STAGEMAKER®

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MASTER SM10

English

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13.11.2008

VERLINDE
LIFTING EQUIPMENT

2, Bld de l'Industrie – B.P. 20059 – 28501 Vernouillet cedex – France
Téléphone: (33) 02 37 38 95 95 – Fax: (33) 02 37 38 95 99

Web site : www.stagemaker.com
E-mail: contact@stagemaker.com

13.11.2008

Read the instructions supplied with the product before installation and commissioning.

Keep the instructions in a safe place for future reference.

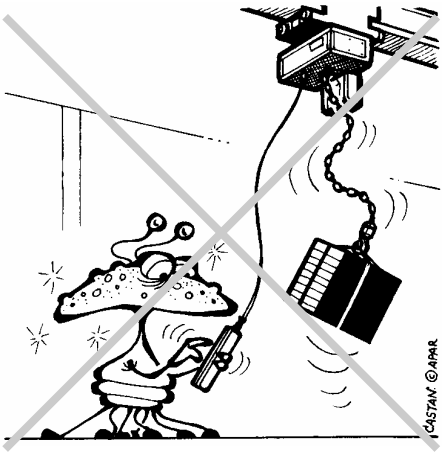
Table of content

2 SAFETY INSTRUCTIONS

WARNING !

THE FOLLOWING INSTRUCTIONS FOR SAFE USE MUST BE FOLLOWED IN ORDER TO AVOID PERSONAL INJURY OR MATERIAL DAMAGE

Do not let an unqualified person use the hoist.



Do not let an unqualified person use the hoist.

Make sure that the safety rules are followed (personal safety equipment, clearance of work areas, posting up of instructions to be followed in the area...).

Always be ready during operation to press the emergency stop button. This makes all functions inactive.

Never lift more than the maximum working load indicated on the hoist. Shocks or accidental collision of the load with objects can cause excess loads.

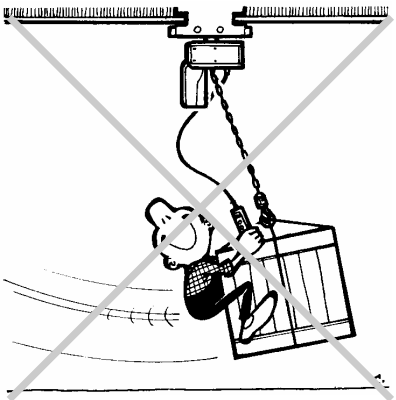
Before operation, check that the load is correctly fastened and installed on the hook. The hook safety latches should be closed correctly.

Do not drive the hook block into the bottom of the hoist. Also do not drive the chain out of the chain bag up to the slack fall stop. These may break the chain and allow the load to drop.

Never use the hoist to transport people.

Never twist the load chains (turning the hook block around...).

Never transport a load with people nearby. Do not pass the hook, with or without a load, above a person. Never go under the load.



Never swing the load intentionally.

Never swing the load intentionally

Never remove the hook safety latches.

Never sling onto the hook jaw (as there is a risk of damage to the hook and of the load falling).

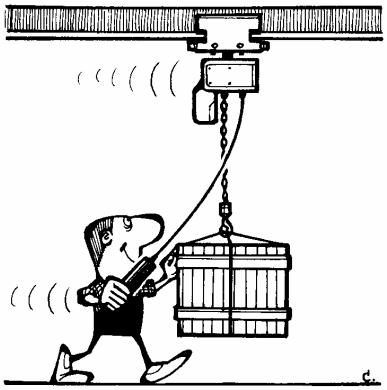
Always lift the load from the floor. Never add load to a lifted hook.

3 Instructions for proper operation and maintenance.

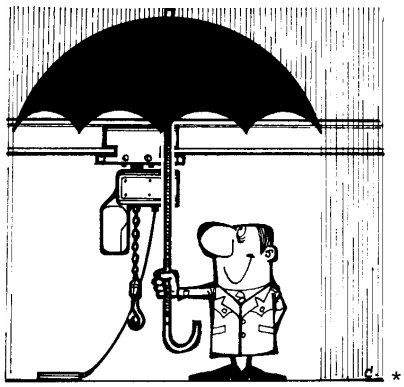
Follow the instructions below in order to keep your equipment in good condition and to keep your product safe

Never move or lift the hoist by the electric cables.
Do not set down the hoist without having an adapted support, to avoid damaging the components on the underside (electric cable, lifting chain, cable gland, chain bucket...).
Never modify the hoist unless the constructor has studied and authorized the modification.
Never modify the values and adjustments of the safety components, outside the limits provided for in the manual, or without the approval of the constructor.
Never try to repair or modify the hoist without the authorization of the constructor or a trained maintenance agent.
Never block, adjust or remove the limit switches or stops installed on the hoist without the authorization of the constructor or a trained maintenance agent.
Never use the hoist to extract, loosen, or pull sideways.
Do not touch the moving components.
Do not operate the hoist if your physical condition does not allow it.
Never use the hoist when in bad repair (wear, deformation...).
Do not subject the hoist to brutal shocks.
Never use the lifting chain as a sling
Never use a hook other than in the vertical position.
Never distract the operator while the hoist is being operated.

Make sure that the hoist is always clean.



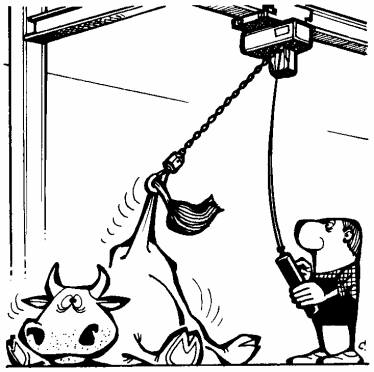
If manually moving the hoist, push the load



Material used outdoors should be protected as well as possible against bad weather conditions.

Never leave a suspended load hanging, if it is not necessary.
Never use the hoist as an earth reference for welding.
Do not use the hoist for a purpose or in an area for which it is not intended.
If manually moving the hoist, push the load.
Do not use the safety components (end buffers, emergency stop,…) as operation components.
Do not use the controls needlessly (avoid inching - stop-start operation of the buttons). This can cause overheating and even damage to the hoist.

Do not use the hoist with a power supply that is different to the one recommended (under-voltage or over-voltage, absence of phase...).
Handle the hoist by its structure, or by the devices provided for this purpose, or in its original packing.
Do not expose the hoist to an aggressive atmosphere (temperature, acidity...).
Make sure that the hoist is always clean and protected from corrosion (lubrication...).
Use the material under normal working conditions (ambient temperature, atmosphere...). Material used outdoors should be protected as well as possible against bad weather conditions. The hoist should be covered to avoid water going inside the chain bucket. In outdoor use a drain hole must be made to the chain bucket's bottom.
Store the hoist in its normal operating position (without load) away from aggressive atmospheres (dust, humidity...).
The hoist should be installed by a competent person
Make sure that the hoist attaching and supporting structure is rigid.
The hoist should be maintained regularly, following the instructions in this manual.
Keep the moving components including the chain clean and oiled as indicated in this manual. The components should only be replaced by original parts that are compatible with the type of hoist. Never use suspect spare parts or parts whose origin is not known.
Make sure that the limit stops are in place.



Never pull the load slantwise.

Never pull the load slantwise, maximum angle 3 degrees.
Make sure that the load is correctly balanced before moving it.
Avoid lifting using only one point of the load. Use adequate accessories (slings, lifting beam...). Pay attention to the center of gravity of the load to be moved.
The elements used to hang the load should be free in relation to the load to be moved (prefer a sling to a rigid beam).
When moving the load, make sure that it is sufficiently raised and clear of surrounding machines and other objects.
Make sure that the hoist is vertical to the load before hoisting.
Avoid swinging the load or the hook when using the travelling trolley or crane. In the case of several speeds, do the starting and braking operations at low speed.
The use of several machines to move a single load should be done by an experienced supervisor. All the necessary precautions should be taken to carefully ensure the distribution of the loads and to avoid overloading a single machine. The machines should be carefully checked before such an operation.
Notify the necessary people after a dangerous operation or if the hoist seems problematic (abnormal noise, abnormal behaviour...).

3.1 Specific Instructions for Inverter

Check the device cover is properly installed.

High voltages are present in this device. Switch the power off and after the display turns off, wait 5 minutes before opening the cover.

Insulation resistance test with a megger multimeter requires special precautions.

Do not make any measurements inside the device when it is connected to the main supply.

Do not touch the components on the circuit boards. Electrostatic discharge may cause damage or destroy the IC-circuits.

- **Check all ventilation holes are clear and unobstructed.**
- **Check that hot air coming from the brake resistors does not cause any danger.**
- **It is forbidden to use radiophones or portable phones near this device with the doors open.**
- **Drive is not intended to be used in a low-voltage public network, which supplies domestic premises. Radio frequency interference is expected if used in such a network.**

4 Guarantee

Our electric chain hoists are guaranteed for two years from the date of delivery.
If for a reason outside the control of the vendor, the delivery is delayed, the time lag cannot exceed three months.
If the use (installation) of the hoist is delayed, the corresponding extension of the guarantee (a single extension limited to three months) must be requested, and written confirmation obtained.
The vendor undertakes to eliminate all operating errors originating from the concept, the execution, the components or the materials themselves.

The guarantee does not cover normal wear, nor the failures resulting from lack of regular and periodic maintenance. It does not cover damage due to a lack of supervision, to false operation or to a bad utilization of the hoists, particularly due to overload conditions, slantwise drawing, undervoltage or overvoltage or a connection error.

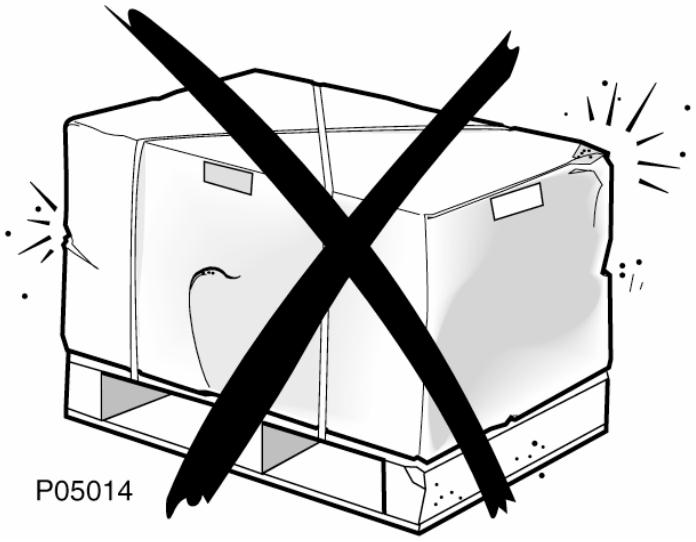
The guarantee does not apply when there is disassembly, modification or replacement of parts (mechanical or electrical) by an unauthorized party or without our prior agreement.
The guarantee only applies for original, factory-installed spare parts.
For the duration of the guarantee, the vendor undertakes to replace or repair, free of charge, the parts that are acknowledged to be damaged following examination by a qualified and authorized technical service.
The guarantee excludes any other services or indemnities. The repairs covered by the guarantee are carried out, as a rule, in the workshops of the vendor or authorized agent. When servicing of the equipment is done outside these workshops, the labor costs for disassembly or assembly of these parts are borne by the vendor when these are done exclusively by his staff or by an authorized agent.
The replaced parts become the property of the vendor and must be returned to the vendor at his expense.
For components of a relative particular importance that are not manufactured by the vendor and which carry the brand name of specialized manufacturers, the manufacturer's guarantee (which can vary according to the manufacturer) is applicable.

The guarantee does not apply for expendable parts defined by the manufacturer :

- Lifting chain
- Chain guide
- Rubber buffer
- Sprockets
- Chain bucket
- Hooks
- Friction and brake discs
- Control box cable

5 Acceptance of the material

Visually inspect the packaging to ensure that it is intact.
If not, notify it as required.
Check that the hoist corresponds to your order.
For transport reasons the chain bucket is delivered disassembled.



6 Description - technical characteristics

6.1 Types of hoist

Type	Load kg	Load (T)	Speed m / min.	Speed ft / mn	Power mot. / kW	Brins falls	Chain d/t
SM10 1004 m1	1000	1	4	16	0.9	1	6,8 / 17,8
SM10 1008 m1	1000	1	8	32	1,75	1	6,8 / 17,8
SM10 2002 m1	2000	2	2	8	0,9	2	6,8 / 17,8
SM10 2004 m1	2000	2	4	16	1,75	2	6,8 / 17,8

☞ The slipping clutch is factory adjusted at a value of 140% (+/- 5%) of a nominal load. Then for the maintenance operations, the setting value will be 125% of the nominal load. This difference is due to the running in of the friction lining.

☞ **EN 14492-2 standard imposes a setting value included between 110 % and 160% of the nominal load.**

7 Description - technical characteristics (SM Stepless)

7.1 Types of hoist

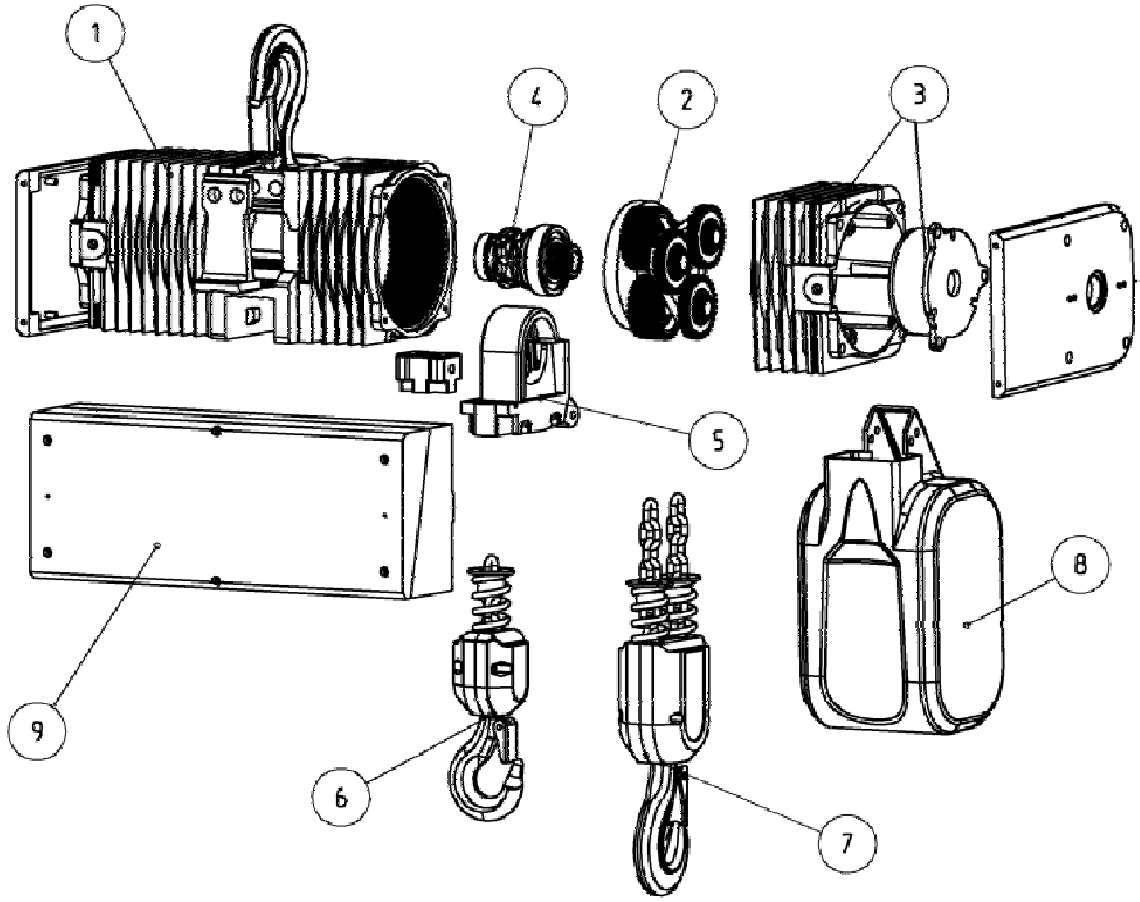
Type	Load kg	Number of falls	Speed m/min.	Motor power kW	Speed reducing ratio	FEM group	Chain d/t
SM10 508 v2	500	1	0,5 → 8	1,75 / 0,45	58	2 m	6,8 / 17,8
SM10 5016 v2	500	1	1 → 16	1,75 / 0,45	58	2 m	6,8 / 17,8
SM10 1008 v1	1000	1	0,5 → 8	1,75 / 0,45	58	1 Bm	6,8 / 17,8
SM10 2004 v1	2000	2	0,25 → 4	1,75 / 0,45	58	1 Bm	6,8 / 17,8

☞ The slipping clutch is factory adjusted at a value of 140% (+/- 5%) of a nominal load. Then for the maintenance operations, the setting value will be 125% of the nominal load. This difference is due to the running in of the friction lining.

☞ **EN 14492-2 standard imposes a setting value included between 110 % and 160% of the nominal load. (> 1000 kg)**

✋ **ATTENTION ! In case of hoist 250 kg 1 fall or 500 kg 2 falls, the slipping clutch is factory adjusted at a value of 250% of the hoist nominal load.**

7.2 Main sub-assemblies



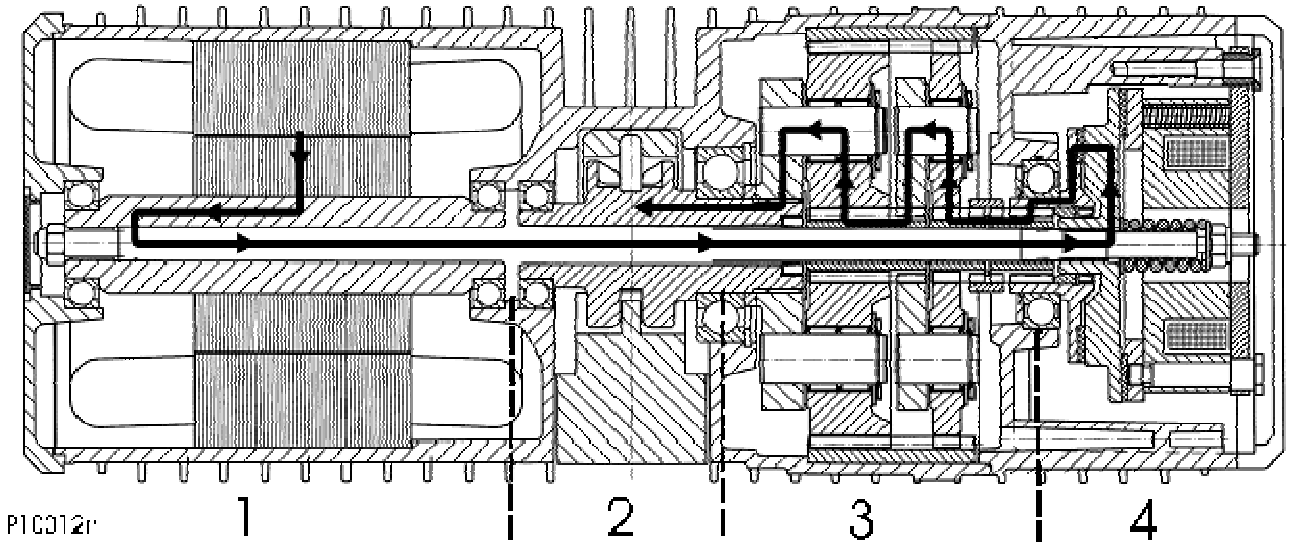
1- Main casing
2- Gears
3- Brake/slipping clutch/housing assembly
4- Chain sprocket with output shaft
5- Chain guide
6- 1-fall hook block/hook
7- 2-fall hook block/hook
8- Chain bucket
9- Electric box

The hoist which you have just purchased should only be used with a maximum load equal to the nominal load (refer to the table above).

The length of its useful service life depends on the demands placed on it, the average operating time, the number of start-ups and its maintenance.

7.3 Operation of the hoist

Kinematic chain

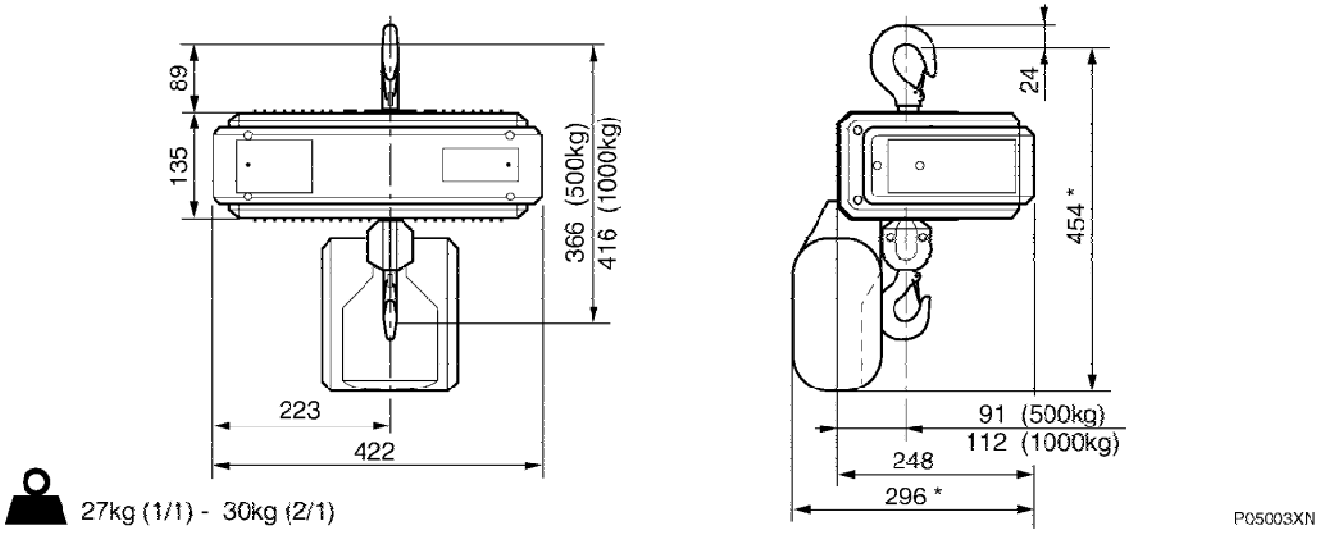


1. Motor
2. Chain sprocket
3. Gear
4. Brake/slipping clutch

Technical advantage

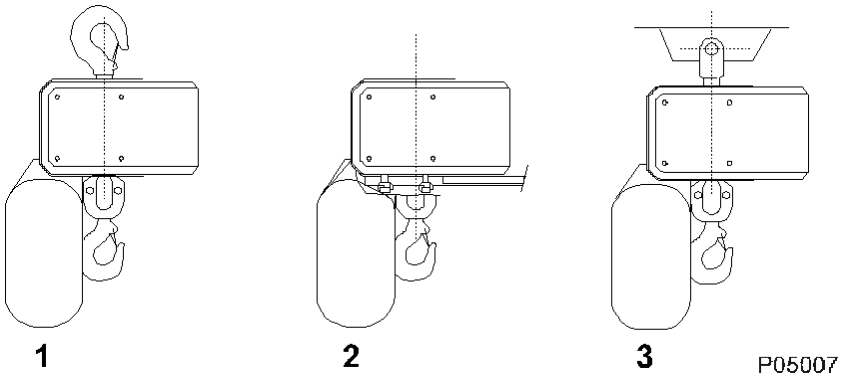
The position of the slipping clutch allows, should it slip, the load to be held in all cases by releasing the control box button.

7.4 Hoist dimensions and weight



For hoist with standard chain bucket.

