	
	M5				*	
	M6				*	
	M7				*	
	M8				*	
HOIST MOTOR AND COUPLING Clean motor fins and fan cowling. Check security of motor and coupling fixings. Check coupling and coupling element (see section 5.7). There is an inspection aperture for the coupling located in the underside of the gearbox casing.	M3				*	
	M4				*	
	M5				*	
	M6				*	
	M7				*	
	M8				*	
BARREL AND ROPE SHEAVES Examine the rope groove for wear or damage due to rope indentations. Rope sheaves must be replaced if the groove profile is not within tolerance (see section 5.12.1). Check that all sheaves are free running, and the sheave saddle is free to tilt.	M3				*	
	M4				*	
	M5				*	
	M6				*	
	M7				*	
	M8				*	
TRAVERSE DRIVE COMPONENTS Check the condition of the wheels for signs of wear on the tread and inside of the flanges (see section 5.12.2). Inspect the condition of any geared pinions and wheels for damage and wear. Ensure correct engagement of gear teeth.	M3				*	
	M4				*	
	M5				*	
	M6				*	
	M7				*	
	M8				*	
END STOPS AND DRIVE TORQUE ARM BUFFERS (where fitted) Check the condition of the end stops and rubber buffers. Replace if damaged.	M3				*	
	M4				*	
	M5				*	
	M6				*	
	M7				*	
	M8				*	
HOIST STRUCTURE Visually inspect overall structure for damage and unusual rubbing marks. Check rail for wear or localised damage. Check security of a reasonable quantity of the bolts, in particular those that are not pen marked or where the pen mark has been disturbed. Visually examine welds for signs of cracks. Clean off any corrosion and apply an approved protective treatment to the surface.	M3				*	
	M4				*	
	M5				*	
	M6				*	
	M7				*	
	M8				*	
PENDANT AND / OR REMOTE CONTROLLER Check that the controller casing, pushbuttons / joysticks and their rubber seals are undamaged. In particular check the operation of the Emergency Stop button. Check that the Pendant strainer wire fixings are secure and the cable entry seal is undamaged. Check that all legends on the controller and hoist are clear and legible. For radio controlled units, check for any corrosion caused by faulty batteries.	M3				*	
	M4				*	
	M5				*	
	M6				*	
	M7			*		
	M8			*		
ELECTRICAL CABLES Check for damage, loose connections and loose / damaged cable entry points. Check cable insulation for signs of brittleness (does not crack when flexed) or overheating (discolouration). Replace where necessary. Check the condition of the strainer wire on the pendant cable and wire clamp points.	M3				*	
	M4				*	
	M5				*	
	M6				*	
	M7				*	
	M8				*	

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INSPECTION AND MAINTENANCE INSTRUCTION	Duty	INTERVAL				
		A	B	C	D	E
CURRENT COLLECTORS / BUSBAR Inspect collector arms and carbon shoes for signs of damage or wear. Replace where necessary. Check joints and insulation for signs of arcing. Rectify as necessary.	M3				*	
	M4				*	
	M5				*	
	M6				*	
	M7				*	
	M8				*	
DISCONNECT SWITCH AND MAIN ISOLATOR Check for damage and satisfactory operation.	M3				*	
	M4				*	
	M5				*	
	M6				*	
	M7				*	
	M8				*	
ELECTRICAL PANELS  Inspect relays, contactors, and wiring for security and physical damage. Renew if signs of damage or overheating are apparent. Ensure panel door closes securely. Lightly lubricate panel hinges. Clean / replace enclosure filters where fitted. Check that isolating switch operates correctly. Remove any dirt or debris from the panel.	M3				*	
	M4				*	
	M5				*	
	M6				*	
	M7			*		
	M8			*		
EARTH CONTINUITY AND INSULATION RESISTANCE Carry out earth continuity and insulation resistance tests on the installation.	M3				*	
	M4				*	
	M5				*	
	M6				*	
	M7				*	
	M8				*	
ROTARY LIMIT SWITCHES Inspect for wear or damage (see section 3.5). Check for correct operating positions for the upper and lower limits. Check the operation of the second upper limit (where fitted) (see section 3.6)	M3				*	
	M4				*	
	M5				*	
	M6				*	
	M7			*		
	M8			*		
TRAVEL / TRAVERSE LIMIT SWITCHES Inspect for wear or damage, and the security of fixings. Check for correct operating position.	M3				*	
	M4				*	
	M5				*	
	M6				*	
	M7			*		
	M8			*		
RATED CAPACITY LIMITER Physically check the components in the RCL for wear or damage. Check the security of cables, connections and mounting. Test the operation of the RCL by applying the necessary calibrated load (see section 3.8).	M3				*	
	M4				*	
	M5				*	
	M6				*	
	M7				*	
	M8				*	
SERVICE LIFE Establish the remaining service life of the hoist (see section 2.5).	M3				*	
	M4				*	
	M5				*	
	M6				*	
	M7				*	
	M8				*	

Inspection and Maintenance Intervals: - A = Weekly, B = Monthly, C = 6 Monthly, D = Annually, E = Every 5 Years

5.6 LUBRICATION

Always follow the safety instructions provided by the lubricant manufacturer. Some general precautions are as follows:-

- Always be aware of the risk of fire. Keep the lubricant away from heat and open fires. Do not smoke. Have the relevant fire extinguish media to hand.
- Keep any containers closed and always store in the manner recommended by the manufacturer. Soak up any spillage immediately.
- Avoid prolonged and frequent contact with skin, wear gloves or use oil repellent barrier creams. Keep away from food and drink. Do not inhale any fumes. Do not swallow. Wear eye protection. Always wash hands thoroughly after use. Obtain first aid treatment for any injury, however slight.
- Dispose of the lubricant and its containers in the recommended manner. Do not allow the lubricant to contaminate water supplies.

General

- All gearboxes must be at standstill when oil filling.
- Use only fresh oils / greases
- Do not mix oils and greases of different types and manufacturers.
- Re-fit all plugs and covers etc, and check for leaks afterwards.
- Remove any excess lubricant.
- Note: Too much grease can cause a bearing to overheat and reduce the life of the bearing.

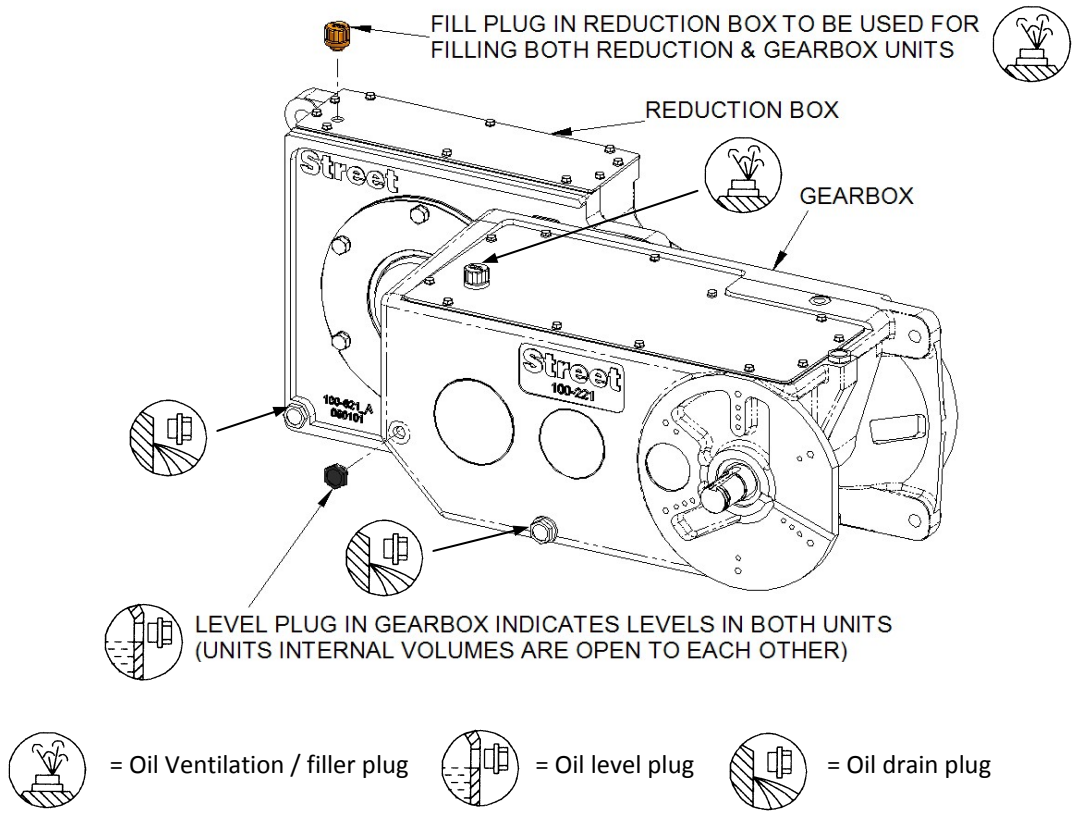

Figure 27 – Gearbox oil fill & level plug locations

5.6.1 Lubrication Schedule

Intervals of lubrication are given for general guidance. Special applications and/or experience may show alternative intervals to be more appropriate.

ITEM and LUBRICATION INSTRUCTION	Duty	INTERVAL					LUBRICANT
		A	B	C	D	E	
ZX HOIST GEARBOX First oil change is due at 500 hours of operation. Thereafter replace the oil every 3000 operating hours or every 60 months. Fill to the level plug (see Figure 27) Gearbox Size: ZX10 ALL — Quantity (litres): 9.25 Total qty for reduction & gearbox units	M3					*	ISO VG460 **mineral** oil for ambient operating temperatures of –10 to +60°C.
	M4					*	
	M5					*	
	M6					*	
	M7					*	
	M8					*	
HOOK BLOCK THRUST BEARING Grease nipple for the thrust bearing. (Note: The ZX hook block sheave bearings are 'sealed for life' and do not require any further lubrication throughout the design lifetime of the hoist).	M3				*		NLGI grade 2 grease with EP additives and oxidation inhibitors. Viscosity : 1000 cSt at 40°C 58 cSt at 100°C Drop point : >180°C Operating temperature range : -10 to +120°C.
	M4				*		
	M5				*		
	M6			*			
	M7			*			
	M8			*			
HOIST ROPE Clean the rope surface before applying new lubricant. This is particularly important in environments containing abrasive particles. For maximum effect the lubricant is best applied to the rope where it 'opens up' as it travels over a sheave or winds on the barrel. Intervals of lubrication are given for general guidance. Special applications and/or experience may show alternative intervals to be more appropriate. As a general rule the dressing should be re-applied at regular intervals and before the rope shows signs of corrosion or dryness.	M3				*		*"Street-Drako Compound"* or similar oil based rope lubricant with additives for good penetration, adherence and corrosion protection. Effective temperature range –20 to +60°C.
	M4				*		
	M5			*			
	M6			*			
	M7		*				
	M8		*				
ROPE GUIDE Smear the inner groove of the rope guide with the rope lubricant each time a new hoist rope is fitted.	M3						*"Street - Drako Compound"* or similar oil based rope lubricant with additives for good penetration, adherence and corrosion protection. Effective temperature range –20 to +60°C.
	M4						
	M5						
	M6						
	M7						
	M8						

Inspection and Maintenance Intervals: - A = Weekly, B = Monthly, C = 6 Monthly, D = Annually, E = Every 5 Years

ITEM and LUBRICATION INSTRUCTION	Duty	INTERVAL					LUBRICANT
		A	B	C	D	E	
SHEAVE SADDLE PIVOT POINTS AND HOIST LIMIT BUSH GUIDE BAR Spray into the end pivot points of the sheave saddle.	M3				*		Multi-purpose liquid aerosol lubricant/penetrant. (WD40).
	M4				*		
	M5				*		
	M6				*		
	M7				*		
	M8				*		
TRAVERSE DRIVE GEARBOX First oil change is due at 500 hours of operation. Thereafter replace the oil every 3000 operating hours or every 60 months. Fill to the level plug. See table below for lubricant quantity.	M3					*	ISO VG220 **mineral** oil for ambient operating temperatures of –10 to +40°C. ISO VG220 **synthetic** oil for ambient operating temperatures of –25 to +80°C.
	M4					*	
	M5					*	
	M6					*	
	M7					*	
	M8					*	

Traverse Drive Gearbox Ref. (see nameplate)	Lubricant Qty (litres)
SK250	1.4
SK373.IF	0.45
SK573.IF	0.75

Inspection and Maintenance Intervals: - A = Weekly, B = Monthly, C = 6 Monthly, D = Annually, E = Every 5 Years

5.7 INSPECTION AND MAINTENANCE – HOIST DRIVE COUPLING

The coupling between the hoist motor and gearbox does not require any maintenance but periodically check for damage to the coupling element and that the correct gap between the two halves of the coupling as been maintained. Inspection can take place through an aperture on the underside of the gearbox case.

