

STAGEMAKER

X2
DOUBLE
BRAKE
as standard
BGV D8+
READY



TECHNICAL GUIDE

Characteristics (SI/50Hz)

**ELECTRIC CHAIN HOIST DEDICATED TO
ENTERTAINMENT INDUSTRY**

 **VERLINDE**
LIFTING EQUIPMENT

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1 UPDATE HISTORY

Section	Changes	Date	Handled by
All	First draft version	10/2012	ISOTAPA
All	First correction round	12/2012	ISOTAPA
2.8, 3.1.1, 3.2.1	Separate versions for SI 50 Hz / SI 60 Hz / IMP 60 Hz created	12/2012	ISOTAPA
3.4	'lbf' units added to brake torque values	12/2012	ISOTAPA
3.3.1	Cable gland illustration modified	01/2013	ISOTAPA
2.7 & 2.8	Duty cycle data modified	02/2013	ISOTAPA
2.4	NEMA class changed	02/2013	ISOTAPA
2.8, 2.9, 3.1.1, 3.2.1, 3.4, 3.6.3, 3.7.3, 3.8, 3.9., 3.10	SR10 data added	06/2013	ISOTAPA
3.6.3, 3.6.4	Limit switch info modified, new illustrations (2-step/4-step limit switch) added	Q2/2013	ISOTAPA
3.4	Brake measurement info added	06/2013	ISOTAPA
6	Data added to product code table (e.g. hoisting speed, power supply, control	06/2013	ISOTAPA
2.8	Loads 1600 kg (1 ½ ston) and 2000 kg (2 ston), 2 falls, added to the Product range	09/2013	ISOTAPA
2.8, 6	Units changed from 'lbs' to 'ston' (60 Hz IMP version)	09/2013	ISOTAPA
2.5	Information concerning the second brake as an optional feature modified	09/2013	ISOTAPA
2.5	Information about BGV-D8+ hoists added	09/2013	ISOTAPA
3.4.2	Brake coil voltage tables harmonized for both brands (V & R&M), '1 phase' info	09/2013	ISOTAPA
2.6	Data for magnetic limit switch and rotating geared limit switch added for SI 50/60	10/2014	KHVBLA
All	SR01 data added	01/2015	ISOTAPA,
2.4.1	Standard & optional features list updated, added data for availability in different	01/2015	ISOTAPA
2.5	Sound level data checked	01/2015	ISOTAPA
2.6	List of applicable certifications and standards updated	01/2015	ISOTAPA
3.3	Cable entry size (class) added for SR hoists	01/2015	ISOTAPA
3.4	Brake data (single/double brake) updated	01/2015	ISOTAPA
3.4.1	Brake coil voltages and resistance: Warner brake data added for SR01 & SR02	01/2015	ISOTAPA
3.5	Slipping clutch description updated	01/2015	ISOTAPA
3.6	Limit switch data updated	01/2015	ISOTAPA
3.7	Chain reeving components – return sprocket data updated	01/2015	ISOTAPA
3.8	Suspension hooks – dimensions and drawings corrected	01/2015	ISOTAPA
3.10.1	Safety factors for chains updated	01/2015	ISOTAPA
3.11	Pendant – section removed	01/2015	ISOTAPA
4	Lubrication instructions updated	01/2015	ISOTAPA
5	List of materials and coatings updated	01/2015	KHVBLA
6	Stagemaker product code example updated	01/2015	ISOTAPA
All	SR25 data added	06/2015	ISOTAPA
3.6.1	Geared limit switch (GLS) data and functional description updated	06/2015	ISOTAPA
3.6.2	Magnetic limit switch (MLS) data and functional description updated	06/2015	ISOTAPA
3.8	Hook dimensions and dimensional illustrations checked and corrected	06/2015	ISOTAPA
2.4, 2.7, 3.6.1, 3.7.2, 3.8.2, 3.8.4, 3.9.3	2-fall data added for the SR25	06/2015	ISOTAPA

2 GENERAL

2.1 General description

The STAGEMAKER® hoists for show business are electrical chain hoists that are designed to handle stage and theatrical equipment. They enable the safe and accurate positioning of e.g. speakers, lighting systems, stage sets, and sceneries.

The features and options, compact design, and on-going adaptability (R&D, close corporation with the entertainment industry) of the Stagemaker hoist make this system an excellent choice for the stage productions. To ensure the quality process, the hoists meet the requirements of the Machinery Directive EC and CSA (where applicable) standards.

