EUROCHAIN VR

VARIO

TECHNICAL GUIDE

ELECTRIC CHAIN HOIST

TYPE EUROCHAIN VR (50 Hz)

VARIABLE SPEED

Product Distributed in Ireland by:

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VERLINDE LIFTING EQUIPMENT

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1 UPDATE HISTORY

Section	Changes	Date	Handled by
All	New tech guide version for FL created and published	05/2016	XLUOSAHI

2 INTRODUCTION

2.1 About this manual

2.1.1 Use of the manual

This manual presents the product range and the features as well as the functional description of an electrical chain hoist, the Facelift version.

This manual helps to provide the following:

- Range of use of the different hoist types, loads and hoisting speeds
- Standards considered in the design of the product
- List of features available for the range of these hoists, as well as technical details about the product.

2.2 About this product

2.2.1 Product range

SWL [kg]	Frame size	Falls	Duty group ISO	Chain size	Gear life [h]	Gear [i]	Nominal hoisting speed [m/min]	Minimum hoisting speed [m/min]	Max. temp [°C]	ED%	Starts/ hour	ESR hoisting speed [m/min]	ESR load [kg]	Max. lifting hight[1)] [m]
125	05	1	M5	5 x 14	1600	21.649	24	0.65	40	50	300	32	80	30
250	05	1	M5	5 x 14	1600	21.649	16	0.65	40	50	300	32	80	30
320	05	1	M4	5 x 14	800	21.649	12.5	0.65	40	50	300	32	80	30
500	05	1	M5	5 x 14	1600	39.852	8	0.30	40	50	300	16	160	30
	12	1	M5	7 x 20	1600	28.541	16	0.65	40	50	300	32	160	30
630	05	1	M4	5 x 14	800	39.852	6.5	0.30	40	50	300	16	160	30
	12	1	M4	7 x 20	800	28.541	12.5	0.65	40	50	300	32	160	30
800	12	1	M5	7 x 20	1600	57.172	9	0.30	40	50	300	16	320	30
1000	12	1	M5	7 x 20	1600	57.172	8	0.30	40	50	300	16	320	30
	05	2	M5	5 x 14	1600	39.852	4	0.15	40	50	300	8	320	15
1250	12	1	M4	7 x 20	800	57.172	6.5	0.30	40	50	300	16	320	30
1600	12	2	M5	7 x 20	1600	57.172	4.5	0.15	40	50	300	8	630	15
2000	12	2	M5	7 x 20	1600	57.172	4	0.15	40	50	300	8	630	15
2500	12	2	M4	7 x 20	800	57.172	3.2	0.15	40	50	300	8	630	15

[1)]Higher lifting heights are available at request.

2.2.2 Technical regulations

Certifications, standards and other technical documents

The product fulfills the requirements of the following standards: Machine directive EC; CSA; ASME HST-1; ASME B30.16, and EN14492/2.

This product

- is in conformity with the relevant provisions of the Machinery Directive 2006/42/EC and EMC Directive 2004/108/EC
- is applicable with the requirements of the

  CSA Standard C22.2 No. 33 – Construction and Test of Electric Cranes and Hoists*

  UL 508 – Industrial Control Equipment

  UL1004-1 – Rotating Electrical Machines – General Requirements
- has ASME duty rating up to H4 (ISO M4 – M6), depending on hoist type and hoisting speed.*
  For information about ASME Hoist Duty Service Classification, reference ASME publication catalog ASME HST-1M and ASME B30.16 (latest edition) for electric chain hoists.
- is external sound level tested
- is RoHS compliant.

*NOTE: For the 60 Hz motors.

2.2.3 Sound intensity level

The maximum noise level of the hoist, measured at one-meter distance, is 71 dB, and at three-meter distance, 66 dB. This was tested at 8 m/min. according to ISO11210 and EN14492-2.

2.2.4 Hoist weight

Frame size	Falls	Hoist weight [kg]	
		Without chain[1)]	Chain [kg/m]
05	**1/1**	38.0*	0.57
05	**2/1**	30.0	1.14
12	**1/1**	60.0*	1.1
12	**2/1**	55.0	2.2

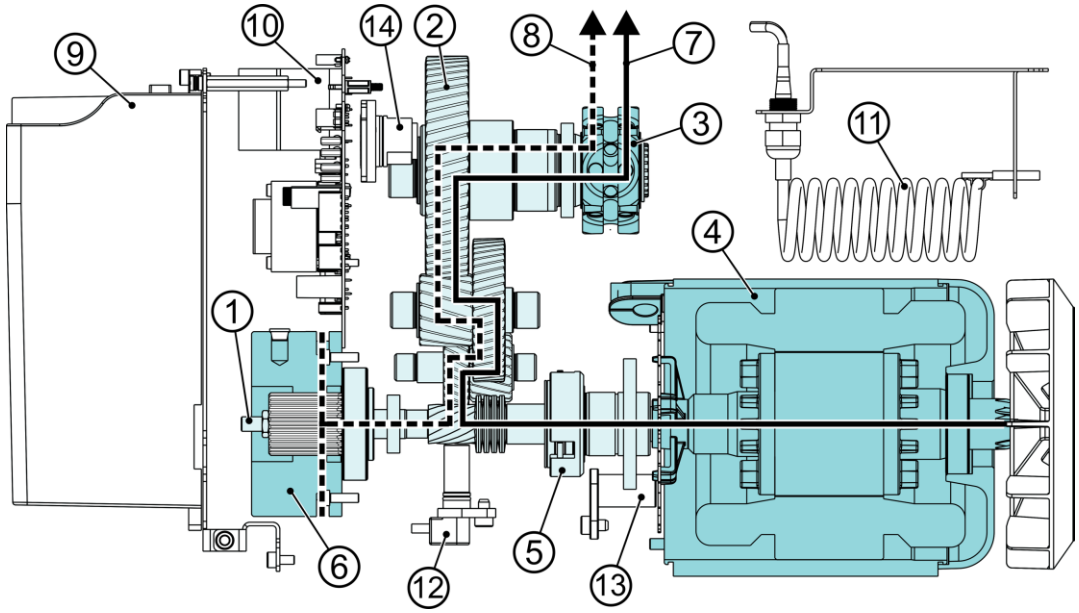
[1)]Values marked with an * include the counterweight. That is, 1-fall hoists use a counterweight, whereas 2-fall hoists do not.

3 PRODUCT DESCRIPTION

3.1 Functional description

The EUROCHAIN VR VARIO is an integrated electric chain hoist that is designed to be used for industrial applications. It is powered with an asynchronous squirrel cage motor that is controlled through a frequency converter. The hoist can be delivered as a hook or eye suspended unit, or together with a variety of trolleys.

KINEMATIC CHAIN FOR ELECTRICAL CHAIN HOIST



Pos.	Part
1	Adjustment screw
2	Gear
3	Chain sprocket
4	Motor
5	Friction torque limiter
6	Brake
7	Motor torque
8	Brake torque
9	Inverter module
10	Main power board
11	Braking resistor
12	Position sensor
13	Speed sensor beside the pulse wheel
14	Load sensor

3.2 Identifying key parts of the hoist

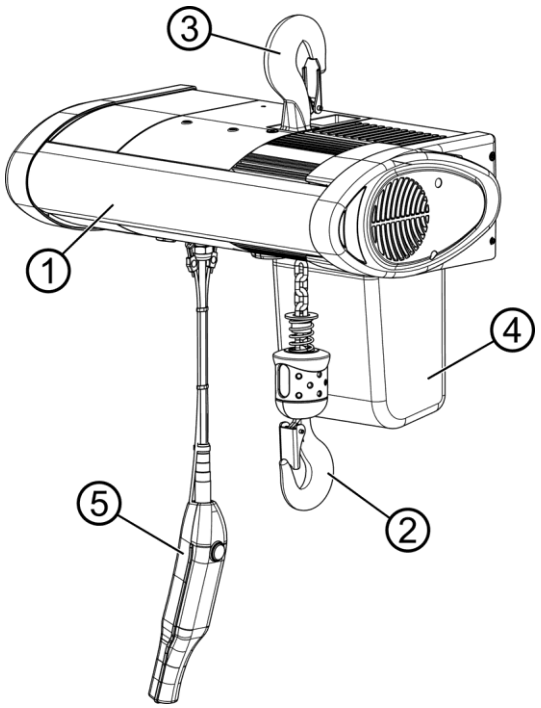


Figure 1. 05–10 frame size hoist

Pos.	Part	Description
1	Hoisting machinery	Equipment that is composed of hoist frame, hoisting motor, gear, and brake
2	Hook	Composed of hook and hook block
3	Suspension hook	The upper hook with which hook-suspended hoist is fixed to its support structure
4	Chain bucket	Bucket where the lifting chain is gathered and stored
5	Controller	Pendant or radio device for operating the hoist

3.3 Features

3.3.1 Standard features

MECHANICS

Technical clause	Feature	Description
LOA01	Load of the hoist	Single fall up to 1250 kg and two falls up to 2500 kg
DES27	Number of falls	Single and two fall designs are available for 05 and 10 frame sizes.
HS03	Overload device type	Mechanical overload device (friction torque limiter), which is predefined to 110% of the hoist's rated load. Overload device stops the lifting movement if the predefined value is exceeded.
	Disc brake	Disc brake that is located behind the motor and the friction torque limiter, on a separate load path. It is directly linked to the load and holds the load even in case of a motor or torque limiter failure.
	Helical gear	The hoist has a 3-step helical gear.
	Sprocket	The hoist has a 5-pocket sprocket on the output shaft in a cantilever position.
	Operation temperature	Operation temperature for the hoist is -20 °C to +50 °C (+40 °C)
	Painting of the hoist	Hoist body paint is Epoxy powder 70µm thickness, C2-M according to EN12944-2 and EN12944-5.
DES54	Upper hook according to DIN classification	Upper hook suspension size varies depending on the load.
	Lower hook according to DIN classification	Lower hook size varies depending on the load.
RR11	Load chain type	Standard load chain type is zinc plated and quenched tempered chain (class T).
PAN01	Hoist protection level	Standard IP protection for the hoist is IP55 / NEMA 3R.

ELECTRICS

Technical clause	Feature	Description
HS01	Type of hoist control	The lifting movement of the hoist is controlled by a frequency converter, which enables a stepless increase and decrease in the hoisting speed.
HS05	Hoist control method	EP, MS or analog control modes with a load adaptive ESR functionality.
ELE01	Main voltage	Possible supply voltages are 380…480V.
ELE03	Frequency	Possible frequencies are 50Hz and 60Hz.
ELE02	Control voltage	Low voltage control 48VAC or 115VAC.
HM05	Hoisting motor thermal protection	Motor thermal protection with a bi-metal switch.
HM12	Insulation class H hoisting motor	Motors are classified as TEFC motors with insulation class H. Maximum temperature in the motor is 180 °C (standard F class 155 °C) and maximum temperature rise is 125°C (F class 105°C).
	Main components connected by plugs	
	Emergency stop with main contactor	Emergency button is located in the pendant.
	Brake rectifier	Separate brake rectifier connected to the contactor.
TR05	Trolley travel control method	Frequency converter traveling with electronic potentiometer (EP) or multi-step mode (MS) – trolley movement with frequency converter or contactors
HS21	Hoisting limit switch	Mechanical upper and lower limit switches
PAN01	IP-type of hoist panel	IP55 protection

Technical clause	Feature	Description
	Integrated frequency converter with a specific control board	The following features are included in a hoist equipped with a lifting frequency converter: • Brake control with supervision • Over speed supervision • Clutch slippage supervision • Electronic overload prevention through load sensor • Programmable hoisting limits • Shock load control • Hour counter, start counter, SWP calculation • Adjustable acceleration/deceleration ramp time • Adaptive ESR deceleration ramp • Active polygon damping, 50% reduction (only for European markets)

3.3.2 Optional features

MECHANICS

Technical clause	Feature	Description
HOK13	Self-locking hook	A hook that cannot be opened if the hook has a load.
HOK10	Stainless steel hook block	The hook block and the forging are made of AISI316.
RR11	Stainless steel chain	Stainless steel chain is optional, and can be used instead of the standard galvanized chain.
PAN01	IP66	The IP66 is a higher protection class and available as an option.
DES54	Eye suspension	Eye type of hook suspension is optional, and can be used instead of the the standard hook suspension.
HS33	Wear resistant chain guide	Wear resistant chain guide is a more robust chain guide type.
EL26	Rain cover	Hoist's rain cover helps to avoid direct contact with rain.
DES01	Trolley type	Selection of trolleys: • Motor trolley • Swiveling trolley • Push trolley • Push trolley inside hollow profile • Normal headroom trolley • Low headroom trolley • Geared trolley With: • Rubber buffers on trolleys • Integrated wheel catch and trolley retaining device

ELECTRICS

Technical clause	Feature	Description
PE11	4-button pendant	A pendant for applications that need two motions.
PE11	6-button pendant	A pendant for applications that need three motions.
PE11	Key switch on pendant	A 2-button pendant that is equipped with a key switch on the emergency stop button.
PE21	Magnet	The pendant can be equipped with a magnet that is located on the back of the pendant.
PE22	Optional pendant	The pendant can be replaced with and old version of the pendant (Schneider type).
EL05	ACF card	The ACF card uses the main voltage to control the brake, and it has a low voltage control. The hoist does not have any limit switches. If switches are needed, they need to be adapted to the available controls on site.
PS49	External plug / Flat cable gland	A special plug for power feeding.
PE23	Hard wired controls	The connections of the electrical parts are created by using wires instead of a printed circuit board.
REMXX	Radio control	The controlling of the hoist(s) is done by using a remote control device.
MM224	Non-supply of pendant	The hoist is delivered without a pendant and a pendant cable.