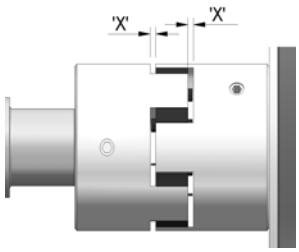

Figure 28 – Drive Coupling Spacing

Motor Size	Gap 'X'
H3 to H5	1.5 – 3.4mm
H6 to H7	1.8 – 4.0mm
H8 to H10	2.3 – 4.5mm

If the coupling element requires changing:

Before removing the motor, lower the bottom block to a suitable level (floor or platform) and allow it to rest on a solid support. Ensure that the mains power is isolated before starting any work.

- Disconnect the power cables from the motor terminal box, making notes of each cable and its relative terminal connection.
- Support the motor and remove the four retaining nuts / spring washers that fasten the motor to the gearbox.

NOTE: A hoist motor can weigh up to 120kg (see HOIST MOTOR DATA 7).

- Carefully withdraw the motor, noting the orientation of the motor terminal box.
- Remove the motor completely, and replace the coupling element.
- If the coupling body is damaged or loose on the shaft and has to be changed, consult the manufacturer before replacing.
- Carefully refit the assembly onto the side of the hoist gearbox ensuring that the orientation is correct, and that the coupling spider element meshes correctly in the coupling hub claws. Do not force engagement of the coupling if any resistance is felt. Use the inspection hole on the underside of the gearcase to ensure correct engagement.
- Replace the motor retaining nuts and spring washers and tighten to 40Nm.
- Via the inspection hole, check that the coupling halves have engaged correctly and that the gap between the two halves is as shown in Figure 28.
- Reconnect the cables to the motor terminals, and when power is re-established, test for correct operation and direction of rotation.

CRITICAL NOTE: Establish correct Phase Rotation of Motors before operation (see section 5.9)

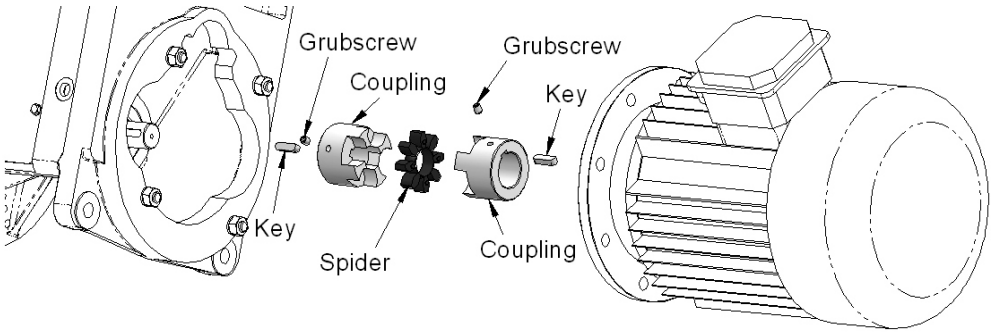

Figure 29 – Hoist Drive Coupling Assembly

5.8 INSPECTION AND MAINTENANCE – HOIST DRIVE CABLE CONNECTION

If either of the hoist drive motors are removed/replaced, it is ***critical*** that before fitting back on the hoist the cables in the motor terminal box are connected to give opposite rotation with respect to the other drive.
(i.e. when both hoist motors are viewed on their drive ends, one rotates clockwise whilst the other rotates anti-clockwise). Refer to the procedure in section 5.9, and the hoist electrical schematic for connection details.

Failure to ensure opposed rotation of the two hoist motors before fitting may cause severe damage to the hoist drive system.

5.9 INSPECTION AND MAINTENANCE – ESTABLISHING HOIST MOTOR PHASE ROTATIONS

To establish the rotation direction of the motors it is required to remove each motor from its gearbox mount, and secure them in a safe position so that they can be energised. The procedure below is recommended.

5.9.1 Motor Disassembly (see Figure 29)

- Adequately support the weight of the motor.
- Unscrew and remove the four M12 hexagon nuts / spring washers attaching the motor to the gearbox.
- Carefully withdraw the motor from the gearbox, noting the orientation of the motor terminal box. Ensure that each half of the coupling remains on its respective shaft. Retain the Rotex spider coupling for later re-assembly.
- Ensure motor coupling grub screw is secured.

5.9.2 Motor Bracket Assembly

Note: This procedure should not be attempted without the ZX10 DT Motor Support Bracket Kit (8210-7046). This can be obtained from Street Crane Co Ltd.
Where space is available, the motor should be supported by the brackets above the gearbox mounting position (Figure 30). If space is limited in the vertical axis, the brackets can offset the motor to the side of the gearbox (Figure 31).

- Fit the ZX10 DT motor support brackets onto the gearbox studs.
- Secure the brackets to the gearbox studs using four M12 hexagon nuts, washers, and spring washers. Once the motor is mounted the fixtures should be tightened to 40Nm.

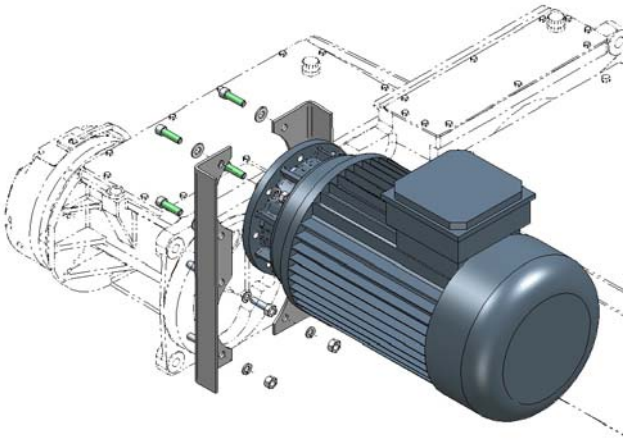

Figure 30 – Vertical Positioning

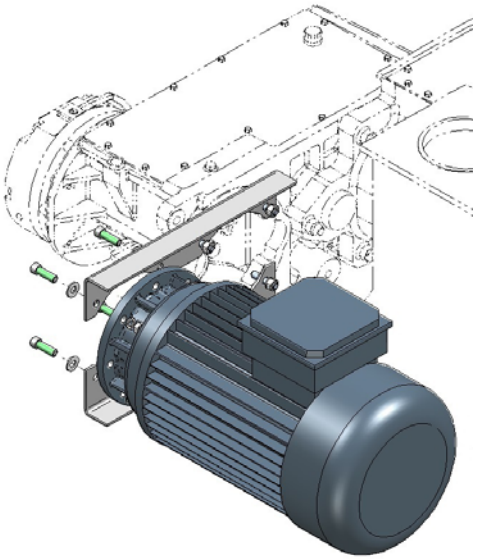

Figure 31 – Parallel Positioning

5.9.3 Motor Fitment to Bracket

- Position the hoist motor to line up with the holes on the bracket.
- Feed the M12x40mm socket head cap screws through the M12 flat plain washers, ZX10 DT motor support brackets, and ZX10 DT hoist motor. Secure with M12 spring washers and M12 nuts.
- Torque all eight fastening positions on the motor and support bracket to 40Nm.
- When the motor is securely attached to the gearbox, any equipment supporting the motor can be removed.

5.9.4 Testing the Hoist Motion

With the hoist motors disconnected from the gearbox energise the motors and check the direction of rotation according to the table below. If the rotation direction is incorrect switch the two phases of the supply to the motor at the terminal box.

The hoist view below dictates the rotational direction of the motor in conjunction with the table.

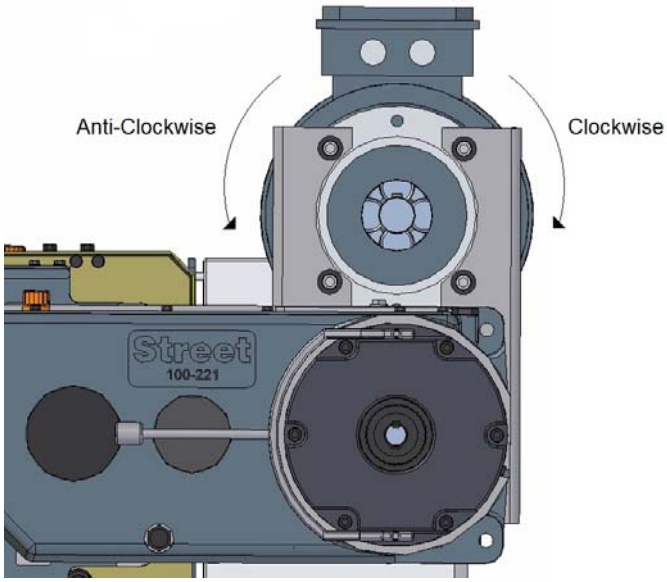

Figure 32 – Motor Rotation Direction

The rope falls off different sides of the barrel depending on the number of falls of rope on the hoist. To determine Fixed/Free end refer to section 2.2, the number of falls is mentioned in the hoist model code (2.4). When looking at the face of the motor (Figure 32) correct rotation of the shaft is as the table below:

ROTATION (when looking at motor face)	**Fixed End**		**Free End**	
	UP	**DOWN**	**UP**	**DOWN**
4 FALL	Anti-Clockwise	Clockwise	Clockwise	Anti-Clockwise
8 FALL	Clockwise	Anti-Clockwise	Anti-Clockwise	Clockwise
12 FALL	Clockwise	Anti-Clockwise	Anti-Clockwise	Clockwise

Note: The fixed end always rotates in an opposite direction to the free end.

5.9.5 Final Testing Procedure

- As a final test, when connected to the gearbox the motors should be tested against the legends on the pendant.
- Test UP/DOWN directions in Slow/Fast ensuring the hoist operates as expected.

5.9.6 Re-Assembling the Motors

Motor connection wires MUST NOT be removed or altered in any way after section 5.9 has been completed.

- Adequately support the weight of the motor.
- Remove the fasteners securing the motor to the bracket.
- Locate Rotex spider into gearbox half of coupling.
- Engage both coupling halves whilst positioning the motor flange onto the four gearbox studs, ensuring the orientation of the motor terminal box is correct. Do not force engagement of coupling if resistance is felt.
- Secure the motor to the gearbox with four M12 spring washers and nuts. Tighten to 40Nm and pen mark.
- Remove lifting eye from motor (if applicable).
- Check through the aperture in the gearbox that the gap between coupling halves is within tolerance stated in section 5.7. Adjust gap if necessary by slackening M8 grub screw in gearbox half of coupling, sliding the coupling to achieve correct gap, and re-tightening grub screw to 10Nm. Re-apply Loctite 243 to grub screw if adjustment is made.

5.10 HOIST INVERTER DISABLE TIMER (NXP) (OPTIONAL)

5.10.1 Maintenance Procedure

Hoists controlled by an NXP frequency inverter have an additional and independent (redundant) circuit that will enforce a stop should the inverter malfunction in a manner that is not detected by its own internal watchdogs.
The disable timer is an important part of the hoist safety circuit and should be checked, on a regular basis, for correct operation.

5.10.2 Recommended Frequency of Testing

Hoist Classification	Recommended interval
M1 – M3	**Annually**
M4	**Annually**
M5	**6 monthly**
M6	**6 monthly**
M7	**3 monthly**
M8	**3 monthly**

5.10.3 Test Procedure

Identify the inverter, disable timer, and brake contactor by referring to the inverter operation and maintenance instructions, and crane/hoist electrical wiring diagrams.

Exercise extreme care when carrying out this procedure. Power is required at the hoist for the test. Only a competent person should carry out this test procedure.

1. Check and make of note the hoist deceleration time set within the inverter (parameter P2.1.4).
2. Check and make note of the setting of the disable timer. The setting of the timer should be approximately 0.5 to 1.0 seconds greater than the hoist deceleration time.
3. Re-program the inverter deceleration time (P2.1.4) to a value approximately 5 seconds greater than the setting of the disable timer.
4. The disable timer uses input I6 (ACIN6) on the inverter to switch off the output switching transistors. Make a note of the original setting of parameter P2.7.24 and then set to 0. This disables the Brake Supervision function.
5. Set the inverter to display output frequency (U1.01).
6. Operate the hoist. Do not attach a load to the hook. Operate in the DOWN direction only and lower at fast speed. When the hoist has reached fast speed, release the DOWN push button / joystick to stop the hoist.

During this test, the stopping distance of the hoist will be increased. Ensure that the hoist can stop before the lower limit is activated. Do not run the hoist in the raise (UP) direction as the longer deceleration time may cause damage due to overrun of the hoist.

7. Check that the brake contactor de-energises when the disable timer de-energises. This must take place before the inverter output frequency reaches zero. If the inverter output frequency reaches zero and the disable timer has not de-energised, replace the timer. Set the timer to its original value (step 2) and repeat the test.
8. Reset the parameter P2.7.24 (from 0) to its original value.
9. Set the inverter to display “Digital input status” (U1.13).
10. Operate the inverter in the lower (DOWN) direction at fast speed and then allow the hoist to stop. Check that the Digital input “ACIN6” changes from 1 to 0, prior to the output frequency reading zero. If the inverter frequency reaches zero without the Digital input changing then the timer needs replacing.
11. Set the inverter deceleration time to its original value (parameter P2.1.4).
12. Test Complete. Leave the crane is a safe state with the controls turned off.