The Stagemaker hoists are designed for lifting and transporting of materials only. Under no conditions or circumstances, either during initial installation or in regular use, are these hoists to be used for lifting or transporting of personnel. For more safety, precautions – such as redundant systems, safety lines from load to structure or enhanced safety features the BGV-C1 hoist – can be used.

2.2 Mounting positions

2.2.1 Industrial suspension = Body Up

Normal position is where the hoist is mounted with load chain down and hoist body up. The load block attaches to the load and moves up and down. The hoist body is stationary.

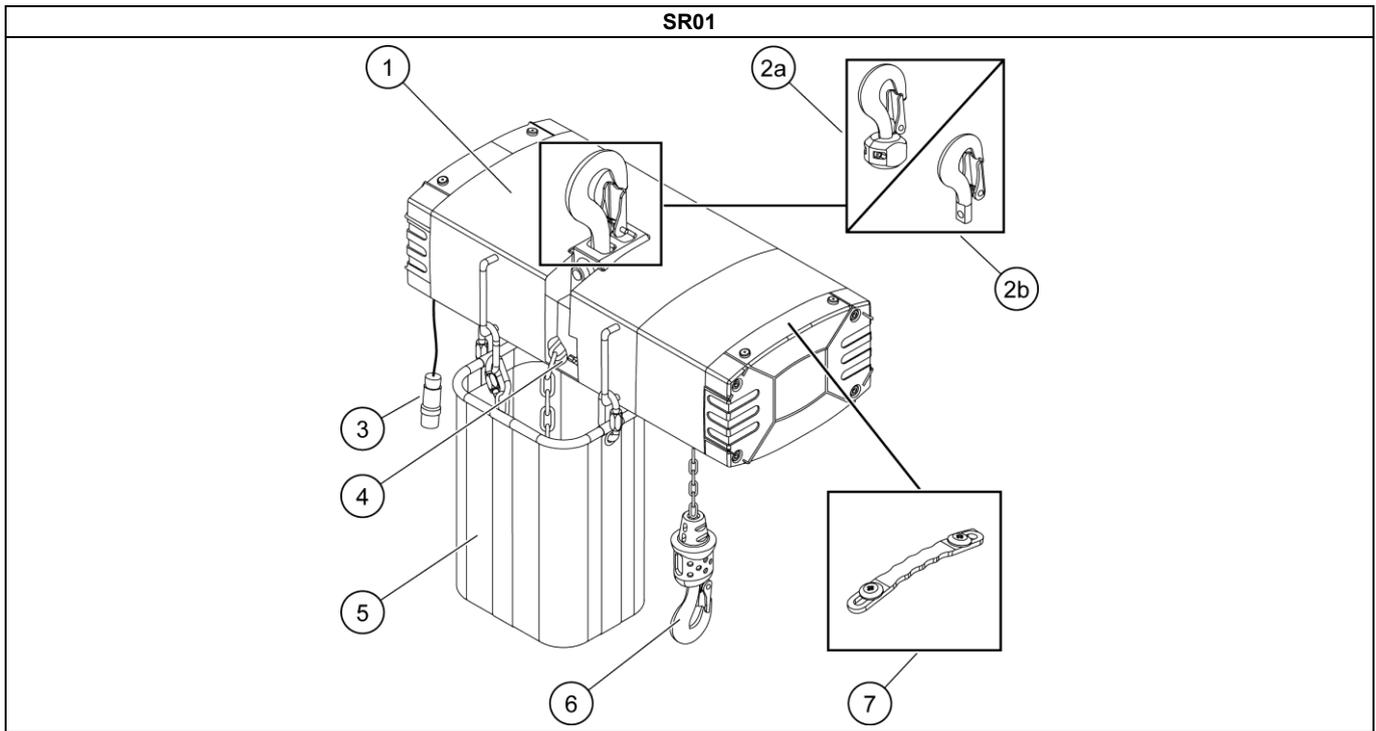


2.2.2 Climbing hoist = Body Down

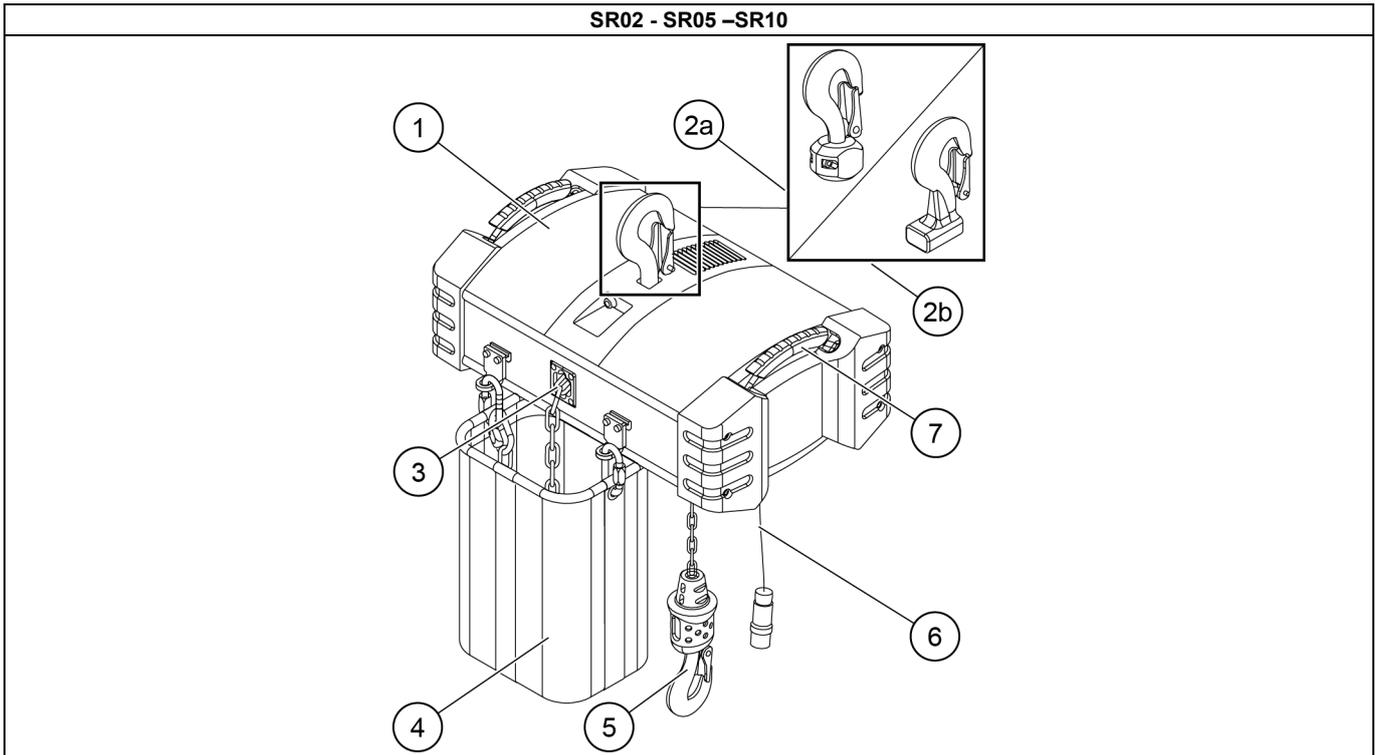
Inverted position is where the hoist is mounted with load chain up and hoist body down. The hoist body attaches to the load and moves up and down with the load. Hoists in the inverted position are easier to install and set up because all the cabling is at the same level, and the hoist is at truss level.