MAINTENANCE

Technical clause	Feature	Description
GE21	Food industry oil	The used oil is NSF-H1 listed

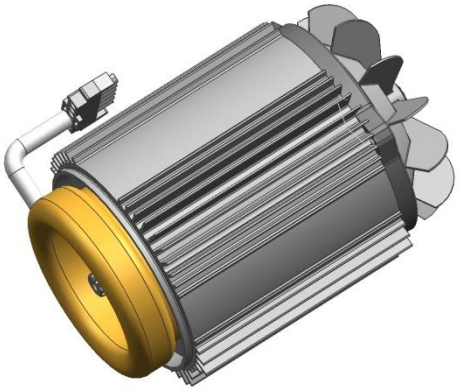
TROLLEY

Technical clause	Feature	Description
LIM14/LIM15	Traveling limit switch	The trolley stops or slows down when the traveling limit switch is activated.
DES01	Low headroom trolley	A special trolley design to minimize the C-dimension.
DES03	Swivelling trolley	A special trolley design for curved tracks (minimum radius is 800 mm).
AC03	Towing arm	A bracket for connecting the power supply to the trolley
SPD05, SPD06	Dual travel speed	A trolley that has two travel speeds: 5 m/min. and 20 m/min.
SPD05, SPD06	Slow variable speed	TMU1 trolley can be upgraded into a TMU2 trolley, to achieve a traveling speed that is lower than 10 m/min.
TG01	Worm gearbox	A special traveling motion unit where the gearbox has a 90 degree angle. This allows to attach a traveling motor parallel to the trolley side plates, to achieve reduced side dimensions of the trolley.
HS04	Rain cover	Trolley's rain cover helps to avoid direct contact with rain.
DES01	Chain driven trolley	A trolley without a TMU and whose traveling movement that is managed by pulling the hand chain.

4 MAIN COMPONENTS

4.1 Hoisting motor

The hoisting motor is specially designed for hoisting purposes with good efficiency. The motor is classified as a 'TEFC motor' – totally enclosed fan-cooled motor. This includes an aluminum frame with cooling ribs for efficient cooling, and a cooling fan for the motor.



Motor type	Frame size	Rated power [kW] (Hp)	Synchronous speed [rpm]	Max. ESR [rpm]	Power supply
					380-480 V [A]
MT08CA200	05	0.8 (1.1)	1860	4950	2.5
MT10CA200	12	1.6 (2.1)	1830	4950	4.5

The size of the main fuse for the hoist power supply is the following:

Frame size	Main fuse
	Power supply 380-480V [A]
05	10
12	10

*NOTE: These are the sizes for maximum fuses, also smaller fuses can be allowed. Please consult the factory if more specified information is needed.

4.1 Hoisting gear

The hoisting gear of the chain hoist is specially developed for hoisting appliances and has two or three helical steps. The gear is lubricated with oil so that the lubrication lasts for the designed working period of the hoist.

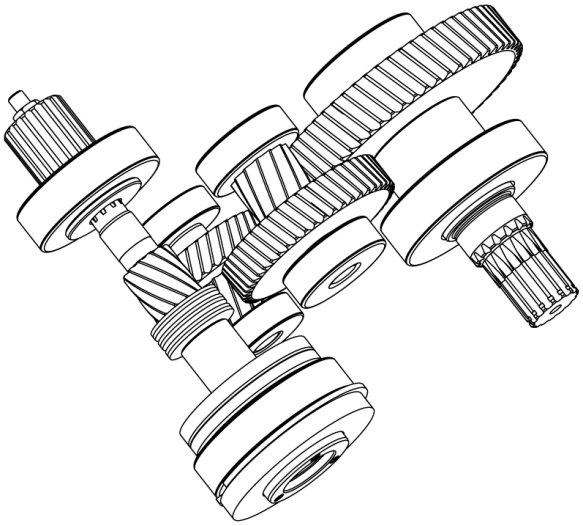
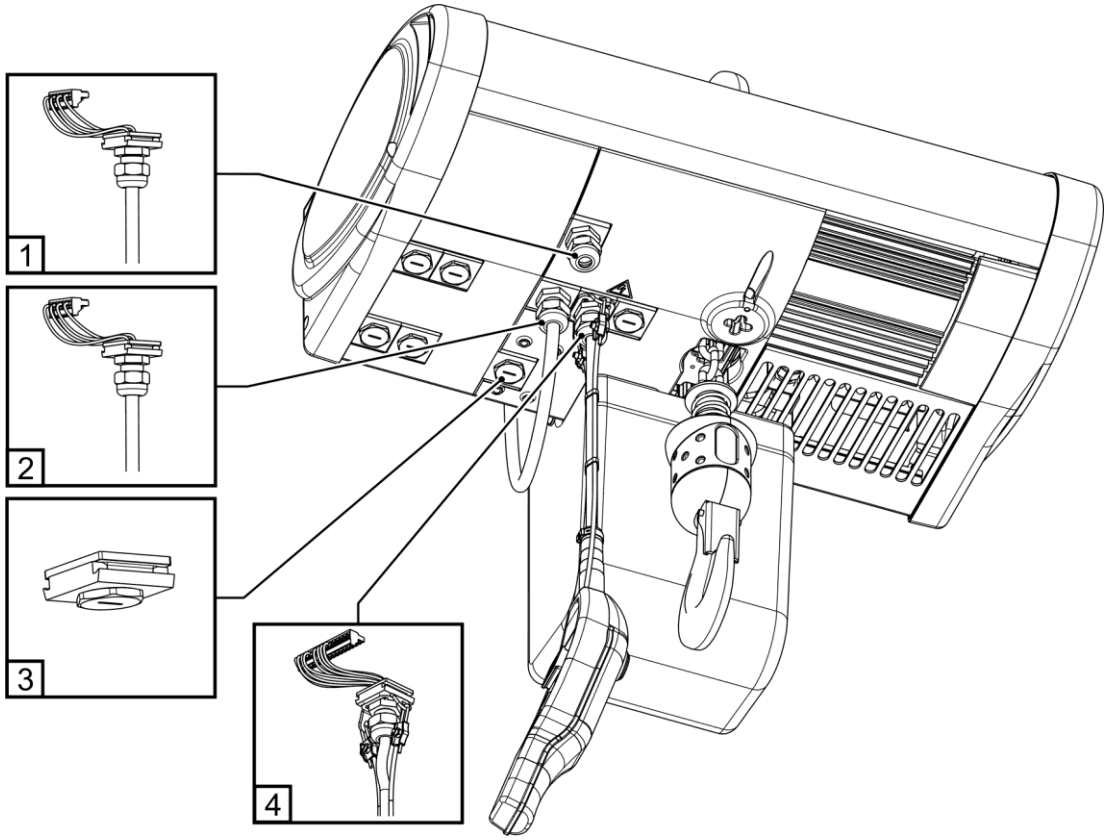


Figure 1. Hoisting gear constructions for the size 05 hoist type (3-step gear).

Frame size	Gear ratio
05	39.852
	21.649
12	57.172
	28.541

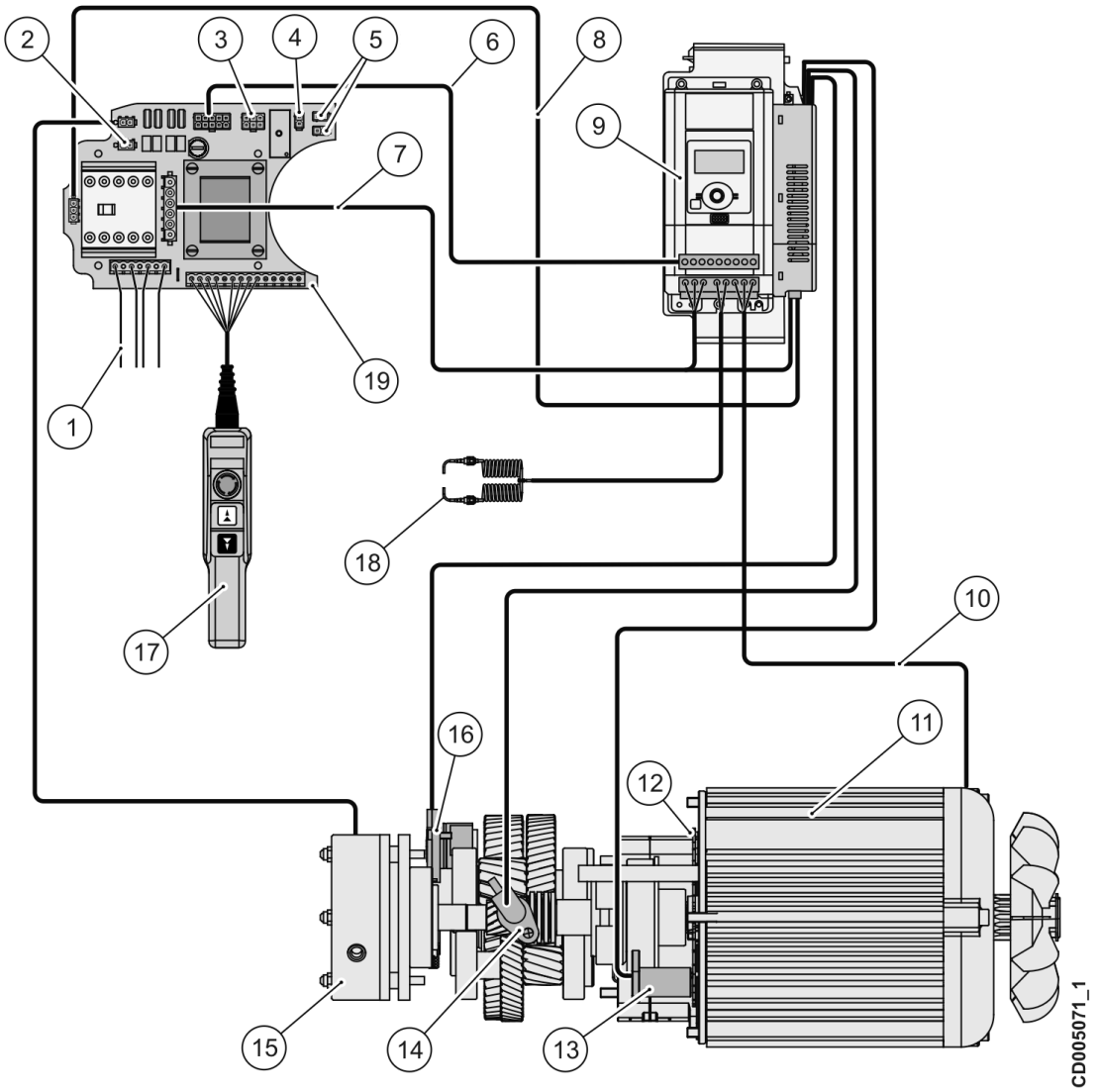
4.2 Electrics

4.2.1 Cable inputs



Pos.	Part	Size (class)
1	Trolley connection cable (optional)	M20
2	Hoist power supply cable	M20
3	Free cable gland(s)	M20
4	Pendant control cable	M20

4.2.2 Wiring principle



Pos.	Part	Pos.	Part
1	Main power supply	**11**	Motor
2	Safety brake (option)	**12**	Pulse wheel
3	Travelling unit control	**13**	Speed sensor
4	Bi-metal switch	**14**	Position sensor
5	Lifting limit switches	**15**	Main brake
6	Frequency converter control voltage	**16**	Load sensor
7	Frequency converter power supply	**17**	Pendant
8	DC power brake	**18**	Braking resistor
9	Frequency converter	**19**	Control power board
10	Motor power supply		

4.3 Hoisting brakes

4.3.1 Single brake

The chain hoist is equipped with a disc brake which includes a rotating disc with two friction linings. The brake coil is energized by a DC voltage coming from the brake rectifier. The brake rectifier converts the AC voltage into a DC voltage. To ensure the self-cleaning function, the rotating parts of the brake are not enclosed.