5.11 INSPECTION AND MAINTENANCE – HOIST BRAKE

The main hoist brake is a spring applied disc brake. The brake is electro-magnetically released by the application of DC power to the brake coil in the stator. The size of the brake fitted to the hoist is indicated within the hoist model code see 2.4.
To maintain a safe and efficient braking action, regular inspection of the brake is essential.
When inspecting the brake, particular attention should be made to checking the air gap, and the condition of the rotor (brake disc) spline.

5.11.1 Hoist Brake Components

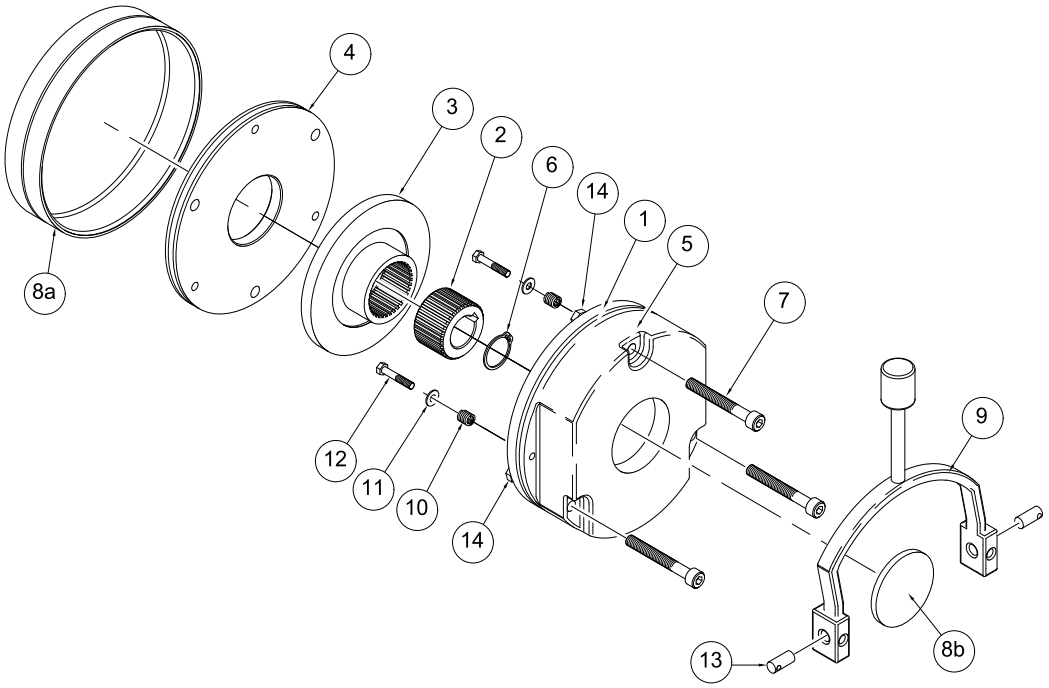

Figure 33 – Hoist Brake Components

Ref	Description
1	Armature plate
2	Brake hub
3	Brake disc (rotor)
4	Mounting Flange
5	Stator
6	Hub circlip
7	Assembly screws
8a	Outer brake seal (optional kit)

Ref	Description
8b	Stator brake seal (optional kit)
9	Hand release mechanism
10	Hand release spring
11	Washer
12	Hand release fixing
13	Barrel nuts
14	Adjustment tubes

5.11.2 Hoist Brake Data

Hoist Brake Size (see model code section 2.4)	**3**	**4**	**5**	**6**	**7**	**8**	**9**
Nominal air gap '**a**' (mm) (+0.1, -0.05mm)	0.3	0.3	0.3	0.4	0.4	0.4	0.4
Maximum air gap '**a**' (mm)	0.75	0.75	0.75	1.0	0.6	1.0	0.6
Maximum rotor thickness (mm)	10.0	10.0	11.5	13.0	16.0	16.0	16.0
Minimum rotor thickness (mm)	7.5	7.5	8.0	10.0	12.4	12.0	12.4
Rotor outside diameter (mm)	124	124	149	174	206	206	206
Maximum adjustment / admissible wear (mm)	2.5	2.5	3.5	3.0	3.6	4.0	3.6
Tightening torque of assembly fixings (Nm)	23	23	23	23	46	46	46
Tightening torque of hand release lever (Nm)	12	12	12	23	23	23	23
Hand release clearance '**s**' (mm)	1.5	1.5	1.5	2.0	2.0	2.0	2.0
Brake Delay Timer -KT102 [Dipswitches set to 0.2, fine adjust to figure stated] (sec)	0.25	0.25	0.25	0.3	0.35	0.35	0.35

Before adjusting the brake or changing the disc, lower the bottom block to a suitable level (floor or platform) and allow it to rest on a solid support. Disconnect the power supply to the hoist and to the brake.

5.11.3 Brake Disc (Rotor) Spline

Check the brake disc and hub for wear on the spline teeth. The end of the spline can be viewed from the end of the brake shaft. If the brake is fitted with the seal end cap (8b), it will have to be removed before inspection. For a more detailed inspection the brake disc will have to be removed.
If the spline appears, replace the brake disc and/or hub immediately.

5.11.4 Checking / Adjusting the Air Gap

To inspect the air gap it may be necessary to lift or remove the outer brake seal (8a) (where fitted). Adjustment of the hoist brake will require total removal of the outer brake seal.
The air gap '**a**' (between the stator (5) and the armature plate (1)) should be checked in at least three positions around the circumference of the brake using non-magnetic feeler gauges (Figure 34). The air gap should not exceed the maximum air gap figure given in the above table.

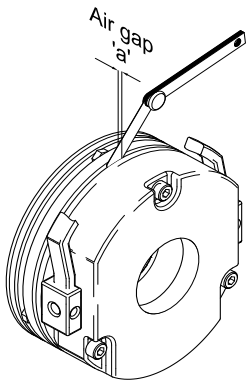

Figure 34 – Checking Hoist Brake Air Gap

Where adjustment is required, slacken the assembly screws (7). Adjust the air gap by turning the adjustment tubes (14) until the nominal air gap '**a**' is reached (Figure 35).

- If the air gap is too large, screw the three adjustment tubes (14) into the stator. If the air gap is too small, screw the adjustment tubes out of the stator.

- NOTE : 1/6 turn adjusts the air gap by approx. 0.15mm
- Re-tighten the assembly fixings to the recommended torque value (see table in 5.11.2).
- Re-check the air gap and repeat the adjustment procedure if necessary.
- Test the brake for correct operation before re-fitting the outer brake seal (where fitted) and returning into service.
- Hoist brake one (+0PH-YB101a) and Hoist Brake two (+0PH-YB101b) must have their air gap set to within 0.2mm of each other. Failure to operate within this delta may result in severe damage to the drive system.

The air gap difference between the two hoist brakes must not exceed 0.2mm.

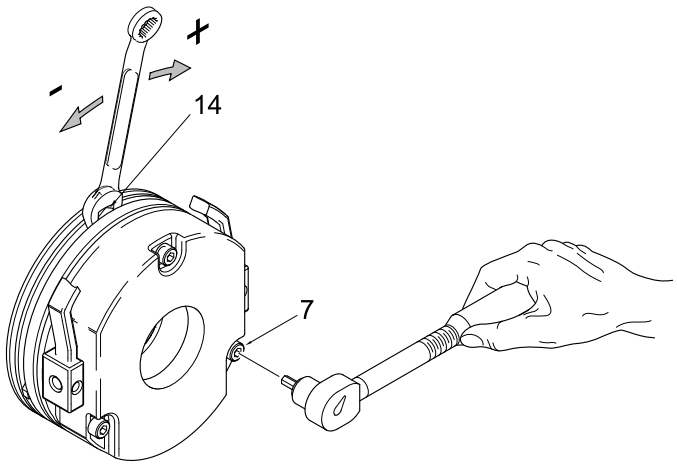

Figure 35 – Adjusting the Hoist Brake Air Gap

5.11.5 Changing the Brake Disc (Brake Rotor) / Inspecting the Brake Hub

The thickness of the brake disc can be measured using a vernier calliper without the need to remove the brake. Disconnect the power supply and remove the brake seal (if fitted). Measure between the mounting flange and the armature plate (Figure 36). If the minimum thickness is below the figure given in the Hoist Brake Data table (5.11.2), the brake disc should be replaced.

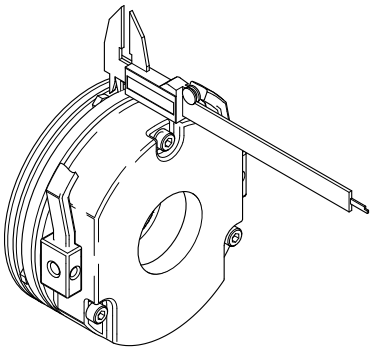

Figure 36 – Inspecting the Brake Disc

- Remove the outer brake seal (where fitted) and clean any brake dust from around the brake.
- Loosen the assembly fixings evenly and remove them, taking care to support the brake body.
- Remove the brake body, taking note of its orientation.
- The brake rotor (brake disc) will now be exposed. Withdraw the brake rotor from its hub.
- Before replacing the brake disc, visually inspect the end of the key between the brake hub and shaft. Check the condition of the spline on the brake hub and ensure there is no radial or rotational play between either the new brake disc and the hub, or the hub and the shaft. If the hub is damaged, worn, or play is apparent, the hub should be replaced. Before replacing, consult Street Crane.
- Ensure the face of the mounting flange is clean and free of any oil or grease. If the mounting flange is worn or excessively scored it should be replaced. Consult Street Crane before replacing.
- Using a vernier calliper, measure both the new brake disc thickness and length of protrusion of the adjustment tubes from the back of the brake.

- Calculate the distance between the stator and the armature plate as follows: -

Distance = Brake disc thickness + Nominal Air Gap 'a' – adjustment tube height

- The adjustment tubes should be unscrewed until the calculated distance between the stator and the armature plate is reached.
- Slide the new brake disc (rotor) onto the hub.
- Replace the brake body in the same orientation as originally installed.
- Replace the assembly fixings and tighten to the torque value stated in the table (5.11.2).
- Check and adjust, where necessary, the nominal air gap 'a' and the hand release clearance 's' (see 5.11.4 and 5.11.6).
- Replace the brake seal (where fitted (see 5.11.7)).
- Re-connect the brake supply and test the brake for correct operation before returning into service.

5.11.6 Fitting the Hand Release

For safety reasons, the hand release is spring loaded and returns to its original position (brake applied) automatically.

- Insert the compression springs (10) into the holes of the armature plate (1).
- Fit the washers (11) onto the hand release fixings (12) and assemble through the compression springs (10) and the stator (5).
- Fit the barrel nuts (13) into the holes provided in the hand release (9).
- Position the hand release (9) over the stator and tighten the hexagon screws (12) into the barrel nuts (13) until the armature plate moves towards the stator.
- Adjust the gap between the armature plate and the stator using the hexagon hand release screws (12) to achieve a dimension ('s' + 'a') (see Figure 37). Example 1.8mm (1.5+0.3) for brake size 3. Check the dimension at three positions around the circumference.
- Fit the complete brake assembly onto the hoist and tighten the assembly screws (7) to the value shown in the table (5.11.2).
- Re-adjust the air gap 'a' in accordance with section 5.11.4.
- Re-check the Hand Release Clearance dimension 's' and nominal air gap 'a' before returning into service.

The hand release clearance gap, 's' is important. The brake may not apply correctly if the clearance is too small. If the nominal air gap 'a' is adjusted at a later date, do not alter the hand release clearance.

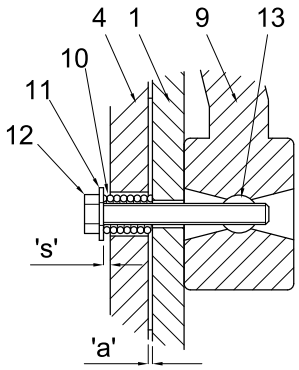

Figure 37 – Hoist Brake Hand Release

5.11.7 Fitting the Brake Seal Kit (Optional)

- Pull the electrical cable through the rubber sealing ring.
- Drop the outer brake seal (8a) over the hand release lever and push the sealing ring over the stator.
- Press the lips of the seal into the grooves in the stator (1) and mounting flange (4) (see Figure 38).
- Tap the stator brake seal (8b) into the hole in the front of the stator.

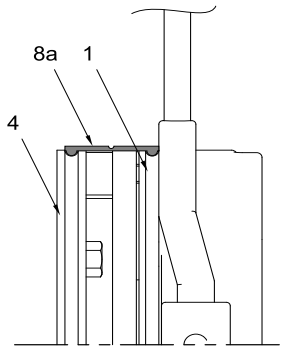

Figure 38 – Brake Seal

5.11.8 Brake Rectifier

The ZX series hoist uses three types of brake rectifier. These vary with the size of brake. The rectifier type is marked on the rectifier.