7.5 Attachment of the hoist



1. Suspension hook
2. Base mounting
3. L or // attachment using the coupling part

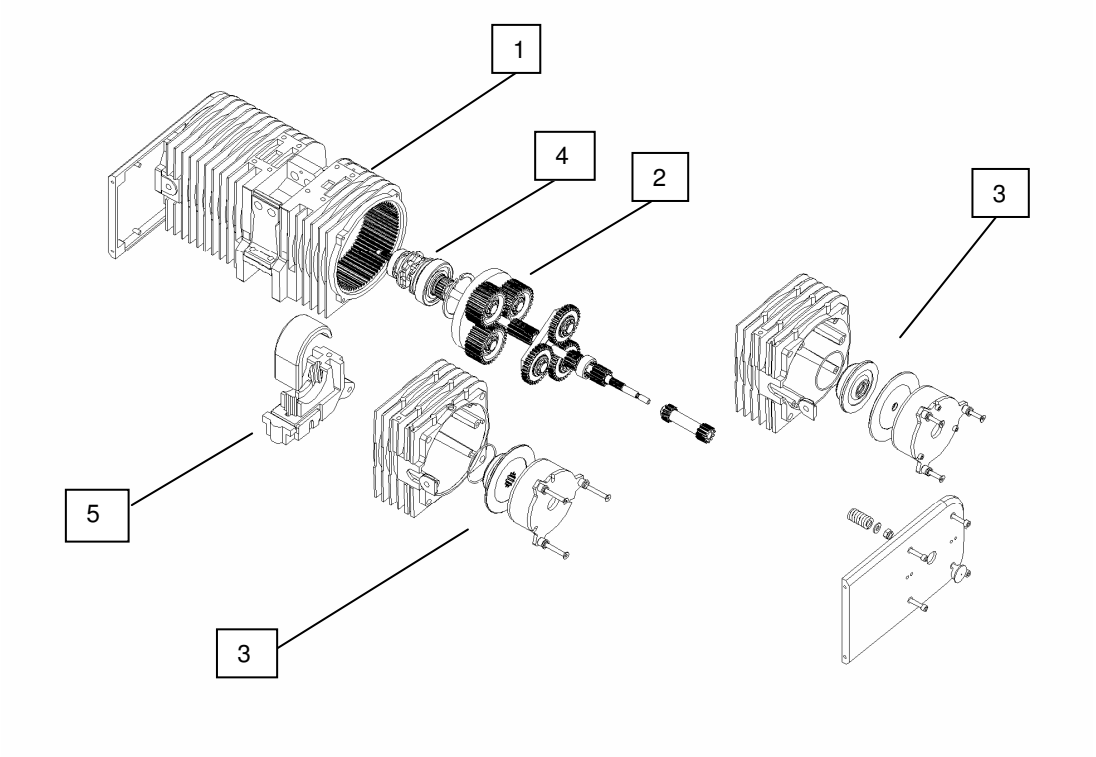
7.6 Environmental data

Ambient temperature : -20°C to +40°C
Protection class : IP55 as standard
Side pulling angle : 3 degrees maximum

Impact on the environment :

Sound level : 75 decibels

7.7 Main sub-assemblies (Double brake)



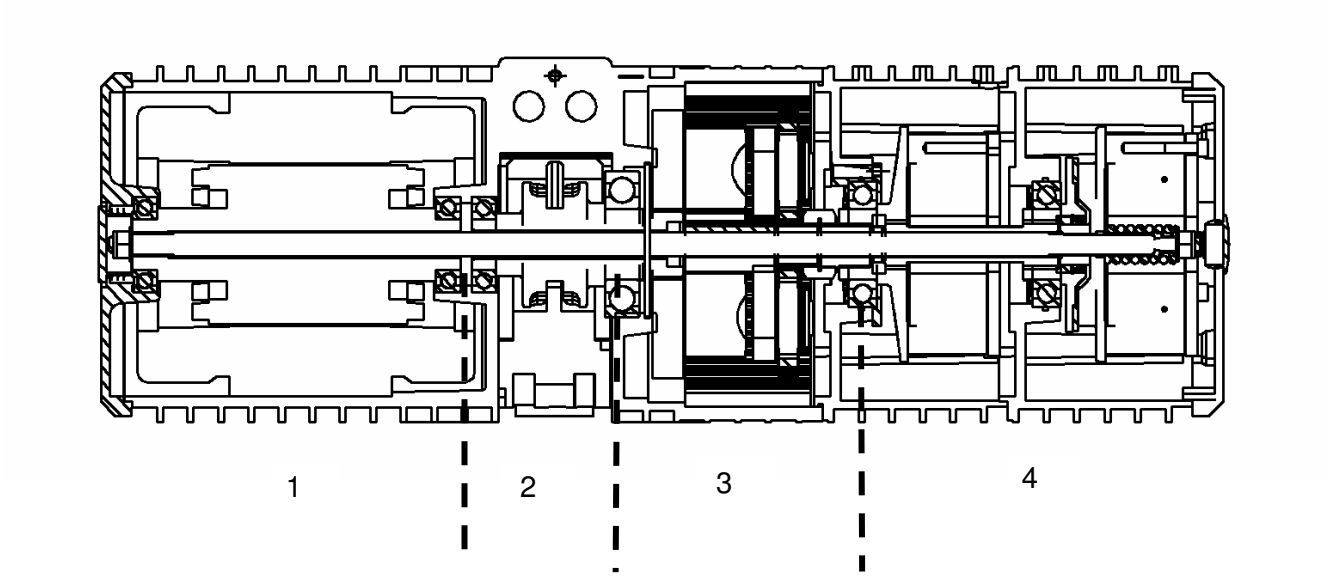
1- Main casing
2- Gears
3- Brake/slipping clutch/housing assembly
4- Chain sprocket with output shaft
5- Chain guide

The hoist which you have just purchased should only be used with a maximum load equal to the nominal load (refer to the table above).

The length of its useful service life depends on the demands placed on it, the average operating time, the number of start-ups and its maintenance.

7.8 Operation of the hoist

Kinematic chain

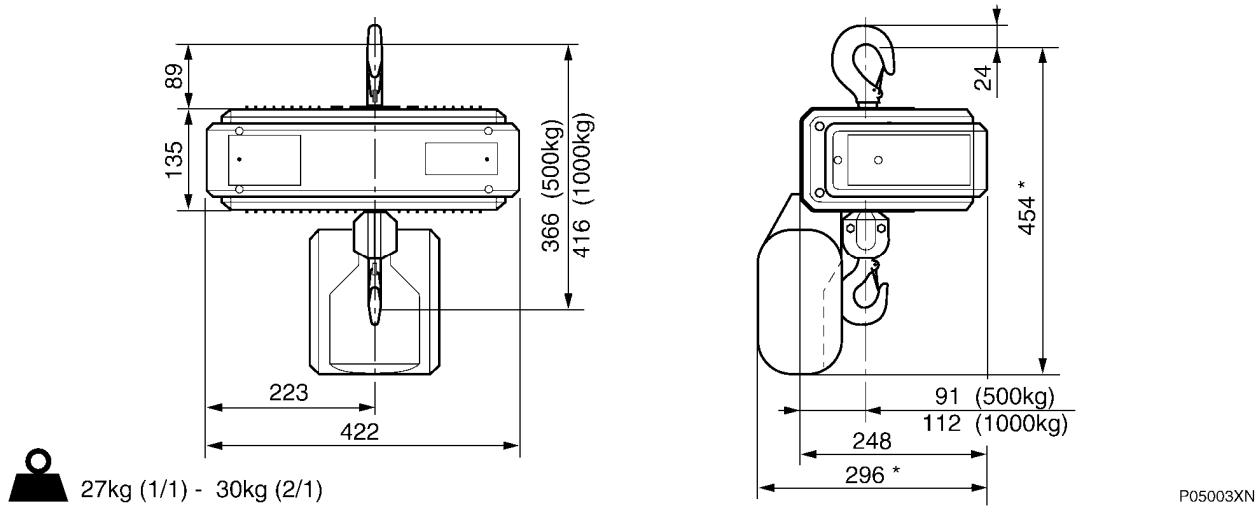


1. Motor
2. Chain sprocket
3. Gear
4. Brake/slipping clutch

Technical advantage

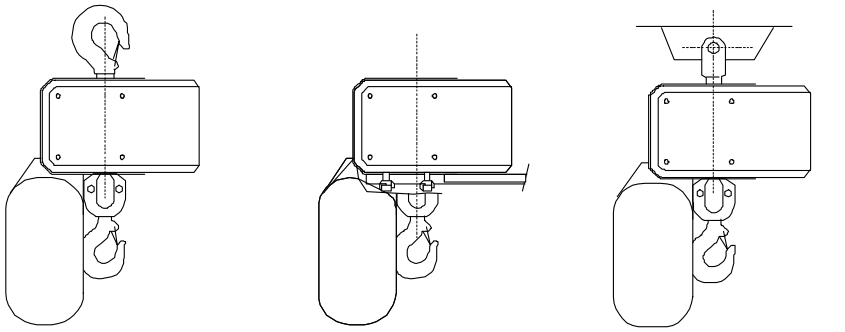
The position of the slipping clutch allows, should it slip, the load to be held in all cases by releasing the control box button.

7.9 Hoist dimensions and weight



For hoist with standard chain bucket.

7.10 Attachment of the hoist

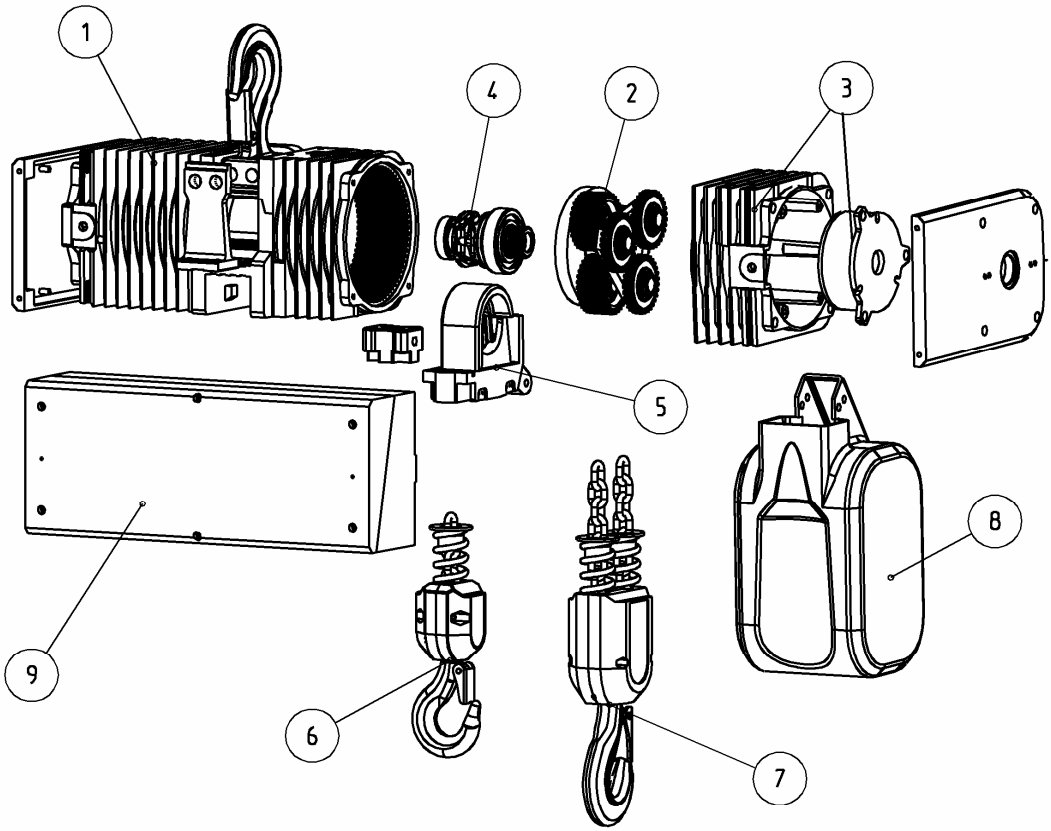


4. Suspension hook
5. Base mounting
6. L or // attachment using the coupling part

7.11 Environmental data

Ambient temperature : -20°C to +40°C
Protection class : IP55 as standard
Side pulling angle : 3 degrees maximum
Impact on the environment :
Sound level : 75 decibels

7.12 Main sub-assemblies (Stepless)



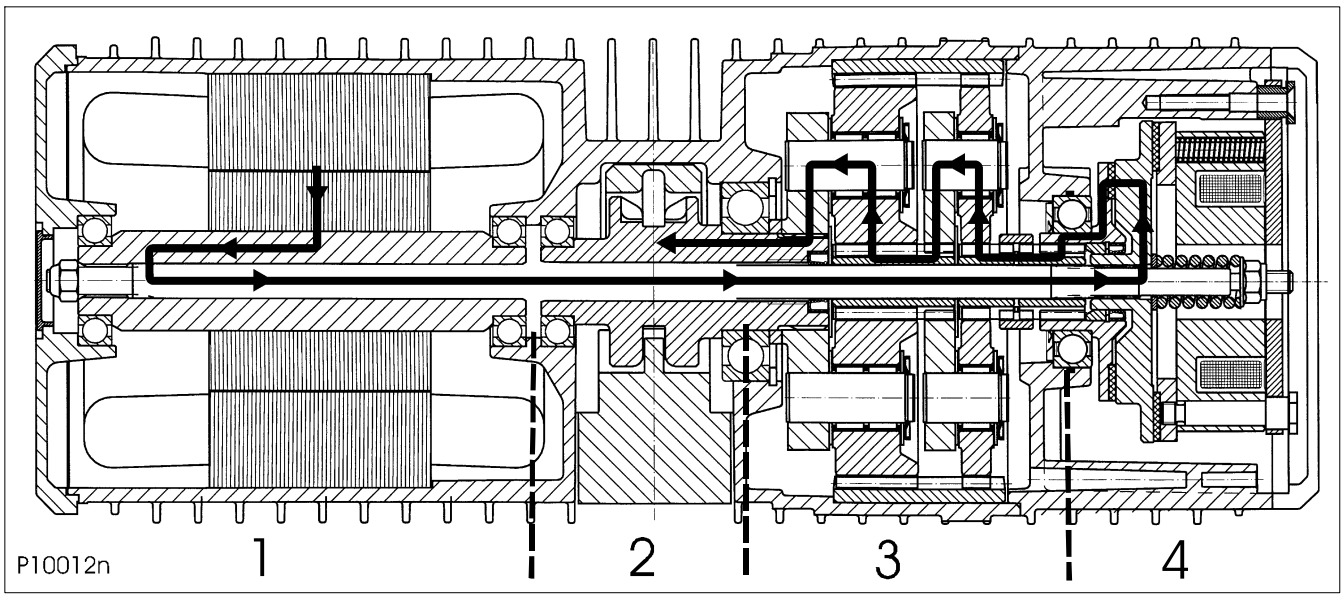
1- Main casing
2- Gears
3- Brake/slipping clutch/housing assembly
4- Chain sprocket with output shaft
5- Chain guide
6- 1-fall hook block/hook
7- 2-fall hook block/hook
8- Chain bucket
9- Electric box

The hoist which you have just purchased should only be used with a maximum load equal to the nominal load (refer to the table above).

The length of its useful service life depends on the demands placed on it, the average operating time, the number of start-ups and its maintenance.

7.13 Operation of the hoist

Kinematic chain

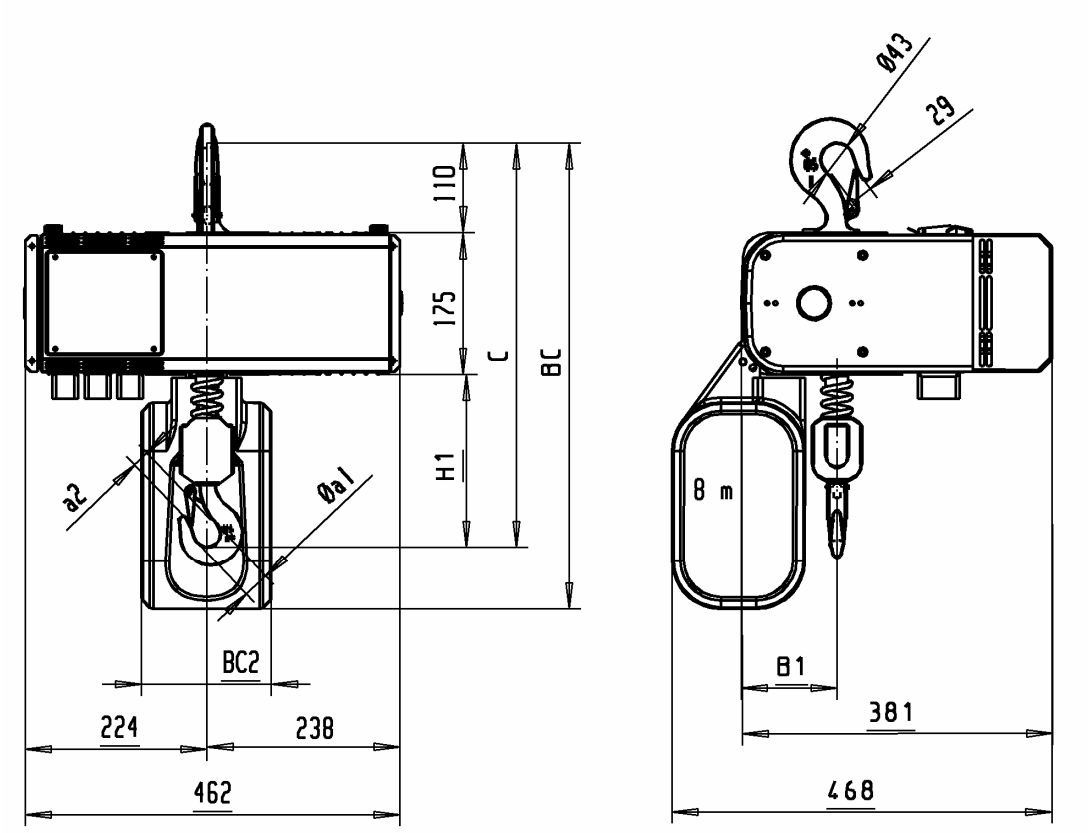


1. Motor
2. Chain sprocket
3. Gear
4. Brake/slipping clutch

Technical advantage

The position of the slipping clutch allows, should it slip, the load to be held in all cases by releasing the control box button.

7.14 Hoist dimensions and weight



For hoist with standard chain bucket.

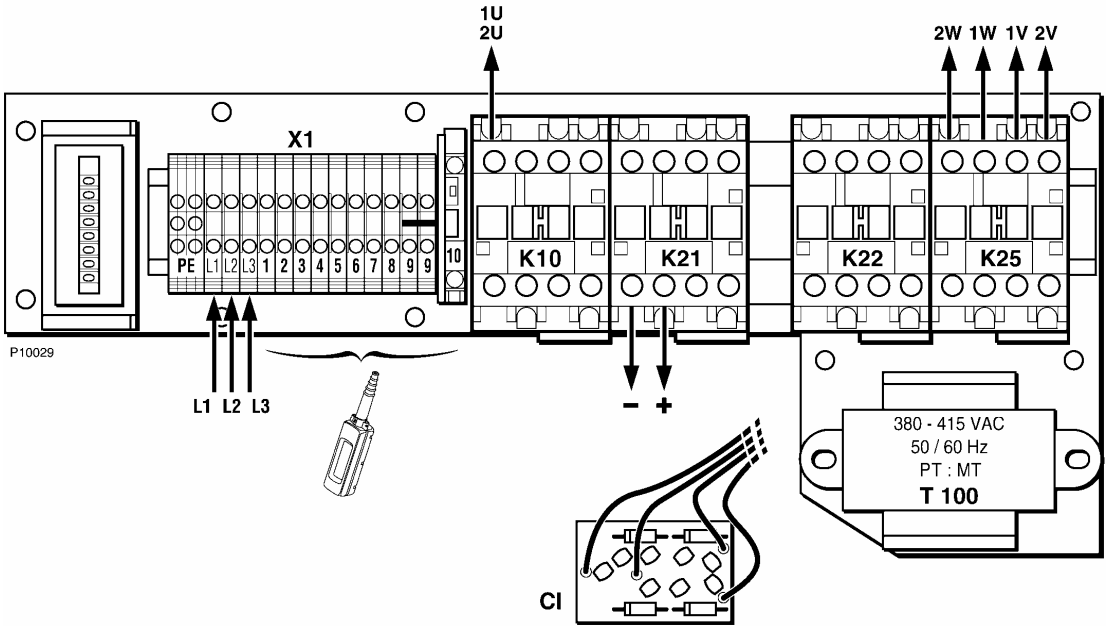
7.15 Environmental data

Ambient temperature : -10°C to +40°C
Protection class : IP55 as standard
Side pulling angle : 3 degrees maximum

Impact on the environment :

Sound level : 75 decibels

7.16 Printed circuit board (2 lifting speeds with emergency stop)



HOIST SUPPLY

L1	hoist supply	
L2	hoist supply	
L3	hoist supply	
K21-2	– brake	
K21-4	+ brake	
K10-1	1U-2U	motor supply
K25-R1	1V	motor supply
K25-1	2V	motor supply
K25-R3	1W	motor supply
K25-3	2W	motor supply

GROUND WIRES

ground terminal, 4 connections

PE	motor
PE	p.c. board
PE	trolley connection
PE	power supply

TROLLEY CONNECTION (X24)

K10-1	L21	electric trolley supply
K10-3	L22	electric trolley supply
K10-5	L23	electric power supply

CONTROL BOX PLUG (X23)

1	Common control box
2	Lifting
3	Lowering
4	Speed selector
5	Emergency stop
6	Right, electric trolley
7	Left, electric trolley
8	Travelling speed selector

PRINTED CIRCUIT BOARD

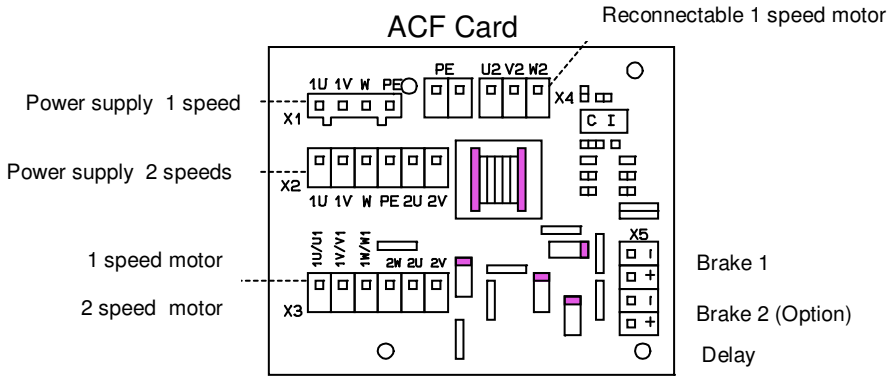
Terminal X1

	Control power supply
	Lifting
	Lowering
	Right, electric trolley
	Left, electric trolley
	Travelling speed selector
	0V
	thermal protection *(replace the shunt)*
	top limit switch *(replace the shunt)*
	bottom limit switch *(replace the shunt)*
	Fuse
	Emergency stop contactor
	Lifting contactor
	Lowering contactor
	Speed selector
	Control transformer
	Counter (Option)
	Counter (Option)

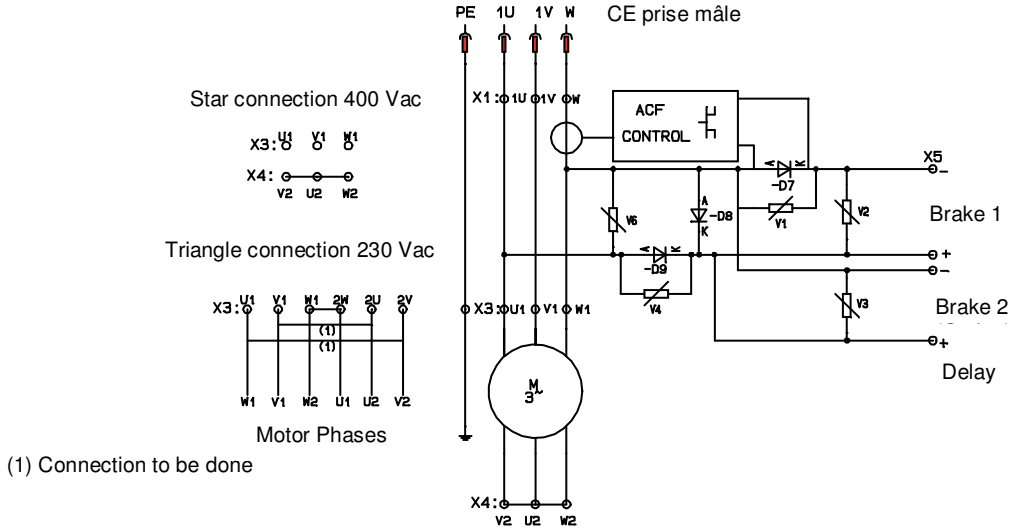
7.17 Electric board (direct voltage control ACF)

ACF board

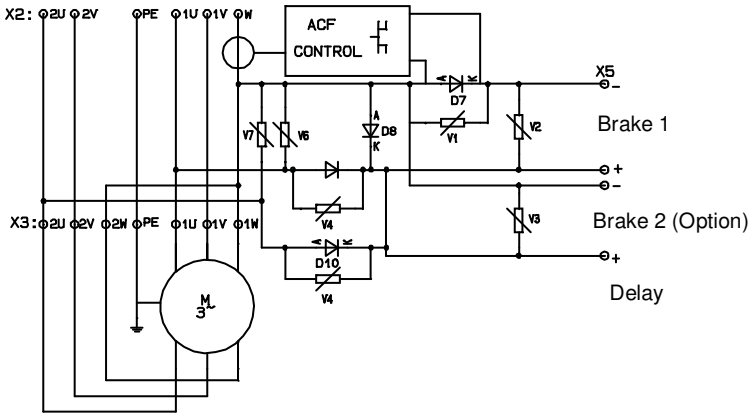
The ACFG board controls electronically the brake. It enables a rapid brake acceleration. (As the hoist is not equipped with contactor control electric's)