The brake is designed so that it lasts for the designed working period of the hoist. The brake wear can be checked at the brake coil, through an inspection hole. The brake lining wear criteria is indicated on a sticker that is placed next to the measurement hole.

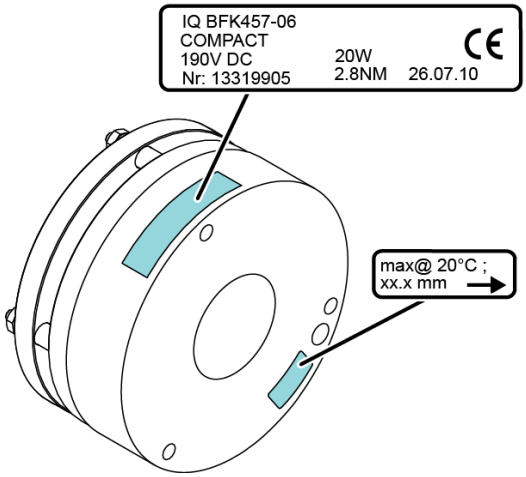


Figure 2. Single brake assembly – INTORQ brake

BRAKE CHARACTERISTICS

Frame size	Brake torque [Nm/lbf]		Brake measurement [20 °C] [mm]*
05	6.8	5.0	25.3
12	14	10.3	30

*NOTE: The brake measurement value that is given in the table is only a theoretical value. The value varies according to manufacturer and brake series. For each case, the maximum value that is not to be exceeded is indicated in the brake sticker that is located on the brake.

4.3.2 Brake coil voltages and resistance

BRAKE COIL VOLTAGE

Motor voltage [Vac]		Frequency [Hz]	Brake voltage [Vd]
380V–415V	**3 phases**	50/60	190
440V–480V	**3 phases**	60	190

*NOTE: All values are also considered as +/-10% of nominal voltage.

BRAKE COIL RESISTANCE

Frame size	Brake type [single brake	Brake torque		Rated voltage [V]	Coil resistance [20 °C]	
	INTORQ	[Nm]	[lbf]		min. [Ohm]	max. [Ohm]
05	**BFK457-06**	6.8	5.0	190	1661	1949
12	**BFK457-08**	14	10.3	190	1366	1552

4.4 Frequency converter

4.4.1 Location of key components of the hoisting function

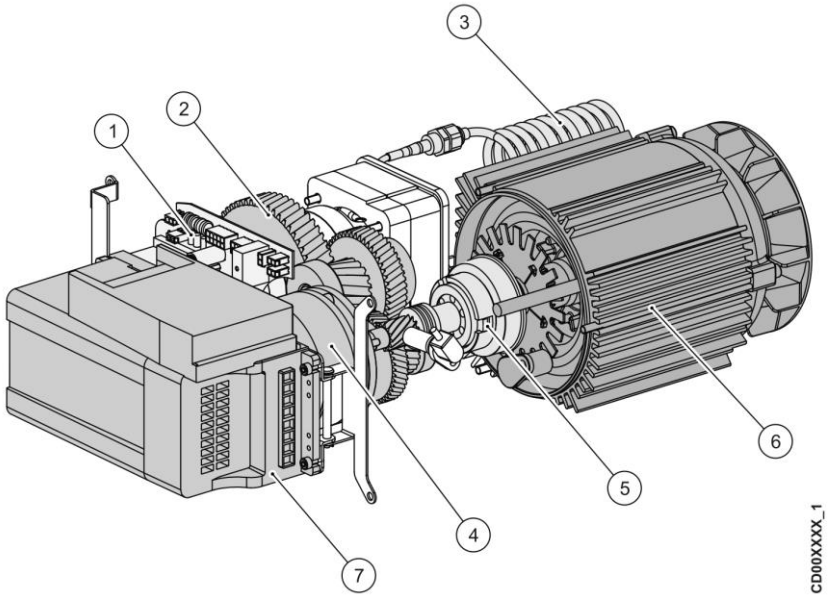


Figure 3. The hoisting functions and its key components in a frequency converter driven hoist.

Pos.	Part
1	Main power board
2	Hoisting gear
3	Braking resistor
4	Brake
5	Slipping clutch
6	Motor
7	Frequency converter

4.4.2 Sensors

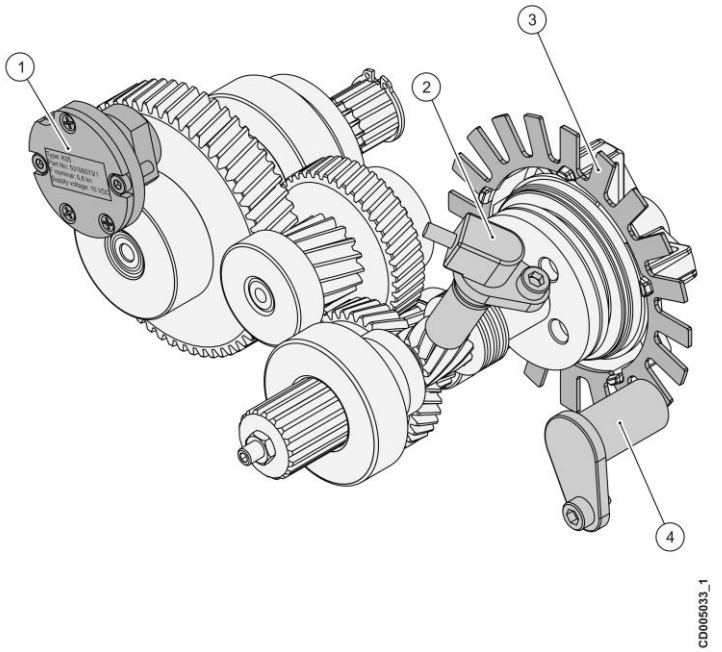


Figure 4. The sensors of a frequency converter driven hoist

Pos.	Part
1	Load sensor
2	Position sensor
3	Pulse wheel
4	Speed sensor

4.4.3 Identifying key parts of the frequency converter

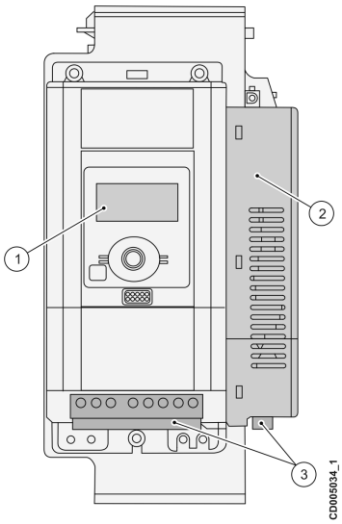


Figure 5. The frequency converter main components

Pos.	Part
1	Display
2	API board including safety features
3	Electrical connections

4.4.4 Frequency converter identification data

The main sticker shows, for example, the model and serial number of the frequency converter, as well as the rated voltage.

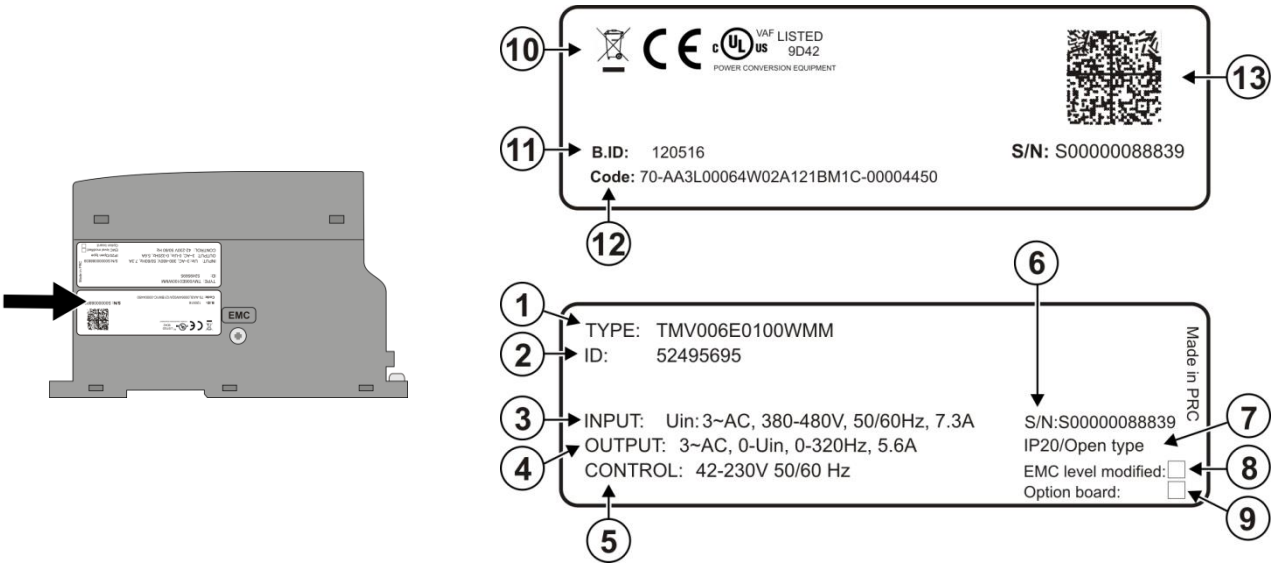
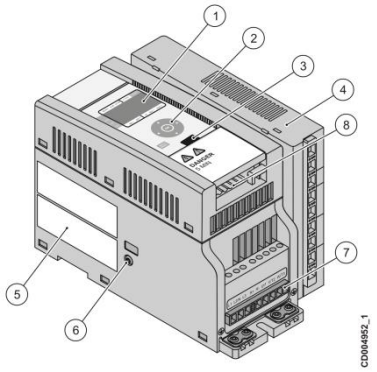


Figure 6. Main sticker of the frequency converter

Pos.	Part	Description
1	Product model number	Indicates the exact model of the product.
2	Identification number	A unique string that identifies the unit.
3	Input	Indicates the acceptable mains voltage range, current, and frequency that the product can be connected to.
4	Output	Indicates the voltage range, current, and frequency range the product is able to provide at a specified output capacity.
5	Control	Indicates the acceptable voltage range and frequency of control signals that the product can be connected to.
6	Serial number	The serial number of the unit in an alphanumerical format.
7	IP classification	Indicates the ingress protection classification of the product.
8	EMC level modified	Indicates whether the EMC level has been changed from the default level. By default, the EMC level is set as N.
9	Option boards	Indicates whether the product is fitted with an optional board providing additional features. Option boards can be used only with a frequency converter featuring a display
10	Approvals and standards	Indicates the directives and approvals the product complies to. See the section “Directives and standards” for more information.
11	Batch identification number	Indicates the batch from which the unit originates. The first four digits indicate the year and week of manufacture, respectively. The last digit (1 through 5) indicates the weekday, 1 being Monday, 2 Tuesday, number 5 indicating Friday.
12	Code	Identification and feature information that is provided by the manufacturer.
13	QR Code	A two-dimensional bar code in an optically readable form. Note: The term “QR Code” is a registered trademark of Denso Wave Incorporated in Japan and other countries.