Brake Size (see hoist model code section 2.4)	**1, 2 and 3**	**4 to 9**
Brake rectifier type	Normal full wave 14.630.32.016 (BEG-161-270) OR B3-18464 (CSA approved)	Force voltage, full/half wave B3-69500(CSA approved)

Testing the normal rectifier types 14.630.32.016 and B3-18464

With the brake connected to the rectifier, check that the input voltage to the rectifier is correct at 220V. The output measured at the brake coil terminals should be approximately 198V DC.

Testing the force voltage rectifier, type B3-69500

With the brake connected to the rectifier, check that the input voltage to the rectifier is correct at 220V. The output measured at the brake coil terminals should be 198V DC for 1 second, and then reduce to, and hold at 98V DC (note these values are approximate only). Use an analogue meter for this test (a digital meter is not suitable).

If the output voltage from the test is below the figures provided, the rectifier should be replaced.

5.12 INSPECTION AND MAINTENANCE – HOIST / CRAB FRAME

Periodically inspect the frame in accordance with recommended intervals given in the inspection and maintenance programme (see 5.5). Check the security of a reasonable quantity of the bolts in the hoist frame, in particular those that are not pen marked or where the pen mark has been disturbed.

5.12.1 Sheaves

- Check all rope sheaves for wear and for free running.
- The sheaves should rotate freely when rotated without load.
- The sheave must be replaced if the wear on the groove side wall or the groove base is significant.
- Measure the thickness to the side wall and groove depth as shown in the table below, and replace the sheave if the wear exceeds the values given.

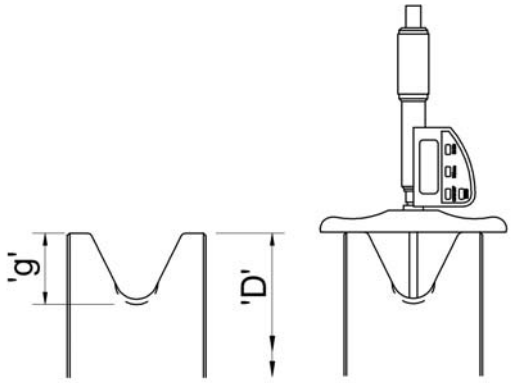

Figure 39 – Sheave characteristics- 16mm rope

Rope Diameter (mm)	Sheave Part No	Diameter '**D**' (mm)	'**g**' (mm)	
			new sheave	minimum
16	220-22531	376	27	29.4

The sheave must also be replaced if the radius in the bottom of the groove has become too large. The rope may become flattened and distorted under load, thus resulting in premature failure. Minor impressions of the rope profile in the bottom of the groove are acceptable.

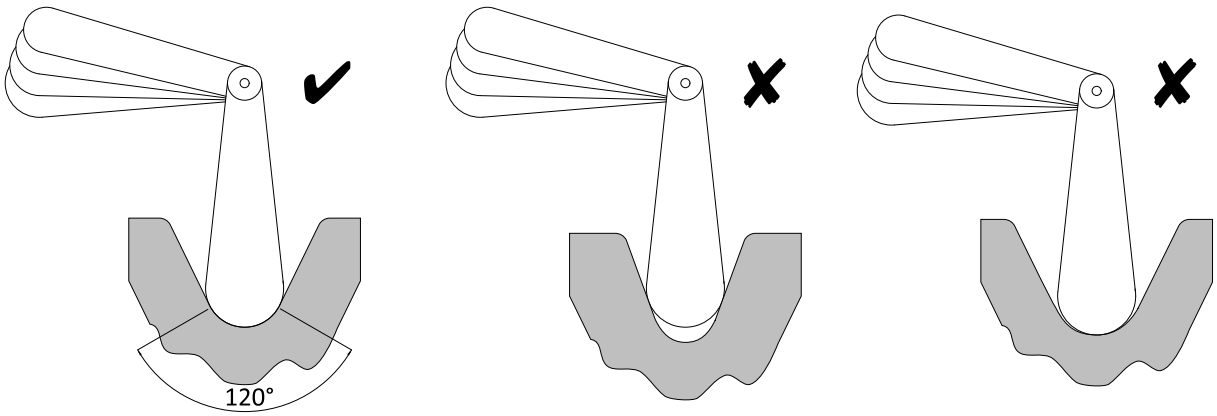

Figure 40 – Sheave and barrel groove inspection

Nominal Rope Diameter (mm)	Minimum Groove Diameter (mm)	Maximum Groove Diameter (mm)
16	16.8	18.0

5.12.2 Double Girder Crab Wheels (Double Flange)

Visually inspect the wheels for wear. When the diameter or flange thickness has reduced to the values given in the table below, replace the wheels.

Wheel		Flange Thickness	
Original diameter (mm)	Replacement diameter (mm)	Original thickness (mm)	Replacement thickness (mm)
125	< 119	10	5
160	< 152	18	9
200	< 190	18	9
250	<238	18	9
315	<299	18	9

5.13 INSPECTION AND MAINTENANCE – WIRE ROPE

Failure of a wire rope may cause death or serious injury. A wire rope will fail if worn out, shock loaded, overloaded, misused, damaged, abused or improperly maintained. Information on care, maintenance, installation, examination and discard criteria of wire ropes can be found in BS ISO 4309:2004 and / or BS 7121-1:2006. The competent person should hold a copy of these documents.

Do not replace a rope or any rope fittings with anything other than to the original specification. This applies equally to the rope length as well as its construction.

The Rope Data Plate is located in the vicinity of the Hoist Nameplate (see 0) and contains all the required rope replacement information.

5.13.1 Offloading and Storage

Care of a new rope begins immediately upon receipt. Use wide textile webbing slings or lift on the rope drum to avoid direct contact with the rope. Inspect the rope upon receipt and ensure that the details on the certificate and other documents are correct. Clearly label the rope and ensure that it is traceable to its certificate and / or other documents.

Steel wire ropes should be stored in a clean, cool, dry place, indoors and away from corrosive and damp atmospheres. Do not let the rope rest directly on the floor; allow air to circulate around the reel. Cover with a breathable cover that prevents condensation. Inspect the rope periodically and, if necessary, apply a suitable dressing that is compatible with the manufacturer's lubricant (see section 5.6.1).

When removing from storage, check that no accidental damage has occurred and that there are no signs of corrosion. Ensure the rope certificate is available and retain this in a safe place as it will be required when periodic examinations are carried out.

5.13.2 Replacing the Wire Rope

Removal and replacing the wire rope is most effectively carried out with the power to the hoist unit switched ON, so all work must be carried out with extreme care. Suitable safety precautions should be made to ensure that other motions are not accidentally activated, i.e. isolate any travel motions.

It may be necessary to adjust the lower limit to allow the block to lower to ground level. NOTE: The upper and lower limit will require resetting after completion of new rope installation.

5.13.2.1 Removing the Rope

- Lower the bottom block down to the lowest possible level and allow the block to rest on a solid support (floor or platform).
- Run the remaining rope off the barrel until approx 1 full wrap remains at each barrel end.
- Carefully release the pair of rope clamps at one end of barrel and lower that end of rope to the floor.
- Repeat for the other end of rope.
- Withdraw the rope through the bottom block and hoist sheaves.

5.13.2.2 Fitting a new Wire Rope

Fitting the wire rope is most effectively carried out with the power to the hoist unit switched ON, so all work must be carried out with extreme care. Suitable safety precautions should be made to ensure that other motions are not accidentally activated, i.e. isolate any travel motions.

Fitting of a new rope must be carried out by a competent person. Before installation check that all sheaves are free running, and rope grooves in sheaves and drums are in good condition. Groove profiles should be circular, smooth, and free from ridges (see 5.12.1).

Check that the correct rope has been ordered / taken out of storage. Examine the rope visually to ensure that there is no damage or corrosion on the rope. Prepare a safe and clean working area to avoid contaminating the rope with any dirt or moisture.

To prevent the possibility of kinking or imparting any twist into the rope, it should be uncoiled without slack and in a straight line. Short lengths of rope can be uncoiled along the ground (see Figure 41). If the coil is too large to handle, place on a turntable and pull the outside end of the rope allowing the coil to rotate.

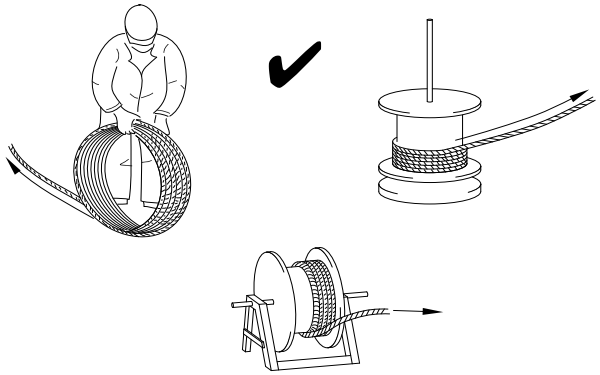

Figure 41 – Correct uncoiling of wire ropes

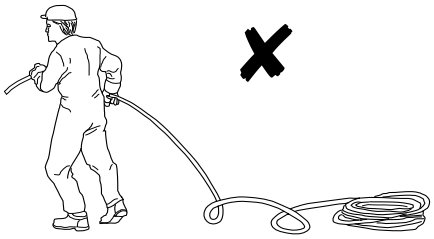

Figure 42 – Incorrect uncoiling of wire ropes

Do not pull the rope away from a stationary coil. This will induce twist and possibly kinks in the rope that will seriously impair its performance and result in premature failure (see Figure 42).

- Roll the rope out on an area of the floor which is free from grit, dust, and chemicals. Take care not to introduce any kinks or loops into the rope.
- Mark the centre of the rope with tape (or similar) to help when reeving the rope through the system of pulleys.
- **For the 4 fall configuration:** thread the rope over the single upper sheave pulley until the marker is reached.
- **For 8 and 12 fall configurations:** thread the rope over the pair of upper sheave pulleys that are furthest from the barrel until the marker is approx midway between them.
- Thread one end of the rope through the reeving system as shown in Figure 44 to Figure 46. Ensure there are no obstructions which may cause twisting of the rope and monitor the rope carefully as it is being pulled through the sheave system.
- Anchor one end of the rope to the hoist barrel using the barrel clamps (Torque to 18Nm) allowing the end of the rope to project 30-40mm. Do not forget the spring washers.
- Thread the other half of the rope through the reeving system and anchor to the barrel following the same procedure as above.
- Tightly wind the rope onto the barrel applying tension to the rope with suitably gloved hands.
- During this installation process ensure that that the fleet angle 'θ 'does not exceed 1½° (see Figure 43).

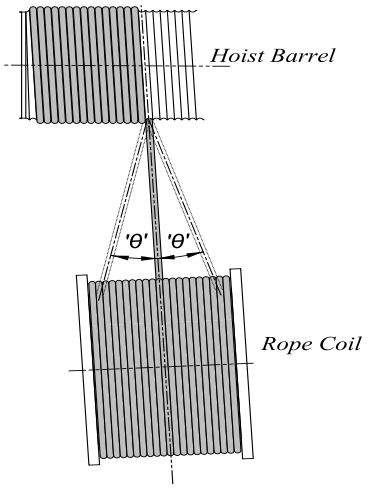

Figure 43 – Fleet angle

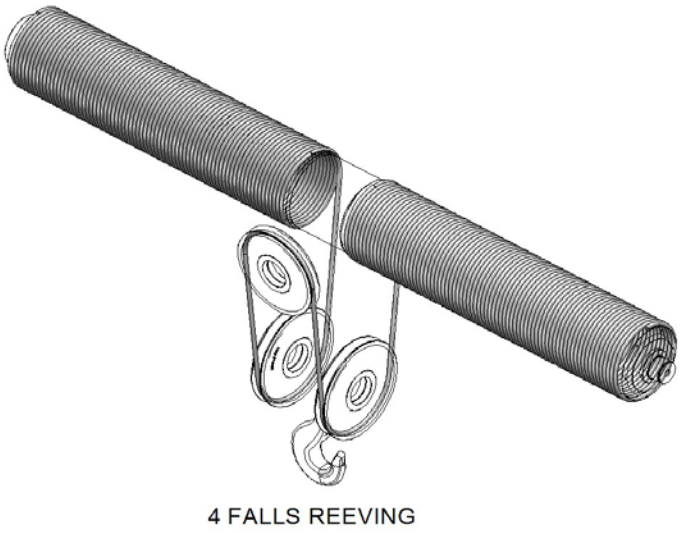

Figure 44 – Reeving Diagrams for ZX10 DT 4 Fall Foot Mount and Double Girder Crab