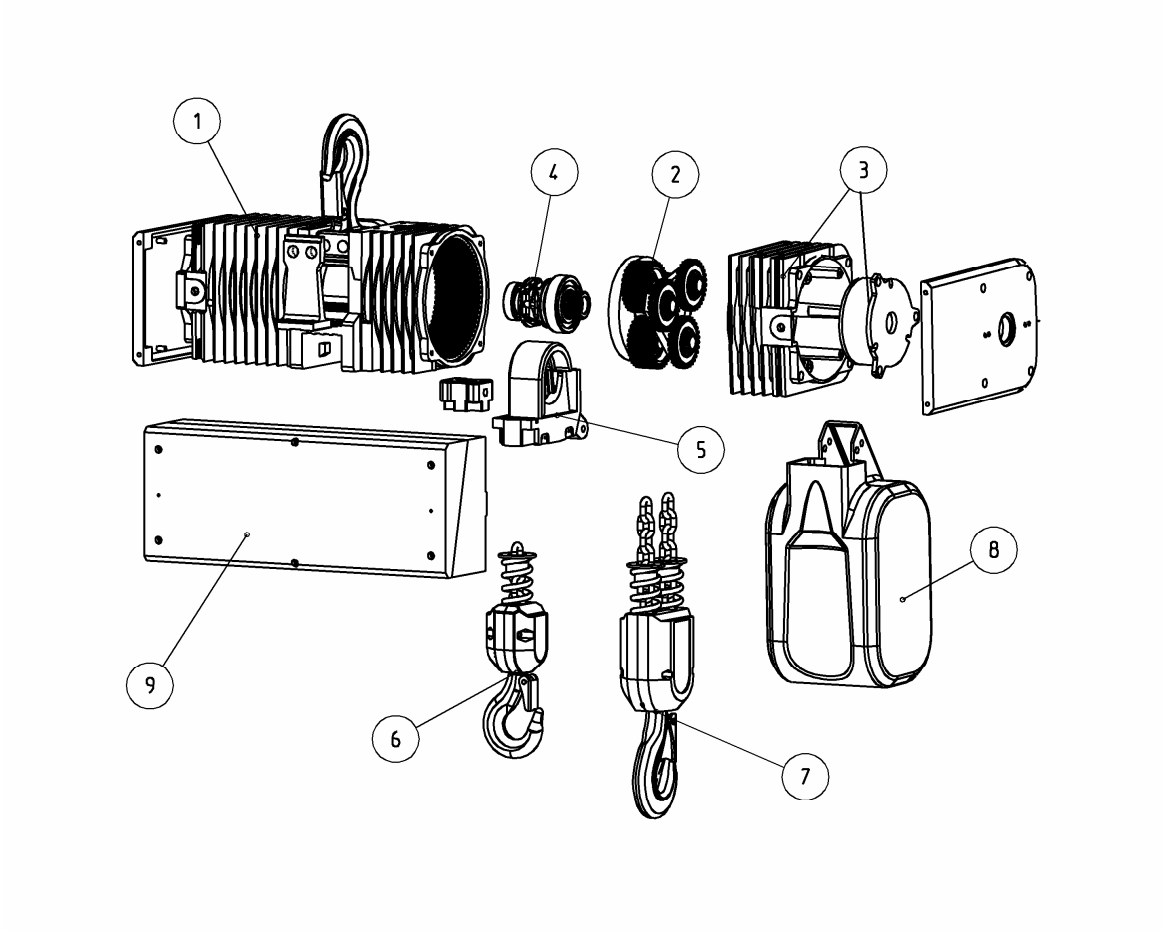
1 Hoisting speed



2 Hoisting speed



7.18 Main sub-assemblies (Stepless)



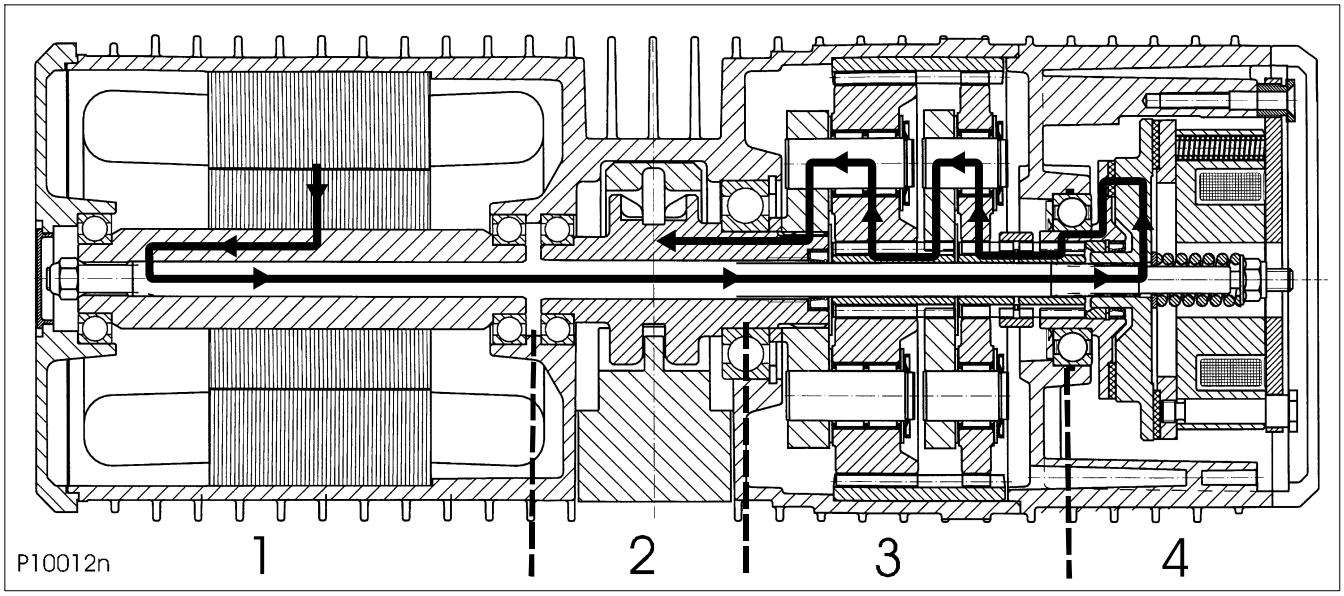
1- Main casing
2- Gears
3- Brake/slipping clutch/housing assembly
4- Chain sprocket with output shaft
5- Chain guide
6- 1-fall hook block/hook
7- 2-fall hook block/hook
8- Chain bucket
9- Electric box

The hoist which you have just purchased should only be used with a maximum load equal to the nominal load (refer to the table above).

The length of its useful service life depends on the demands placed on it, the average operating time, the number of start-ups and its maintenance.

7.19 Operation of the hoist

Kinematic chain

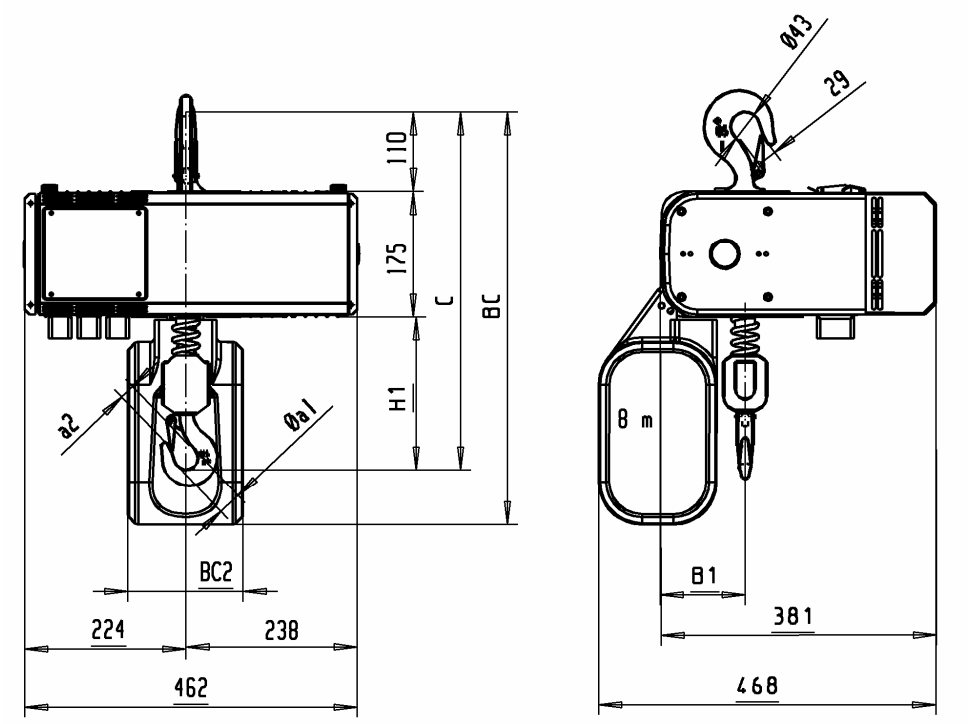


1. Motor
2. Chain sprocket
3. Gear
4. Brake/slipping clutch

Technical advantage

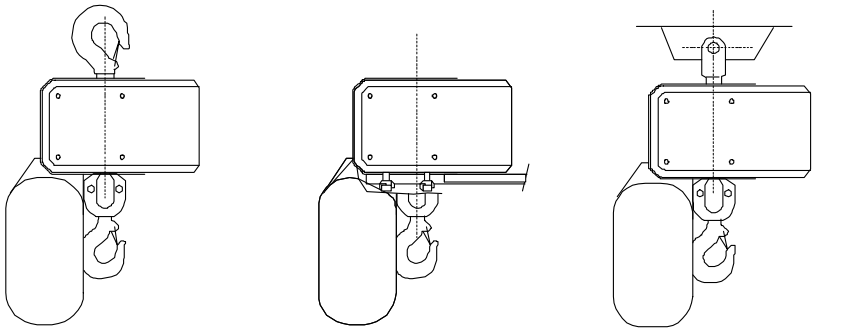
The position of the slipping clutch allows, should it slip, the load to be held in all cases by releasing the control box button.

7.20 Hoist dimensions and weight



For hoist with standard chain bucket.

7.21 Attachment of the hoist



1.- Suspension hook 2.- Base mounting 3.- L or // attachment using the coupling part

7.22 Environmental data

Ambient temperature :	-10°C to +40°C
Protection class :	IP55 as standard
Side pulling angle :	3 degrees maximum

Impact on the environment :

Sound level :	75 decibels

7.23 Electricity (Inverter)

7.23.1 Technical data –VLh 002 Inverter

Power class	**002**
Power (kVA) at 400V	3.5
Output current In (A)	5.0
Max. current 1min (A)	7.6
Overload ability	1.5 x In, 1min/10min
Max. output voltage	Equals to supply voltage
Supply	
Supply voltage	380-415Vac (M) or 440-480Vac (C)
Allowable voltage fluctuation	+/- 10%
Nominal supply frequency	50/60Hz +/- 5%
Signal input levels	
Digital controls	S1, S2, DID3, DID4, DID5: 42 … 240Vac; 15mA
Control features	
Control method	Open loop vector control
Frequency control range	0 ... 250Hz
Frequency command	Electronic potentiometer, 2-step controller or 0 … 10V analog signal
Limit switch functions	Stop limit inputs for both directions
Speed control range	s_N ... 100% (s_N= motor nominal slip)
Speed accuracy	1% of nominal speed at speed range 10 ... 100% 1/3 of motor nominal slip at speed below 10%
Braking torque	150%
Protections	
Motor overload protection	Thermistor or Klixon thermostat based temperature measurement
Overload protection	Fault is detected if the current momentarily exceeds 280% of rated current
Undervoltage / blown fuse	Fault is detected if DC voltage drops below 333V
Overvoltage protection	Fault is detected if DC voltage exceeds 911V
Momentary power loss	Immediate fault stop
Inverter overtemperature	Temperature sensor on the heat sink
Ground fault	Provided by electronic circuitry
Ambient conditions	
Ambient temperature	-10°C ... +50°C (14°F ... 122°F) for ED≤40%
Storage temperature	-40°C ... +70°C (-31°F ... 158°F) dry
Humidity	<95%RH (no condensation)
Altitude	Maximum 1000m at In. Above 1000m: In reduces 1% per each 100m. Above 3000m: consult factory.
Vibration	Operation: maximum displacement amplitude 3mm at 2-9Hz. Maximum acceleration amplitude 0.5g (5m/s²) at 9-200Hz Conforms to LV and EMC directives.

7.23.2 Basic description

Inverter	The specific crane features for the inverter hardware and the special software are achieved by combining the experience and know-how of crane applications with the latest technology.
Crane user interface	Interface with pre-designed locations for typical crane functions. The main part of this interface is carried out by a terminal strip, which has separated sections for signals with main, control and electronics voltage levels.
Brake control	Includes the brake contactor for disk brakes.
Electrical Braking	Includes a braking transistor and a braking resistor.

Control methods	Can be controlled by • the electronic potentiometer control with 2-step pushbuttons. • the multistep control with 2-step controllers. • the automation control using any control device with an 0-10V output (computer, radio, PLC)
Limit switch functions	Built-in slowdown stop limit switch (S12, S22) functions for both running directions.
Protections	Includes a motor thermal protection, which is based on motor temperature measurement by Klixon placed in motor windings. A great number of other protections included are shown in the technical data.

7.23.3 Main components

The main components are :

A1	Inverter
A3	Overspeed monitor
K1	Main contactor
K7	Brake contactor
T100	Control voltage transformer
G1	Rectifier
R1	Braking resistor unit
Z1, Z3	Ferrite rings (Depending on EMC level, optional)
FU1	Filtering capacitors (Depending on EMC level, optional)
X1	Terminals

The most important external components are :

M1	Hoisting motor
Y1	Mechanical brake
B5	Speed sensor
B6	Thermal sensor for motor protection
	Control devices (switches, pushbuttons etc.)
S11, S21, S12, S22	Limit switches

7.23.4 Control methods

There are three different control methods available:

1	EP	Electronic potentiometer function. • Stepless control using a 2-step controller.
2	MS	Multistep control (2 steps) • Requires programmable digital inputs for speed reference steps
3	AU	Automation control for any control device with an output in the range of 0 – 10V • E.g. radio controls, process computers.

All control methods are available without any changes in the hardware or software.
The control mode is selected by parameter P1.1.11 Input set. The parameter assigns digital inputs S1, S2 and DID3-DID5. It is not possible to change the functions of the inputs separately. The state of inputs can be checked from parameter V2.3.

Control Mode		**MS2 (stop-lim)**	**EP2 (stop-lim)**	**AU (Ain1)**	**Must not be used**
Parameter P1.1.11		0	2	7	1,3,4,5,6
Signal	Terminal				
S1	DID1	S1	S1	S1	-
S2	DID2	S2	S2	S2	-
DID3	DID3	MAX	AP	S11/S21	-
DID4	DID4	S12	S12	S12	-
DID5	DID5	S22	S22	S22	-

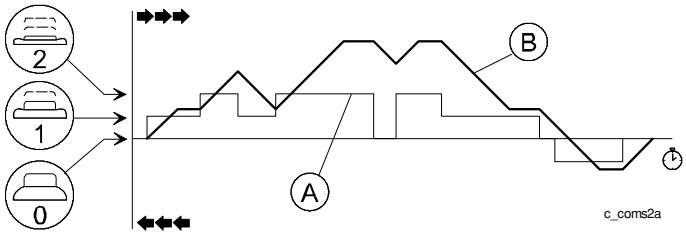
S1	Drive command direction S1		S2	Drive command direction S2
AP	Acceleration command		MAX	Maximum frequency
S12	Stop-limit forward		S22	Stop-limit reverse
S11/S21	Common slowdown limit			

Desired speed levels for multi-step control mode are selected with following parameters

Speed	Parameter	Input
Minimum	P1.1.4	S1/S2
Maximum	P1.1.5	MAX

7.23.5 Description of the control modes

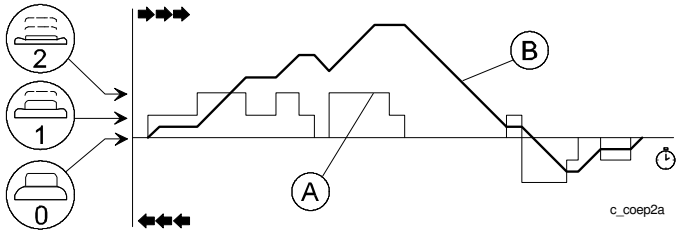
7.23.5.1 MS2-control



- A. Pushbutton / controller position
- B. Speed

- 0) "decelerate to zero"
- 1) step 1 "drive minimum speed"
- 2) step 2 "drive maximum speed"
-

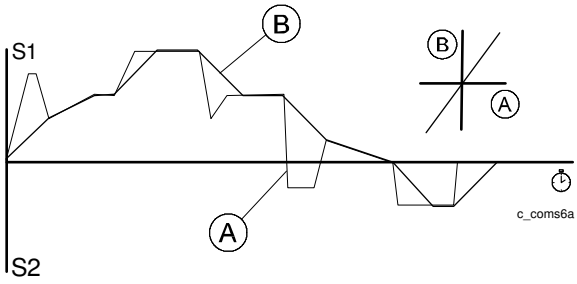
7.23.5.2 EP2-control



- A. Pushbutton / controller position
- B. Speed

- 0) "decelerate to zero"
- 1) while starting "drive minimum speed"
- while running "hold speed"
- 2) while running "accelerate"
- while running at maximum speed "hold speed"

7.23.5.3 AU/PO-control



- A. Reference
- B. Speed

AU control may be used with control device with an output in the range of 0 V – 10 V (for example radio or PLC).
PO control may be used with a controller with potentiometer.

The operation is as follows :

- Driving command S1 or S2 is given separately and means “drive minimum speed”
- The speed linearly follows the analog input signal.

7.23.5.4 Stop-limit operation

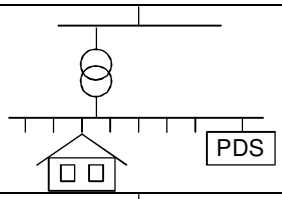
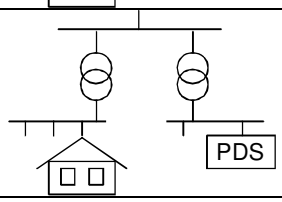
Normally inputs (S12 and S22) are "high" (limit switch closed, voltage present in the input). When either of these signals goes “down” (no voltage in the input), the motion is stopped by switching the motor current off immediately and by opening the relay contact ROD1 (mechanical brake closes).

Restart may occur only after one second. Restart is only allowed to the direction opposite to the stop-limit switch circuit being off. If both of these inputs are off restart is not permitted. Restart may be initiated only by a run command changing from off to on (= before restart both run commands must be off after the one-second time has passed).

7.23.6 EMC

The abbreviated "EMC" stands for the Electromagnetic Compatibility. According to the European EMC directive "the apparatus shall be so constructed that :

- The electromagnetic disturbance it generates does not exceed a level allowing other apparatus to operate as intended
- The apparatus has an adequate level of intrinsic immunity of electromagnetic disturbance to enable it to operate as intended."

<table>
<tr><td>Declaration of conformity</td><td colspan="2">With the declaration of conformity the manufacturer informs that device is manufactured to fulfill required EMC standards.</td></tr>
<tr><td>CE-mark</td><td colspan="2">The CE marking is a declaration by a manufacturer or importer located in the European Economic Area that a product complies with the safety and health requirements of the directive in question. The manufacturer demonstrates for the authorities that the product complies with the safety requirements within the EU.</td></tr>
<tr><td rowspan="3">Environments</td><td colspan="2">☞ Immunity and emission requirements are divided in two levels in the product standard according to the environments.</td></tr>
<tr><td>First environment means environment that includes domestic premises and also establishments directly connected to a low-voltage power supply network.</td><td> 
</td></tr>
<tr><td>Second environment means environment that includes all establishments other than those directly connected a low-voltage power supply network</td><td> 
</td></tr>
</table>

7.23.6.1 EMC levels

Three kinds of EMC levels are available in VARIATOR VLh 002 product family, they are S, N and 0 level.

- S-level : No manufacturer’s EMC solution is adopted and products will be used in other market areas than European Union (EU) when local power supply system is the grounded network.
- N-level : Manufacturer’s EMC solution is adopted to fit for Second Environment and products will be used in EU when local power supply system is the grounded network.
- 0-level : No manufacturer’s EMC solution is adopted, products can be used in either EU or other market areas when local power supply system is the non-grounded network.

7.23.6.2 Fulfilled EMC-standards

Immunity All VARIATOR VLh 002 products fulfil the immunity requirements defined in the EN 61800-3 Amendment 11 (2000) for the second environment.

Emissions VARIATOR VLh 002 N level products fulfil the emission requirements (lower than specification) of the EN 61800-3 A11 2000 for the second environment.
VARIATOR VLh 002 - 0 level products fulfil the emission requirements (they might exceed the limit of N level products) of the EN 61800-3 A11 2000 for the second environment

The involved products are designed for Second Environment (Industrial Environment) only. The disturbances emitting from the basic products are not filtered to the required level of residential, commercial and light industrial (e.g. offices, gasoline station, retailer shops etc.) environment (First Environment). In this sense, these products should not be used in First environments. If you still want to use them in First environments, additional requirements are needed, please contact VERLINDE S.A.

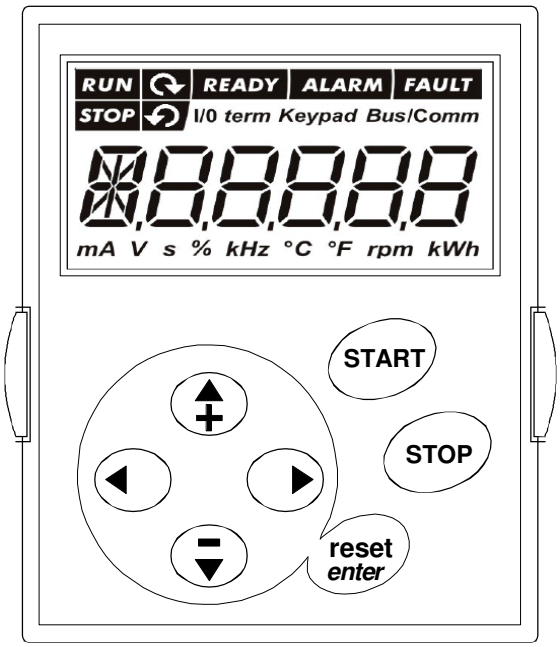
EMC filters in N level products might cause disturbances on fault (leakage) current relay

7.23.7 Parameters adjustments

7.23.7.1 The display panel

The display panel is used for :

- Displaying the drive identification, electrical values, operating or fault parameters
- Altering the parameter settings



Meaning of the displays :

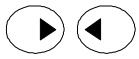
Drive status indications:

RUN	Motor is running, blinks when ramping down.
	Direction of motor rotation.
STOP	Motor is not running.
READY	Power is on. In case of a fault, the symbol will not light up.
ALARM	Drive is running outside of certain limit.
FAULT	Fault is active

Control place indications:

I/O term	I/O-terminals are the selected control place
Keypad	Keypad is the selected control place (not used)
Bus/Comm	Control through Profibus is selected (not used)

Button description

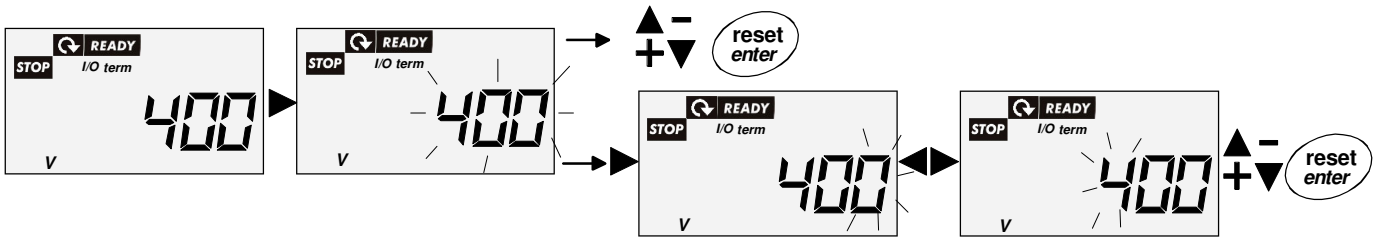
	Browse the main menu and the pages of submenus Edit values
	Move in menu Move cursor Enter and exit edit mode
	Start button
	Stop button
	Active faults reset Fault history reset Confirmation of selections

7.23.7.2 Navigation on the control keypad

Editing numerical settings

WARNING! Changing parameter settings during running may cause a hazardous situation. Parameter settings must not be changed during running.

a.) Pushing ► button takes you into the edit mode.
As an indication, the parameter value starts to blink.
b.) Two different methods are available to change values.
One is to set with ▲▼buttons till your desired value.
Another is to select desired digit and edit it. First push ► button, the digit before decimal point will blink, then use ►◄ buttons to select desired digit, set value with ▲ ▼ buttons.
c.) Accept and exit with “reset/enter” button.



7.23.7.3 Storing and restoring parameters

User parameters

- File “User parameters” is stored in inverter’s control unit.
- User parameters should be saved after final set up.
- The whole customized parameter set can be stored with parameter P3.3.1 by option 1(=Store user parameters)
- Select Option number 1, then press “Enter”
- User parameters can be restored with parameter P3.3.1 by option 2 (=Load user parameters).
- Select Option number 2, then press “Enter”

- After restoring always check the motor parameters.