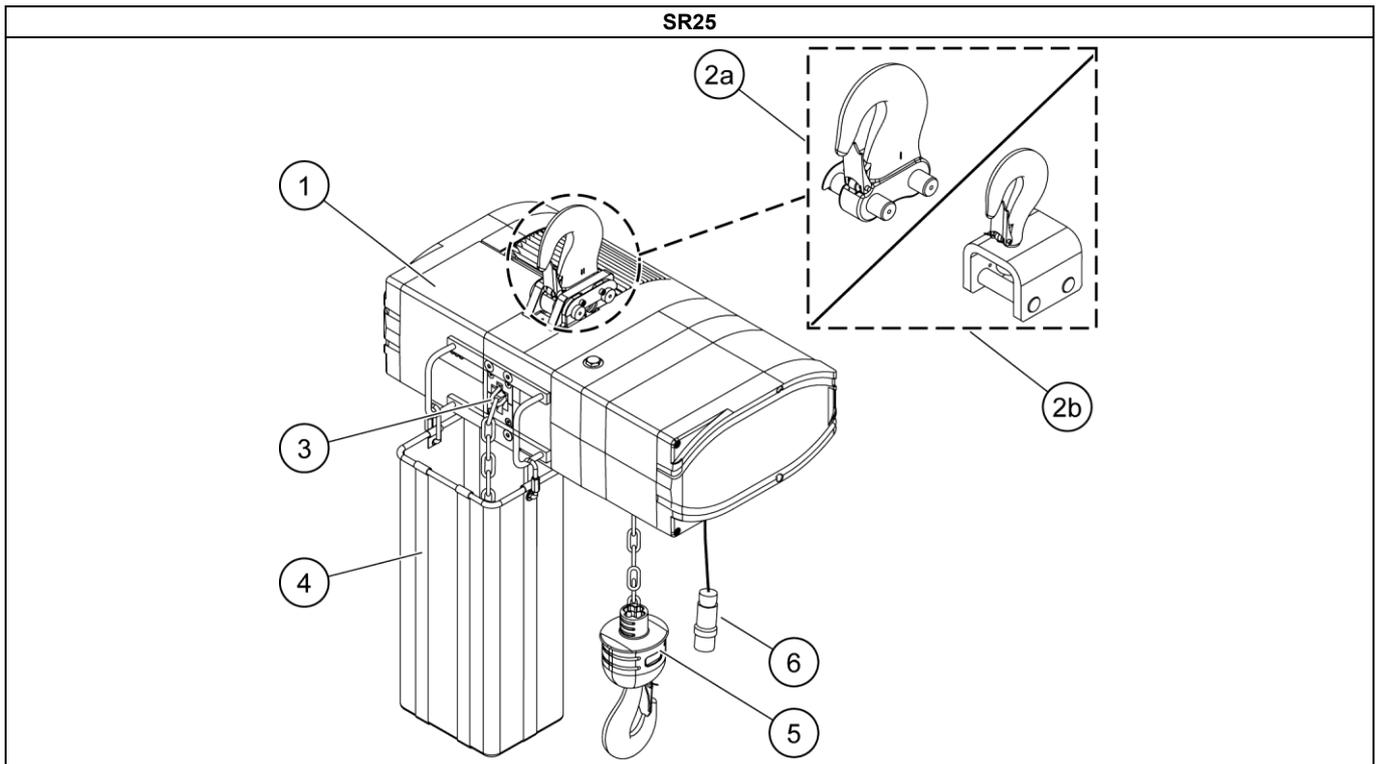
2.3 Identifying the key parts of the hoist



Pos.	Part	Description
1	Hoisting machinery	Equipment composed of hoist frame, hoisting motor, gear, clutch, and brake
2a	Upper hook (rotating)	Rotating upper hook, normally used when hoist is operated in inverted position
2b	Upper hook (fixed)	Fixed suspension, normally used when hoist is operated in normal position
3	Control cable + plug	Plug for connecting power or controls to the hoist
4	Chain guide	Chainflux type chain guide for precise chain alignment
5	Chain bag	A bag made of textile material where the lifting chain is gathered and stored
6	Hook	Hook Includes hook housing, hook forging, and a rubber grip
7	Handles (optional)	Removable handles for easy carrying of the hoist



Pos.	Part	Description
1	Hoisting machinery	Equipment composed of hoist frame, hoisting motor, gear, clutch, and brake
2a	Upper hook	Rotating upper hook, normally used when hoist is operated in inverted position
2b	Upper hook	Fixed suspension, normally used when hoist is operated in normal position
3	Chain guide	Chainflux type chain guide for precise chain alignment
4	Chain bag	A bag made of textile material where the lifting chain is gathered and stored
5	Hook	Hook Includes hook housing, hook forging, and a rubber grip
6	Control cable + plug	Plug for connecting power or controls to the hoist
7	Handles	Integrated handles for easy carrying of the hoist
8	Buffers	Rubber buffers at each corner to protect hoist against external shocks