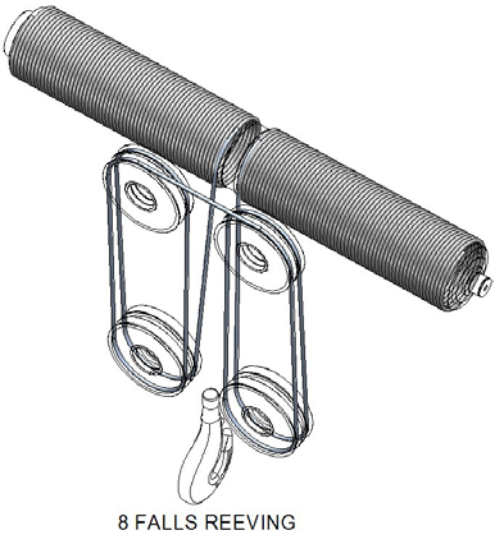

Figure 45 – Reeving Diagrams for ZX10 DT 8 Fall Foot Mount and Double Girder Crab

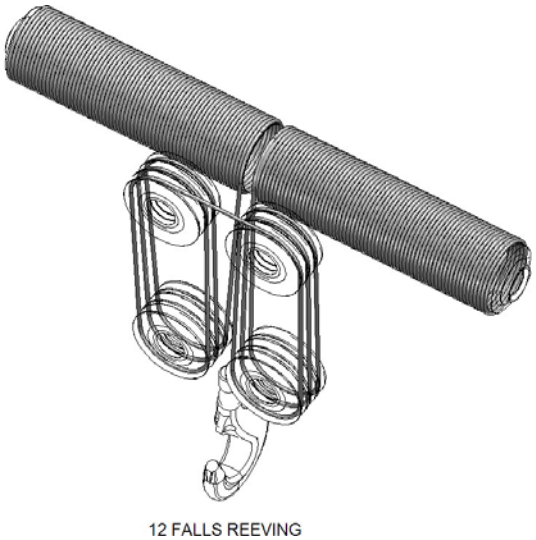

Figure 46 – Reeving Diagrams for ZX10 DT 12 Fall Foot Mount and Double Girder Crab

5.13.2.3 Running In

After installation of a new rope the hoist should be run (at slow speed) several times under a light load (approx 10% of SWL) to allow the wire and strands of the rope to align themselves and bed down. This can greatly increase the rope life. After the running in period, check the operation of the lower limit switch, and upper limit switch, and adjust if necessary. Check the security of the barrel clamps.

5.13.2.4 Removing Twist

If any twist is imparted in the rope during installation the bottom block will rotate, particularly with no load attached. If twisting does occur, remove the rope from the hoist and untwist by letting the rope hang freely or laying the rope out on the floor.

Remove any twist before the hoist is subject to any further load. The rope may otherwise be permanently damaged.

5.14 INSPECTION AND MAINTENANCE – HOOK BLOCK

All inspections should be carried out by trained personnel.

- Each bottom block is clearly labelled with the maximum capacity (safe working load) of the hoist. Ensure that the SWL labels are legible on the sheave covers.
- Check that the hook rotates freely.
- Check the security of the hook nut and it's securing grub screw (Figure 48 to Figure 50).
- Inspect the hook ensuring that it is in good condition and free from deformation.
- Check the hook throat admittance (see Figure 47). Replace the complete bottom block where "t" max has been exceeded.

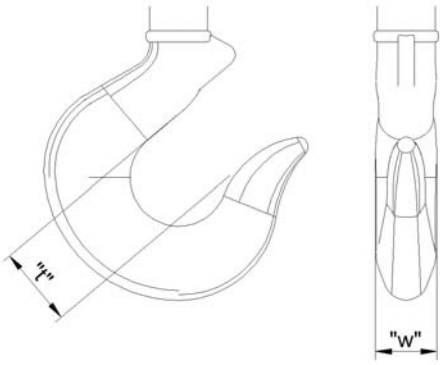

Figure 47 – Hook Throat Admittance

Example from hoist model code: ZX1004 - **XXXXXXXXXXXX** – DT-**XXXXXXXX** - **XXXXXXXXX**

HOIST MODEL CODE	NO. FALLS	"**t**" New Hook (mm)	"**t**" max (mm)	"**w**" ref only (mm)
ZX1004- **XXXXXXXXXXXX** – DT	4	71	78.1	93
ZX1008- **XXXXXXXXXXXX** – DT	8	112	123.2	140
ZX1012- **XXXXXXXXXXXX** – DT	12	126	138.6	148

- Check that the safety catch operates and springs fully closed against the hook point.
- Check the condition of the sheave covers, ensuring that they are not damaged. Replace any damaged covers.
- Check security of sheave cover fixings.
- Examine the condition of the sheave(s) and ensure that they are free from cracks or damage due to rope indentations. Check that they can be rotated freely.
- Grease the hook thrust bearing as required in the lubrication schedule (see section 5.6.1 / Figure 48).

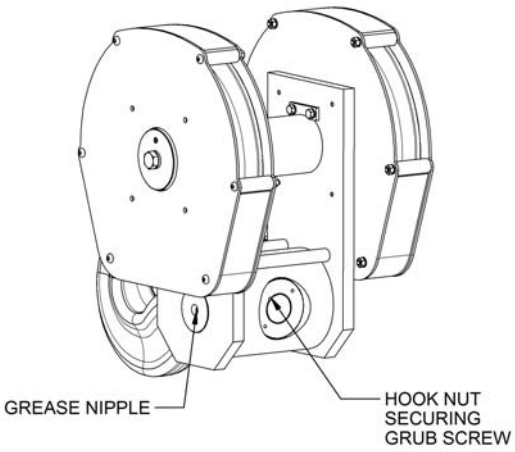

Figure 48 – 4 Fall Bottom Block, Hook Nut, Grubscrew, Grease nipple

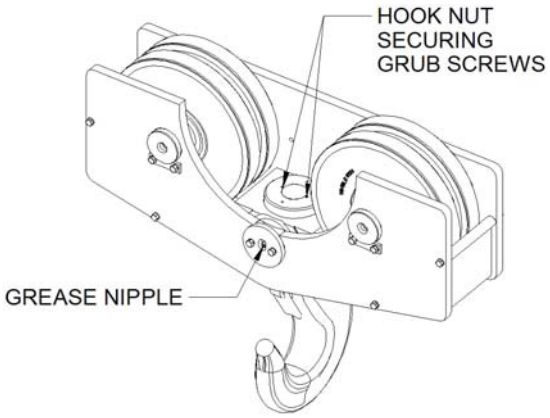

Figure 49 – 8 Fall Bottom Block, Hook Nut, Grubscrew, Grease nipple

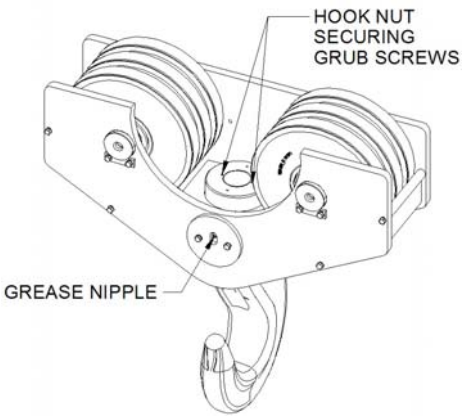

Figure 50 – 12 Fall Bottom Block, Hook Nut, Grubscrew, Grease nipple

5.15 INSPECTION AND MAINTENANCE – TRAVERSE BRAKE

The traverse brake is a spring applied disc brake. The brake is electro-magnetically released by the application of DC power to the brake coil in the stator. To access the traverse brake, the traverse drive fan cowl should be removed. First unscrew the hand release lever (if fitted). The brake rectifier is located in the motor terminal box.

5.15.1 Traverse Brake Components

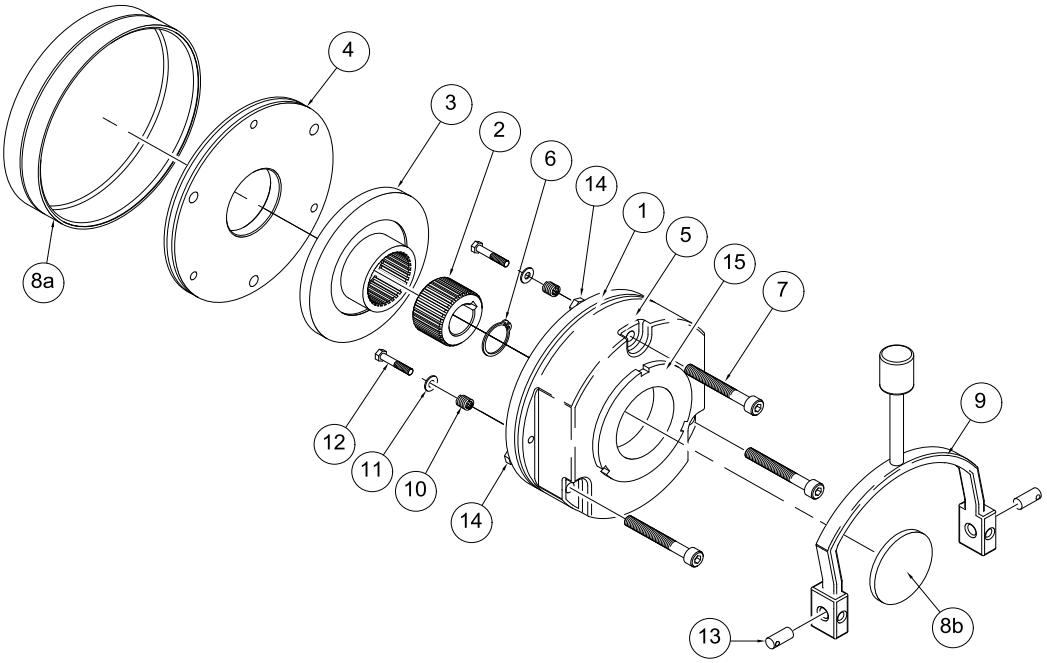

Figure 51 – Traverse Brake Components

Ref	Description
1	Armature plate
2	Brake hub
3	Brake disc (rotor)
4	Mounting Flange
5	Stator
6	Hub circlip
7	Assembly screws
8a	Outer brake seal (optional kit)

Ref	Description
8b	Stator brake seal (optional kit)
9	Hand release mechanism
10	Hand release spring
11	Washer
12	Hand release fixing
13	Barrel nuts
14	Adjustment tubes
15	Torque adjuster nut (Factory set)

Before adjusting the brake or changing the disc, disconnect the power supply to the hoist and to the brake.

5.15.2 Checking / Adjusting the Air Gap

To inspect the air gap it may be necessary to lift or remove the outer brake seal (8a) (where fitted). Adjustment of the brake will require total removal of the outer brake seal.

The air gap '**a**' (between the stator (5) and the armature plate (1)) should be checked in at least three positions around the circumference of the brake using non-magnetic feeler gauges (Figure 52). The air gap should not exceed the maximum air gap of **0.6mm**.

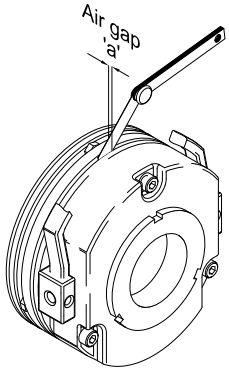

Figure 52 – Checking Traverse Brake Air Gap

Where adjustment is required, loosen the assembly screws (7) by half a turn. Adjust the air gap by turning the adjustment tubes (14) until the required air gap is reached (see Figure 53).

- If the air gap is too large, screw the three adjustment tubes (14) into the stator. If the air gap is too small, screw the adjustment tubes out of the stator.
- Adjust the air gap until a gap of 0.2-0.3mm is reached around the brake.
- Re-tighten the assembly fixings to 3Nm
- Re-check the air gap and repeat the adjustment procedure if necessary.
- Test the brake for correct operation before replacing the outer brake seal (where fitted), the fan cowl and returning the drive into service.

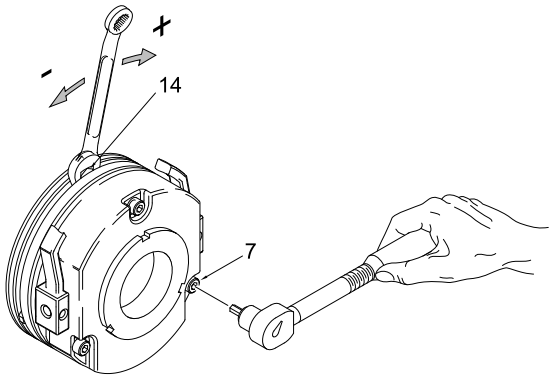

Figure 53 – Adjusting the Traverse Brake Air Gap

5.15.3 Changing the Brake Disc (Brake Rotor) / Inspecting the Brake Hub

The thickness of the brake disc can be checked by measuring the distance between the mounting flange and armature plate (5.11.5). If the distance is below **4.5mm,** the brake disc should be replaced.