Factory parameters

- File “Factory parameters” is stored in inverter’s control unit.
- Factory parameters are saved at the factory according to the order and they should not be changed, the values are the same as those in parameter list delivered with inverter.
- Factory parameters can be restored with parameter P3.3.1 by option 4 (=Load factory parameters).
- Select Option number 4, then press “Enter”
- After restoring always check the motor parameters.
-

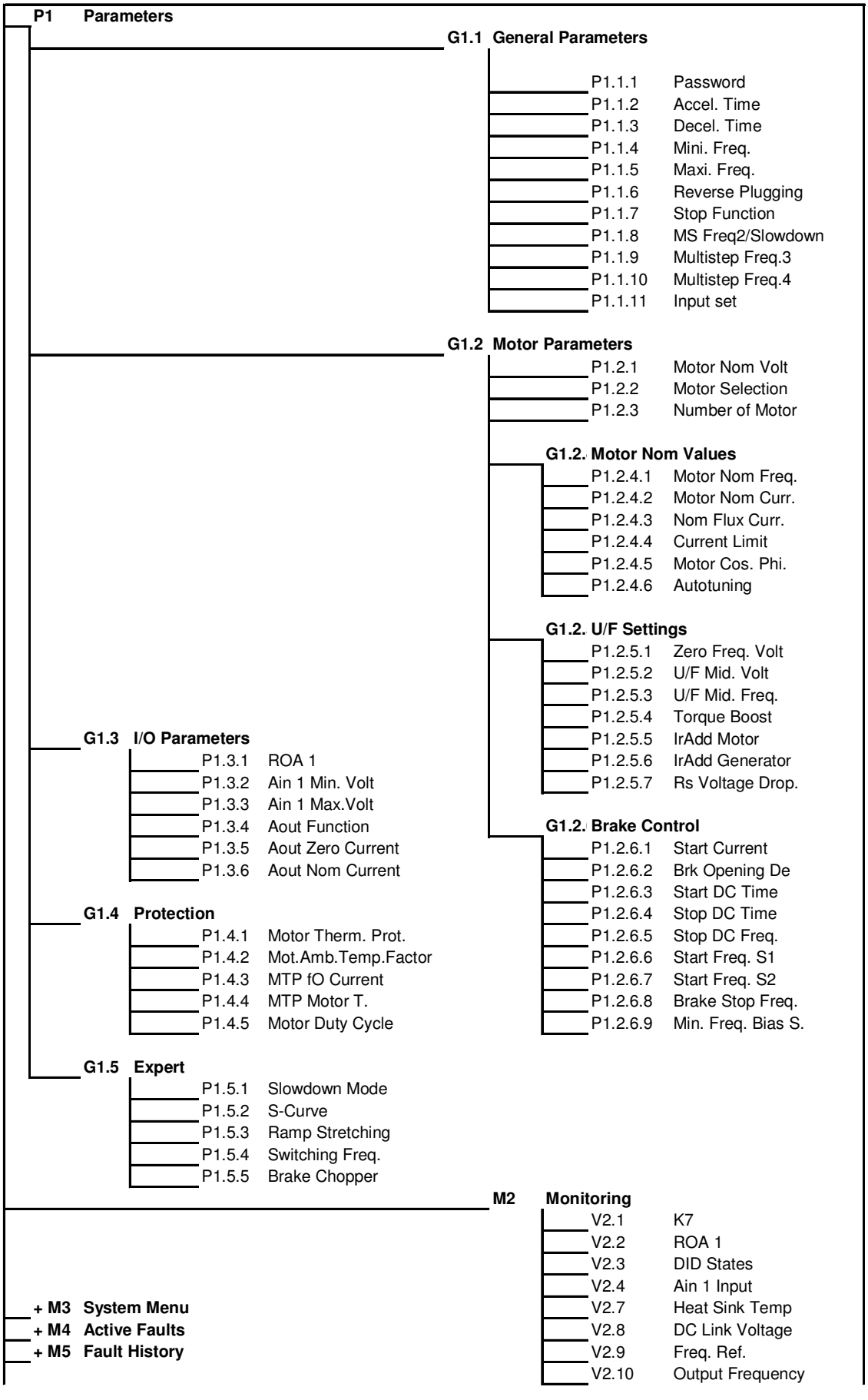
7.23.8 Parameter descriptions

7.23.8.1 General Description

Parameters are assorted to Groups. All Groups are not always listed in control panel. Groups are shown in the control panel according to password level and selected functions. This feature makes the viewable parameter menu simple and only needed parameters are shown.

Letter front of the code number describes variable type.

P	=	Parameter	V	=	Value	F	=	Active Fault
G	=	Group	M	=	Menu	H	=	Fault History
			S	=	System			


P1 Parameters
G1.1 General Parameters
P1.1.1 Password
P1.1.2 Accel. Time
P1.1.3 Decel. Time
P1.1.4 Mini. Freq.
P1.1.5 Maxi. Freq.
P1.1.6 Reverse Plugging
P1.1.7 Stop Function
P1.1.8 MS Freq2/Slowdown
P1.1.9 Multistep Freq.3
P1.1.10 Multistep Freq.4
P1.1.11 Input set
G1.2 Motor Parameters
P1.2.1 Motor Nom Volt
P1.2.2 Motor Selection
P1.2.3 Number of Motor
G1.2. Motor Nom Values
P1.2.4.1 Motor Nom Freq.
P1.2.4.2 Motor Nom Curr.
P1.2.4.3 Nom Flux Curr.
P1.2.4.4 Current Limit
P1.2.4.5 Motor Cos. Phi.
P1.2.4.6 Autotuning
G1.2. U/F Settings
P1.2.5.1 Zero Freq. Volt
P1.2.5.2 U/F Mid. Volt
P1.2.5.3 U/F Mid. Freq.
P1.2.5.4 Torque Boost
P1.2.5.5 IrAdd Motor
P1.2.5.6 IrAdd Generator
P1.2.5.7 Rs Voltage Drop.
G1.2. Brake Control
P1.2.6.1 Start Current
P1.2.6.2 Brk Opening De
P1.2.6.3 Start DC Time
P1.2.6.4 Stop DC Time
P1.2.6.5 Stop DC Freq.
P1.2.6.6 Start Freq. S1
P1.2.6.7 Start Freq. S2
P1.2.6.8 Brake Stop Freq.
P1.2.6.9 Min. Freq. Bias S.
G1.3 I/O Parameters
P1.3.1 ROA 1
P1.3.2 Ain 1 Min. Volt
P1.3.3 Ain 1 Max.Volt
P1.3.4 Aout Function
P1.3.5 Aout Zero Current
P1.3.6 Aout Nom Current
G1.4 Protection
P1.4.1 Motor Therm. Prot.
P1.4.2 Mot.Amb.Temp.Factor
P1.4.3 MTP fO Current
P1.4.4 MTP Motor T.
P1.4.5 Motor Duty Cycle
G1.5 Expert
P1.5.1 Slowdown Mode
P1.5.2 S-Curve
P1.5.3 Ramp Stretching
P1.5.4 Switching Freq.
P1.5.5 Brake Chopper
M2 Monitoring
V2.1 K7
V2.2 ROA 1
V2.3 DID States
V2.4 Ain 1 Input
V2.7 Heat Sink Temp
V2.8 DC Link Voltage
V2.9 Freq. Ref.
V2.10 Output Frequency
+ M3 System Menu
+ M4 Active Faults
+ M5 Fault History

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7.23.8.2 Parameter descriptions

P1 Parameters					
G 1.1 General Parameters					
Code	**Name**	**Min**	**Max**	**Unit**	**Description**
P1.1.1	Password	0	9999		
P1.1.2	Acceleration Time	0.0	20.0	s	Time it will take to accelerate from zero to the set maximum frequency
P1.1.3	Deceleration Time	0.0	20.0	s	Time it will take to decelerate from max frequency to zero.
P1.1.4	Minimum Freq	0.00	Max freq	Hz	The set minimum operating frequency.
P1.1.5	Maximum Freq	Min freq	120.00	Hz	The maximum frequency may not be higher than the motor nominal frequency for listed motors.
P1.1.6	Reverse Plugging	50	100	%	See *Chapter "Reverse plugging"*
P1.1.7	Stop Function	0	1		Stopping mode selection 0 = Brake 1 = Ramping, default Ramping: When the drive command is switched off the motion is stopped according to the set deceleration ramp. Brake: When the drive command is switched off the motor current is cut off, then the motion is stopped by the mechanical brake.
P1.1.8	MSFreq2/Slowdown	0	100	%	Slowdown frequency and Multistep frequency2, • Setting "100%" equals maximum frequency, • if the setting is lower than minimum frequency then it equals the minimum frequency
P1.1.9	Multistep Freq 3	0	100	%	3rd preset speed. • Setting "100%" equals maximum frequency, • if the setting is lower than minimum frequency then it equals the minimum frequency
P1.1.10	Multistep Freq 4	0	100	%	4th preset speed. • Setting "100%" equals maximum frequency, • if the setting is lower than minimum frequency then it equals the minimum frequency
P1.1.11	Input set	0	7		Control mode selection, see *Chapter "control methods"* 0 = MS2 (stop-limit) 1 = MS2/MS3 (slow-limit) 2 = EP2 (stop-limit) 3 = EP2 (slow-limit) 4 = EP3 5 = MS4 6 = MS5 7 = AU (Ain)
G1.2 Motor Parameters					
Code	**Name**	**Min**	**Max**	**Unit**	**Description**
P1.2.1	Motor Nominal Voltage	200	500	V	Nominal motor voltage Un from motor nameplate.
P1.2.2	Motor Selection	0	13		0 = Not Used 1 = Free Travel (see Note 1) 2 = MF06MA100 3 = MF06MA200 4 = MF06LA100 5 = MF06LA200 (MF06LA200, 0.45kW/400V; 0.55kW/460V) 6 = MF06LA20P (MF06LA200, 0.65kW/400V; 0.75kW/460V) 7 = Not Used 8 = Not Used 9 = Not Used 10 = Not Used 11 = Not Used 12 = Not Used 13 = Free Hoist (see Note 2) **Note1**: when one of listed motors is selected, Parameters group G1.2.4, G1.2.5 and G1.2.6 are not viewable. Parameters group G1.2.4, G1.2.5 can be viewed after P1.2.2 is set back to 1 ''free travel'' **Note 2**: Parameters group G1.2.6 "Brake Control" can only be viewed when parameter P1.2.2 is set to 13 "free hoist"
P1.2.3	Number of Motors	0	10	pcs	The parameter is not active if value 0,1 or 13 in P1.2.2 is selected
G1.2.4 Motor Nominal Values, see note1					
Code	**Name**	**Min**	**Max**	**Unit**	**Description**

P1.2.4.1	Motor Nominal Frequency	0.00	120.00	Hz	Nominal motor frequency (fn) from motor nameplate
P1.2.4.2	Motor Nominal current	0.0		A	Disc brake motors: Number of motors * In (Motor nominal current) Compact brake motors: Number of motors * In or Number of motors * 2,3A, if In<2,3A DC-current during starting = Motor Nominal current P1.2.4.2. * Start Current P1.2.6.1 DC-current during stoping = Motor Nominal current P1.2.4.2.
P1.2.4.3	Motor Nominal Flux Current	0.0		A	Motor nominal flux current (Io), same as no-load current or magnetizing current from motor nameplate. In multimotor drives nominal flux currents must be summed up.
P1.2.4.4	Current Limit	0.0		A	Defines the maximum motor current from the inverter. If the output current exceeds the value set in parameter P1.2.4.4 the output frequency is lowered until the current drops below the current limit. Typical value is 1.5 times motor(s) nominal ($1,5xI_n$). In multimotor drives nominal currents must be summed up. **Must not be set over inverters max 1min. current.**
P1.2.4.5	Motor Cos Phi	0.00	1.00		From motor nameplate (Power factor)
P1.2.4.6	Autotuning	0	4		See *Chapter* "*Autotuning*" 0 = Not Done 1 = Tuning 2 = Failed 3 = Done 4 = Modified

G1.2.5 U/f Settings, see note1

Code	Name	Min	Max	Unit	Description
P1.2.5.1	Zero Frequency Voltage	0.00	40.00	%	Output voltage at zero frequency, % of motor nominal voltage.
P1.2.5.2	U/f Middle point Voltage	0.00	100.00	%	Voltage in the selected middle point frequency, % of motor nominal voltage.
P1.2.5.3	U/f Middle point Frequency	0.00	120.00	Hz	Middle point frequency.
P1.2.5.4	Torque Boost	0	1		Torque maximization 0 = Off 1 = On Torque boost is adjustable with parameters P1.2.5.5 "IrAdd Motor" and P1.2.5.6 "IrAdd Generator" when "Free Travel" or "Free Hoist" is selected with parameter P1.2.2 "Motor Selection"
P1.2.5.5	IrAdd Motor	0	100		With small speeds and heavy load the drive may not have enough voltage to produce sufficient torque. Raising the value of parameter increases the voltage. Default value is 30% in travelling and 100% in hoisting.
P1.2.5.6	IrAdd Generator	0	100		If motor voltage at generator area is too high, reducing value of parameter decreases the voltage. Default value is 50% in travelling and 0% in hoisting.
P1.2.5.7	Rs Voltage Drop	0	512		Relative value of motor stator impedance voltage drop. Value of this parameter is calculated by formula given below. $\frac{\text{Motor Nom Flux current x Measured motor resistance (phase to phase) x 2217}}{\text{Motor nominal voltage}}$

G1.2.6 Brake Control, see note2

Code	Name	Min	Max	Unit	Description
P1.2.6.1	Start Current	0	200	%	To adjust DC-current during starting. See P1.2.4.2 Travelling with compact brake motors 130%, otherwise 80%. Hoisting 100%.
P1.2.6.2	Brake Opening Delay	0.00	10.00	s	Defines the opening delay of mechanical brake. "Start Freq S1" or "Start Freq S2" is commanded during "Brk Opening Del". After delay, output frequency increases according to the acceleration parameters. Default 0.05s
P1.2.6.3	Start DC-Time	0.00	5.00	s	Defines duration of the "Start Current"
P1.2.6.4	Stop DC-Time	0.00	5.00	s	Defines the function and the duration of the DC-braking time when stopping the motor. If "Stop DC-Time" = 0 the DC-braking is not used.
P1.2.6.5	Stop DC-Frequency	0.00	250.00	Hz	Defines the DC-braking starting frequency
P1.2.6.6	Start Frequency S1	0.0	100.0	%	Defines the output frequency during brake opening delay in the S1 direction.
P1.2.6.7	Start Frequency S2	0.0	100.0	%	Defines the output frequency during brake opening delay in the S2 direction.
P1.2.6.8	Brake Stop Frequency	0.00	Max Freq	Hz	Defines the output frequency when the relay output ROD1 for brake control opens during stopping

P1.2.6.9	Minimum Frequency Bias S2	0.00	Min Freq	Hz	**Helps to define the Minimum frequency in down direction for hoisting. Minimum frequency in down direction is "Min Frequency" - "Minimum Frequency Bias S2".**
G1.3 I/O Parameters					
Code	**Name**	**Min**	**Max**	**Unit**	**Description**
P1.3.1	ROA1	0	12		State of relay output ROA1 (See *Chapter* "*Relay output*") 0 = Not Used 1 = Fault 2 = External Brake Control 3 = Run, current is fed to the motor, default 4 = Drive is ready to operate 5 = Drive is NOT ready to operate 6 = Fan. DC-link voltage is above braking chopper operating value –70V. Relay is closed minimum 300s. 7 = Emergency Stop, relay is activated in case of faults F1 Overcurrent, F2 Overvoltage, F3 Earth Fault. Relay is deactivated when the power is switched off. 8 = Reverse Plugging. Direction request is different than direction of actual frequency. 9 = At Speed. The Drive has reached the speed reference request. 10 = S2 Active. Motor actual speed direction is S2. 11 = Temp1. Relay is activated when temperature is 20ºC (68F) or below. Relay is inactivated when temperature is 23ºC (73F) or above. 12 = Temp2. Relay is activated when temperature is 40ºC (104F) or above. Relay is inactivated when temperature is 37ºC (98F) or below.
P1.3.2	Ain1 Minimum Voltage	0.000	10.000	V	Minimum value of analog input Ain1 for AU-control
P1.3.3	Ain1 Maximum Voltage	0.000	10.000	V	Maximum value of analog input Ain1 for AU-control
P1.3.4	Aout Function	0	5		0 = Not Used 1 = Motor Freq (100%*Normal Motor Frequency) 2 = Motor Curr (100%*Normal Motor Current) 3 = Motor Volt (100%*Normal Motor Voltage) 4 = DC-link Volt (1000V) 5 = MotorFreqABS (Absolute value of Motor Frequency)
P1.3.5	Aout Zero Current	0.00	Aout Nom Curr	mA	
P1.3.6	Aout Nominal Current	Aout Zero Curr	100.00	mA	
G1.4 Not used					
Code	**Name**	**Min**	**Max**	**Unit**	**Description**
P1.4.1					0 = Default value 1 = must not be used 2 = must not be used
P1.4.2					Not used
P1.4.3					Not used
P1.4.4					Not used
P1.4.5					Not used
G1.5 Expert					
Code	**Name**	**Min**	**Max**	**Unit**	**Description**
P1.5.1	Slowdown Mode	0	2		0 = Slow 1 = Fast, default 2 = Fast Power Up (See *Chapter* "*Slowdown-limit operation*")
P1.5.2	S-Curve	0.00	0.50	s	The start and end of the acceleration and end of deceleration ramp can be smoothed with this parameter. Setting value 0.00-0.50 seconds for this parameter produces an S-shaped acceleration/deceleration.
P1.5.3	Ramp Stretching	0.00	50.0		See *Chapter* "*Ramp Stretching*". Not used in hoisting
P1.5.4	Switching Frequency				Must not be changed from factory setting
P1.5.5	Brake Chopper				1, default Must not be changed
M2 Monitoring					
Code	**Name**	**Min**	**Max**	**Unit**	**Description**
V2.1	K7	0	1		State of relay output ROD1, which controls brake contactor
V2.2	ROA1	0	1		State of relay output ROA1
V2.3	DID states	.00000	.11111		State of digital input DID1-DID5

V2.4	Ain1 Input	0.00	10.00	V	Value of analog input Ain1
V2.5	Motor Current			A	Measured motor current
V2.6	Motor Voltage			V	Calculated motor voltage
V2.7	Heat Sink Temperature			℃	Temperature of heat sink.
V2.8	DC-link Voltage			V	Actual value of measured DC-link voltage.
V2.9	Frequency Reference			Hz	
V2.10	Output Frequency			Hz	Output frequency to the motor
M3 System Menu					
Code	**Name**	**Min**	**Max**	**Unit**	**Description**
S3.3 Copy parameters					
P3.3.1	Parameter sets				0 = Select 1 = Store user parameters 2 = Load user parameters 3 = Store factory parameters 4 = Load factory parameters 5 = Reset parameters 6 = Fault 7 = Wait 8 = OK
S3.5 Security					
P3.5.2	Parameter lock				0 = Change Enabled 1 = Change Disabled
S3.6 Keypad settings					
P3.6.1	Default page				Display goes to Default page after Timeout time. If value 0 is selected, this feature is not active. Default value 2.10 “Output Frequency”
P3.6.3	Timeout time	0	65535	s	Display goes to Default page after Timeout time.
S3.7 Hardware settings					
P3.7.2	Fan control				0 = Continuous, default 1 = Temperature
P3.7.3					Not used
P3.7.4					Not used
S3.8 System info					
S3.8.1 Counters menu					
C3.8.1.1	MWh counter		KWh		
C3.8.1.2	Operating days Counter		hh:mm:ss		
C3.8.1.3	Operating hours Counter		hh:mm:ss		
S3.8.2 Trip counters					
T3.8.2.1	MWh trip counter		KWh		
P3.8.2.2	Clear MWh trip counter				
T3.8.2. 3	Operating days trip counter				
T3.8.2.4	Operating hours trip Counter		hh:mm:ss		
P3.8.2.5	Clear operating time Counter				
S3.8.3 Software info					
I3.8.3.1	Software package				
I3.8.3.2	System SW version				
I3.8.3.3	Firmware interface				
I3.8.3.4	System load				
S3.8.4 Application info					
A3.8.4.1	Application				
A3.8.4.1. 1	Application id				
A3.8.4.1. 2	Application version				
A3.8.4.1. 3	Firmware interface				
S3.8.5 Hardware info					
I3.8.5.2	Unit voltage				

I3.8.5.3	Brake chopper			
I3.8.5.4	Brake resistor			
S3.8.6 Options				
S3.8.6.1	NXOPT			
E3.8.6.1.1	Status			
E3.8.6.1.2	Program version			
S3.9 (not used)				
S3.10 (not used)				

M4 Active faults
The memory of active faults can store the maximum of 10 faults in the order of appearance. By pushing the ⊙ button you will enter the Fault history section.
M5 Fault history
The fault memory can store a maximum of 5 faults in the order of appearance. The number of faults currently in the fault history is shown on the value line of the main page. The latest fault carries the indication H5.1, the second latest H5.2 etc. If there are 5 uncleared faults in the memory, the next occurring fault will erase the oldest from the memory. Pressing the Enter button for about 2 to 3 seconds resets the whole fault history.

☞ Note 1 : when one of listed motors is selected, Parameters group G1.2.4, G1.2.5 and G1.2.6 are not viewable. Parameters group G1.2.4, G1.2.5 can be viewed after P1.2.2 is set back to 1 ‘’free travel’’

☞ Note 2 : Parameters group G1.2.6 “Brake Control” can only be viewed when parameter P1.2.2 is set to 13 “free hoist”

Reverse Plugging

When opposite drive command is active while the inverter is operating, the deceleration/acceleration ramp can be shorter than the normal ramp. Reverse plugging function is “on” if the driving frequency > 30% of the “Max Freq” (not the “Motor Nom Freq”). Reverse plugging function goes “off state” in opposite direction to original direction when driving frequency > 95% of reference frequency.
The value can be set between 50 to 100%. 100% corresponds that the ramp is the same as the normal ramp. 50% corresponds that the ramp is a half of the normal ramp. The default value is 80%.

Relay output

Inverter has one programmable relay output (ROA1) and one relay output for brake control (ROD1). Relay output functions for ROA1 are listed below.

Par value	Name	Description
0	Not Used	
1	Fault	Relay is activated when fault is on.
2	Brake Control	External brake ON/OFF-control. Default value in relay output ROD1 (K7 control).
3	Run	Relay is activated when current is fed to motor.
4	Ready	Relay is activated when Drive is ready to operate.
5	Ready Inverted	Relay is activated when Drive is not ready to operate.
6	Fan	Relay is activated when DC-link voltage is above braking chopper operating level - 70V. Relay is closed for a minimum of 300s.
7	Emergency Stop	Relay is activated in case of F1 Overcurrent, F2 Overvoltage or F3 Earth Fault. Relay is deactivated when the power is switched off.
8	Reverse Plugging	Relay is activated when direction requested is different than direction of actual frequency.
9	At Speed	Relay is activated when ramp generator output has reached speed reference request.
10	S2 Active	Relay is activated when motor actual speed direction is S2.
11	Temp 1	Relay contact is activated when temperature is 20°C (68F) or below. Relay is inactivate when temperature is 23°C (73F) or above.
12	Temp 2	Relay contact is activated when temperature is 40°C (104F) or above. Relay is inactivate when temperature is 37°C (98F) or below.

7.23.9 Factory default parameters

400V 100Hz		
Label	**Code**	**Default**
G 1.1. General Parameters		
P 1.1.1	Password	0
P 1.1.2	Accel Time	1.5
P 1.1.3	Decel Time	0.5
P 1.1.4	Min Freq	12
P 1.1.5	Max Freq	100
P 1.1.6	Reverse Plugging	100
P 1.1.7	Stop Function	Ramping
P 1.1.8	MSFreq2/Slowdown	20
P 1.1.9	Multistep Freq 3	50
P 1.1.10	Multistep Freq 4	50
P 1.1.11	Input set	EP2
G 2.2. Motor Parameters		
P 1.2.1	Motor Nom Volt	400
P 1.2.2	Motor Selection	Free Hoist
P 1.2.3	Number of Motors	1
G 1.2.4 Motor Nominal Values		
P 1.2.4.1	Motor Nom Freq	100
P 1.2.4.2	Motor Nom Curr	4.4
P 1.2.4.3	Nom Flux Curr	2.6
P 1.2.4.4	Current Limit	7
P 1.2.4.5	Motor Cos Phi	0.69
P 1.2.4.6	Autotuning	Not Done
G 1.2.5 U/f Settings		
P 1.2.5.1	Zero Freq Volt	4.2
P 1.2.5.2	U/f Mid Volt	4.5
P 1.2.5.3	U/f Mid Freq	3
P 1.2.5.4	Torque Boost	On
P 1.2.5.5	IrAdd Motor	100
P 1.2.5.6	IrAdd Generator	0
P 1.2.5.7	Rs Voltage Drop	99
G 1.2.6 Brake Control		
P 1.2.6.1	Start Current	100
P 1.2.6.2	Brk Opening Del	0.05
P 1.2.6.3	Start DC-Time	0.1
P 1.2.6.4	Stop DC-Time	0.2
P 1.2.6.5	Stop DC-Freq	2
P 1.2.6.6	Start Freq S1	4
P 1.2.6.7	Start Freq S2	3
P 1.2.6.8	Brake Stop Freq	3.5
P 1.2.6.9	Min Freq Bias S2	3
G 1.3. I/O Parameters		
P 1.3.1	ROA1	Not Used
P 1.3.2	Ain1 Min Volt	0
P 1.3.3	Ain1 Max Volt	10
P 1.3.4	Aout Function	Motor Curr
P 1.3.5	Aout Zero Curr	0
P 1.3.6	Aout Nom Curr	10
G 1.4 Protection		
P 1.4.1	Motor Thermal Prot	Not Used
P 1.4.2	-	0
P 1.4.3	-	40
P 1.4.4	-	45
P 1.4.5	-	100
G 1.5 Expert		
P 1.5.1	Slow Down Mode	Fast
P 1.5.2	S-Curve	0
P 1.5.3	Ramp Stretching	0
P 1.5.4	Switching Freq	8
P 1.5.5	Brake Chopper	Run

460V 120Hz		
Label	**Code**	**Default**
G 2.1. General Parameters		
P 1.1.1	Password	0
P 1.1.2	Accel Time	1.5
P 1.1.3	Decel Time	0.5
P 1.1.4	Min Freq	12
P 1.1.5	Max Freq	120
P 1.1.6	Reverse Plugging	100
P 1.1.7	Stop Function	Ramping
P 1.1.8	MSFreq2/Slowdown	20
P 1.1.9	Multistep Freq 3	50
P 1.1.10	Multistep Freq 4	50
P 1.1.11	Input set	EP2 StopLim
G 2.2. Motor Parameters		
P 1.2.1	Motor Nom Volt	460
P 1.2.2	Motor Selection	Free Hoist
P 1.2.3	Number of Motors	1
G 1.2.4 Motor Nominal Values		
P 1.2.4.1	Motor Nom Freq	120
P 1.2.4.2	Motor Nom Curr	4.4
P 1.2.4.3	Nom Flux Curr	2.6
P 1.2.4.4	Current Limit	7
P 1.2.4.5	Motor Cos Phi	0.69
P 1.2.4.6	Autotuning	Not Done
G 1.2.5 U/f Settings		
P 1.2.5.1	Zero Freq Volt	4.2
P 1.2.5.2	U/f Mid Volt	4.5
P 1.2.5.3	U/f Mid Freq	3
P 1.2.5.4	Torque Boost	On
P 1.2.5.5	IrAdd Motor	100
P 1.2.5.6	IrAdd Generator	0
P 1.2.5.7	Rs Voltage Drop	99
G 1.2.6 Brake Control		
P 1.2.6.1	Start Current	100
P 1.2.6.2	Brk Opening Del	0.05
P 1.2.6.3	Start DC-Time	0.1
P 1.2.6.4	Stop DC-Time	0.2
P 1.2.6.5	Stop DC-Freq	2
P 1.2.6.6	Start Freq S1	4
P 1.2.6.7	Start Freq S2	3
P 1.2.6.8	Brake Stop Freq	3.5
P 1.2.6.9	Min Freq Bias S2	3
G 1.3. I/O Parameters		
P 1.3.1	ROA1	Not Used
P 1.3.2	Ain1 Min Volt	0
P 1.3.3	Ain1 Max Volt	10
P 1.3.4	Aout Function	Motor Curr
P 1.3.5	Aout Zero Curr	0
P 1.3.6	Aout Nom Curr	10
G 1.4 Protection		
P 1.4.1	Motor Thermal Prot	Not Used
P 1.4.2	-	0
P 1.4.3	-	40
P 1.4.4	-	45
P 1.4.5	-	100
G 1.5 Expert		
P 1.5.1	Slow Down Mode	Fast PowerUp
P 1.5.2	S-Curve	0
P 1.5.3	Ramp Stretching	0
P 1.5.4	Switching Freq	8
P 1.5.5	Brake Chopper	Run

7.23.10 Speed supervision

Overspeed Monitor is a hoist motion speed supervision unit, which reads the pulse frequency from the hoist motor sensor bearing (48ppr). This pulse frequency is compared with a fixed oscillator frequency. As a result of frequency comparison, there are two different speed supervision functions :

- overspeed supervision (rush control)
- stall supervision

Overspeed supervision is totally implemented by hardware.
Switch S1 multiplies the overspeed detection frequency set by switch S2. There are 3 values available as multiplier from switch S1. x0.5/x1/x2.
Switch S2 sets the detection frequency. Value can be selected stepless between values 1.5 and 3 kHz.
With switches S1 and S2 the overspeed detection frequency can be set between values 0.75 and 6 kHz.