Pos.	Part	Description
1	Hoisting machinery	Equipment composed of hoist frame, hoisting motor, gear, clutch, and brake
2a	Upper hook	Fixed suspension, normally used when hoist is operated in normal position
2b	Upper hook	Rotating upper hook, normally used when hoist is operated in inverted position
3	Chain guide	Chainflux type chain guide for precise chain alignment
4	Chain bag	A bag made of textile material where the lifting chain is gathered and stored
5	Hook	Hook Includes hook housing, hook forging, and a rubber grip
6	Control cable + plug	Plug for connecting power or controls to the hoist

2.4 Features – standard and optional features

2.4.1 Standard features

Mechanics

- 1-fall up to 2500 kg, 2-fall up to 5000 kg
- D8 as standard, BGV-D8+ ready
- New “Perfect Push”, patented concept, 5 pocket load wheel, fitted with 5 intermediate teeth. This innovation provides improved chain guiding and chain flow, to help reduce the risk of chain jamming



- Mechanical overload device (clutch)
- Disc brake is located after the motor and the clutch, on a separate load path. It is directly linked to the load and holds the load even in case of motor or clutch failure.
- 2- or 3-step helical gear
- Sprocket on output shaft in cantilever position (SR02–SR25) or in center position (SR01)
- Operation temperature -20 °C to +40 °C with rated load and speed
- Hoist body has epoxy powder 70 µm thickness paint, C2 according to EN12944-2 and EN12944-5
- Upper and lower hook according to DIN classification
- G80 black finished (SR01–SR10) or electro-galvanized (SR25) load chain
- Rubber buffers on the hoist body (not in SR01 or SR25)
- Integrated handles (standard for SR02–SR05 and SR10, optional for SR01, not available for SR25)
- Maximum relative humidity 90%
- Maximum altitude 1000 m
- Chain bag
- Inverted position – hoist body down
- CHAINFLUX Design provides a horizontal flow of the chain as it comes off of the load wheel. This design, along with the high strength aluminum construction, allows for a more fluid flow of the chain into the chain bag and helps reduce the risk of chain jamming. Drain in housing to avoid water collection in load wheel compartment.

CHAINFLUX



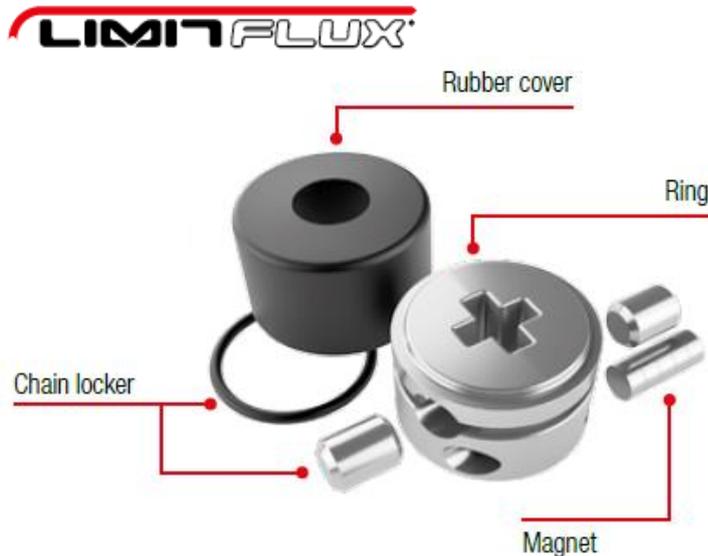
- Chain guide CHAINFLUX contains drain hole, the purpose of which is to avoid water collection in load wheel compartment.

Electrics

- 3-phase single speed motors
- Double brake as standard



- The Limitflux is a built-in limit switch device in the CHAINFlux MKII® that's allow to control setting of hoist or hook position in industrial suspension or climbing configuration (on version B only with SR5 & 10).



- Upper and lower limit switches (in configuration B): SR1,2 and 25
- Motor thermal protection (in configuration B), protection class IP55, tropical impregnation
- Motors are TENV type with insulation class F
- All components are connected by plugs (not in SR25, configuration B)
- Low voltage control 48 VAC or 115 VAC (configuration B)
- Electrics on one main printed circuit board (PCB) (configuration A and B)
- Separate brake rectifier that is connected to contactor (for SR02–SR25 in configuration B, not in SR01)
- IP55 / NEMA 3R protection

2.4.2 Optional features

Mechanics

- BGV-D8+ (second brake + static safety factor 10)
- Manual brake release (not with 2 brakes unit)
- Additional chain stop
- Upper suspension fixed eye
- Self-locking hook block with safety load hook (not available for SR25)
- Lockable rotation of hook forging (lockable in 60° increments)
- Soft rain cover. The hoist can be operated with rain cover fitted