- Remove the circlip and withdraw the fan from the motor shaft.
- Remove the outer brake seal (if fitted) and clean any brake dust from around the brake.
- Loosen the assembly fixings evenly and remove them, taking care to support the brake body.
- Remove the brake body, taking note of its orientation.
- The brake rotor (brake disc) will now be exposed. Withdraw the brake rotor from its hub.
- Before replacing the brake disc, visually inspect the end of the key between the brake hub and shaft. Check the condition of the spline on the brake hub, and ensure there is no radial or rotational play between either the new brake disc and the hub, or the hub and the shaft. If the hub is damaged, worn, or play is apparent, the hub should be replaced. Before replacing, consult Street Crane.
- Ensure the face of the motor end shield is clean and free of any oil or grease. If the end shield is worn or excessively scored it should be replaced. Consult Street Crane before replacing.
- Slide the new brake disc (rotor) onto the hub.
- Replace the brake body in the same orientation as originally installed.

- Replace the assembly fixings and tighten 3Nm.
- Check and adjust, where necessary, the nominal air gap ‘a’ and the hand release clearance ‘s’ (see 5.15.2 and 5.15.4).
- Replace the brake seal (where fitted (see 5.15.5)).
- Press the motor fan onto the motor shaft and replace the circlip, motor fan cowl, and the hand release lever.
- Re-connect the brake supply and test the brake for correct operation before returning into service.

5.15.4 Fitting the Traverse Drive Hand Release

For safety reasons, the hand release is spring loaded and returns to its original position (brake applied) automatically.

- Insert the compression springs (10) into the holes of the armature plate (1).
- Fit the washers (11) onto the hand release fixings (12) and assemble through the compression springs (10) and the stator (5).
- Fit the barrel nuts (13) into the holes provided in the hand release (9).
- Position the hand release (9) over the stator and tighten the hexagon screws (12) into the barrel nuts (13) until the armature plate moves towards the stator.
- Adjust the gap between the armature plate and the stator using the hexagon hand release screws (12) to achieve a dimension of 1.0mm. Check the dimension at three positions around the circumference.
- Fit the complete brake assembly onto the hoist and tighten the assembly screws (7) to 3Nm.
- Re-adjust the air gap ‘a’ in accordance with section 5.15.2.
- Re-check the Hand Release Clearance dimension ‘s’ (0.7mm) and nominal air gap ‘a’ (0.2-0.3mm) before returning into service.

The hand release clearance gap, ‘s’ (0.7mm) is important. The brake may not apply correctly if the clearance is too small. If the nominal air gap ‘a’ is adjusted at a later date, do not alter the hand release clearance.

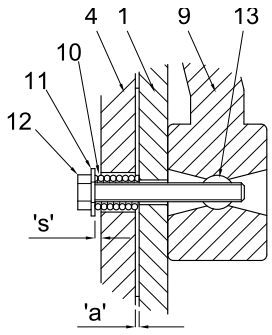

Figure 54 – Traverse Drive Brake Hand Release

5.15.5 Fitting the Brake Seal Kit (Optional)

- Withdraw the fan from the motor shaft.
- Pull the electrical cable through the rubber sealing ring.
- Drop the outer brake seal (8a) over the hand release lever and push the sealing ring over the stator.
- Press the lips of the seal into the grooves in the stator (1) and the mounting flange (4) (see Figure 55).
- Tap the stator brake seal (8b) into the hole in the front of the stator.
- Press the motor fan onto the motor shaft and replace the motor fan cowl.

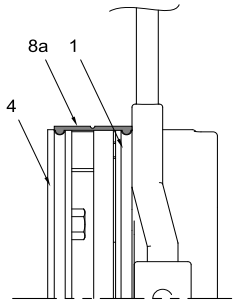

Figure 55 – Traverse Drive Brake Seal

6 FAULT FINDING

When fault finding on live electrical circuits or energised equipment, wear the relevant PPE and use test equipment suitably rated for the tests being carried out. Obtain information from the people who use the equipment, and who were present at the time the fault developed. Observe the system during start-up, operation, and shut-down to trace the fault area. Isolate the area of the system that is suspicious, but do not restrict your focus too narrowly. Test and take corrective action as required. Check the system / device is working properly and document your findings and corrective measures.

Should you require any assistance from the Street Crane Service Department please have available the following information:-

- The hoist serial number and details from both hoist nameplates.
- The reading on the hours-in-service meter.
- A description and the nature and extent of the fault.
- Explain under what circumstances the fault occurred.
- State your suspected cause.

6.1 GENERAL

Problem	Possible Cause	Remedy
Hoist will not operate but travel moves in wrong direction.	Wrong phase sequence to hoist or voltage supply to hoist is too low.	Correct phase sequence and supply.
Hoist unit does not operate or will not start.	No electrical power supply or not all phases are present.	Check that the power supply is correct and the equipment is switched ON.
	Phase monitoring relay not set correctly.	Check settings on relay as section 3.10.3.
	Emergency stop activated.	Release emergency stop. First ensure that the emergency stop button has not been depressed because of a fault.
	Pendant or switchgear fault.	Check condition of pushbuttons, pendant wiring and switchgear.
	After a long period out of service, the brake(s) may be stuck.	Dismantle and service the brake.
Movement of the equipment does not correspond to the symbols on the controller.	Power supply wrongly connected.	Check the phase connections to the equipment and to the relevant motor.
Hoist will not raise.	Hook is at upper limit switch position.	Lower to reset the limit. Check setting of limit.
	Attempt to lift load in excess of hoist rated capacity.	Lower load to floor. Do not apply any load greater than rated capacity of hoist.
	Motor over-temperature protection tripped.	Allow motor to cool. See fault finding guide for motors.
Hoist will not lower.	Hook is already at lower limit switch position.	Raise bottom block to reset limit. Check setting of limit
SWL cannot be lifted or loads in excess of SWL can be lifted.	Rated capacity limiter incorrectly set.	Check and adjust setting of rated capacity limiter.
Hoist does not travel when no load attached.	Wear on the wheel and/or reaction roller.	Check and adjust the setting of the reaction roller spring.
Bottom hook block and rope rotate.	Twist in the rope.	Remove the wire rope and let it hang or lay freely to remove the twist.

6.2 BRAKES

Problem	Possible Cause	Remedy
The brake will not release.	Wrong (low) voltage at the brake coil.	Check that the rectifier has the correct input and output voltage particularly at motor start up.
	Loss of supply to the brake.	Check output from rectifier and check supply from brake contactor. Check the cable for continuity.
	Max permissible air gap exceeded.	Check the air gap and adjust where necessary.
	Brake coil fault or short circuit.	Change the complete brake.
Brake overheating.	Excessive 'inching' of the drive.	Operator Training.
	High ambient temperature.	Check that the ambient temperature is within the design range. Consult Street Crane
	Voltage to the brake coil is too high.	Check function of the rectifier and supply to the rectifier.
Brake slow releasing.	Faulty rectifier or air gap too large.	Check the air gap and function of the rectifier.
Brake does not hold the load or excessive run through when stopping.	Air gap too large.	Check the working air gap.
	Brake lining worn.	Change the brake disc (rotor).
	Manual release device incorrectly set.	Adjust the hand release clearance gap.
Excessive brake lining wear.	Brake slow releasing allowing motor to run excessively before brake released.	Check operation of the brake. Check operation of the brake rectifier.
	Excessive 'inching' of the drive.	Operator Training.
Noise from the brake.	Wear of the carrier gearing caused by excessive stopping and starting.	Replace the carrier.

6.3 HOIST GEARBOX PROTECTION SYSTEM

Problem	Possible Cause	Remedy
Hoist Gearbox Protection System actuated	Loss of supply to brake	Check output from rectifier. Check supply from brake contactor. Check the cable for continuity.
	Brake lining worn or contaminated	Change the brake disc (rotor).
	Manual release incorrectly set	Adjust the hand release clearance gap.
	Air gap too large	Check the working air gap.
	Brake release switch not operated (where fitted)	Check operation of brake release switch. The switch must operate within 0.3s. Check operation of the timer controlling the brake release period. Replace if necessary.
	One motor failed	Replace motor. See section 5.9 for sequencing motors.
	Motors operate in incorrect direction	Rectify direction of motor. Refer to section 5.9 for sequencing motors.

6.4 GEARBOXES

Problem	Possible Cause	Remedy
Unusual grinding or knocking noise in gearbox when running.	Bearing damage or irregular gearing.	Check oil and condition of gears and bearings. Call customer service if noise persists.
	Polluted oil or not enough oil.	Check oil / oil level.
Oil is leaking from gearbox.	Defective seal.	Call customer service.
Oil is leaking at breather plug.	Excessive amount of oil in gearbox.	Correct the oil level
	Breather plug fitted incorrectly.	Fit breather plug correctly

6.5 MOTOR UNITS

Problem	Possible Cause	Remedy
Motor will not start or motor 'hums',	Break in the connecting cable.	Check and restore the connections
	Loss of phase(s) to motor.	Check operation of switchgear.
	Fuse blown or circuit breaker tripped. Phase sequence to hoist incorrect.	Replace fuse or reset circuit breaker. Investigate reasons for the fault. Check phase sequence.
	Motor contactor does not operate, control system fault.	Check the motor contactor control circuit; rectify the fault if necessary
Motor will not start or starts with difficulty.	Voltage or frequency differs greatly from the design, especially when starting.	Ensure that the supply voltage conditions are improved. Check that the cross section of the cables matches the design
Motor hums and has high power consumption	Faulty winding or rotor catching on housing.	Motor must be repaired by service specialist.
Fuses blow or circuit breaker trips immediately.	Short circuit in the cable.	Repair the short circuit.
	Short circuit in the motor or short circuit to earth.	Motor must be repaired by service specialist.
Motor overheats and thermal protection device trips.	Overload.	Ensure the motion is free and clear of all obstructions.
	Inadequate cooling.	Ensure the cooling air passage is clear.
	Ambient temperature too high.	Check that the ambient temperature is within the design range.
	Motor connected in delta instead of star	Change connection
	Loose lead (intermittent two phase operation)	Repair the loose contact.
	Mains voltage is outside the range quoted in the technical data.	The mains voltage and the motor voltage must be within the stated limits.
	Brake slow to release or not releasing.	See brake fault finding.
	Motor being used beyond its design duty or excessive 'inching' by the operator.	Adjust the operating conditions to the design cycle otherwise consult Street Crane
Motor noisy	Bearings distorted, damaged or dirty, rotating parts vibrate.	Consult Street Crane
	Foreign matter in the cooling air passages.	Clean cooling air passages

7 HOIST MOTOR DATA

7.1.1 ZX10 Hoist Motor Data – 4:1 SPEED RATIO - 400V, 3Ph, 50Hz

Example from hoist model code: ZX10xx - **4**xxxxx**M7**x**07**x – xx - xxxxxxxx **– 40050**xxxx

Hoist Motor	Speed Ratio	Motor Mass (kg)	Motor Ratings at **400V(±10%) 50Hz**							
			BS Class	CDF %	S/h	Power kW	FLC A	LRC A	Main Fuse	Cos ϕ
06	4	50 (110lb)	M3	17/8	50/100	9.1/2.3	21.0/8.8	61/17.5	32A	0.87/0.59
			M4	20/10	60/120	8.4/2.1	18.9/8.3			0.87/0.56
			M5	27/13	80/160	7.6/1.9	16.7/8.0			0.87/0.54
			M6	34/17	100/200	6.8/1.7	14.7/7.7			0.84/0.51
			M7	40/20	100/200	6.1/1.5	13.3/7.5			0.83/0.46
07	**4**	**58** (128lb)	M3	17/8	50/100	11.2/2.8	26.0/11.5	**72/24**	**40A**	0.85/0.6
			M4	20/10	60/120	10.1/2.5	23.0/11.4			0.84/0.6
			M5	27/13	80/160	9.2/2.3	20.0/10.8			0.83/0.55
			M6	34/17	100/200	8.3/2.1	18.5/10.5			0.83/0.52
			M7	**40/20**	**100/200**	**7.4/1.8**	**16.3/10.2**			**0.81/0.47**
08	4	98 (216lb)	M3	17/8	50/100	13.0/3.2	27.0/11.0	129/29	40A	0.83/0.53
			M4	20/10	60/120	12.0/3.0	24.5/10.6			0.83/0.52
			M5	27/13	80/160	10.8/2.7	22.0/10.2			0.81/0.49
			M6	34/17	100/200	9.7/2.4	20.3/9.8			0.8/0.45
			M7	40/20	100/200	8.6/2.2	19.7/9.6			0.79/0.42
10	4	120 (265lb)	M3	17/8	50/100	19.2/4.8	46.0/17.5	240/40	TBA	0.75/0.89
			M4	20/10	60/120	17.6/4.4	46.0/15.5			0.7/0.56
			M5	27/13	80/160	16.0/4.0	45.0/14.7			0.67/0.53
			M6	34/17	100/200	14.4/3.6	44.0/14.0			0.64/0.5
			M7	40/20	100/200	12.8/3.2	42.0/13.7			0.6/0.46

7.1.2 ZX10 Hoist Motor Data – 4:1 SPEED RATIO - 460V, 3Ph, 60Hz

Example from hoist model code: ZX10xx - **4**xxxxx**M7**x**07**x – xx - xxxxxxxx **– 46060**xxxx