Overspeed detection level should be set to 120% of nominal speed of motor.

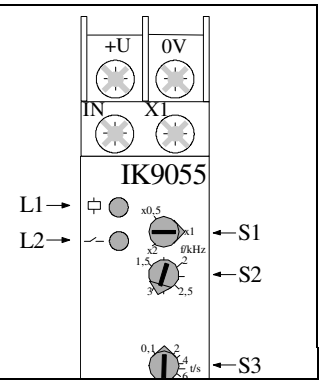
Stall supervision stops the motion if there are no pulses coming from the sensor within set time after the brake is open. Stall supervision time can be set with switch S3 between values 0.1 and 10 s. Time should be set to value 1s, line between 0.1 and 2.

Led L1 indicates the state of incoming pulse. Green light means: pulse is down. Red light means : pulse is up.
Led L2 indicates the state of output relay of Overspeed Monitor. Green led means: Hoisting is ok and relay between terminals 11 and 14 is closed. Orange led means: Overspeed or stall fault is detected and relay between terminals 11 and 14 is open

7.23.10.1 Overspeed Monitor adjustment

- Check maximum hoisting speed of application.
- Set with parameter P1.1.5. maximum Freq to value “Set up driving freq” from table
- Set parameter V2.10. visible on display
- Set switch S1 to value x0.5 and switch S2 to value 3 kHz.
- Drive with maximum speed
- Decrease value of switch S2 inch by inch until Overspeed Monitor trips.
  This should happen with value about “Estimated detection freq” from table
- Set switch S1 to value x1
- Set with parameter P1.1.5. maximum Freq back to original value according the application
- Set stall supervision time with switch S3 to value 1s.
- Check setting by driving at maximum speed to both directions, Overspeed Monitor should not trip

Max hoisting speed in application		Set up driving freq	Estimated detection freq
m / min	feet / min		
8,0	26,2	60,00	2,7
7,5	24,6	56,25	2,5
7,0	23,0	52,50	2,3
6,5	21,3	48,75	2,1
6,0	19,7	45,00	1,9
5,5	18,0	41,25	1,7
5,0	16,4	37,50	1,5
4,5	14,8	33,75	1,3
4,0	13,1	30,00	1,1
3,5	11,5	26,25	0,9



3,0	9,8	22,50	0,7
2,5	8,2	18,75	0,5
2,0	6,6	15,00	0,3
1,5	4,9	11,25	0,1

hoisting speed	
m / min	Frequency / Hz
8,0	100
7,5	93,75
7,0	87,5
6,5	81.25
6,0	75
5,5	68,75
5,0	62,5
4,5	56,25
4,0	50
3,5	43,75
3,0	37,5
2,5	31,25
2,0	25
1,5	18,75
1,0	12,5
0,5	6.25

7.23.11 Drawings

7.23.11.1 Description of terminals X1

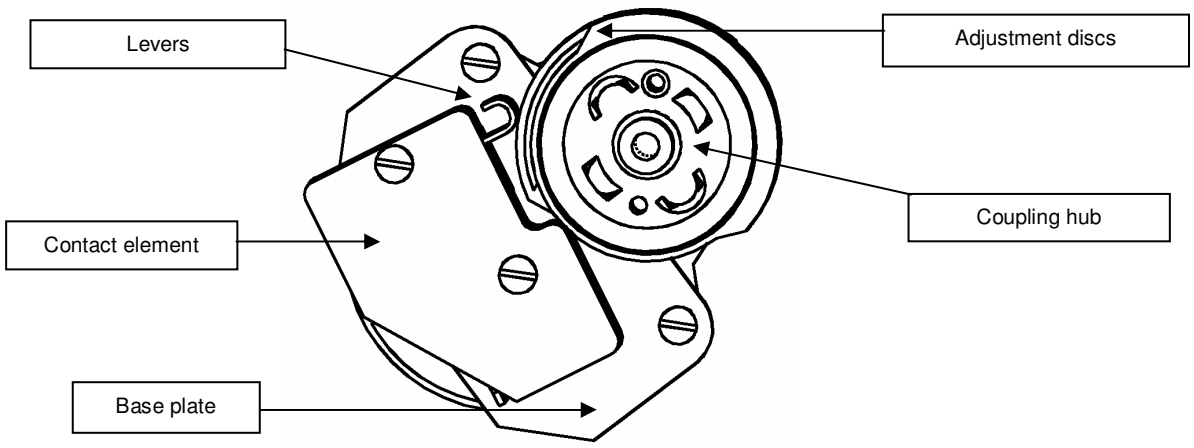
BOTTOM LEVEL			**UPPER LEVEL**		
No	**Name**	**Description, signal level**	**No**	**Name**	**Description, signal level**
	PE				
91	L11	Power supply to trolley, phase 1	L1	L1	Power supply, phase 1
92	L12	Power supply to trolley, phase 2	L2	L2	Power supply, phase 2
93	L13	Power supply to trolley, phase 3	L3	L3	Power supply, phase 3
B+	R+	Braking resistor	U/T1	U/T1	Motor output, phase 1
R-	R-	Braking resistor	V/T2	V/T2	Motor output, phase 2
			W/T3	W/T3	Motor output, phase 3
	PE				
DOLD, OVERSPEED MONITOR					
1	OLE	Control voltage fuse			
1	OLE	External control voltage, 48/115/230Vac	6	MT S1	Motor trolley, direction 1
1	OLE	External control voltage, 48/115/230Vac	7	MT S2	Motor trolley, direction 2
2	ROS	Relay output of speed detection device	8	MT SP2	Motor trolley, SP2/AP
3	DID4 (S12)	Stop limit signal, direction 1	9	ONE	Neutral of external control voltage OLE
4	DID5 (S22)	Stop limit signal, direction 2	9	ONE	Neutral of external control voltage OLE
5	ES	External Stop	10		
	PE				

7.23.11.2 Description of terminals X2

N°	Name	Description, signal level
2	ROS	Relay output of speed detection device
2	ROS	Relay output of speed detection device
3	DID4 (S12)	Stop limit signal, direction 1
4	DID5 (S22)	Stop limit signal, direction 2

7.24 Description of Gear limit switch

It is situated into the electric panel of the hoist
Or into the subsidiary panel
Or behind the brake cover
and is adjusted in our works.
This device prevents the operation of torque limiter as upper and lower gear limit switch.
Less solicited, this device is subject to a reduced wear and less adjustment.



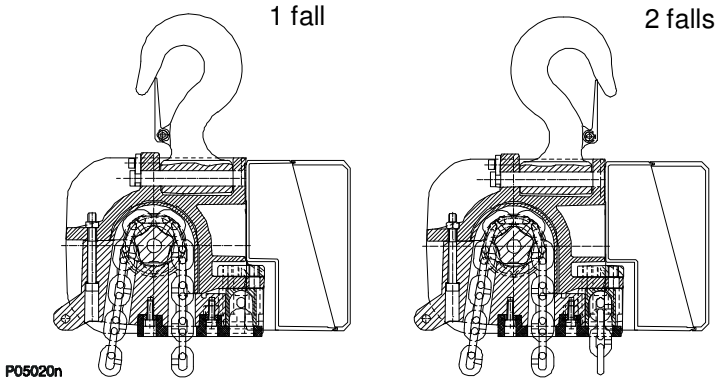
To modify this setting or to change it (after load chain replacement for example), proceed as follow :
7. For upper limit switch : Move the external adjustment disc
8. For lower limit switch : Move the internal adjustment disc
9. Check the rotation direction of the disc by operating the hoist
10. Each disc includes two movable sectors independent from the other, one red, one grey

Move each of the two, red and grey, discs in the desired direction, keeping a gap of 10 mm between the two discs.(1). Control the limit switch operates in the good position. If not, readjust.
If your hoist is fitted with a chain bucket, you can adjust the upper limit switch so that the load does not touch the bucket.

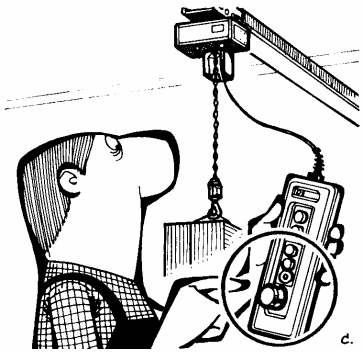
(1) When lever is down, the hoist can move.
When lever is up, the hoist is stopped.

8 Installation of hoist (3 phases)

The service life of the hoist depends on the way it is installed.
The instructions in this manual must be followed carefully for the installation, use and maintenance of the hoist.
Any use contrary to our instructions can be dangerous. In this case, the manufacturer will not accept any responsibility.
Do not use the hoist until this manual has been fully read and assimilated.
Always keep this manual near the hoist, available to the operator and the person in charge of maintenance.
Make sure that the safety rules are followed *(harness, clearance of work areas, posting up of instructions to be followed in the area...).*



Carry out :
The electrical connection
(refer to : Electrical connection).
Fitting of the chain bucket
(refer to : Chain bucket).
Check that the suspension hook is correctly positioned, depending on whether for 1 or 2 falls.
Check that the tightening torques of the hook blocks, locking plates and chain guide conform to the torques indicated in this manual
(refer to : Screw tightening torques).
Check that the chain is not twisted.
Check that the slack fall stop is correctly attached
in the chain bucket and that the fixed point and the 2-fall chain are correctly held.
Measure the dimension of the opening of the suspension hooks and the hook block. Note it for a follow-up.
Once these checks have been completed, proceed as follows (be ready to press the emergency stop button at all times).



Oil and start to run in the chain by a few movements without load.
Check, when not under load, that the movement of the hook corresponds to the direction of the arrows on the control box.
If not, invert 2 supply phases.
Check the operation of the brake: lift up a nominal load and then lower it.
Check the operation of the limit switch.
Carry out dynamic tests with +10% of the nominal load and static tests with + 25% of the nominal load on your installation equipped with our hoist.

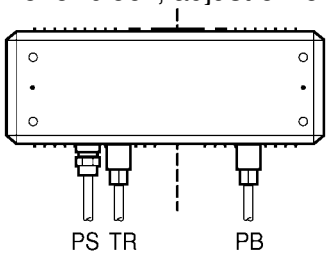
8.1 Electricity

Before any operation on the electric box, check that the hoist supply is disconnected.

An isolator switch should be installed at a maximum of 6 meters from the hoist.

8.1.1 Electrical connection

The customer must supply the power supply cable, the main fuses and the main isolator switch (refer to the wiring diagram).
Check that the mains system is correct for the hoist.
Check that the voltage does not vary by more than ± 5% from the nominal value.
Neutralize the electric sources.
Make sure that the main hoist electric power switch is off.
Do not use binding posts (luster terminals, etc.) to connect the power supply cable to the hoist.
Do not use rigid cable or cable with a section different to that indicated below to supply the hoist.
Never shunt the isolators, the power switches or the limitation or prevention equipment.
Never block, adjust or remove the limit stops or switches to go higher or lower than these allow.



PS: Power supply
TR: Trolley connection
PB: Control box connection

8.1.2 Connection :

- Remove the control box cover.
- Insert the cable (PS) into the box through the PG cable gland.
- Connect phases L1 - L2 - L3, and the ground wire to the terminal board X1(see 9.2).
- Check that the terminals are correctly tightened.
- Close the box.
- Check the hoist operation

Minimum cable sections :

Power supply :	1.50 mm^2
Auxiliary current :	0.75 mm^2
Control box/hoist :	1.00 mm^2
Fuses for control voltage :	
Fuses for power supply :	See electric drawings
- 230 V :	
- 400 V :	

The supply cable must be equipped with a power switch or an isolator in conformity with the regulation.

The supply cable and main isolator switch must be supplied by the customer.

8.2 Lifting assembly

Only a genuine, manufacturer's chain may be used.

Never use the lifting chain as a sling.

Never twist the lifting chain.

Do not bundle the chain into the chain bucket.

Always keep the chain clean and oiled and check that it is in good condition every day.

8.2.1 Slack fall stop (in the chain bucket)

The slack fall stop is a safety component, not a functional one.

A correct length of chain is required to avoid using it.

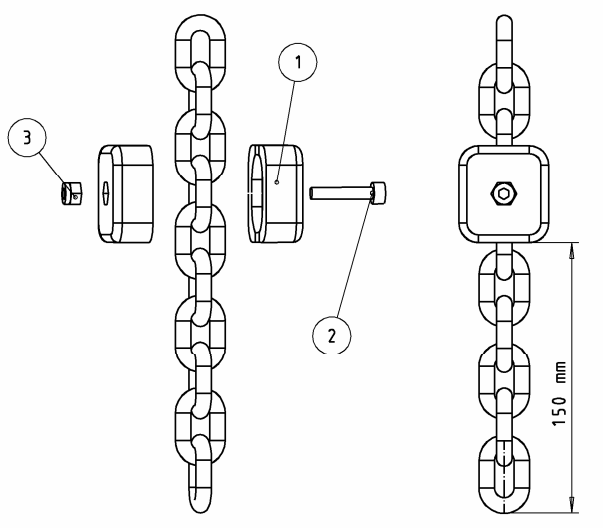
REMOVAL:

- Remove the nut.(3)
- Remove the screw.(2)
- Remove the two halves of the stop.(1)

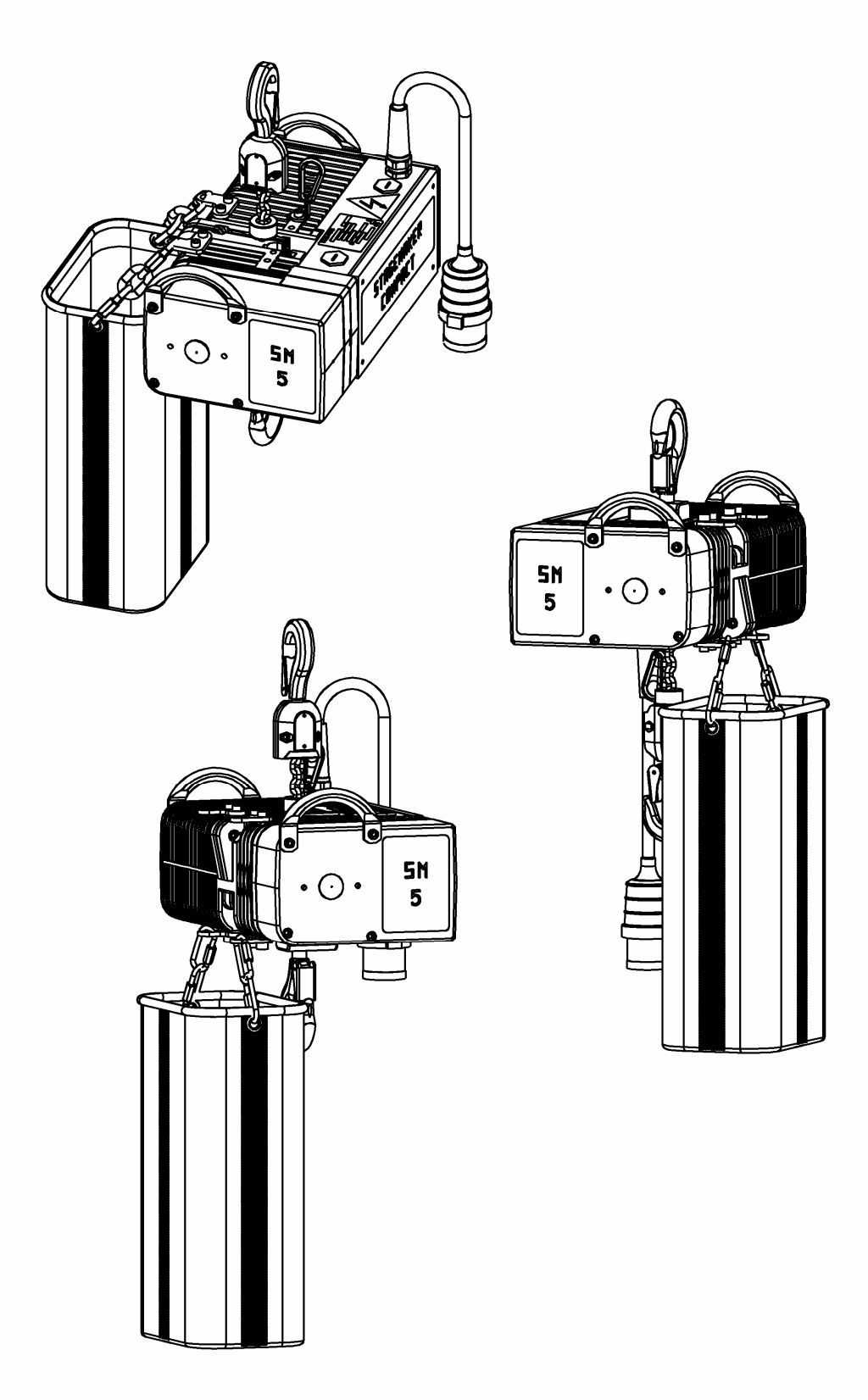
REPLACEMENT:

- Check that there is at least 150 mm of chain under the slack fall stop.
- Position the two halves of the stop around the chain.(1)
- Insert the screw and put the nut.(3)(2)

Make sure that the stop is correctly fitted. The locking tube should be turned towards the hoist.

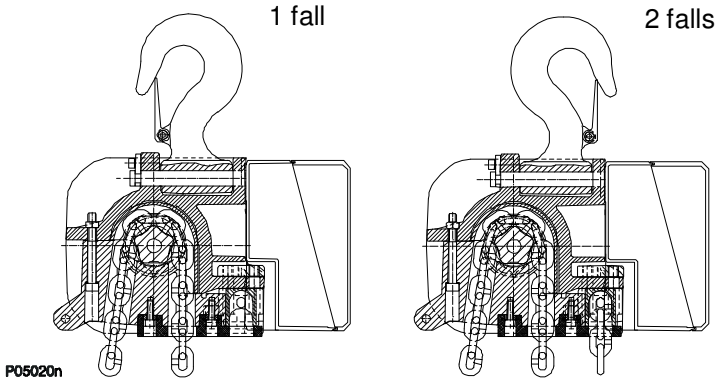


8.2.2 Chain bucket

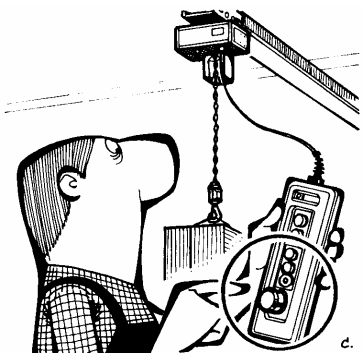


9 Installation of hoist (Stepless)

The service life of the hoist depends on the way it is installed.
The instructions in this manual must be followed carefully for the installation, use and maintenance of the hoist.
Any use contrary to our instructions can be dangerous. In this case, the manufacturer will not accept any responsibility.
Do not use the hoist until this manual has been fully read and assimilated.
Always keep this manual near the hoist, available to the operator and the person in charge of maintenance.
Make sure that the safety rules are followed *(harness, clearance of work areas, posting up of instructions to be followed in the area...).*



Carry out :
The electrical connection
(refer to : Electrical connection).
Fitting of the chain bucket
(refer to : Chain bucket).
Check that the suspension hook is correctly positioned, depending on whether for 1 or 2 falls.
Check that the tightening torques of the hook blocks, locking plates and chain guide conform to the torques indicated in this manual
(refer to : Screw tightening torques).
Check that the chain is not twisted.
Check that the slack fall stop is correctly attached
in the chain bucket and that the fixed point and the 2-fall chain are correctly held.
Measure the dimension of the opening of the suspension hooks and the hook block. Note it for a follow-up.



Once these checks have been completed, proceed as follows (be ready to press the emergency stop button at all times).
Oil and start to run in the chain by a few movements without load.
Check, when not under load, that the movement of the hook corresponds to the direction of the arrows on the control box.
If not, invert 2 supply phases.
Check the operation of the brake: lift up a nominal load and then lower it.
Check the operation of the limit switch.
Carry out dynamic tests with +10% of the nominal load and static tests with + 25% of the nominal load on your installation equipped with our hoist.

9.1 Electricity

In case of IT network, remove the filter FU1 before any operation

Before any operation on the electric box, check that the hoist supply is disconnected.

An isolator switch should be installed at a maximum of 6 meters from the hoist.

9.1.1 START-UP PROCEDURE

If any problems or malfunctions occur during the start-up, refer to Chapter *"Troubleshooting"*, to find out the reason. All problems must be solved before continuing.

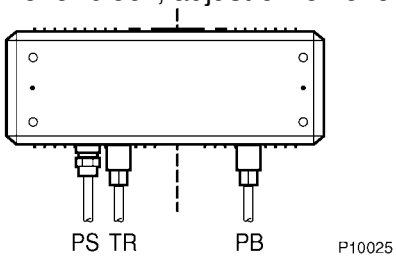
Warning! High voltages inside device. Wait for at least five minutes after the supply voltage has been switched off before service actions. Display in operating condition (lights on) indicates a dangerous voltage on the DC-bus. When display turns off, the DC-bus voltage is about 100V. Note also that there is a dangerous voltage in the braking resistor always when the DC-bus is charged.

Do not connect any voltage to the output terminals (U, V, W). Otherwise, the inverter will be damaged.

The overload protection protects both the supply and the motor cables. The supply fuses provide short circuit protection.

9.1.2 Electrical connection

The customer must supply the power supply cable, the main fuses and the main isolator switch (refer to the wiring diagram).
Check that the mains system is correct for the hoist.
Check that the voltage does not vary by more than ± 5% from the nominal value.
Neutralize the electric sources.
Make sure that the main hoist electric power switch is off.
Do not use binding posts (luster terminals, etc.) to connect the power supply cable to the hoist.
Do not use rigid cable or cable with a section different to that indicated below to supply the hoist.
Never shunt the isolators, the power switches or the limitation or prevention equipment.
Never block, adjust or remove the limit stops or switches to go higher or lower than these allow.



PS: Power supply
TR: Trolley connection
PB: Control box connection

9.1.3 Connection :

- Remove the control box cover.
- Insert the cable (PS) into the box through the PG cable gland.
- Connect phases L1 - L2 - L3, and the ground wire to the terminal board X1(see 9.2).

- Check that the terminals are correctly tightened.
- Close the box.
- Check the hoist operation

Minimum cable sections :

Power supply :	2.50 mm^2
Auxiliary current :	0.75 mm^2
Control box/hoist :	1.00 mm^2
Fuses for control voltage :	See electric drawwings
Fuses for power supply :	
- 230 V :	
- 400 V :	

Wires through ferrite : Z1 = 2 times / Z2 = 1 time

9.1.4 Checks before the first test run

- Turn on power from main switch and control voltage switch.
- Within about 1 second the control panel should have display.
- In a fault situation the red “FAULT” status indicator blinks and the display shows a fault code instead of frequency.
- Check that green “RUN” status indicator is off.
- Check that external connections and selected control parameters are according to application.

The supply cable must be equipped with a power switch or an isolator in conformity with the regulation.

9.1.5 Test run without load

- Make sure that movement will not cause any danger to the environment or to the crane itself. Avoid driving close to the limit areas.
- Check limit switches manually if possible.
- Check the run commands on the display panel and correct the hoisting direction. The arrow rotates clockwise if S1 is applied and counter-clockwise if S2 is applied.
- Drive direction S1 at minimum speed for 5 to 10 seconds. Accelerate to full speed. Run 5 to 10 seconds. Stop. Repeat the same in direction S2. Check the frequency display to make sure that the frequency changes through the whole operational frequency range from minimum to nominal speed.
- Check motor operation (acceleration, deceleration and braking): accelerate to full speed direction S1, change to full speed direction S2 and full speed direction S1 again and stop.
- Check limit switch functions: drive direction S1 slowly and check the limit switch operations. Re-check using full speed. Repeat the same check for direction S2.

9.1.6 Test run with load

- Make sure that movement will not cause any danger to the environment or to the crane itself.
- Drive in both directions at minimum and maximum speeds.