4.4.5 Frequency converter model

The frequency converter model 006 is used with the frame sizes 05-10.



Pos.	Part	Description
1	Display	LCD Display
2	Navigation and confirmation buttons	Buttons with four arrow navigation buttons and buttons for back/reset and confirmation, used in navigating in the menu structure and in adjusting parameter values.
3	Terminal for MCA cable	MCA cable is used with Connection tool for TM
4	API3 Control board	CAN bus, analog inputs and speed sensor terminals
5	Main sticker	Identification data
6	EMC fIlter screw	EMC level of the frequency converter can be modified by removing the EMC filter screw
7	Power supply terminals	3-phase power supply and motor supply terminals
8	Digital input terminals	6 digital input terminals (API2 control board)

*NOTE: More detailed info about the frequency converter can be found in the Frequency converter system owner's manual.

4.4.6 Frequency converter technical data

Main connection	Supply voltage U_{in}	380 - 480V, -10%...+10% 3-phase
	Supply voltage frequency	45…66 Hz
	Connection to mains	Once per minute or less (normal case)
Motor connection	Output voltage	0 — U_{in}
	Nominal output current	003: I_N 2.4A (max 3.6A), 006: I_N 5.6A (max 8.4A), 012: I_N 12A (max 18A)
	Continuous output current	Rated current I_n at ambient temperature max +50°C, overload 1.5 x I_N max (1min/10min)
	Starting current	2 x I_N 2 sec every 20 sec
	Output frequency	0…250 Hz (limited options)
Digital inputs	Control voltage	42 – 240 V_{ac}, current consumption 14 - 20 mA
Control features	Control method	Frequency Control U/f Open Loop Sensorless Vector Control
	Switching frequency	3,6 kHz
	Field weakening point	Adjustable with parameter
	Acceleration time	0…20s (0,1s steps)
	Deceleration time	0…20s (0,1s steps)
Ambient conditions	Ambient operating temperature	–10°C (no frost)…+50°C (outside the cubicle + 40˚C)
	Storage temperature	–40°C…+70°C
	Relative humidity	0…95% RH, non-condensing, non-corrosive, no dripping water
	Air quality: - Chemical vapors - Mechanical particles	 IEC 721-3-3, unit in operation, class 3C2 IEC 721-3-3, unit in operation, class 3S2
	Altitude	100% load capacity (no derating) up to 1000m. 1% derating for each 100m above 1000m; max. 2000m
	Vibration: EN50178/EN60068-2-6	5...150 Hz Displacement amplitude 1 (peak) mm at 5...15.8 Hz Max acceleration amplitude 1 G at 15.8...150 Hz
	Shock EN50178, IEC 68-2-27	UPS Drop Test (for applicable UPS weights) Storage and shipping: max 15 G, 11 ms (in package)
	Enclosure class	IP20
	Weight	003 model: 0.9 kg, 006 model: 1.2 kg, 012 model: 1.7 kg
Safety		61800-5-1 (2007), EN60204-1 (2009), CE, UL, cUL, FI, GOST R, IEC (see the unit's main sticker for more detailed approvals), RoHS
Protections	Over voltage protection	875V_{DC} trip level
	Under voltage protection	333V_{DC} trip level
	Earth-fault protection	Earth fault is tested before every start. In case of earth fault in motor or motor cable, only the frequency converter is protected.
	Unit over temperature	Yes
	Motor stall	Yes
	Overcurrent protection	Trip limit 4,0*I_N instantaneously
	Motor overtemperature supervision	Yes

Braking resistor (only 006 and 012 drives)	Minimum Resistance	006; 208-240V:35 Ω 012; 208-240V: 26 Ω 006; 380-480V: 75 Ω 012; 380-480V: 54 Ω
Terminals	Tightening torque	0,5 – 0,6 Nm
	Conductor diameter	Mains, motor, braking resistor and grounding terminals: 1.5 – 4.0 mm Digital input terminals: 1.0 – 1.5 mm
EMC	Immunity	Complies with EN50082-1, -2, EN61800-3
	Emissions	EMC-level N: with the internal EMC filter connected EMC level 0: with the internal EMC filter disconnected Complies with EN61800-3 A11 (2004) for second environment

4.5 Overload protection: Load sensor and friction torque limiter

In a frequency converter driven hoist the overload protection is ensured through two overload protection systems:

1. The primary overload protection is the load sensor, which is connected to the frequency converter and, by default, calibrated to 110% of the nominal load. The protection level can be adjusted with parameters. The frequency converter acts before the friction torque limiter.
2. The secondary overload protection is managed by the friction torque limiter. In a frequency converter driven hoist, the friction torque limiter acts only as a secondary safety device.

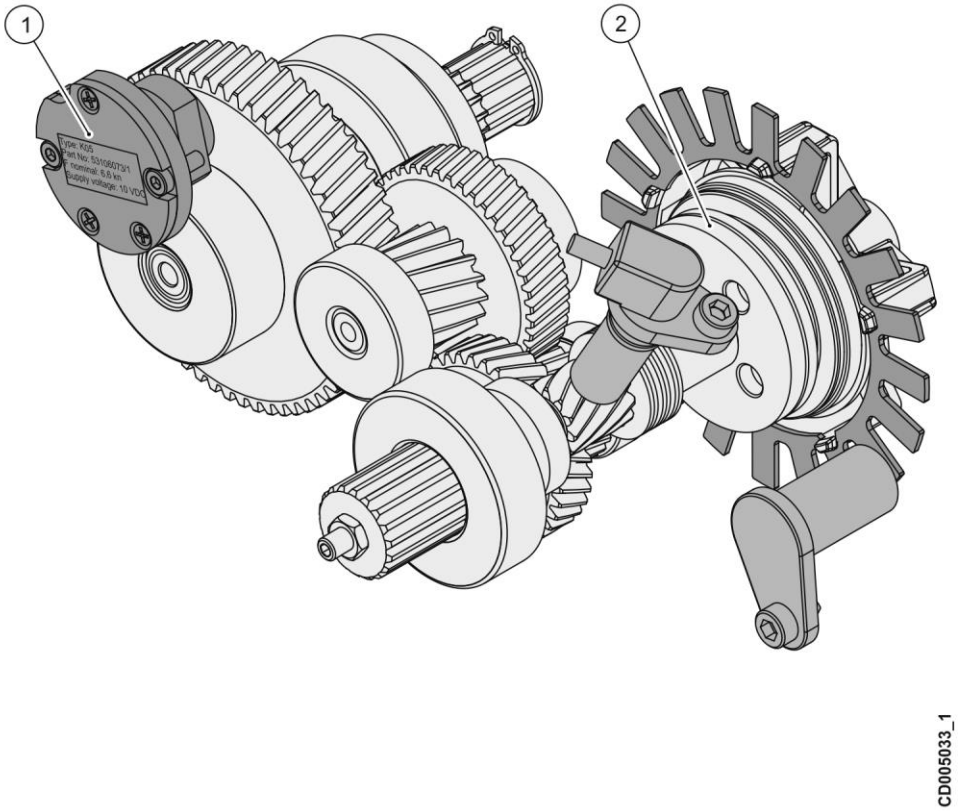


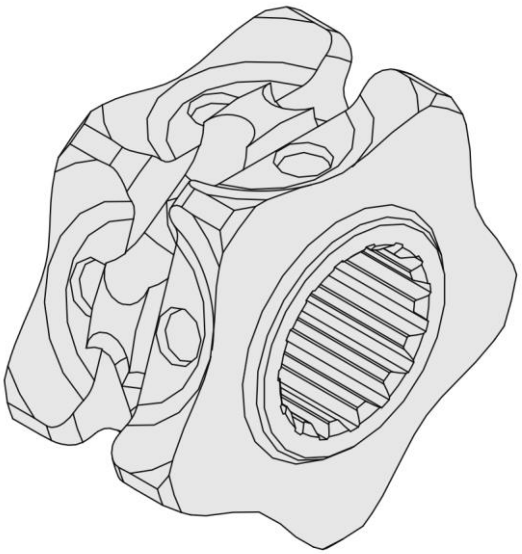
Figure 7. The overload protection devices of a frequency converter driven hoist

Pos.	Part
1	Load sensor
2	Friction torque limiter

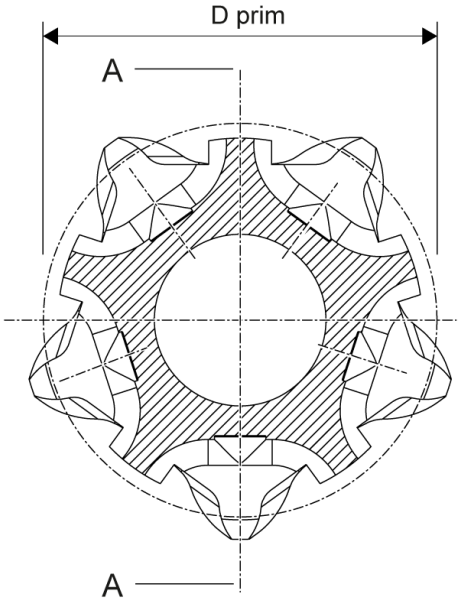
4.6 Chain reeving components

The chain hoist units are fitted with a special patented chain drive. The solution includes additional supporting (intermediate) teeth on the chain sprocket which improve the support for the chain and reduce stress on the chain.

The chain sprocket has five pockets and five intermediate teeth on the sprocket. The intermediate teeth enable an accurate positioning of the chain, resulting in less chain wear and thus a longer lifetime of the chain.

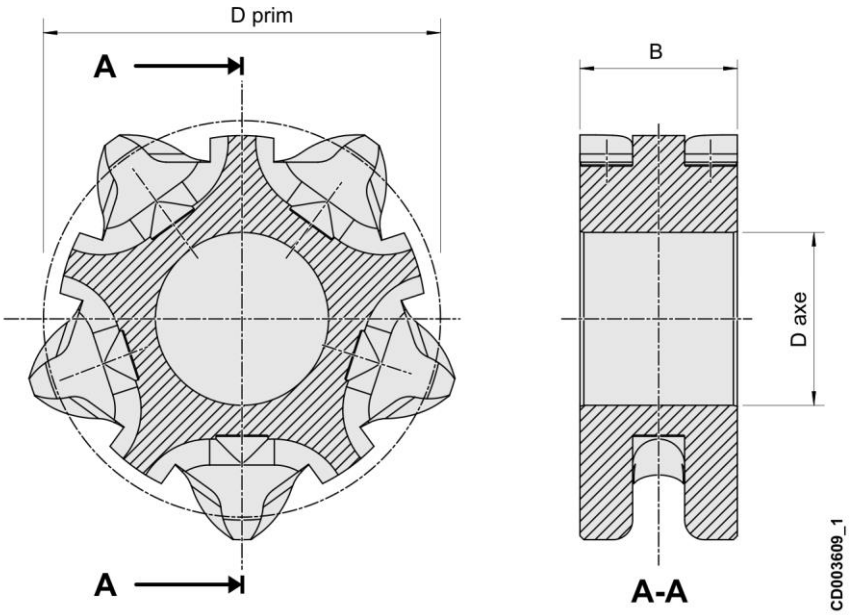


4.6.1 Chain sprocket



Frame size	Chain sprocket	Chain	Nbr of pockets	D prim [mm]
05	SINGLE	5 x 14	5	45.61
12	SINGLE	7 x 20	5	65.45

4.6.2 Return sprocket



Frame size	Chain sprocket	Chain	Nbr. of pockets	D prim [mm]	D axe [mm] [Ø]	B [mm]	
05	SINGLE	5 x 14	5	45.61	16H7	25.5	+-0.1
12	SINGLE	7 x 20	5	65.35	32H7	33.0	-0.1

*NOTE: The return sprocket is only for the 2-fall hoist versions.