Hoist Motor	Speed Ratio	Motor Mass (kg)	Motor Ratings at **460V(±6%) 60Hz**							
			BS Class	CDF %	S/h	Power kW	FLC A	LRC A	Main Fuse	Cos ϕ
06	4	50 (110lb)	M3	17/8	50/100	10.9/2.8	21.0/8.8	61/17.5	32A	0.87/0.59
			M4	20/10	60/120	10.1/2.5	18.9/8.3			0.87/0.56
			M5	27/13	80/160	9.1/2.3	16.7/8.0			0.87/0.54
			M6	34/17	100/200	8.2/2.0	14.7/7.7			0.84/0.51
			M7	40/20	100/200	7.3/1.8	13.3/7.5			0.83/0.46
07	**4**	**58** (128lb)	M3	17/8	50/100	13.4/3.4	26.0/11.5	**72/24**	**40A**	0.85/0.6
			M4	20/10	60/120	12.1/3	23.0/11.4			0.84/0.6
			M5	27/13	80/160	11/2.8	20.0/10.8			0.83/0.55
			M6	34/17	100/200	10/2.5	18.5/10.5			0.83/0.52
			M7	**40/20**	**100/200**	**8.9/2.2**	**16.3/10.2**			**0.81/0.47**
08	4	98 (216lb)	M3	17/8	50/100	15.6/3.8	27.0/11.0	129/29	40A	0.83/0.53
			M4	20/10	60/120	14.4/3.6	24.5/10.6			0.83/0.52
			M5	27/13	80/160	13.0/3.2	22.0/10.2			0.81/0.49
			M6	34/17	100/200	11.6/2.9	20.3/9.8			0.8/0.45
			M7	40/20	100/200	10.3/2.6	19.7/9.6			0.79/0.42
10	4	120 (265lb)	M3	17/8	50/100	23.0/5.8	46.0/17.5	240/40	TBA	0.75/0.89
			M4	20/10	60/120	21.1/5.3	46.0/15.5			0.7/0.56
			M5	27/13	80/160	19.2/4.8	45.0/14.7			0.67/0.53
			M6	34/17	100/200	17.3/4.3	44.0/14.0			0.64/0.5
			M7	40/20	100/200	15.4/3.8	42.0/13.7			0.6/0.46

7.1.3 ZX10 Hoist Motor Data – 4:1 SPEED RATIO - 575V, 3Ph, 60Hz

Example from hoist model code: ZX10xx - **4**xxxxx**M7**x**07**x – xx - xxxxxxxx **– 57560**xxxx

Hoist Motor	Speed Ratio	Motor Mass (kg)	Motor Ratings at **575V(±6%) 60Hz**							
			BS Class	CDF %	S/h	Power kW	FLC A	LRC A	Main Fuse	Cos ϕ
06	4	50 (110lb)	M3	17/8	50/100	10.9/2.7	18.3/8.0	62/17	25A	0.77/0.55
			M4	20/10	60/120	10.0/2.5	17.0/7.8			0.77/0.53
			M5	27/13	80/160	9.1/2.3	15.8/7.6			0.75/0.50
			M6	34/17	100/200	8.2/2.0	14.8/7.3			0.72/0.46
			M7	40/20	100/200	7.3/1.8	13.8/7.2			0.69/0.44
07	**4**	**58** (128lb)	M3	17/8	50/100	13.4/3.4	20.2/9.5	**77/20.2**	**25A**	0.87/0.55
			M4	20/10	60/120	12.1/3.0	18.5/9.2			0.86/0.52
			M5	27/13	80/160	11.0/2.8	16.9/9.0			0.85/0.50
			M6	34/17	100/200	10.0/2.5	15.3/8.8			0.84/0.47
			M7	**40/20**	**100/200**	**8.9/2.2**	**13.9/8.8**			**0.82/0.44**
08	4	98 (216lb)	M3	17/8	50/100	15.6/3.8	24.7/10.0	115/25	30A	0.85/0.57
			M4	20/10	60/120	14.4/3.6	23.0/9.7			0.85/0.54
			M5	27/13	80/160	13.0/3.2	20.9/9.2			0.85/0.51
			M6	34/17	100/200	11.6/2.9	19.4/8.9			0.84/0.49
			M7	40/20	100/200	10.3/2.6	17.6/8.7			0.83/0.47
10	4	120 (265lb)	M3	17/8	50/100	23.0/5.8	33.3/14.9	181/39	40A	0.84/0.53
			M4	20/10	60/120	21.1/5.3	31.0/14.3			0.85/0.51
			M5	27/13	80/160	19.2/4.8	28.1/13.8			0.84/0.48
			M6	34/17	100/200	17.3/4.3	26.6/13.6			0.84/0.47
			M7	40/20	100/200	15.4/3.8	24.4/13.1			0.83/0.42

7.1.4 ZX10 Hoist Motor Data – 4:1 SPEED RATIO - 380V, 3Ph, 60Hz

Example from hoist model code: ZX10xx - **4**xxxxx**M7**x**07**x – xx - xxxxxxxx **– 38060**xxxx

Hoist Motor	Speed Ratio	Motor Mass (kg)	Motor Ratings at 380V(±10%) 60Hz							
			BS Class	CDF %	S/h	Power kW	FLC A	LRC A	Main Fuse	Cos ϕ
06	4	50 (110lb)	M3	17/8	50/100	9.1/2.3	22.2/10.9	86/25.9	40A	0.86/0.49
			M4	20/10	60/120	8.4/2.1	20.1/10.6			0.80/0.48
			M5	27/13	80/160	7.6/1.9	18.9/10.2			0.78/0.42
			M6	34/17	100/200	6.8/1.7	16.6/10.2			0.80/0.40
			M7	40/20	100/200	6.1/1.5	15.4/10.2			0.76/0.37
07	**4**	**58** (128lb)	M3	17/8	50/100	11.2/2.8	25.7/12.1	**100/28**	**40A**	0.83/0.53
			M4	20/10	60/120	10.1/2.5	23.6/11.7			0.82/0.50
			M5	27/13	80/160	9.2/2.3	21.7/11.4			0.80/0.48
			M6	34/17	100/200	8.3/2.1	20.3/11.2			0.79/0.45
			M7	**40/20**	**100/200**	**7.4/1.8**	**18.8/11.0**			**0.76/0.41**
08	4	98 (216lb)	M3	17/8	50/100	13.0/3.2	32.7/16.6	167/50	63A	0.84/0.44
			M4	20/10	60/120	12.0/3.0	31.0/16.4			0.83/0.42
			M5	27/13	80/160	10.8/2.7	27.9/16.2			0.83/0.40
			M6	34/17	100/200	9.7/2.4	26.4/16.0			0.82/0.37
			M7	40/20	100/200	8.6/2.2	24.8/15.8			0.80/0.35
10	4	120 (265lb)	M3	17/8	50/100	19.2/4.8	47.3/17.4	211/45	TBA	TBA
			M4	20/10	60/120	17.6/4.4	43.5/16.8			TBA
			M5	27/13	80/160	16.0/4.0	40.5/16.4			TBA
			M6	34/17	100/200	14.4/3.6	38.6/16			TBA
			M7	40/20	100/200	12.8/3.2	36/15.7			TBA

CDF = Cyclic duration factor (%ED), S/h = Motor starts per hour, FLC = Motor full load current, LRC = Locked rotor current, Cos ϕ = Power factor.

The motors are designed for the voltage range shown.
The hoist motor 2 pole starting current and the rated current of the travel motor are used in selecting the recommended main fuse size.
Main fuses are type gL/gG. Fuse size in (parentheses) are for class 'J' fuses for CSA (CSA-22.2) approved installations.

7.1.5 ZX Dual Wound 'WU' Type Traverse Motor Data- 400V, 3Ph, 50Hz

Example from hoist model code: ZX10xx - **4**xxxxx**M7**x**07**x – xx - xxxxxxxx **– 40050**xxxx

Traverse Motor Frame	Motor Mass (kg)	Motor Ratings at **400V(±10%) 50Hz**						
		Classification	CDF %	S/h	Power kW	FLC A	LRC A	Cos ϕ
80SWU/2-8	12 (26lb)	M3/M4/M5	20/10	80/160	0.55/0.13	1.61/0.79	4.25/1.17	0.77/0.57
		M6	27/13	100/200	0.45/0.1	1.37/0.73		
		M7	40/20	120/240	0.37/0.09	1.32/0.73		
ABOVE MOTOR IS NOT USED ON ANY STANDARD ZX10 DT MODELS:-								
Traverse Motor Frame	Motor Mass (kg)	Motor Ratings at **400V(±10%) 50Hz**						
		Classification	CDF %	S/h	Power kW	FLC A	LRC A	Cos ϕ
80LWU/2-8	13 (29lb)	M3/M4/M5	20/10	80/160	0.60/0.13	1.63/0.74	4.85/1.18	0.9/0.7
		M6	27/13	100/200	0.55/0.13	1.47/0.74		
		M7	40/20	120/240	0.55/0.13	1.47/0.74		
ABOVE MOTOR IS USED ON THE FOLLOWING HOIST MODELS:-								
ZX10**04** – xxxxxxx**(A,B,C,D,E,F,G,H,I,J)**xx – **DT** – xxxxxx**25 – 40050**xxxx								
Traverse Motor Frame	Motor Mass (kg)	Motor Ratings at **400V(±10%) 50Hz**						
		Classification	CDF %	S/h	Power kW	FLC A	LRC A	Cos ϕ
90SWU/2-8	17 (38lb)	M3/M4/M5	20/10	80/160	1.3/0.24	3.38/1.35	9.75/2.36	0.87/0.59
		M6	27/13	100/200	0.8/0.2	2.50/1.31		
		M7	40/20	120/160	0.8/0.2	2.50/1.31		
ABOVE MOTOR IS USED ON THE FOLLOWING HOIST MODELS:-								
ZX10**04** – xxxxxxx**(A,B,C,D,E,F,G,H,I,J)**xx – **DT** – xxxxxx**27 – 40050**xxxx								
ZX10**08** – xxxxxxx**(A,B,C,D,E,F,G,H,I,J,K,L,M)**xx – **DT** – xxxxxx**27 – 40050**xxxx								
ZX10**12** – xxxxxxx**(A,B,C,D,E,F,G,H,I,J,K,L,M)**xx – **DT** – xxxxxx**27 – 40050**xxxx								
ZX10**(08,12)** – xxxxxxx**O**xx – **DT** – xxxxxx**25 – 40050**xxxx								
Traverse Motor Frame	Motor Mass (kg)	Motor Ratings at **400V(±10%) 50Hz**						
		Classification	CDF %	S/h	Power kW	FLC A	LRC A	Cos ϕ
90LWU/2-8	19 (42lb)	M3/M4/M5	20/10	80/160	1.65/0.32	3.93/1.7	13.3/3.15	0.79/0.59
		M6	27/13	100/200	1.2/0.3	3.17/1.66		
		M7	40/20	120/160	1.2/0.3	3.17/1.66		
ABOVE MOTOR IS USED ON THE FOLLOWING HOIST MODELS:-								
ZX10**12** – xxxxxxx**O**xx – **DT** – xxxxxx**27 – 40050**xxxx								
ZX10**12** – xxxxxxx**Q**xx – **DT** – xxxxxx**25 – 40050**xxxx								

7.1.6 ZX Dual Wound 'WU' Type Traverse Motor Data- 460V, 3Ph, 60Hz

Example from hoist model code: ZX10xx - **4**xxxxx**M7**x**07**x – xx - xxxxxxxx **– 46060**xxxx

Traverse Motor Frame	Motor Mass (kg)	Motor Ratings at **460V(±10%) 60Hz**						
		Classification	CDF %	S/h	Power kW	FLC A	LRC A	Cos ϕ
80SWU/2-8	12 (26lb)	M3/M4/M5	20/10	80/160	0.63/0.14	1.5/0.73	4.12/1.14	0.77/0.57
		M6	27/13	100/200	0.52/0.115	1.33/0.71		
		M7	40/20	120/240	0.42/0.10	1.22/0.69		
ABOVE MOTOR IS NOT USED ON ANY STANDARD ZX10 DT MODELS:-								

Traverse Motor Frame	Motor Mass (kg)	Motor Ratings at **460V(±10%) 60Hz**						
		Classification	CDF %	S/h	Power kW	FLC A	LRC A	Cos ϕ
80LWU/2-8	13 (29lb)	M3/M4/M5	20/10	80/160	0.65/0.15	1.39/0.68	4.52/1.09	0.9/0.7
		M6	27/13	100/200	0.63/0.15	1.37/0.68		
		M7	40/20	120/240	0.63/0.15	1.37/0.68		
ABOVE MOTOR IS USED ON THE FOLLOWING HOIST MODELS:-								
ZX10**04** – xxxxxxx**(A,B,C,D,E,F,G,H,I,J)**xx – **DT** – xxxxxx**25 – 46060**xxxx								