9.1.7 Test run with overload

If an overload test has to be performed during crane commissioning, minimum frequency should be raised for duration of the commissioning to 20Hz. Minimum frequency can be changed with parameters P1.1.4. After testing, minimum frequency should be changed back to its original value.

9.1.8 After the test run

- Record all parameter value changes in the parameter list.

- Make sure all remarks and setting values are recorded.

It is recommended to store the parameter settings in file User parameters, see Chapter *"User parameters"*.

☞ The supply cable and main isolator switch must be supplied by the customer.

10- Maintenance – Replacement of hoist

10.1 Maintenance table

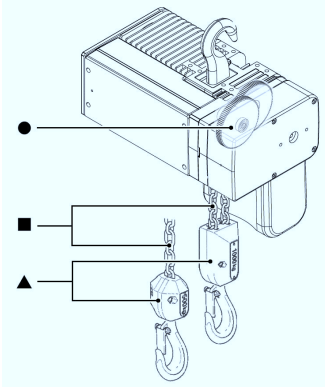
Check	Interval *	Qualification of the customer's personnel
Brake operation	Daily	Operator
Visual inspection of the chain	Daily	Operator
Suspension of the control box by the steel wire	Daily	Operator
Cleanness and lubrication of the chain	Monthly	Operator
Slipping clutch operation	Monthly	Operator
End limit switches operation	Every 3 months	Operator
Measuring of the wear on the chain	Every 3 months	Operator
Measuring of the wear on the hooks	Annually	Qualified mechanic
Tightening of the hook block screws	Every 3 months	Operator
Visual checking of hook and hook bottle	Every 3 months	Operator
Checking of the locking plate screws	Annually	Operator
Checking of the tightness of the brake screws	Annually	Qualified mechanic
Lubrication of the idler sprocket	Annually	Operator
Checking of the screw tightening torques and checking for signs of corrosion	Annually	Qualified mechanic
Adjustment of the slipping clutch and brake	Annually	Qualified mechanic
Lubrication of the gears	Lubricated for life	

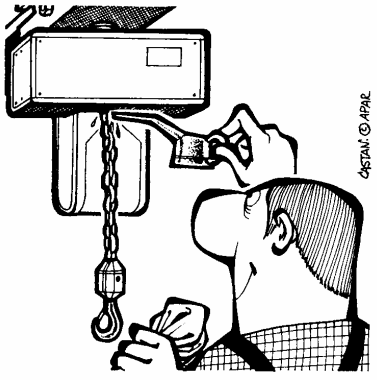
*** These intervals should be shortened depending on the national regulations.**

These intervals should be shortened if the hoist is used a lot, if it is used with maximum loads or in difficult ambient conditions.

10.2 Lubricants

Lubrication point	Specifications	Possible brands	Quantity
Chain ■	Oil or liquid grease	Chain lubricating fluid (Ceplattyn or similar)	As required
Idler sprocket ▲ slide bearing + bearing	Grease (**without MoS2**) KP 2 (DIN 51 502) Soap-based lithium Approx. drip point + 260°C Worked penetration 265 - 295° Operating temperature - 20°C à + 130°C	**Aral** : Aralub FK 2 **BP** : BP Energrease LS - EP 2 **Esso** : Unirex N2 **Mobil** : Mobilgrease HP **Shell** : Shell Alvanio EP Grease 2 **DEA** : Paragon EP 2 **Fuchs** : Renolit Duraplex EP 2	As required
Gears ●		**MOBIL :** MOBILITH SHC 460	12 cl



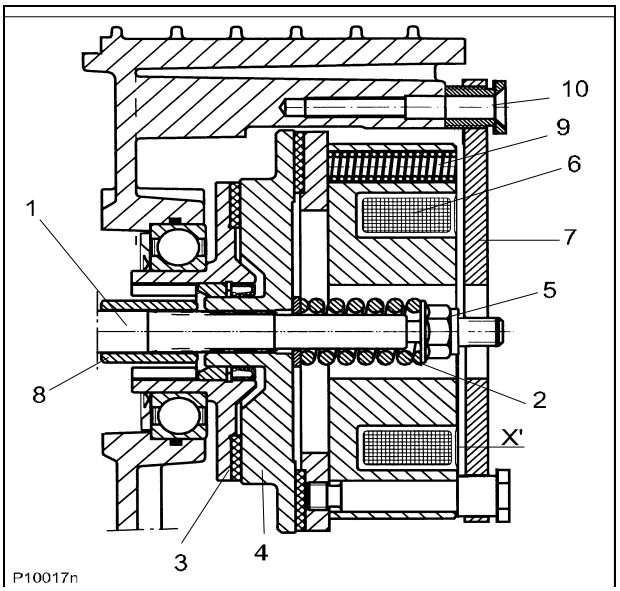


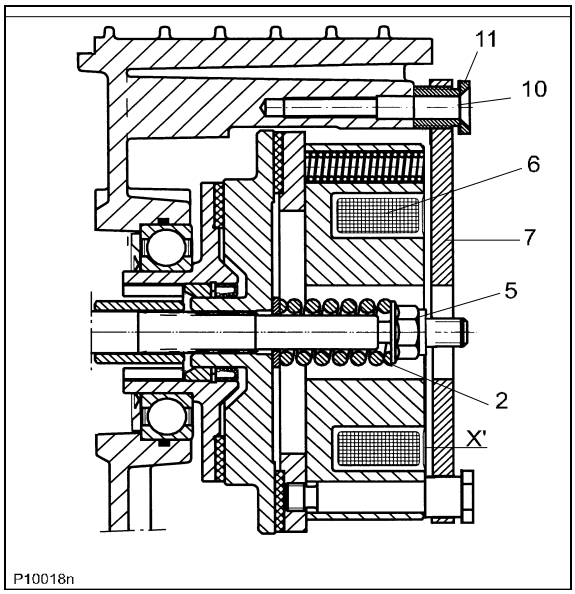
Oil the chain regularly

10.3 Brake/slipping clutch assembly

10.3.1 Operation

The parts of slipping clutch are mounted free on the gear input shaft (1). Other brake parts are mounted on the brake cap.
The spring (9) keeps a pressure between the slipping clutch lining (4) and brake disc (3).
The nut (5) maintains the assembly on the gear input shaft.
When the coil (6) is energized, during lifting or lowering, it pulls against the anchor disk (7) *(releasing the brake disk (4) there is a play X for this purpose).*
The disks (3 and 4) turn freely, transmitting the movement to the pinion (8).
Braking occurs when the coil is no longer energized and the springs (9) drive back the coil and its lining against the brake disk (4).





10.3.2 Adjustment of the slipping clutch:

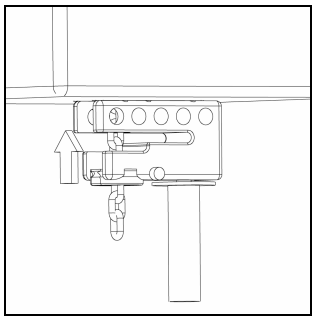
- Hook a load of 1.25 times the nominal load into the hoist.
- Remove the brake endcap and the sealing.
- Raise the load at slow and fast speed.
- Use a key to turn the adjusting nut (5) in the required direction.
  – Turn the nut clockwise to increase the torque.
  – Turn the nut counterclockwise to decrease the torque.
- Repeat steps 3 and 4 until the load can barely be lifted at fast speed. The slipping clutch is now adjusted.
- Fit the sealing and the brake end cap.
- Check, at fast speed, the lifting of a nominal load.

☞ Remind : The value of the factory setting is 1,4 x the nominal load because friction lining are not running in yet.

✋ **When the slipping clutch is adjusted the brake end cap must be removed and the motor must not be running.**

Do no touch the moving components. Before pressing the "lift" button on the control box, check that there is nothing in contact with the adjusting nut *(key, for example).*

To adjust the slipping clutch, it is recommended to use the chain force measuring device. Nevertheless, it is possible to use loads.



10.3.3 Adjustment of the brake

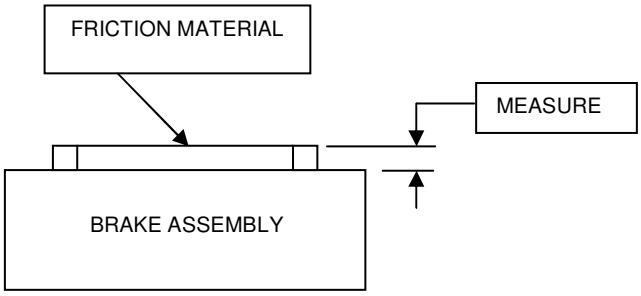
- Before starting the adjustment, remove the load and switch off the power supply.
- Remove the brake endcap and the sealing.
- Use feeler gauge to measure the air gap (**X'**) between the anchor disk (7) and the electromagnet at least three points around the electromagnet.
- To adjust the brake :
  - Unscrew one of the locking screw (10).
  - Adjust the air gap by turning the adjusting screw (11) counterclockwise to reduce the airgap, clockwise to increase it.
  - Tighten the locking screw (1).
  - Make the same operation with the 2 other adjustment points.
  - Control the air gap adjustment all around the magnet.
- Check the operation of the brake
- Fit the sealing and the brake end cap

Brake air gap	Minimum air gap (mm)	Maximum air gap (mm)
Between brake disk (7) and coil (6)	X = 0.20	X = 0.50

To replace the brake/slipping clutch assembly, the electromagnet supply wires inside the electric box must first of all be disconnected.

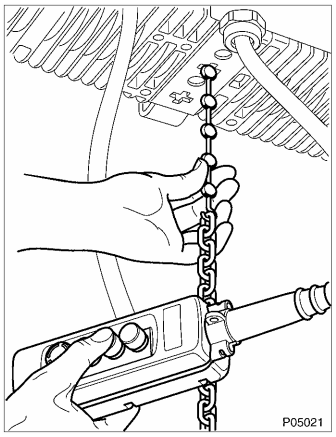
10.4 Thickness of brake lining

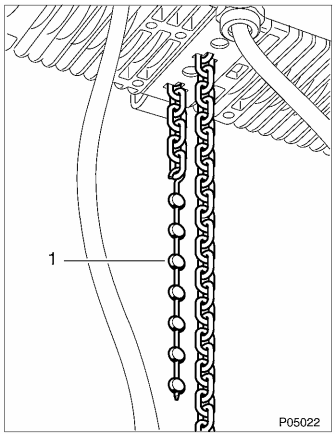
Thickness as new	Replace when
1,4 mm	**0,4 mm**



10.5 Chain

10.5.1 Removal of the chain





1-fall chain :

- Remove the load from the hook.
- Disassemble the hook block.
- Lower the chain into the chain bucket.
- Remove the chain bucket and unscrew and remove the lower chain guide.

2-fall chain :

Raise the hook block to about 30 cm from the hoist body.

- Remove the chain bucket.
- Carefully remove the lower chain guide.
- Disassemble the fixed point of the chain.
- Remove the 2-fall hook block, without disassembling it, letting the chain run through it.
- Let the rest of the chain slide through the chain sprocket.

10.5.2 Replacement of the chain

The chain should always be fitted using the flexible plastic insertion tool (1). Use of this tool always ensures that the chain is fitted correctly.

Don't forget to put the rubber rings around the chain when changing it.

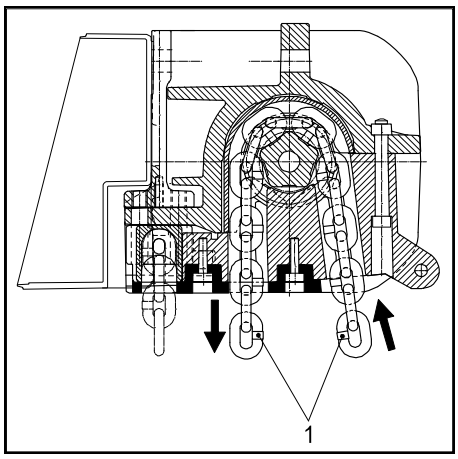
The metallic ring must be oriented towards the hoist body.

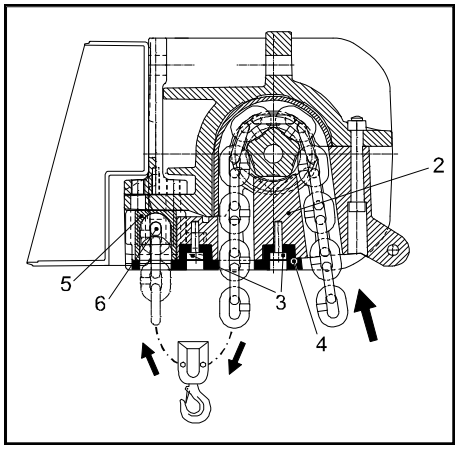
1-fall chain :

- Insert the last link in the small plastic hook of the insertion tool.
- Insert the other side of the tool in the sprocket, chain bucket side.
- Raise the chain at slow speed so that the tool and the chain come out the other side of the sprocket.

2 – fall chain :

- Insert the last link in the small plastic hook of the insertion tool.
- Insert the other side of the tool in the sprocket, chain bucket side.
- Raise the chain at slow speed so that the tool and the chain come out the other side of the sprocket. Continue until about 50 cm of chain are visible.
- Put the chain through the idler sprocket, taking care not to twist the chain
- Carefully remove the chain anchor (5) removing the 4 screws. Take out the pin (6).
- Insert the end of the chain into the hole of the chain anchor.
- Insert the pin (6) into the hole of the chain anchor.
- Insert the chain anchor and tighten the 4 screws (torque 20 Nm).





10.5.3 Measuring the wear on the chain

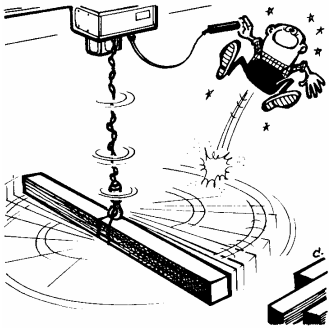
This should be done by measuring the dimensions, at several points of the chain, of one link (d) and (t), and over 11 links (11 t).
Maximum wear allowed :

Minimum link thickness allowed (d) :	6.10 mm
Maximum pitch allowed (t) :	18.70 mm
Maximum length allowed (11 t) :	199.70 mm

☞ If these limits are exceeded**, the chain must be replaced immediately**. In this case, the wear on the guide chain and chain sprocket should also be checked and they should be replaced if necessary.

☞ If a single link is defective in any way whatsoever, **the chain must be replaced**

A repetitive stop and start at the same point of the chain will create a more important wear on the 2-3 links which are in the chain sprocket



Never twist the lifting chains

(Turning around of the hook block)

10.6 Suspension hook

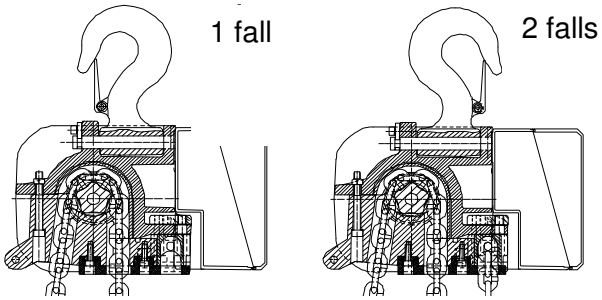
Removal :

- Remove the screw and the locking plate.
- Remove the two pins. Take the hook out.

Replacement :

- Put the hook into its housing.
- Place the two pins inside the hook
- Fit the screw and the locking plate without forgetting the safety washer.

☞ The hook should be set depending on 1/1 and 2/1 revings.



10.6.1 Measurement of the wear on the suspension and lifting hooks

(see hook certificate)
The wear on the suspension and lifting hooks should be checked regularly. Damage safety catches should be replaced immediately.
If the maximum dimension (**a2**) on the lifting hook is greater than the initial dimension by more than 15%, the hook should be replaced immediately.

Class :	025	050
a2, max. allowed :	30 mm	39 mm

10.7 Spare parts replacement table

Further to a long storage time or during annual service, check the function and the setting of the safety devices (brake, end limit switch, slipping clutch…). If any component is deformed, or if abnormal wear is noticed, the pieces must be changed.

Disconnect the power supply before replacing any parts.

Spare part	To be replaced by	Qualification of the personnel
Upper chain guide	Authorized manufacturer personnel	Qualified electrician
Output shaft	Authorized manufacturer personnel	Qualified electrician
PG cable gland	Authorized manufacturer personnel	Qualified electrician
Motor input shaft + adjusting nuts	Authorized manufacturer personnel	Qualified mechanic
Motor end cap	Authorized manufacturer personnel	Qualified mechanic
Gearing (1st/2nd stage)	Authorized manufacturer personnel	Qualified electrician
Brake cap/end cap sealing	Customer	Qualified mechanic
Other sealing and O-rings	Authorized manufacturer personnel	Qualified mechanic
Brake-slipping clutch	Authorized manufacturer personnel	Qualified electrician
Brake end cap	Customer	Qualified mechanic
Lower chain guide	Customer	Qualified mechanic
Rubber buffer	Customer	Qualified mechanic
Electric box	Authorized manufacturer personnel	Qualified electrician
PC-board	Authorized manufacturer personnel	Qualified electrician
Plugs	Customer	Qualified electrician
Chain	Customer	Qualified mechanic
Chain bucket	Customer	Qualified mechanic
Slack fall stop	Customer	Qualified mechanic
Suspension hook	Customer	Qualified mechanic
Hook block (1/1; 2/1)	Customer	Qualified mechanic
Control box	Customer	Qualified electrician

Once a part has been replaced, check the operation of the hoist.

10.8 Screw tightening torques (Nm)

	M5	M6	M8	M10	M12	Plastic*
Standard screws	6	10	24	48	83	1
Self-tapping screws	5	8	20	40	72	1

(*) Screws for fixing plastic parts

10.9 Discarding the hoist

Once the hoist has been used for the FEM class duration, all of the components must be checked by an authorized agent or by the manufacturer. The hoist should no longer be used, *unless agreement is obtained from the authorized agent or the manufacturer*.

☞ Remove all greases and oils from the hoist before discarding it.

11– Troubleshooting (3 phases)

Problem	Cause	Solution
The chain hoist does not work	• The emergency stop button is activated	• Desactivate it
	• Triggered fuse	• Replace the fuse
	• Temperature control *(optional)* activated	• Allow to cool down
	• Contactor terminal screws loose	• Tighten them
	• Main switch is off	• Turn it on
Impossible to lift the load	• Overload	• Reduce the load
	• Slipping clutch worn or incorrectly adjusted	• Adjust or replace it
Braking path of more than 10 cm	• Brake lining worn	• Adjust the brake and replace the brake components if necessary
The travel direction does not correspond to that indicated on the control box	• The power supply is incorrectly connected	• Change two phases of the power supply
Abnormal noises while the load is being moved	• The chain components are not lubricated	• Lubricate the components
	• Chain is worn	• Replace it
	• Sprocket or chain guide is worn	• Replace the sprocket or chain guide
	• Idler sprocket is worn	• Replace it
	• A supply phase is missing	• Check the connection of the 3 phases

12– Troubleshooting (Stepless)

Problem	Cause	Solution
The chain hoist does not work	• Inverter problem	• See technical documentation
	• The emergency stop button is activated	• Desactivate it
	• Triggered fuse	• Replace the fuse
	• Temperature control *(optional)* activated	• Allow to cool down
	• Contactor terminal screws loose	• Tighten them
	• Main switch is off	• Turn it on
Impossible to lift the load	• Overload	• Reduce the load
	• Slipping clutch worn or incorrectly adjusted	• Adjust or replace it
Braking path of more than 10 cm	• Brake lining worn	• Adjust the brake and replace the brake components if necessary
The travel direction does not correspond to that indicated on the control box	• The power supply is incorrectly connected	• Change order up and down
Abnormal noises while the load is being moved	• The chain components are not lubricated	• Lubricate the components
	• Chain is worn	• Replace it
	• Sprocket or chain guide is worn	• Replace the sprocket or chain guide
	• Idler sprocket is worn	• Replace it
	• A supply phase is missing	• Check the connection of the 3 phases

Warning ! High voltages inside Frequency converter. Wait for at least five minutes after the supply voltage has been switched off before service actions. The display in the operating condition (lights on) indicates a dangerous voltage on the DC-bus. When display turns off, the DC-bus voltage is approximately 100V. Note also that there is always a dangerous voltage in the braking resistor when the DC-bus is charged.

12.1 Field repair actions

The purpose of troubleshooting and field repair actions is primarily to determine whether the drive or external devices in fact cause the problems. After that, the next step is to detect the possibly damaged components inside the drive. If any damage inside the drive is caused by the environment (motor failure, brake failure, power supply problems etc.) it is very important to repair/change faulty items to prevent reoccurring problems.

The best way to repair a faulty inverter is to replace it with a new one. If the fault can be located, it is also possible to replace some of the components. When replacing an inverter or a Control unit with a new one, the parameter list of the existing drive is needed so that the parameter settings can be copied to new the one.

12.2 Typical functional problems

- Inverter does not start when mains are connected.
  Check mains voltage between terminal L1, L2 and L3

- Indicator “Ready” is on and indicator “Fault” is off, but motor does not run.
  Check control mode selection
  Check voltage at run command terminals
  Check state of digital inputs from parameter V2.3

- Indicator “Ready” is on and indicator “Run” is on, but motor does not run.
  Check motor cable connection

- Motor runs poorly
  Check that load is not over nominal
  Check that all cables are connected correctly and the junctions are reliable
  Check that all motor dependant parameters are correct
  Check the voltage of the slowdown limit switch input
  Check state of digital inputs from parameter V2.3
  Check that motor’s brake opens completely
  Check that minimum speed parameters do not have too small values
  For travelling application: check u/f-curve tuning and/or Autotuning. If the main girder is new, it might be necessary to drive trolley several times with no load from end to end, before beginning of u/f-curve tuning and/or Auto tuning.

- Some parameters are not accessible or changing is not possible
  Check that password has value 2156
  Check that parameter value is inside the limits
  Parameter value can not be changed in RUN state
  Parameter value change must be confirmed with “Enter” button

12.3 Inverter fault codes

If any of the following failures is found, the inverter displays the fault code and closes the mechanical brake causing the movement to stop. If several faults occur one after another, the latest one is displayed, the others are stored to fault history page.

When inverter fault supervision trips, the FAULT indicator turns on and the blinking fault code “Fx xx“ (x= fault accounting number, xx = fault code number) appears on the display.
The drive includes an automatic fault reset operation; the fault code stays on the display until the fault is removed and the controller released back to 0-position. Some of the fault codes require to switch the power off before run is possible, for example F1 (overcurrent).

All faults are stored in the Fault History menu except F51 Stop-Limit, from there they can be seen if necessary. The fault history store the last 5 fault codes.