4.7 Hoist suspension type

4.7.1 Eye suspension

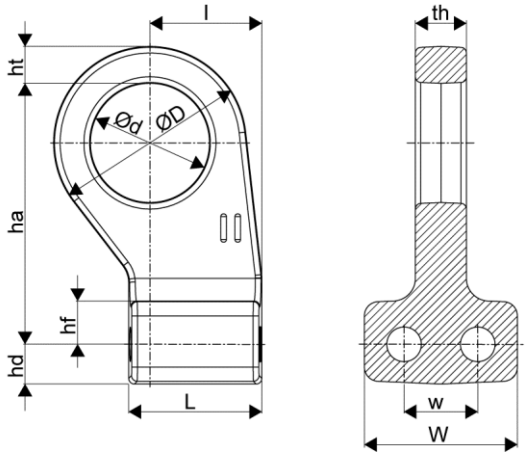


Figure 8. Eye suspension for frame sizes 05–10

Frame size	Dimensions [mm]										
	L	l	D [ø]	d [ø]	hd	ha	ht	hf	W	w	th
05	47	35	60	38	16	75	11	14	36	19	18
12	47	39	68	42	14	92	13	16	54	26	18

*NOTE: **1-fall hoists**: The eye leans towards the back of the hoist. **2-fall hoists**: The eye leans towards the front of the hoist. This is marked with markings 'I' and "II" on the top of the hoist body.

4.7.2 Suspension hook

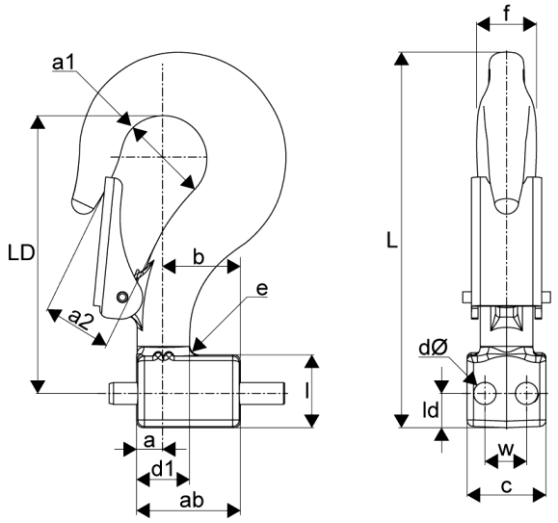


Figure 9. Suspension hook for frame size 05

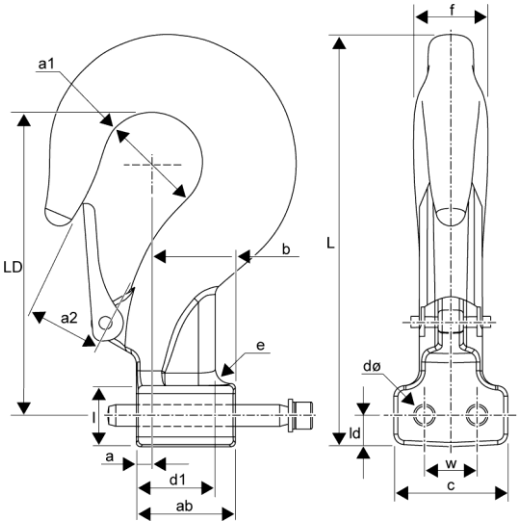


Figure 10. Suspension hook for frame size 10

Frame size	Hook size [RSN]	Dimensions [mm]														
		a	ab	a_1	a_2 [1)]	b	c	d [ø] [2)]	d_1	e	f	l	ld	L	LD	w
05	04T	12	47	40	24	35	35.5	10.5	24	4	25	33	15.5	172	127	19
12	08T	7.5	47	48	32	39.5	54	12.2	37.5	7	29	30	14	196	145	26

*NOTE: **1-fall hoists**: The hook opens towards the back of the hoist. **2-fall hoists**: The hook opens towards the front of the hoist. This is marked with markings 'I' and "II" on the top of the hoist body.

[1)]The dimensions a_2 are given with the hook latch opened.

[2)]The dimension 'd [ø]' is needed for both (x 2) pins.

4.7.3 Coupling part

Coupling part is used for attaching the hoist body to the trolley.

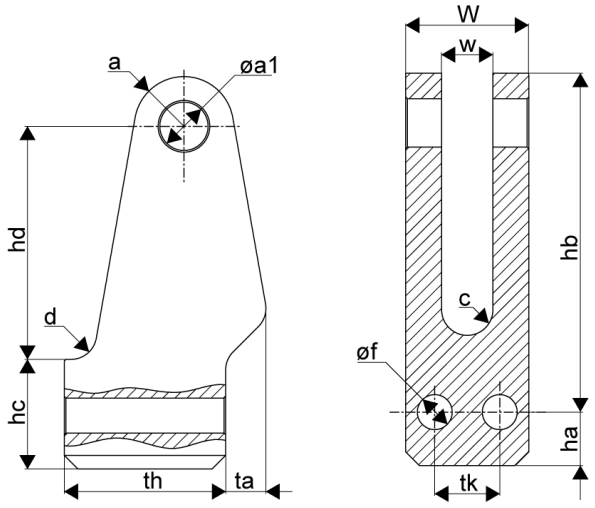
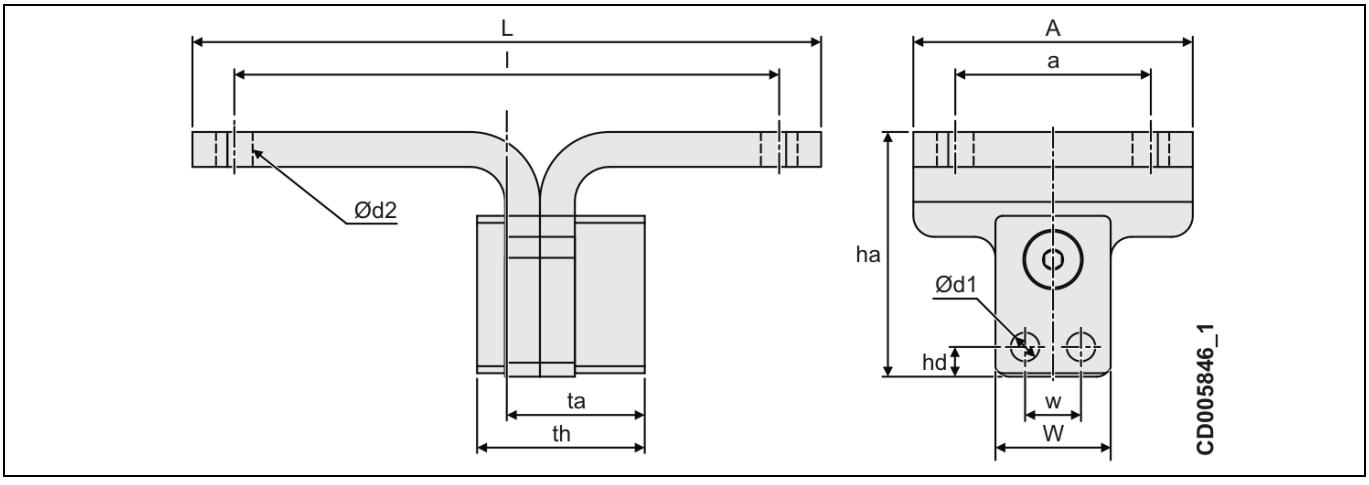


Figure 11. Coupling part for frame sizes 05–10

Frame size	Dimensions [mm]													
	a [r]	a_1 [ø]	hc	Hd	d	ha	hb	th	ta	W	w	c	tk	f [ø]
05	14.5	14.1	32	45	7.5	15.6	76	47	8	36	15	2	19	10.2
12	20	20.2	30	42.5	10	14.5	78	45	16	54	20	-	26	12.2

4.7.4 Stationary (fixed) suspension (option)



Frame size	Dimensions [mm]											
	ta	th	ha	hd	d_1 [ø]	w	W	d_2 [ø]	l	L	a	A
05	39.5	48	70	8.5	8.2	16	33	10.5	156	180	56	80
10	42	47	85	14	12.2	26	54	17	120	180	80	115

4.8 Lifting hooks

4.8.1 Lower hook

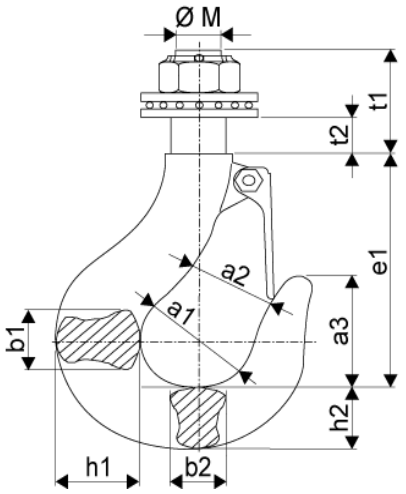


Figure 12. Lower hook for the frame sizes 05–10

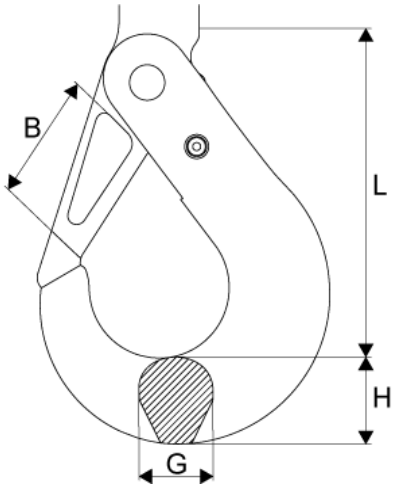
The hooks are designed according to the requirements of the DIN15401. The hook material is 34 CrMo 4 (standard hook) or AISI 316L (stainless steel hook).

Frame size	Reeving	Hook size [RSN]		Dimensions [mm]*										
		Std.	Stainl.	M [ø]	a_1 [2)]	a_2*	a_3	b_1	b_2	e_1	h_1	h_2	t_1	t_2
05	1/1	020T	025	16	34	24	39	21	18	81	26	22	36	13.5
	2/1	05T	05	20	43	24	49	29	24	102	37	31	39	14.5
12	1/1	05T	05	20	43	32	49	29	24	102	37	31	39	14.5
	2/1	08T	1	20	48	32	54	35	29	115	44	37	43	14.5

[1)]The dimensions are valid for the standard hook type (not stainless steel).

[2)]The dimensions a_2 are given with the hook latch opened.

4.8.2 Safety hook / self-locking hook (option)



Hook type	Dimensions [mm]			
	L	B	G	H
BKT 6-10	90	29	15	21
BKT 7/8-10	111	37	17	26
BKT 10-10	133	45	21	30

Frame size	Falls	Hook type [BKT]	Influence to C-dimension [+mm]
05	1/1	6-10	3
05	2/1	7/8-10	7
12	1/1	7/8-10	5
12	2/1	10-10	13

4.8.3 Stainless steel hook

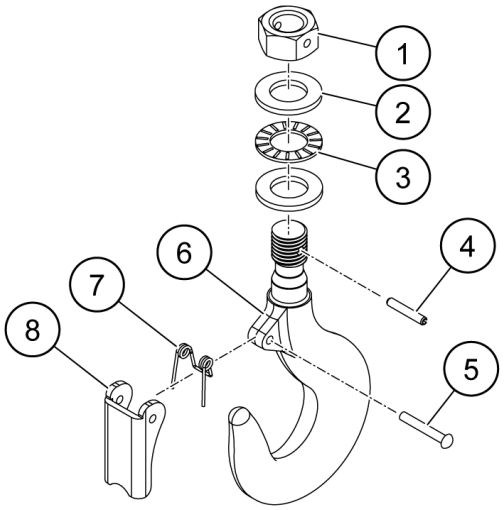


Figure 13. Stainless steel hook assembly

Pos.	Description	Stainless steel
1	Nut	X
2	Bearing	*
3	Needle thrust bearing	*
4	Rivet	X
5	Hook	X
6	Spring	X
7	Safety latch	X

*NOTE: The bearing and the needle thrust bearing of the stainless steel hook assembly are not available as stainless steel parts.

MAXIMUM LOAD

Maximum loads for stainless steel hook are offered according to the same rules as for the stainless steel chain.

Frame size	Falls	Max load [kg]	Hook type [RSN]
05	1/1	320	025
05	2/1	*	
12	1/1	630	05
12	2/1	1250	1

*NOTE: Available at a later point of time.