Traverse Motor Frame	Motor Mass (kg)	Motor Ratings at **460V(±10%) 60Hz**						
		Classification	CDF %	S/h	Power kW	FLC A	LRC A	Cos ϕ
90SWU/2-8	17 (38lb)	M3/M4/M5	20/10	80/160	1.5/0.26	3.15/1.24	8.89/2.18	0.87/0.59
		M6	27/13	100/200	0.92/0.23	2.28/1.21		
		M7	40/20	120/160	0.92/0.23	2.28/1.21		
ABOVE MOTOR IS USED ON THE FOLLOWING HOIST MODELS:-								
ZX10**04** – xxxxxxx**(A,B,C,D,E,F,G,H,I,J)**xx – **DT** – xxxxxx**27 – 46060**xxxx								
ZX10**08** – xxxxxxx**(A,B,C,D,E,F,G,H,I,J,K,L,M,N)**xx – **DT** – xxxxxx**2{5,7) – 46060**xxxx								
ZX10**12** – xxxxxxx**(A,B,C,D,E,F,G,H,I,J,K,L,M,N)**xx – **DT** – xxxxxx**2(5,7) – 46060**xxxx								
ZX10**(12)** – xxxxxxx**O**xx – **DT** – xxxxxx**25 – 46060**xxxx								

Traverse Motor Frame	Motor Mass (kg)	Motor Ratings at **460V(±10%) 60Hz**						
		Classification	CDF %	S/h	Power kW	FLC A	LRC A	Cos ϕ
90LWU/2-8	19 (42lb)	M3/M4/M5	20/10	80/160	1.8/0.35	3.53/1.58	12.1/2.96	0.79/0.59
		M6	27/13	100/200	1.38/0.35	2.89/1.56		
		M7	40/20	120/160	1.38/0.35	2.89/1.56		
ABOVE MOTOR IS USED ON THE FOLLOWING HOIST MODELS:-								
ZX10**12** – xxxxxxx**O**xx – **DT** – xxxxxx**27 – 46060**xxxx								
ZX10**12** – xxxxxxx**(Q,R)**xx – **DT** – xxxxxx**25 – 46060**xxxx								

7.1.7 ZX Dual Wound 'WU' Type Traverse Motor Data- 575V, 3Ph, 60Hz

Example from hoist model code: ZX10xx - **4**xxxxx**M7**x**07**x – xx - xxxxxxxx **– 57560**xxxx

Traverse Motor Frame	Motor Mass (kg)	Motor Ratings at **575V(±10%) 60Hz**						
		Classification	CDF %	S/h	Power kW	FLC A	LRC A	Cos ϕ
80SWU/2-8	12 (26lb)	M3/M4/M5	20/10	80/160	0.63/0.14	1.31/0.64	3.09/0.92	0.77/0.57
		M6	27/13	100/200	0.52/0.115	1.21/0.62		
		M7	40/20	120/240	0.42/0.10	1.12/0.61		
ABOVE MOTOR IS NOT USED ON ANY STANDARD ZX10 DT MODELS:-								

Traverse Motor Frame	Motor Mass (kg)	Motor Ratings at **575V(±10%) 60Hz**						
		Classification	CDF %	S/h	Power kW	FLC A	LRC A	Cos ϕ
80LWU/2-8	13 (29lb)	M3/M4/M5	20/10	80/160	0.65/0.15	1.2/0.58	5.28/1.17	0.88/0.69
		M6	27/13	100/200	0.63/0.15	1.16/0.58		
		M7	40/20	120/240	0.63/0.15	1.16/0.58		
ABOVE MOTOR IS USED ON THE FOLLOWING HOIST MODELS:-								
ZX10**04** – xxxxxxx**(A,B,C,D,E,F,G,H,I,J)**xx – **DT** – xxxxxx**2(5,7) – 57560**xxxx								

Traverse Motor Frame	Motor Mass (kg)	Motor Ratings at **575V(±10%) 60Hz**						
		Classification	CDF %	S/h	Power kW	FLC A	LRC A	Cos ϕ
90SWU/2-8	17 (38lb)	M3/M4/M5	20/10	80/160	1.5/0.26	2.65/1.12	7.61/1.79	0.87/0.65
		M6	27/13	100/200	0.92/0.23	2.05/1.1		
		M7	40/20	120/160	0.92/0.23	2.05/1.1		
ABOVE MOTOR IS USED ON THE FOLLOWING HOIST MODELS:-								
ZX10**(08,12)** – xxxxxxx**(K,L,M)**xx – **DT** – xxxxxx**2(5,7) – 57560**xxxx								
ZX10**12** – xxxxxxx**O**xx – **DT** – xxxxxx**2(5,7) – 57560**xxxx								
ZX10**12** – xxxxxxx**Q**xx – **DT** – xxxxxx**25 – 57560**xxxx								

7.1.8 ZX Dual Wound 'WU' Type Traverse Motor Data- 380V, 3Ph, 60Hz

Example from hoist model code: ZX10xx - **4**xxxxx**M7**x**07**x – xx - xxxxxxxx **– 38060**xxxx

Traverse Motor Frame	Motor Mass (kg)	Motor Ratings at **380V(±10%) 60Hz**						
		Classification	CDF %	S/h	Power kW	FLC A	LRC A	Cos ϕ
80SWU/2-8	12 (26lb)	M3/M4/M5	20/10	80/160	0.63/0.14	2.50/1.04	7.56/1.62	0.77/0.57
		M6	27/13	100/200	0.52/0.115	2.44/1.01		
		M7	40/20	120/240	0.42/0.10	2.37/1.0		
ABOVE MOTOR IS NOT USED ON ANY STANDARD ZX10 DT MODELS:-								

Traverse Motor Frame	Motor Mass (kg)	Motor Ratings at **380V(±10%) 60Hz**						
		Classification	CDF %	S/h	Power kW	FLC A	LRC A	Cos ϕ
80LWU/2-8	13 (29lb)	M3/M4/M5	20/10	80/160	0.65/0.15	1.69/0.82	5.45/1.31	0.9/0.7
		M6	27/13	100/200	0.63/0.15	1.65/0.82		
		M7	40/20	120/240	0.63/0.15	1.65/0.82		
ABOVE MOTOR IS USED ON THE FOLLOWING HOIST MODELS:-								
ZX10**04** – xxxxxxx**(A,B,C,D,E,F,G,H,I,J)**xx – **DT** – xxxxxx**2(5,7) – 38060**xxxx								

Traverse Motor Frame	Motor Mass (kg)	Motor Ratings at **380V(±10%) 60Hz**						
		Classification	CDF %	S/h	Power kW	FLC A	LRC A	Cos ϕ
90SWU/2-8	17 (38lb)	M3/M4/M5	20/10	80/160	1.5/0.26	4.03/1.71	12.05/3.0	0.87/0.59
		M6	27/13	100/200	0.92/0.23	3.09/1.66		
		M7	40/20	120/160	0.92/0.23	3.09/1.66		
ABOVE MOTOR IS USED ON THE FOLLOWING HOIST MODELS:-								
ZX10**(08,12)** – xxxxxxx**(K,L,M)**xx – **DT** – xxxxxx**2(5,7) – 38060**xxxx								
ZX10**12** – xxxxxxx**O**xx – **DT** – xxxxxx**2(5,7) – 38060**xxxx								
ZX10**12** – xxxxxxx**Q**xx – **DT** – xxxxxx**25 – 38060**xxxx								

7.1.9 ZX Traverse Motor Data for use with Frequency Inverter

Traverse Motor Frame	Motor Mass (kg)	Motor Ratings at **400V(±10%) 87Hz (DELTA)**						
		Classification	CDF %	S/h	Power kW	FLC A	LRC A	Cos ϕ
80 S/4	12 (26lb)	N/A	N/A	N/A	0.55	2.63	5.02	0.73
ABOVE MOTOR IS USED ON THE FOLLOWING HOIST MODELS:-								
ZX10**04** – xxxxxxx**(A,B,C,D,E,F,G,H,I,J)**xx – **DT** – xxxxxx**1(5,7) – (380,400,460,575)(50,60)**xxxx								
ZX10**(08,12)** – xxxxxxx**(A,B,C,D,E,F,G,H,I,J,K,L,M)**xx – **DT** – xxxxxx**1(5,7)– (380,400,460,575)(50,60)**xxxx								
ZX10**12** – xxxxxxx**O**xx – **DT** – xxxxxx**15 – (380,400,460,575)(50,60)**xxxx								
Traverse Motor Frame	Motor Mass (kg)	Motor Ratings at **400V(±10%) 87Hz (DELTA)**						
		Classification	CDF %	S/h	Power kW	FLC A	LRC A	Cos ϕ
80 L/4	13 (29lb)	N/A	N/A	N/A	0.75	3.64	7.35	0.74
ABOVE MOTOR IS USED ON THE FOLLOWING HOIST MODELS:-								
ZX10**12** – xxxxxxx**O**xx – **DT** – xxxxxx**17 – (380,400,460,575)(50,60)**xxxx								
ZX10**12** – xxxxxxx**Q**xx – **DT** – xxxxxx**15 – (380,400,460,575)(50,60)**xxxx								

NOTE:
Street Crane policy is to run motors at 87 Hz full speed from the inverter connected in Delta.
The inverter will be common to all voltages as a transformer will be used, therefore CT inverter motors will be wound to 400V 50 Hz base and will be common for main supply voltages.

7.2 CABLE CROSS SECTION AND LENGTH OF SUPPLY CABLE

Hoist Motor	Monorail Installation						Crane Installation					
	Flexible PVC sheathed festoon cable in free air from point of supply to hoist.						Flexible PVC sheathed festoon cable in free air along crane bridge to hoist.					
	400V(±10%) 50Hz		**460V(±6%) 60Hz**		**575V (±6%) 60Hz**		**400V(±10%) 50Hz**		**460V(±6%) 60Hz**		**575V (±6%) 60Hz**	
	CSA (mm²)	Max Length (m)	CSA (mm²)	Max Length (m)	CSA (mm²)	Max Length (m)	CSA (mm²)	Max Length (m)	CSA (mm²)	Max Length (m)	CSA (mm²)	Max Length (m)
03	2.5	60	2.5	69	2.5	87	2.5	22	2.5	26	2.5	33
	-	-	-	-	-	-	4.0	35	4.0	41	4.0	53
	-	-	-	-	-	-	6.0	53	6.0	62	6.0	79
04	2.5	36	2.5	41	2.5	53	2.5	13	2.5	15	2.5	19
	4.0	57	4.0	66	4.0	83	4.0	20	4.0	24	4.0	31
	-	-	-	-	-	-	6.0	30	6.0	35	6.0	46
	-	-	-	-	-	-	10.0	51	10.0	60	10.0	77
05	2.5	25	2.5	29	2.5	37	2.5	9	2.5	11	2.5	14
	4.0	40	4.0	46	4.0	59	4.0	14	4.0	17	4.0	22
	6.0	60	6.0	69	6.0	88	6.0	21	6.0	25	6.0	33
	-	-	-	-	-	-	10.0	36	10.0	43	10.0	56
06	4.0	38	4.0	44	4.0	56	4.0	13	4.0	16	4.0	21
	6.0	56	6.0	65	6.0	83	6.0	20	6.0	24	6.0	31
	-	-	-	-	-	-	10.0	34	10.0	40	10.0	52
	-	-	-	-	-	-	16.0	55	16.0	64	16.0	83
07	6.0	51	6.0	59	6.0	74	6.0	19	6.0	22	6.0	28
	10.0	86	10.0	99	10.0	125	10.0	32	10.0	37	10.0	47
	-	-	-	-	-	-	16.0	50	16.0	59	16.0	75
08	6.0	34	6.0	39	6.0	50	6.0	12	6.0	14	6.0	18
	10.0	57	10.0	66	10.0	84	10.0	20	10.0	24	10.0	31
	-	-	-	-	-	-	16.0	32	16.0	38	16.0	49
10					10.0	46					10.0	17
	TBA				16.0	74	TBA				16.0	28

CSA is the recommended conductor cross sectional area for the cable length stated.

Max supply cable length for monorail installation assumes 5% voltage loss from point of supply to hoist.

Max supply cable length for crane installation assumes 2% voltage loss along the crane bridge to hoist (allowing 3% losses in supply to crane).

8 HOIST LOG BOOK

8.1 RESULTS OF PERIODIC TESTS

HOIST SERIAL No			Page No	
Date	Defects found	Remedial actions	Estimated remaining service life (see 2.5)	Signature

8.2 RECORD OF REPLACEMENT PARTS (ropes, brakes, sheaves etc.)

HOIST SERIAL No			Page No
Date	Hours In Service	Part description / Reason for replacement	Signature

HOIST SERIAL No			Page No
Date	Hours In Service	Part description / Reason for replacement	Signature

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www.streetcrane.co.uk

Street

Street Crane Company Limited, Chapel-en-le-Frith, High Peak SK23 0PH, UK
Email: admin@streetcrane.co.uk Web: www.streetcrane.co.uk
Telephone: +44 (0) 1298 812456

Certificate No. FM13635