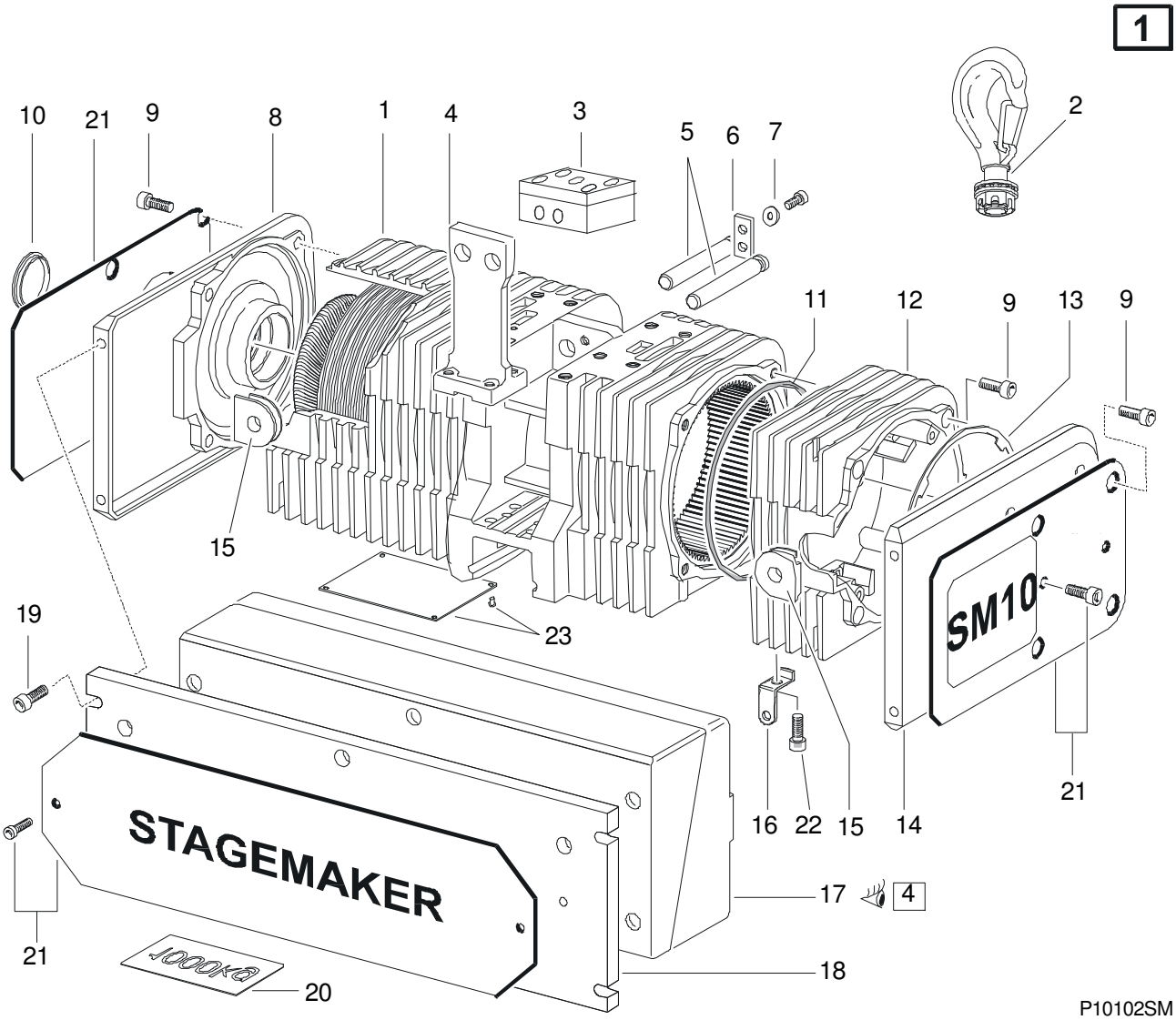
Fault code	Fault	Possible cause	Checking	A	B
F 1	Overcurrent	Inverter has measured too high current (over 4*I_N peak or over 2.8* I_N rms) in the motor output: sudden heavy load increase short circuit in the motor or cable not suitable motor wrong motor parameters	Reset: switch power off and restart after the lamps of display are off. Check: brake operation motor type and power rating parameters motor cable connection motor insulation motor loading		X
F 2	Overvoltage	DC-bus voltage has exceeded 135% maximum level, 911Vdc deceleration time is too short supply voltage raised >1.35 x Un (high overvoltage spikes at mains or not sinusoidal wave form)	Reset has an additional 5s time delay. Check: adjust the deceleration time P1.1.3 longer measure main supply voltage level and wave form while not driving braking resistor cable braking resistor type and resistance braking chopper operation		X
F 3	Earth fault	Current measurement has sensed unbalance in motor phase currents. Supervision level is 5% of inverter nominal current not symmetric load insulation failure in the motor or the cable	Reset has an additional 5s time delay. Check: motor insulation motor cable insulation (phase-ground, phase-phase)		X
F 6	External Stop	ES signal inactive	Check: ES external connections Control mode selection P1.1.11 State of input DID5, V2.3. Thermal protection of motor is normally connected to ES signal, check motor temperature.	X	
F 9	Undervoltage	DC-bus voltage has dropped below 333Vdc mains supply voltage interrupted inverter fault can also cause an undervoltage trip external fault during run may cause an undervoltage trip	In case of temporary supply voltage break, reset the fault and start again. Check mains input. If mains supply is correct, an internal failure has occurred. Contact authorized service center.	X	
F 11	Output phase supervision	Current supervision has sensed that at least one of the motor phases has no current	Check: motor cable connections measure motor phase currents and compare to display value		X
F 13	Inverter undertemperature	Temperature of heat sink is below acceptable operating level -10°C (14°F)	Check ambient temperature	X	

			cubicle heating		
F 14	Inverter overtemperature	Temperature of heat sink is over acceptable operating level +90°C (194°F). Overtemperature warning is issued when the heat sink temperature exceeds +85°C (185°F)	Check: ambient temperature inverter cooling fan operation cooling air flow through heat sink heat sink is not dirty	X	
F 16		Parameter P1.4.1 has value "1" or "2"	Change Parameter P1.4.1 to value "0"		X
F 22 F 23	EEPROM checksum fault	Parameter save error interference fault component failure (control unit)	After power off the inverter will automatically reset parameter settings. The drive does not work properly nor enable driving after this fault. Check: all parameter settings. +24V voltage output loading If the fault comes again, contact authorized service center.		x
F 25	Microprocessor watchdog-fault	interference fault component failure (control unit)	Reset: switch power off and restart after the lamps of display are off. If the fault comes again, contact service center.	X	
F 39	Device removed	Option board removed.	Reset the fault Check option board connection	X	
F 40	Device unknown	Unknown option board or drive.	Check board and drive type.		X
F 41	IGBT temperature	IGBT transistors is calculated to be over heated long duration overload lowered cooling high environment temperature	Reset: switch power off and restart after the lamps of keypad are off. Check: motor loading brake operation inverter heatsink inverter cooling fan operation environment temperature		x
F 44	Device changed	Option board changed.	Reset the fault	X	
F 45	Device added	Option board added.	Reset the fault	X	
F 51	Stop limit	S12 or S22 signal is inactive	Reset: keep controller at zero >300ms. Check control mode selection P1.1.11 Check the state of inputs DID4 and DID5, V2.3 Hoisting application: check Dold settings	X	
F 56	Generator side current limit	The inverter cannot stop with the set ramp stretching, it will stop by brake and show F56 Too short deceleration time	Reset has an additional 5 s time delay. Check: deceleration time	X	
F 60	Parameter fault	"Motor selection" parameter P1.2.2 has value = "Not Used"	Download parameters again		X
F 73	Both drive commands active	S1 and S2 signals on over 500ms in same time The inverter stops according "Stop Function" parameter Short circuit in pendent cable	Check: digital I/O cabling		X

A = Can be done by the user
B = Can be done only by manufacturer authorized personnel

13- Illustrated catalogue

13.1 Casings



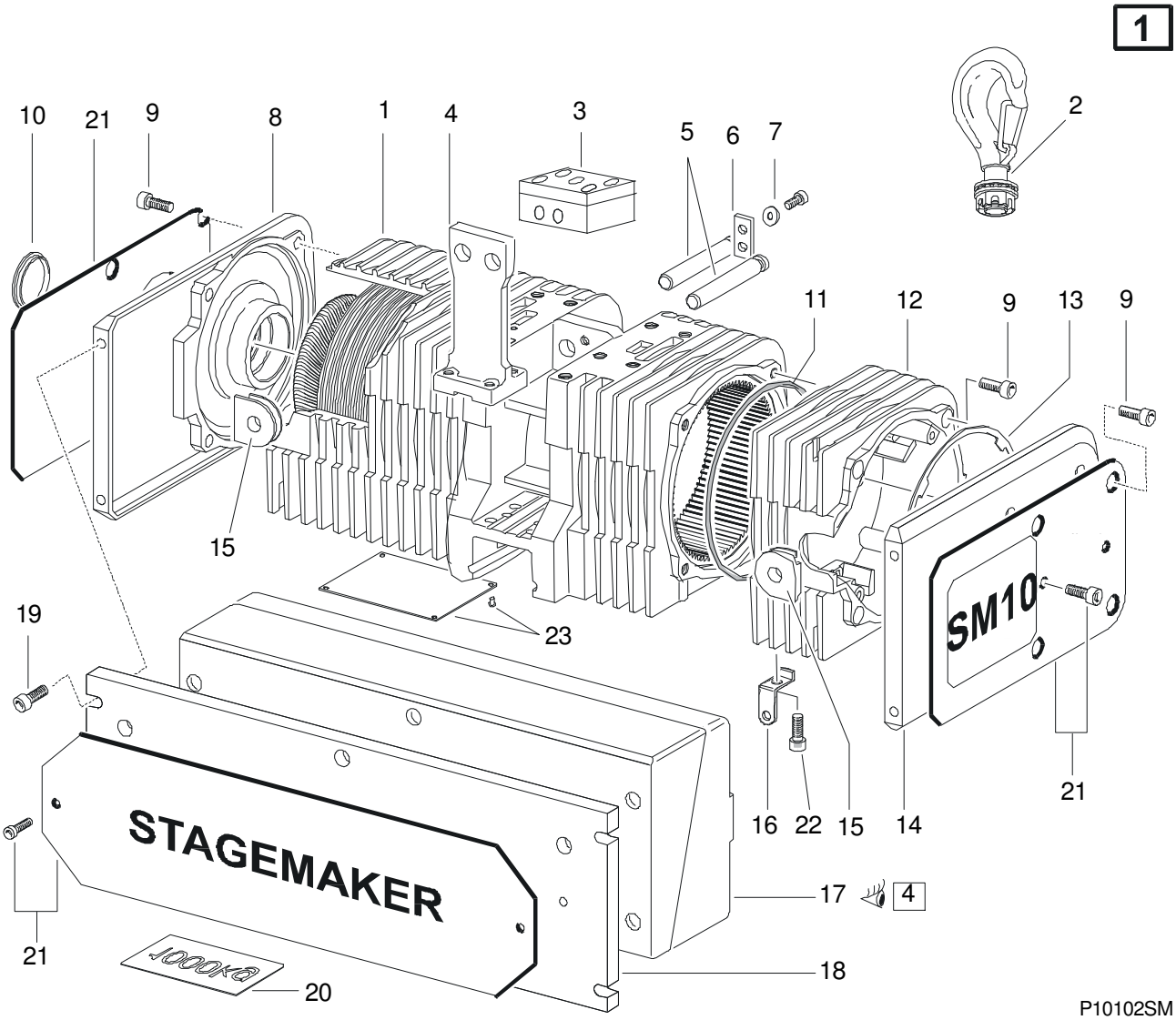
P10102SM

Item	Reference	Description	Qty	Observations
1	2240024	Main casing assembled	1	
2	2247005	Suspension hook (Standard hoist)	1	
2	2242021	Rotating hook	1	
3	52313566	Rotating hook fixing	1	
3 bis	52315372	Spacer for rotating hook	1	
4	2242011	Suspension member	1	
5	2247007	Pin	2	
6	2247008	Locking plate	1	
7	830909	Screw M6x20 DIN 912	1	
	8560610	Safety washer	1	
8	2240005	Motor end cap	1	
9	8110051	Screw M6x20 DIN 7500	12	
10	2218001	Cap	1	

11	8381502	O-ring Ø 2 x 150	1	
12	2240004	Brake cap	1	
13	2240002	Sealing ring	1	
14	2248007	Brake endcap	1	
15	2218004	Cable guide	2	
16	2213020	Cable fastening bracket	1	
17	2243008	Electric box	1	
18	8110051	Counter weight	1	
19	2246051	Screw M 6-20st. DIN 7500-E	4	
20		Load plate	1	when ordering, specify the load
21	2246047	Marking assembly SM10	1	630 to 2000kg
22	830905	Screw M8-20DIN7500-E	1	
-	52320470	Rotating handles	2	

14- Illustrated catalogue (Stepless)

14.1 Casings

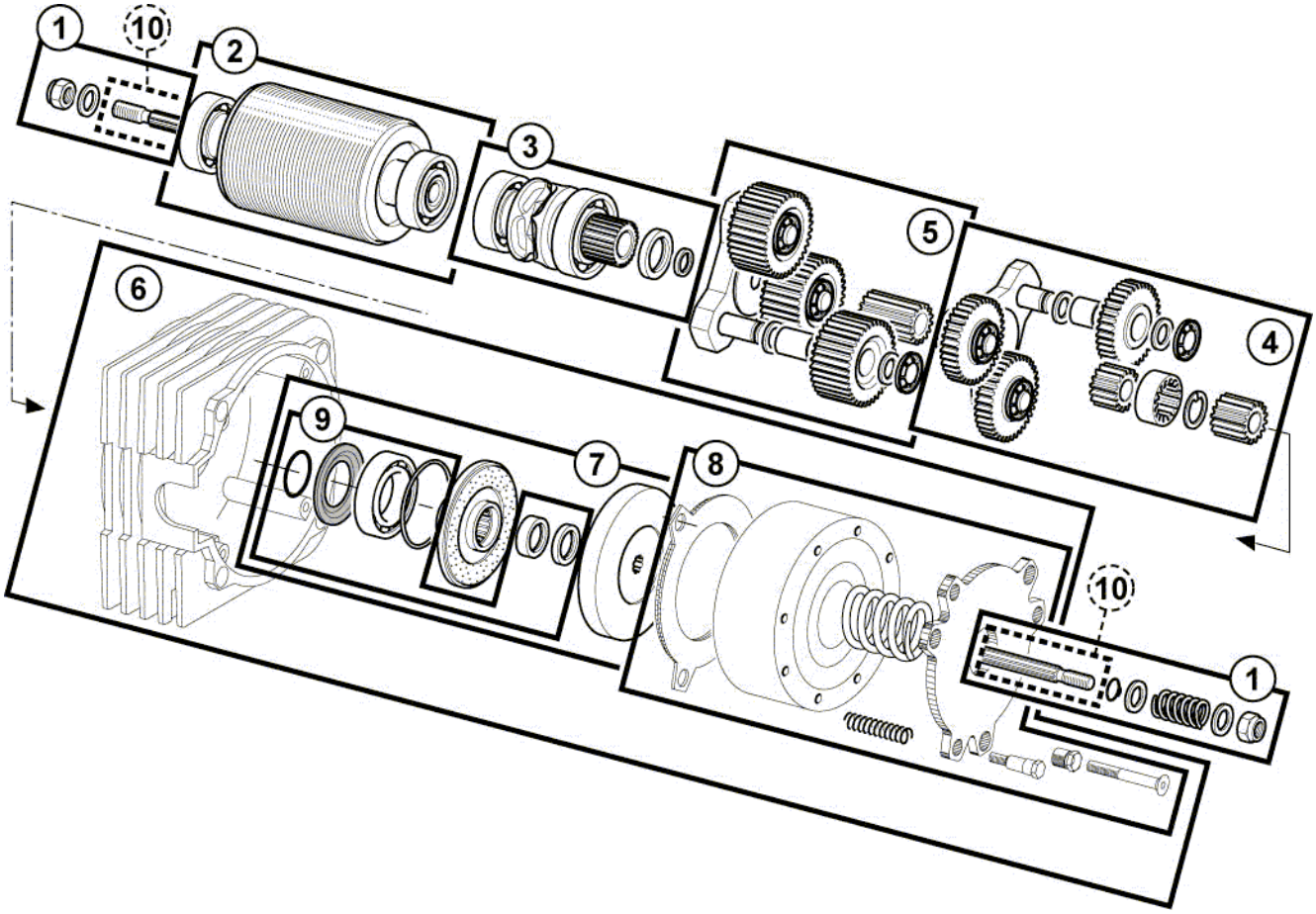


P10102SM

Item	Reference	Qty	Description
1	52326387	1	Casing with stator step less speed 400V/100Hz with thermal protection
2	2247005	1	Suspension hook
2	2242021	1	Rotating hook
3	52313566	1	Rotating hook fixing
3 bis	52315372		Spacer for rotating hook
4	2242011	1	Suspension member
5	2247007	2	Pin
6	2247008	1	Locking plate
8	52326388	1	Motor end cap assembly
8a	52320957	1	Fixing plate for sensor bearing
10	2218001	1	Cap
11	2240013	1	Sealing ring and O-ring for brake cap
12	2240011	1	Brake cap assembly

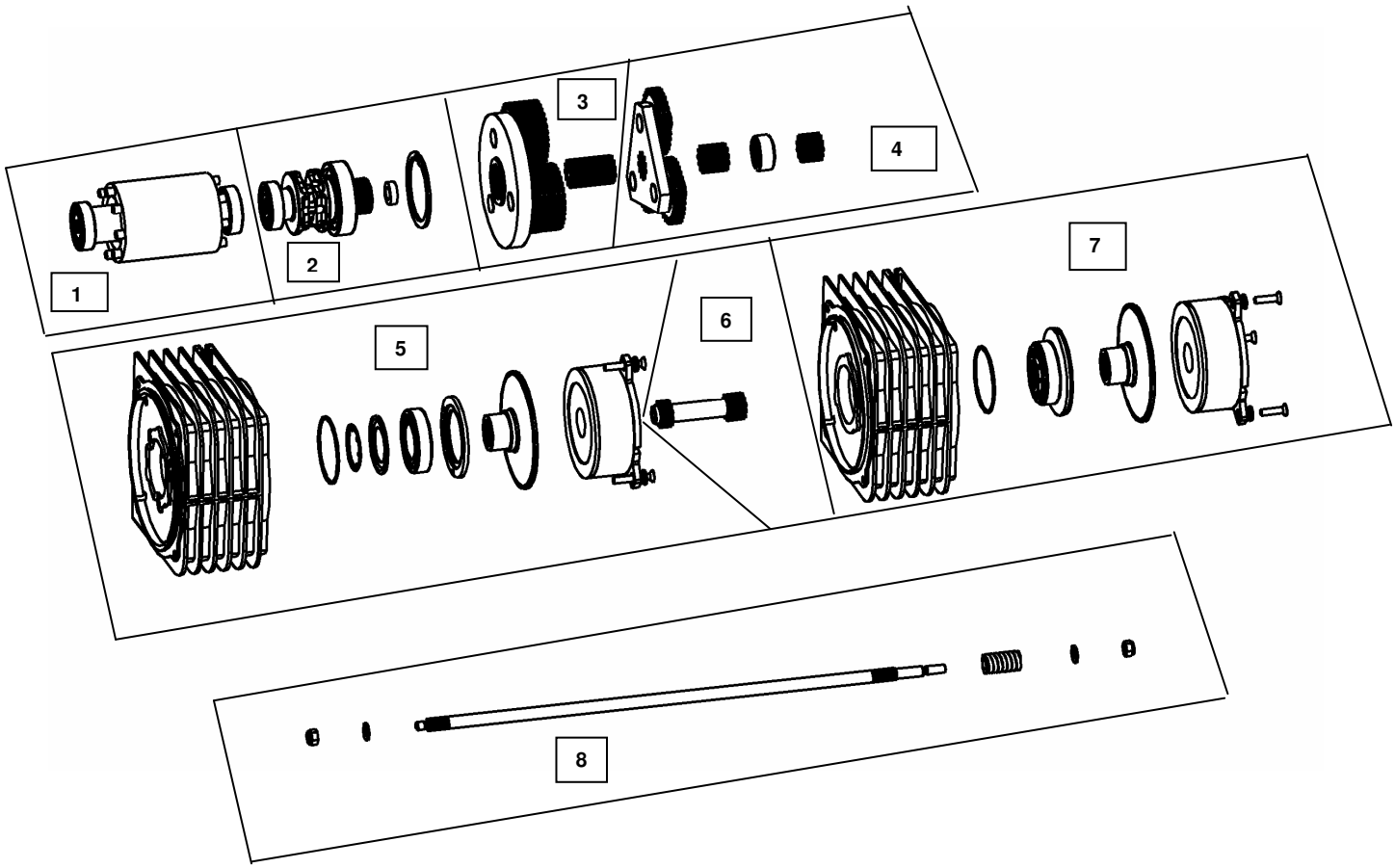
13	2249903	1	Brake end cap assembly
15	2218004	1	Cable guide
16	2218000	1	Cable fastening bracket
17		1	Electric box
18	2243008	1	Counter weight
20		1	Load plate
21	2246047	1	Marking assembly SM10
23		1	Motor data plate
24	52320470	2	Rotating handles

14.2 Mechanism / Brake (3 phases)



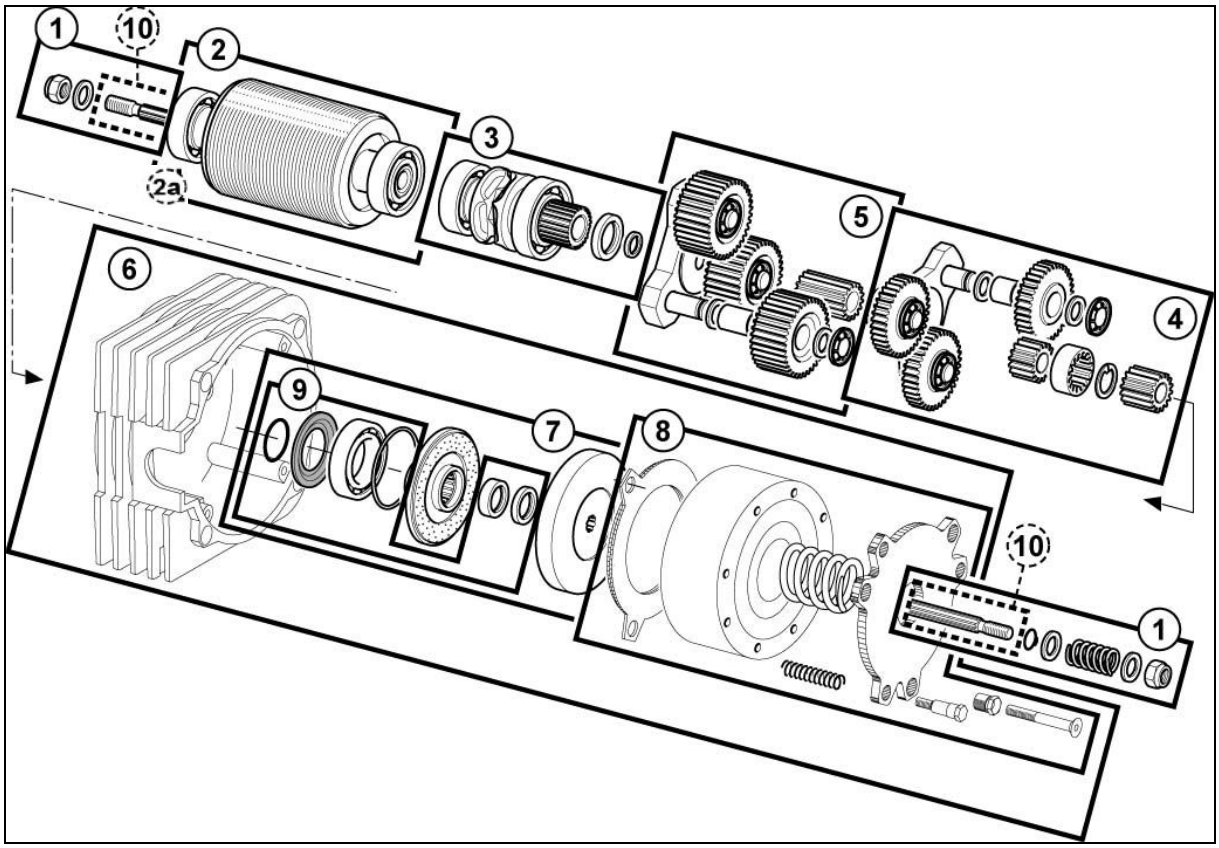
POS	QTY	CODE	Description
1	1	2249940	Slipping clutch spring with motor shaft
2	1	2245025	Rotor assembly - 1 and 2-speed type
3	1	2249941	Chain sprocket assembly
4	1	2249937	Planetary gear train - 1st step -
5	1	2249938	Planetary gear train - 2nd step - 8M/MN (reducing 58)
5	1	2249951	Planetary gear train - 2nd step - 16M/mn (reducing 29)
6	1	2241074	Brake assembly complete with brake cap - 190V/400V
6	1	2241073	Brake assembly complete with brake cap - 100V/230V
6	1	2241072	Brake assembly complete with brake cap - 230V/500V-575V
7	1	2249972	Slipping clutch friction assembly
8	1	2248001	Brake, complete 190V/400V
8	1	2248000	Brake, complete 100V/230V
8	1	2248003	Brake, complete 230V/500V-575V
9	1	2240012	Set of seals for brake cap
10	1	2241501	Tree motor

14.3 Double Brake Mechanism



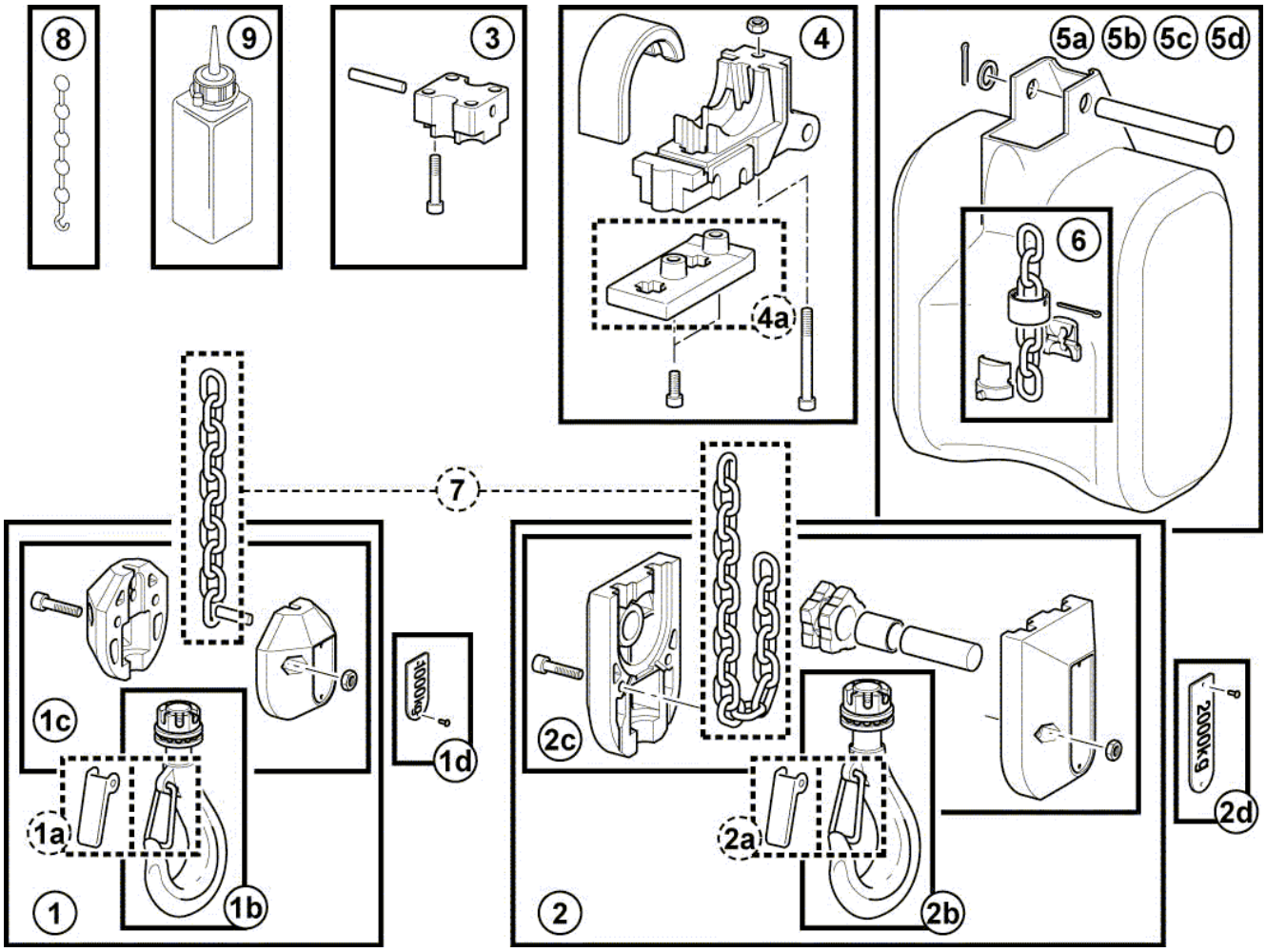
Pos	QTY	CODE	Description
1	1	2245025	Rotor assembly
2	1	2249941	Chain sprocket assembly
3	1	2249938	Planetary gear train - 2nd step - 8M/MN (reducing 58)
3	1	2249951	Planetary gear train - 2nd step - 16M/mn (reducing 29)
4	1	2249937	Planetary gear train - 1st step
5	1	2249006	Brake assembly complete with brake cap – 1° brake – 400 V
5	1	2249016	Brake assembly complete with brake cap – 1° brake – 230 V
6	1	2249054	Pinion
7	1	2249007	Brake assembly complete with brake cap – 2° brakes – 400 V
7	1	2249017	Brake assembly complete with brake cap – 2° brakes – 230 V
8	1	2249051	Double brake motor shaft