4.9 Hook blocks

The material of the hook block rubber part is Santoprene-8221.65.

4.9.1 Single fall hook blocks

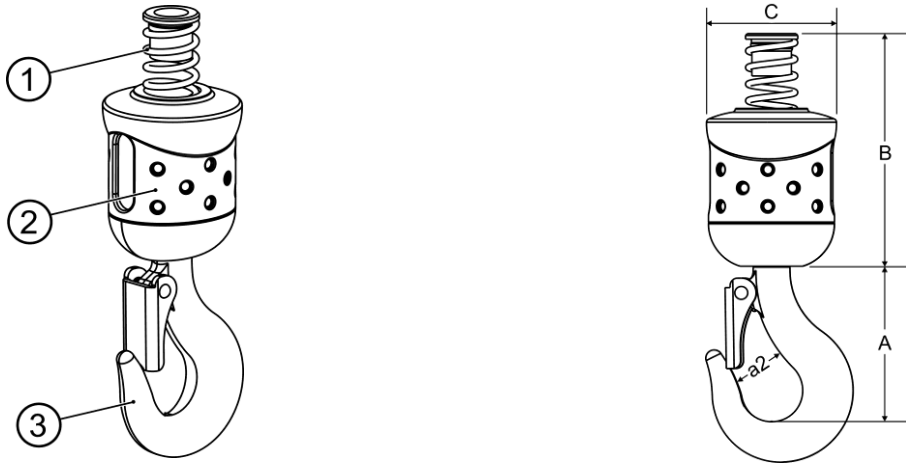


Figure 14. Single fall (1/1) hook block for frame sizes 05–10

Pos.	Part
1	Limit switch activator
2	Grip area
3	Turnable hook with safety latch, axial needle bearings

DIMENSIONS:

Frame size	Reeving	Dimensions [mm]			
		A	B	C	a_2 [1)]
05	**1/1**	84	121	71	21
12	**1/1**	106	148	82	27

4.9.2 Two-fall hook blocks

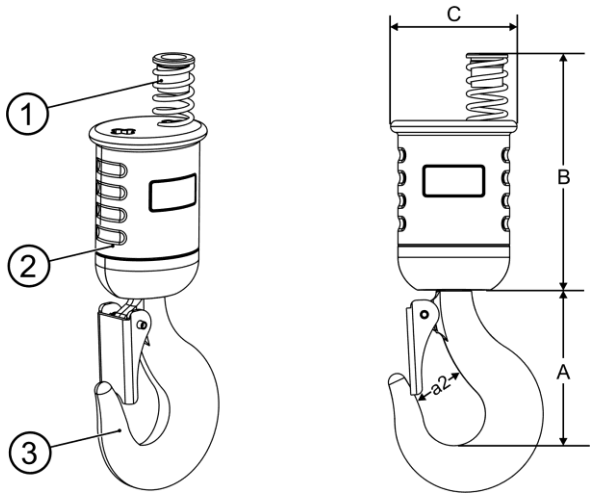


Figure 15. Two-fall (2/1) hook block for frame size 05

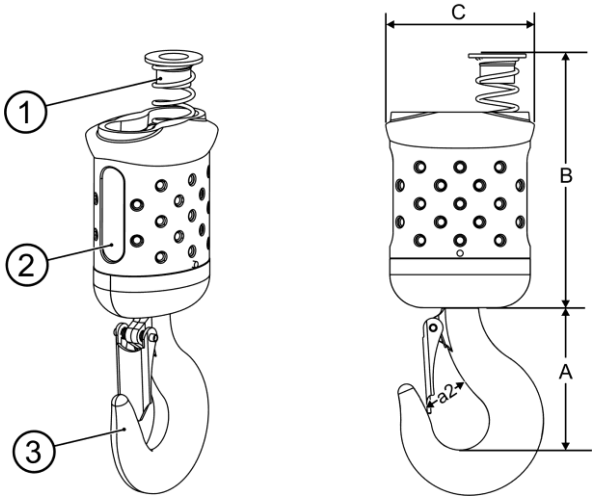


Figure 16. Two-fall (2/1) hook block for frame size 10

Pos.	Part
1	Limit switch activator
2	Grip area
3	Turnable hook with safety latch, axial needle bearings

DIMENSIONS:

Frame size	Reeving	Dimensions [mm]			
		A	B	C	a_2 [1)]
05	**2/1**	106	161	86	27
12	**2/1**	116	207	122	33

[1)]The dimensions a_2 are given with the hook latch opened.

[2)]The stainless steel hook blocks have the same dimensions as the standard hook blocks.

4.9.3 Stainless steel hook block (option)

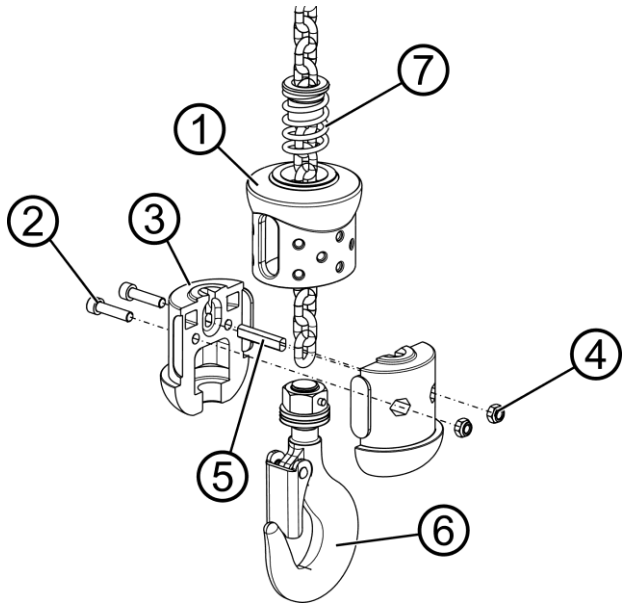


Figure 17. Stainless steel hook block

The material for the stainless steel hook block is AISI 316L.

Pos.	Description	Stainless steel
1	Rubber cover	X
2	Bolt	X
3	Hook bottle	
4	Nut	X
5	Pin	X
6	Hook	X
7	Spring	

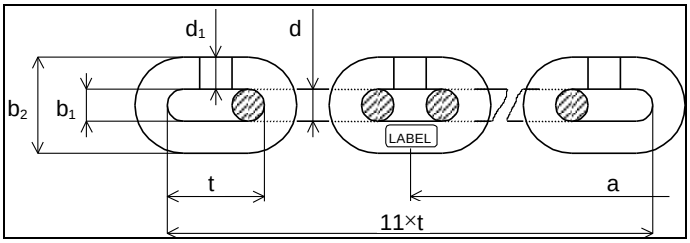
*NOTE: The pin (3) in the stainless steel hook block is not available as a stainless steel part.

4.10 Hoisting chains

4.10.1 Safety factors for chains

Frame size	Static safety factor
05	5 to 6.4
12	5 to 6.4

4.10.2 Chain technical data



The load chain is marked with a label that contains information about the chain manufacturer and manufacturing date as well as the chain size and grade.

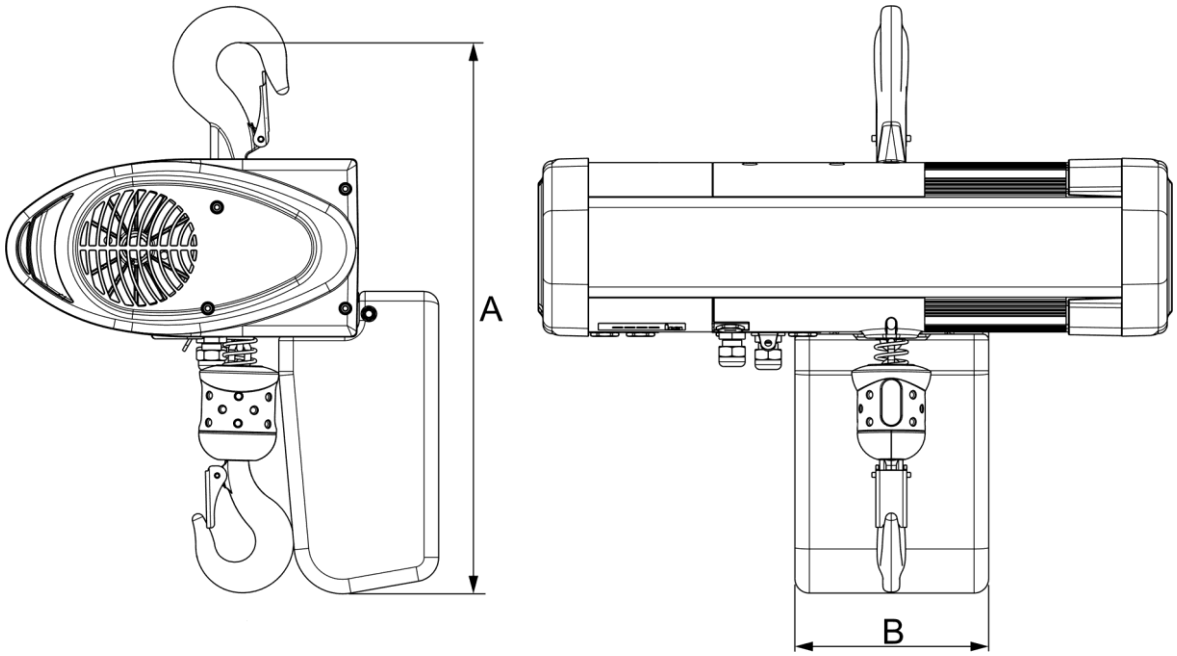
DIMENSIONS:

Chain size	Unit	05		10	
		5 x 14		7 x 20	
Diameter	d [mm]	5	+0.2 -0.2	7	+0.03 -0.03
Pitch	t [mm]	14	+0.2 -0.1	20	+0.25 -0.15
Control length	11 × t [mm]	154	+0.5 -0.25	220	+0.7 -0.35
Weld seam	d1 [mm], max.	5.4		7.5	
Internal width	b1 [mm], min.	6		8.4	
External width	b2 [mm], max.	16.8		23.6	
Label spacing	a [m], min.	0.3		0.4	
Label mark height	[mm]	1.8		2	
Weight	G [kg/m]	0.57		1.10	

TECHNICAL CHARACTERISTICS:

Chain size	Unit	05		10	
		5 x 14		7 x 20	
		Standard	**Stainless**	**Standard**	**Stainless**
Cross section	A [mm^2]	39.25	39.25	76.93	76.93
Max. working load	mSWP [kg]	630	400	1250	800
Stress at max. working load	σ [MPa]	157.5	100	159.4	102
Test force	Fm [kN]	20	12.5	40	25
Min. breaking force	FB [kN]	32	20.0	61.6	40.0
Min. breaking elongation	A [%]	10	15	10	15
Min. surface hardness	[HV]	380HV10	180HV5	380HV10	180HV5
Corrosion protection		zinc plated		zinc plated	
Grade		80	50	80	50
Class		T	P	T	P

4.10.3 Chain bags



DIMENSIONS:

Frame size	Bag capacity [m]	Chain bag type	Chain size	Dimensions [mm]	
				A	B
05	6	Hard	5 x 14	489	150
05	16	Soft	5 x 14	554	154
05	25	Soft	5 x 14	674	154
12	6	Hard	7 x 20	570	200
12	16	Soft	7 x 20	711	204
12	30	Soft	7 x 20	781	204

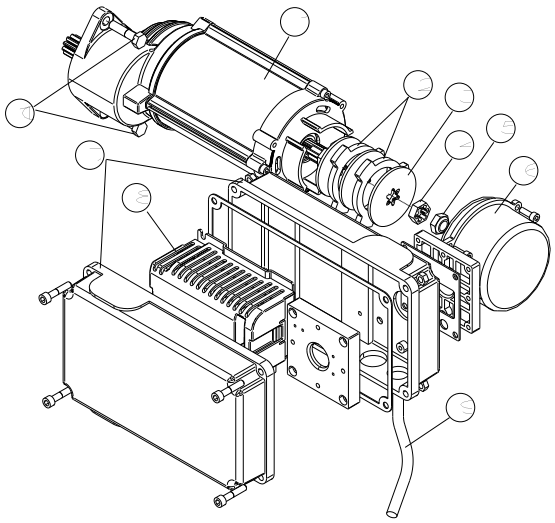
CHARACTERISTICS:

Hard chain bag	
Material	High-density polyethylene
Weight	0.93 to 0.97 g/cm^3
Wall thickness	3 mm [0.12 in]
Msax. temp	110 °C [230F]
Color	Black

Soft chain bag	
Material	Polyester 1100 denier
Fabric	TER 630
Weight	630 g/m^2
Breaking	230/210 daN/5 cm
Tear	22/17 daN
Standard	DIN 53363
Color	Black

*NOTE: The dimensions are valid for hoists equipped with single fall reeving.