14.4 Mechanism / Brake (Stepless)



POS	QTY	CODE	Description
1	1	2249940	Slipping clutch spring with motor shaft
2	1	52326386	Rotor assembly – stepless speed rotor
2a	1	52315226	Bearing with integrated pulse sensor
3	1	2249941	Chain sprocket assembly
4	1	2249937	Planetary gear train - 1st step -
5	1	2249938	Planetary gear train - 2nd step - 8M/MN (reducing 58)
5	1	2249951	Planetary gear train - 2nd step - 16M/mn (reducing 29)
6	1	2241074	Brake assembly complete with brake cap - 190V/400V
7	1	2249972	Slipping clutch friction assembly
8	1	2248001	Brake, complete 190V/400V
9	1	2240012	Set of seals for brake cap
10	1	2241501	Tree motor

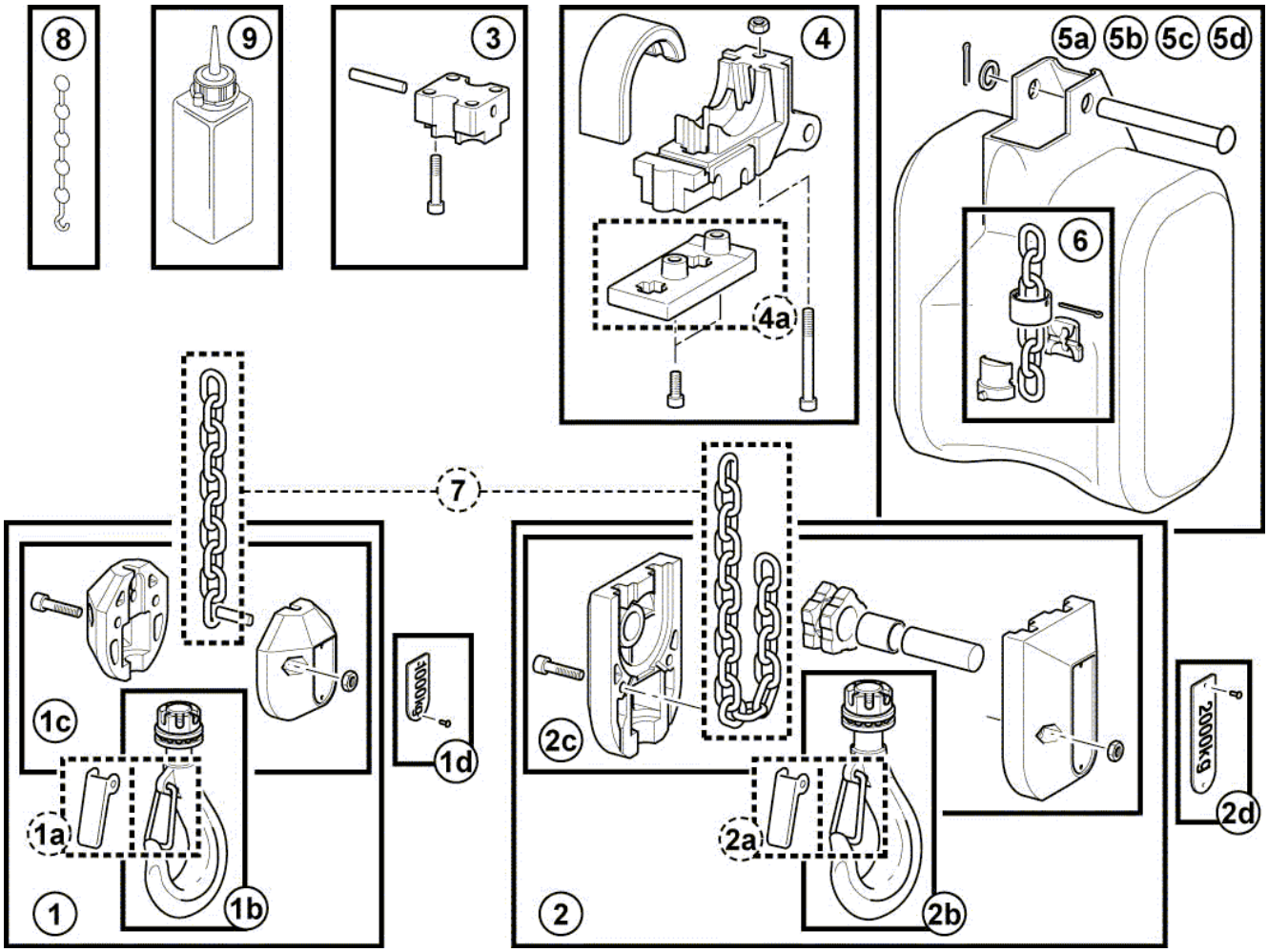
14.5 Lifting assembly



POS	QTY	CODE	Description
1	1	2249905	1-fall lifting hook block - Standard type
1	1	2242018	1-fall lifting hook block - Self-locking type
1a	1	001515	Safety latch - Steel wire type - 1 fall
1a	1	2212017	Safety latch - Steel plate type - 1 fall
1b	1	2217004	1-fall lifting hook - Standard type
1b	1	2247015	1-fall lifting hook - Self-locking type
1c	1	2249976	Set of 2 half-casings with axle and screws
1d	1	2249995	Load plates - 1 fall type - 500Kg (set of 10)
1d	1	2219939	Load plates - 1 fall type - 630Kg (set of 10)
1d	1	2219914	Load plates - 1 fall type - 1000Kg (set of 10)
2	1	2249906	2-fall lifting hook block - Standard type -
2	1	2242028	2-fall lifting hook block - Self-locking type -
2a	1	001513	Safety latch - Steel wire type - 2 falls
2a	1	2242017	Safety latch - Steel plate type - 2 falls
2b	1	2242021	2-fall lifting hook - Standard type
2b	1	2267015	2-fall lifting hook - Self-locking type
2c	1	2249978	Set of 2 half-casings with axle, return sprocket, and screws
2d	1	2249996	Load plates - 2 falls type - 500Kg (set of 10)

2d	1	2249990	Load plates - 2 falls type - 630Kg (set of 10)
2d	1	2219915	Load plates - 2 falls type - 1000Kg (set of 10)
2d	1	2219936	Load plates - 2 falls type - 1250Kg (set of 10)
2d	1	2219959	Load plates - 2 falls type - 1600Kg (set of 10)
2d	1	2219916	Load plates - 2 falls type - 2000Kg (set of 10)
3	1	2243523	Chain anchor assembly
4	1	2242060	Upper and lower chain guide assembly with rubber buffer
4a	1	2244008	Rubber buffer
5a	1	2249925	Chain bucket - 8m chain length capacity
5b	1	2249926	Chain bucket - 16m chain length capacity
5c	1	2249932	Chain bucket - 30m chain length capacity
5d	1	2249933	Chain bucket - 50m chain length capacity
6	1	2249942	Slack fall stop assembly
7		2243500	Load chain - Galvanized type
7		2243501	Load chain - Black type
8	1	2241045	Load chain mounting tool
9	1	9995008	Oil can

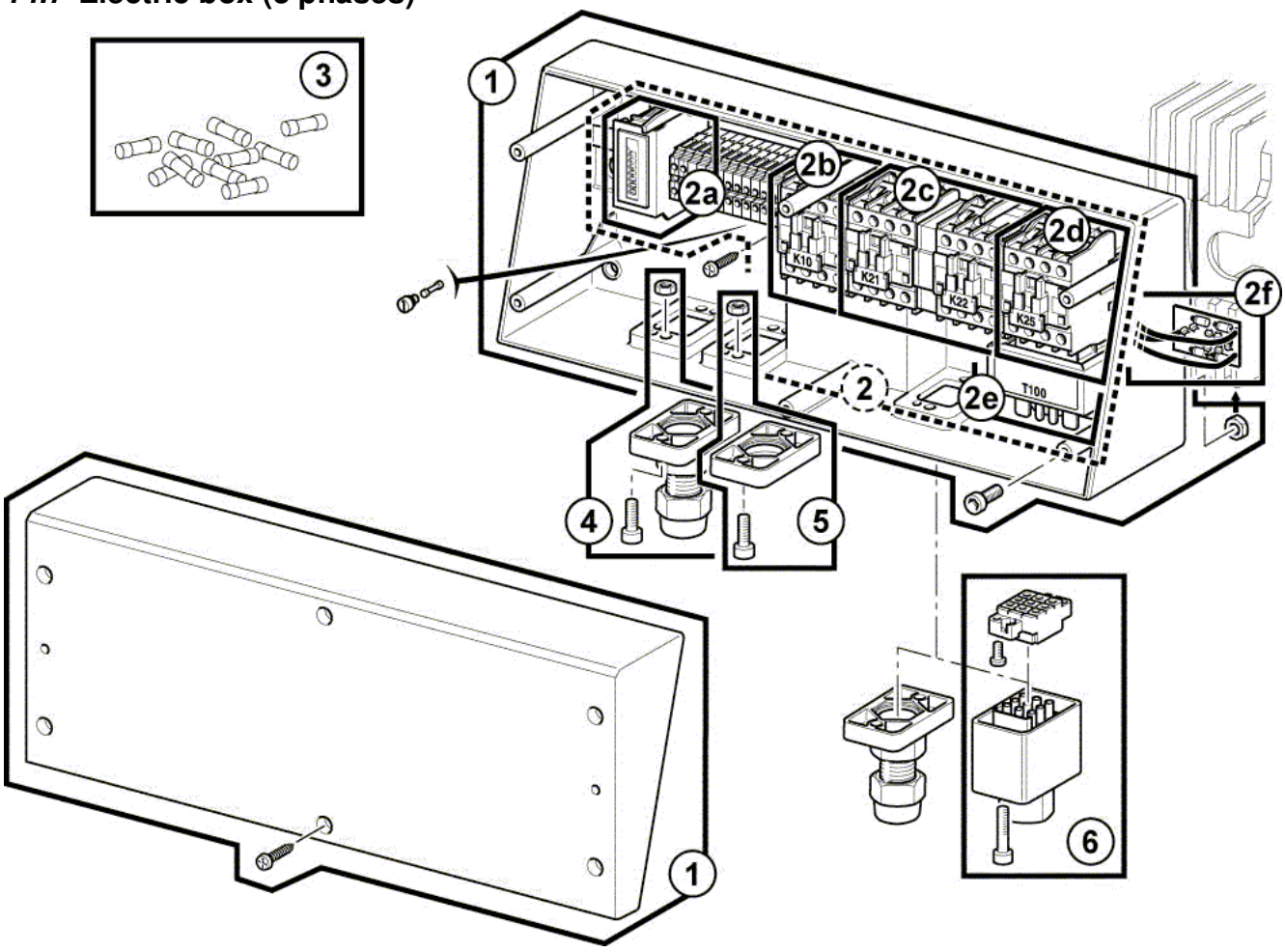
14.6 Lifting assembly



POS	QTY	CODE	Description
1	1	2249905	1-fall lifting hook block - Standard type
1	1	2242018	1-fall lifting hook block - Self-locking type
1a	1	001515	Safety latch - Steel wire type - 1 fall
1a	1	2212017	Safety latch - Steel plate type - 1 fall
1b	1	2217004	1-fall lifting hook - Standard type
1b	1	2247015	1-fall lifting hook - Self-locking type
1c	1	2249976	Set of 2 half-casings with axle and screws
1d	1	2249995	Load plates - 1 fall type - 500Kg (set of 10)
1d	1	2219939	Load plates - 1 fall type - 630Kg (set of 10)
1d	1	2219914	Load plates - 1 fall type - 1000Kg (set of 10)
2	1	2249906	2-fall lifting hook block - Standard type -
2	1	2242028	2-fall lifting hook block - Self-locking type -
2a	1	001513	Safety latch - Steel wire type - 2 falls
2a	1	2242017	Safety latch - Steel plate type - 2 falls
2b	1	2242021	2-fall lifting hook - Standard type
2b	1	2267015	2-fall lifting hook - Self-locking type
2c	1	2249978	Set of 2 half-casings with axle, return sprocket, and screws
2d	1	2249996	Load plates - 2 falls type - 500Kg (set of 10)

2d	1	2249990	Load plates - 2 falls type - 630Kg (set of 10)
2d	1	2219915	Load plates - 2 falls type - 1000Kg (set of 10)
2d	1	2219936	Load plates - 2 falls type - 1250Kg (set of 10)
2d	1	2219959	Load plates - 2 falls type - 1600Kg (set of 10)
2d	1	2219916	Load plates - 2 falls type - 2000Kg (set of 10)
3	1	2243523	Chain anchor assembly
4	1	52293746	Upper and lower chain guide assembly with rubber buffer (standard position)
	1	52386762	Upper and lower chain guide assembly with rubber buffer (inverted position)
4a	1	2244008	Rubber buffer
5a	1	2249925	Chain bucket - 8m chain length capacity
5b	1	2249926	Chain bucket - 16m chain length capacity
5c	1	2249932	Chain bucket - 30m chain length capacity
5d	1	2249933	Chain bucket - 50m chain length capacity
6	1	2249942	Slack fall stop assembly
7		2243500	Load chain - Galvanized typ
7		2243501	Load chain - Black type
8	1	2241045	Load chain mounting tool
9	1	9995008	Oil can

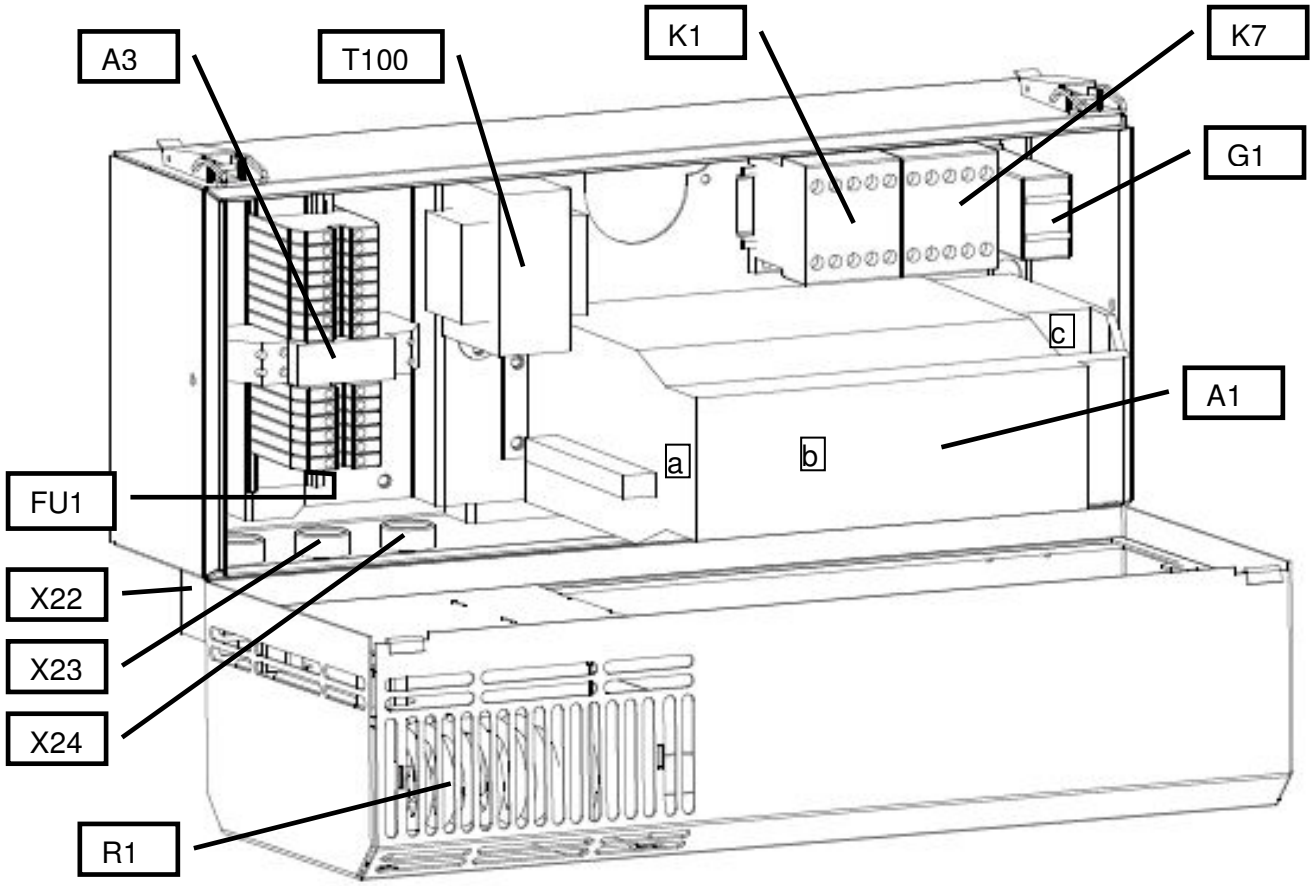
14.7 Electric box (3 phases)



POS	QTY	CODE	DESCRIPTION
1	1	2249965	Electric cubicle (lid, cover, and screws)
2	1	2243004	Printed circuit board - 2-speed hoisting + On-Off - 400V 50&60Hz 48V AC
2	1	2243003	Printed circuit board - 2-speed hoisting + On-Off - 230V 50&60Hz 48V AC
2	1	2243009	Printed circuit board - 2-speed hoisting + On-Off - 460V 60Hz 48V AC
2	1	2243002	Printed circuit board - 2-speed hoisting + On-Off - 500V 50&60Hz 48V AC
2	1	2243005	Printed circuit board - 2-speed hoisting + On-Off - 575V 60Hz 48V AC
2	1	2243011	Printed circuit board - 2-speed hoisting + On-Off - 400V 50&60Hz 115V AC
2	1	2243016	Printed circuit board - 2-speed hoisting + On-Off - 575V 60Hz 115V AC
2	1	2243017	Printed circuit board - 2-speed hoisting + On-Off - 230V/460V 60Hz 115V AC Standard
2	1	2243018	Printed circuit board - 2-speed hoisting + On-Off - 230V/460V 60Hz 115V AC Reconnectable
2	1	2243034	Printed circuit board - 2-speed hoist and travel + On-Off - 400V 50&60Hz 48V AC
2	1	2243033	Printed circuit board - 2-speed hoist and travel + On-Off - 230V 50&60Hz 48V AC
2	1	833098	Brake control module 230V/400V Main switching control type
2	1	833096	Brake control module 500V Main switching control type
2a	1	2213002	Hour counter 48V AC 50Hz
2a	1	2213027	Hour counter 48V AC 60Hz
2a	1	2213028	Hour counter 115V AC 60Hz
2b	1	7983061	Emergency stop contactor K10 48V AC

2b	1	7983055	Emergency stop contactor K10 115V AC
2c	1	7983062	Reversing contactor K21 or K22 48V AC (coef.1)
2c	1	7983056	Reversing contactor K21 or K22 115V AC (coef.2)
2d	1	7983063	Selecting contactor K25 48V AC
2d	1	7983057	Selecting contactor K25 115V AC
2e	1	7983021	Transformer 400V 50&60Hz 48V AC
2e	1	7983023	Transformer 230V 50&60Hz 48V AC
2e	1	7983025	Transformer 460V 50&60Hz 48V AC
2e	1	7983022	Transformer 500V 50&60Hz 48V AC
2e	1	7983024	Transformer 575V 50&60Hz 48V AC
2e	1	7983029	Transformer 400V 50&60Hz 115V AC
2e	1	7983027	Transformer 575V 60Hz 115V AC
2e	1	7983026	Transformer 230V/460V 60Hz 115V AC
2f	1	2243060	Rectifier 230V/400V/460V/500V/575V
2f	1	2243061	Rectifier 230V/460V - Reconnectable
3	1	2249979	Set of 10 fuses
4	1	2249947	Cable gland assembly
5	1	2219814	Closing plate assembly
6	1	2249945	Connecting plug set for push-button box
6	1	2249946	Connecting plug set for trolley
6	1	2249982	Connecting plug set for power supply

14.8 Electric box (Stepless)

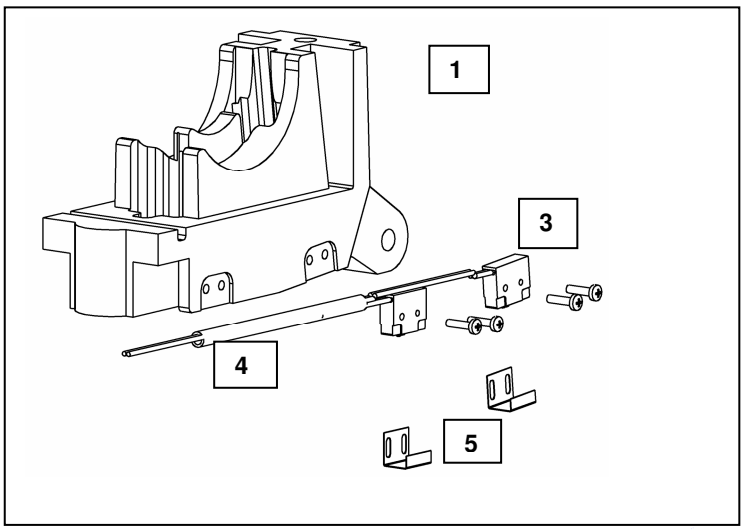


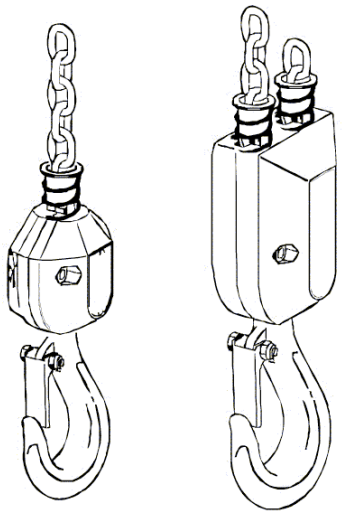
☞ Inverter includes only one I/O Extension board slot.

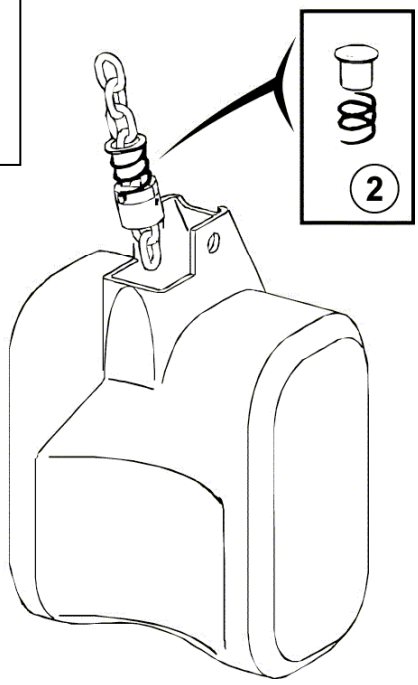
Pos.	Qty	Code	DESCRIPTION	REMARKS
	1	52326394	Electric cubicle without plug X24	400V/48V
	1	52326393	Electric cubicle without plug X24	400V/115V
	1	52326392	Electric cubicle without plug X24	400V/230V
	1	52326395	Electric cubicle without plug X24	460V/115V
	1	52317988	Empty electric cubicle	
A1	1	52319630	Inverter	
A1a	1	52305691	I/O extension board	
A1b	1	52314515	Display Panel	
A1c	1	52320763	Fan	
K1 / K7	1	7983061	Contactor LC1K0910E7	48V
K1 / K7	1	1123051	Contactor LC1K0910F7	115V
K1 / K7	1	1123113	Contactor LC1K0910P7	230V
G1	1	1115062	Brake control unit	
A3	1	52318159	Overspeed monitor	

T100	1	7983021	Transformer	400V/48V
T100	1	7983029	Transformer	400V/115V
T100	1	7983028	Transformer	400V/230V
T100	1	7983026	Transformer	460V/115V
R1	1	52318160	Braking resistor	65 ohm
FU1 + Z1	1	52296673	Input filter for EMC level (N)	
Z3	1	52297604	Input filter for EMC level (N)	
X22a	1	52326514	Round cable gland	
X22b	1	52326515	Flat cable gland	
X22c	1	52326516	Connection plug set for power supply	
X23	1	52326517	Connection plug set for push-button box	
X24a	1	52326518	Connection plug set for trolley	
X24b	1	52326519	cap	

14.9 Upper and lower limit switch







POS	QTY	CODE	DESCRIPTION
1	1	52328101	Micro-switches assembly
2	1	2241068	Spring assembly + support
3	1	52329084	Micro-switches
4	1	833433	Cable guide
5	2	52337705	Slides

Cut off the mains power supply before doing any work on the electric cubicle.