4.11 Traveling motors



Three different frequency converter drive units are used as standard for the varying chain hoist applications.

The control frequency converter Variator 2VT is mounted on the side of the unit and is connected with a plug to the chain hoist.

The TMU 2 is also available as a 2-speed motor version.

Speed control	Gearless drive	Geared drive
Inverter	TMU 1 (150 W)	TMU 2 (300 W)
Inverter		TMU 3 (400 W)
2-speed		TMU 2 50Hz: 300/50 W 60Hz: 370/70 W

Pos.	Part
1	Gear/motor unit
2	Brake friction discs
3	Brake disc
4	Aluminum ring
5	Adjustment nut
6	Motor cover
7	Electric box
8	Frequency converter
9	Connecting cable
10	Fixing screws

4.11.1 Inverter motor data

	Inverter motors							
	Standard						Options	
	TMU 1 [35Hz]		TMU 2 [100Hz]		TMU 3 [100Hz]		TMU 2	TMU 2
	LS	HS	LS	HS	LS	HS	LS	HS
Traveling speed [m/min.]	4	20	2	10	1.6	8.3	4	16
	...	...	...	...	...	...	...	...
	20	44	10	20	8.3	16.7	16	32
							Max. 5000 kg	
Maximum load [kg]	1000		5000		10 000		-	
ED %	40		40		40		-	
Starts	240		240		240		-	
Current [A]	In = 1.1		In = 1.2		In = 1.8		-	
	Id = 2.3		Id = 4.2		Id = 8.2			
Power [W]	150		300		450		-	
Cos φ	0.5		0.57		0.52		-	
RPM	965		2855		2850		-	
Frequency [Hz]	50…60		50…60		50…60		-	
Power supply [Vac]	380…480		380…480				208/220/230/525/575/600/690	
Control voltage [Vac]	42…230		42…230		42…230		42…230	
End limit switches	-		-		-		Yes	
Slow down switches	-		-		-		Yes (MS mode only)	
Thermal protection	-		-		-		Yes	
IP protection	55		55		55		Reinforced	
Tropicalization [%]	95		95		95		-	
Ambient temperature [°C]	-10 °C to +40 °C		-10 °C to +40 °C		-10 °C to +40 °C		-	
Standby heaters	-		-		-		Yes	
Motor class	H		H		H		-	
Alone (low volt. cubicle)	-		-		-		Yes	

Abbreviations	
In	Nominal current
Id	Starting current

4.11.2 Two-speed motor data

	2-speed motors		
	TMU 2		
	Standard [50Hz]		Options
Traveling speed [m/min.]	**LS**	**HS**	**-**
	5	20	-
Maximum load [kg]	5000		-
ED %	40		-
Starts	240		-
Current [A]	In = 1.0	In = 0.8	-
	Id = 3.5	Id = 1.0	
Power [W]	300	50	-
Cos φ	0.70	0.77	-
RPM	2800	690	-
Frequency [Hz]	50		-
Power supply [Vac]	400		208/220/230/525/575/600/690
Control voltage [Vac]	48		115
End limit switches	-		-
Slow down switches	-		-
Thermal protection	-		Yes
IP protection	55		Reinforced
Tropicalization [%]	95		-
Ambient temperature [°C]	-10 °C to +40 °C		-
Standby heaters	-		Yes
Motor class	H		-

Abbreviations	
In	Nominal current
Id	Starting current

4.12 Trolley constructions

4.12.1 Trolley fixation types

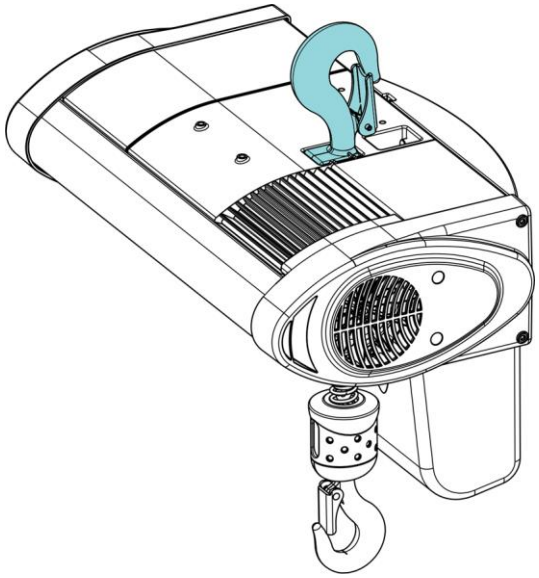


Figure 18. ***Suspension hook***

Fixation with the suspension hook is used in hook suspended hoist models, with fixed hoist positions, and in hoists equipped with a push trolley.

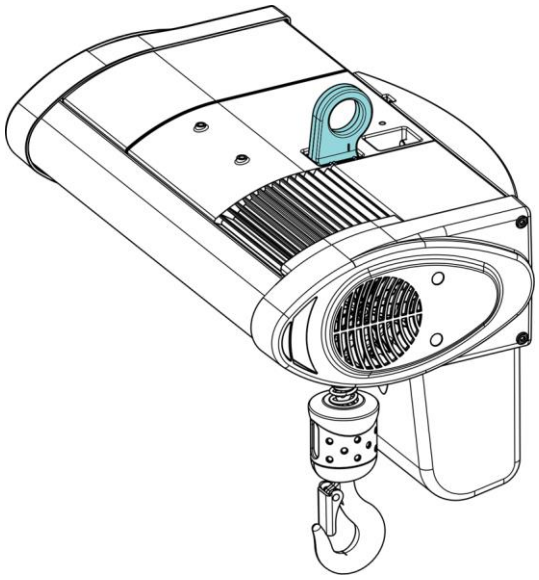


Figure 19. ***Eye suspension***

Fiixation with the eye suspension is used, for example, in hoists attached to a Light crane system profile.

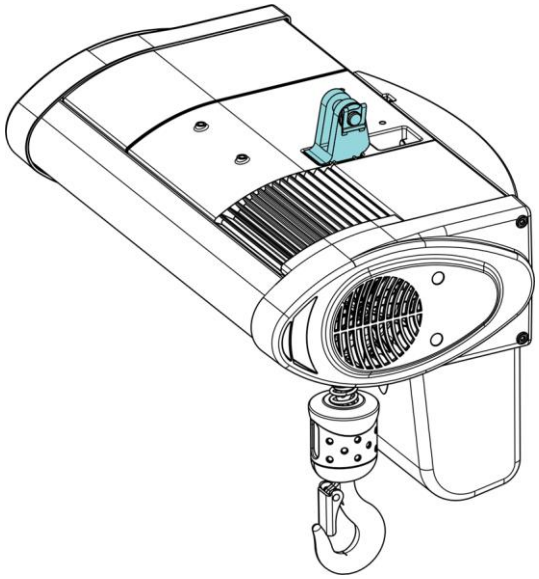


Figure 20. Coupling part

Fixation to the trolley with the coupling part is used in motor trolley solutions.

4.12.2 Trolley types

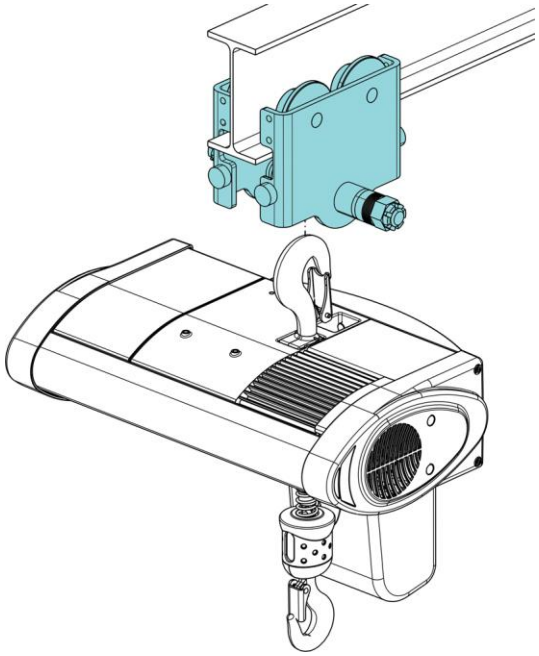


Figure 21. Push trolley hoist

In the push trolley applications, the hoist is attached to the push trolley with a suspension hook.

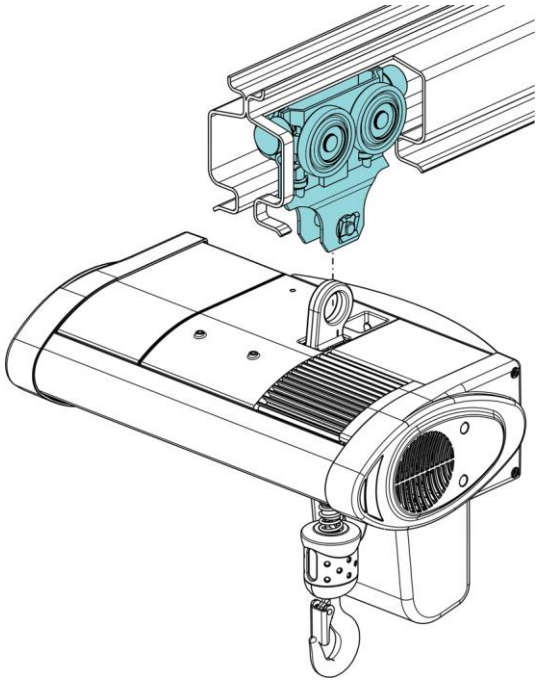


Figure 22. Push trolley inside hollow (LCS) profile

In the Light crane system solutions, the hoist is attached to the trolley with an eye suspension.

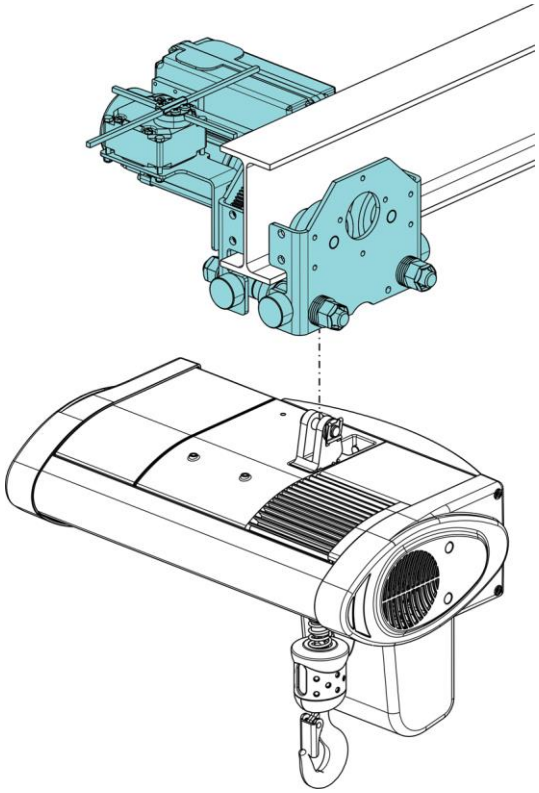


Figure 23. Normal headroom trolley

The normal headroom motor trolley is the standard trolley solution in environments with no special limitations in the hoist headroom area. The hoist is attached to the trolley with a coupling part fixation.

*****NOTE**:** The figure above shows the trolley with a traveling limit switch, which is an option.

4.12.3 Trolley technical data

Safe working load (SWL) possibilities

Frame size	Clutch size	SWL [kg]			
		M6	M5	M4	Rating min. (1 fall)
05	std	250	500	630	125
12	std	500	1000	1250	500

Flange widths for manual push trolleys

Frame size	SWL [kg]	min.	max.
05	500	50	310
05	1000	65	310
12	1000	65	310
12	2000	88	310

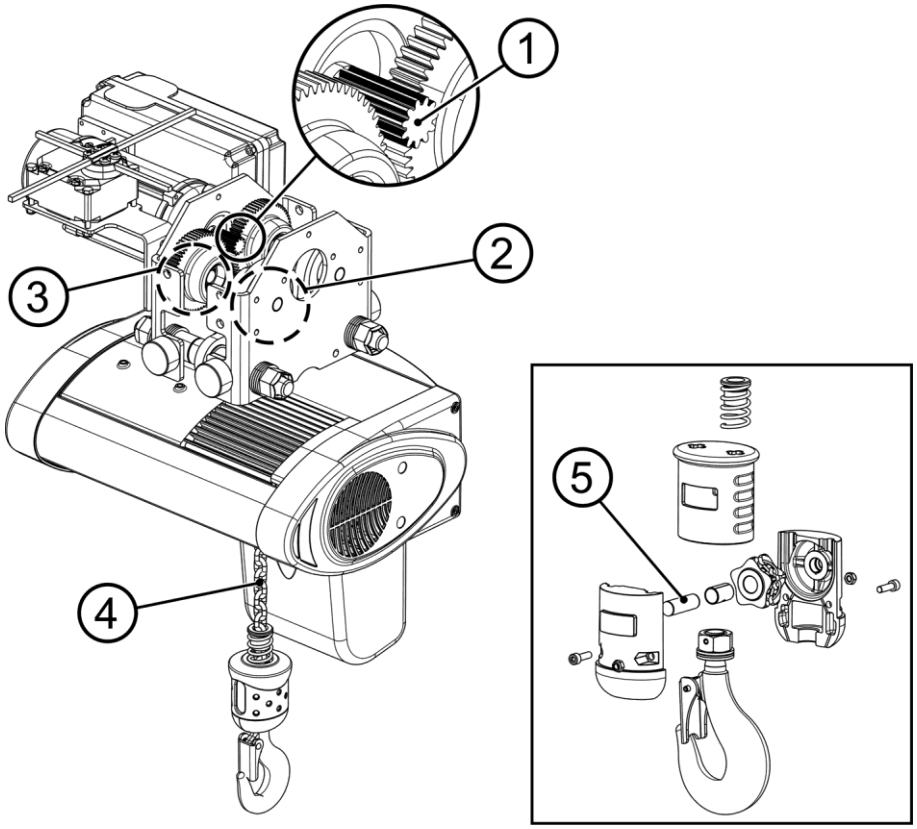
Flange widths for normal headroom motor trolleys

Frame size	SWL [kg]	Trolley type	Flange width adjustments [mm]					
05	1000	C1	5–100	106–150	155–200	206–248	260–307	308–310
12	1000	C1	5–100	106 -150	155–200	206–248	260–307	308–310
12	1250–2000	C2	-	64 -126	131–190	198–248	260–310	-

Motor trolley selections

	Trolley type and load [kg]		
Frame size	**C1**	**C2**	**C3**
05	125	-	-
12	500–1000	1250–2000	2500

4.13 Lubrication charts



Pos.	Component	Intervals
1	Secondary/output shaft (traveling transmission)	Annual
2	Hoisting transmission	Lubricated for the designed working period of the product
3	Traveling wheel bearings	Lubricated for the designed working period of the product
4	Chain	From 1 week – up to a year (depending on the usage)
5	Return sprocket axle (2-fall hoist only)	Annually or after 400 h (whichever comes first)

4.14 Lubricant information

1

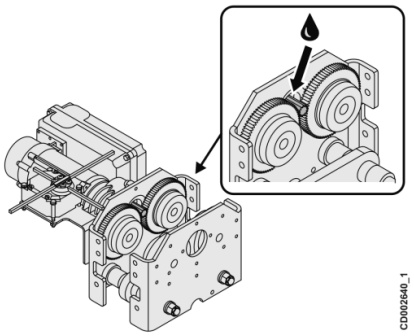
Traveling transmission (secondary/output shaft)

- Requires lubrication annually. Remove the plug and grease the open transmission.

Installation	Trade name and number	Quantity
Factory installed	MOBILITH SHC 460	7.5 cl

- Available as an option: Food industry lubricant (grease).

Installation	Trade name and number	Quantity
Factory installed	Klübersynth UH1 14-151	7.5 cl



2

Hoisting transmission (gear)

- Lubricated with oil. The lubrication will last for the designed working period of the hoist.

Installation	Trade name and number	Quantity
Factory installed	Dexron III	Lubricated for the designed working period of the hoist*

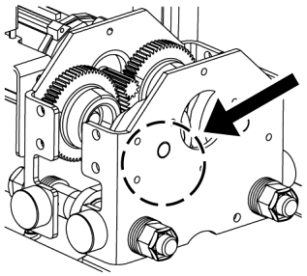
*NOTE: If you need to add lubricant for the hoisting transmission, see the table below for the correct fill amount.

Frame size	Quantity of oil needed [l]
05	0.23
10	0.6

- Available as an option: Food industry oil.

Installation	Trade name and number	Quantity
Factory installed	Klüberoil 4 UH1- 220 N	See table

Frame size	Quantity of oil needed [l]
05	0.23
10	0.6



4 **Chain**

- Lubricate the chain carefully before the first run and after that when needed.
- The lubrication interval varies from a minimum of one week to one year, depending on the usage.

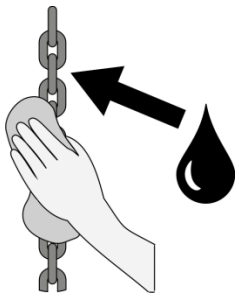
Installation	Trade name and number	Quantity
Lubricate before 1st run	Renolit LZR000	As required

- Available as an option: Oil lubricant.

Installation	Trade name and number	Quantity
Lubricate before 1st run	Mobil Gear 632	As required

- Available as an option: Food industry oil.

Installation	Trade name and number	Quantity
Lubricate before 1st run	Exalub AL 46	As required



5 **Return sprocket axle (2-fall hoist only)**

Installation	Type	Quantity
Annually or every 400 hours	Grease (without MoS2) KP 2 (DIN 51 502) soap-based lithium • drip point +260°C • worked penetration 265-295°C • operating temperature -20 .. +130°C For example, Fuchs Renolit Duraplex EP 2	As required

5 LIST OF MATERIALS AND COATINGS

MATERIALS:

Part	Fabrication	Material type	Norm
Frame	Pressure die casted aluminum alloy	GD-AlSi9CU3	EN AC – AlSi9Cu3
Suspension hook	Forged steel	34CrNiMo6	EN10250-3
Suspension eye	Machined plate	S355J2	EN-GJS-500-7
Covers	Pressure die casted aluminum alloy	GD-AlSi9CU3	EN AC – AlSi9Cu3
Profiles	Extruded aluminum alloy	AlMg0.7Si	EN AW - 6063
Gear wheels	Alloy steel	20NiCrMo2-2 / 16MNCr5	EN 10060
Chain bucket	High-density polyethylene	PEHD BLACK	
Hooks	Forged steel	34CrMo4	EN 10083
Hook blocks	Pressure die casted aluminum	GD-AlSi9CU3	EN AC – AlSi9Cu3
Chains	Bended and welded alloy steel	Special steel	EN 818-7
Rubber parts	Molded neoprene	Santoprene / Geolast	
Wheels	Forged steel, casted iron	C40 and GJS-700-2	EN 10060

LUBRICANTS:

Component	Lubricant
Traveling transmission	MOBILITH SHC 460
Hoisting transmission (gear)	Dexron III / Klüberoil 4 UH1- 220 N
Chain	Grease: Renolit LZR 000
	Oil: Mobil Gear 632 / Exalub AL 46

COATINGS:

Component	Coating
Aluminum alloy components	Epoxy polyester powder painting (70 µm); motor anodized black
Steel components	C2-M painting
Chain	Zinc plating

COLOR CODES:

	Color code				
Component	Konecranes	Verlinde	SWF	R&M	Stahl
Body	RAL 7021	RAL 7021	RAL 7021	RAL 7021	RAL 7021
Frame cover	NCS-S0585-Y80R	DZ2369	RAL 9006	RAL 2021	RAL 6018
Hook	RAL 1021	RAL 1021	RAL 1021	RAL 1021	RAL 1021

6 LOAD RANGE AND DUTY CLASSES

6.1 Hoist classifications

The mechanism group – M4, M5, or M6 – of an electric chain hoist depends on the operating time per working day and on the class of load spectrum.

The hoist operating time (O_t) can be calculated by using the following formula:

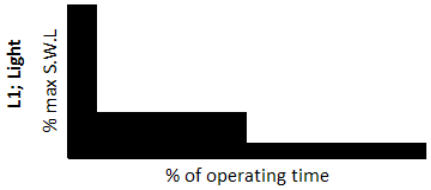
$$O_t = \frac{2 \times HOL(m) \times \text{No. of cycles} \left(\frac{1}{h}\right) \times \text{working time} \left(\frac{h}{day}\right)}{60 \left(\frac{min}{h}\right) \times \text{lifting speed} \left(\frac{m}{min}\right)}$$

The actual load spectrum factor can be calculated using the following schema:

Load %	Lifting time %		Factor k^3		Load spectrum factor
100%		*	1	=	
+					
80%		*	0.51	=	
+					
60%		*	0.22	=	
+					
40%		*	0.06	=	
+					
20%		*	0.01	=	
+					
0%		*	0	=	
=					
Sum:	100%			Sum:	
			Divide by 100:		/100 =
			Load spectrum factor, k_m:		

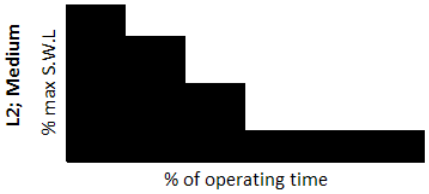
Class of load spectrum	Load spectrum k_m
L1	$k_m \leq 0.125$
L2	$0.125 < k_m \leq 0.250$
L3	$0.250 < k_m \leq 0.500$
L4	$0.500 < k_m \leq 1$

LOAD SPECTRUM CLASSES:



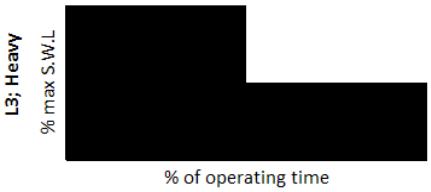
L1 Light

Mainly operated at very low loads and in exceptional cases at maximum loads.



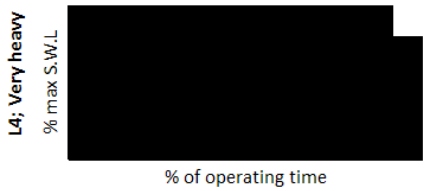
L2 Medium

Operated continually at low loads and frequently at maximum loads.



L3 Heavy

Operated continually at medium loads and frequently at maximum loads.



L4 Very heavy

Operated regularly at maximum and at almost maximum loads.

Load spectrum		Average operating time per working day [hrs]			
L1	Light	≤ 2	≤ 4	4 - 8	8 - 16
L2	Medium	≤ 1	≤ 2	2 - 4	4 - 8
L3	Heavy	≤ 0.5	≤ 1	1 - 2	2 - 4
L4	Very heavy	≤ 0.25	≤ 0.5	0.5 - 1	1 - 2
FEM/ISO rating			1Bm/M3	1Am/M4	2m/M5

The following table shows the theoretical service lifetime for ISO ratings M3, M4, M5, and M6:

Load spectrum		Theoretical service life [hrs]			
L1	Light	3150	6300	12500	25000
L2	Medium	1600	3200	6300	12500
L3	Heavy	800	1600	3200	6300
L4	Very heavy	400	800	1600	3200
FEM/ISO rating		1Bm/M3	1Am/M4	2m/M5	3m/M6