Soft rain cover

Electrics

- 2- or 4-step rotating geared limit switch (GLS) (SR02–SR10: 2-/4-step version optional; SR25: 4-step version optional, 2-step version standard; not available for SR01). The 4-step geared limit switch version increases the hoist length (except for SR25).
- One brake
- HE 6 plug on B type instead of Red + Yellow P17

2.5 Sound intensity level

Noise level (of the hoist): For the SR01–SR10 hoists, the sound intensity level is measured 56 dB (tested with 1500 rpm 4 m/min. according to ISO11210 and the EN14492-2.). For the SR25 hoists, the maximum noise level is 70 dB.

2.6 Certifications, standards and other technical documents

The product fulfills the requirements of the following standards: Machinery 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 up to M5), 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
- is built with mechanics that are compatible with D8, D8+ requirements
- has GOST** approval.

*NOTE: For the 60 Hz motors.

**NOTE: Not valid for the SR25.

2.7 Product range at D8

Load [kg] D8	Load [kg] D8 +	Frame size	Falls	Duty group ISO	Chain size	Gear life [h]	Motor type	Motor power [kW]	Hoisting speed [m/min.]	Max. amb. temp [°C]	ED%	Starts/hour
250	125	01	1	M3	4 x 11	400	MT06CA200	0.2	4	+40	25	150
		05	1	M4	5 x 14	800	MT08CA106	0.9	16	+40	30	180
320	160	02	1	M5	4 x 11	1600	MT07CA200	0.23	4	+40	40	240
		02	1	M4	4 x 11	800	MT07CA104	0.45	8	+40	30	180
500	250	01	2	M3	4 x 11	400	MT06CA200	0.2	2	+40	25	150
		05	1	M5	5 x 14	1600	MT08CA200	0.45	4	+40	40	240
		05	1	M4	5 x 14	800	MT08CA106	0.9	8	+40	30	180
		10	1	M4	7 x 20	800	MT10CA106	1.8	16	+40	30	180
1000	500	10	1	M5	7 x 20	800	MT10CA200	0.9	4	+40	30	180
		10	1	M4	7 x 20	800	MT10CA106	1.8	8	+40	30	180
1600	800	10	2	M4	7 x 20	800	MT10CA106	1.8	4	+40	30	180
2000	1000	10	2	M4	7 x 20	800	MT10CA106	1.8	4	+40	30	180
2500	1250	25	1	M5	11.3 x 31	1600	MT10CC200	1.8	4	+40	40	240
		25	1	M3	11.3 x 31	800	MT10CC106	3.6	8	+40	25	150
5000	2500	25	2	M3	11.3 x 31	400	MT10CC106	3.6	4	+40	25	150

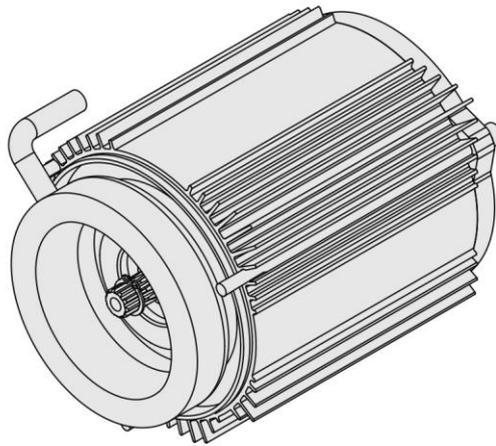
2.8 Hoist weight

Frame size	Hoist weight [kg]				Chain [kg]
	Without chain		With 20 m of chain		
	Single brake	Double brake	Single brake	Double brake	
01	10,4	11,4	17,4	18,4	0.37
02	20	22	28	29	0.37
05	30	31	41	42	0.57
10	45	47	67	69	1.1
25	107.7	114.3	163.7	170.3	2.8

3 MOTOR

3.1.1 Hoisting motors

The hoisting motor is specially designed for hoisting purposes with good efficiency. It is classified as a 'TENV motor' with the insulation class F.



CD004384_1

Motor type	Speed ratio	Power [kW]	Speed n/rpm	Cos ϕ	Nbr. of pole pairs	Nominal voltage 230 V – Amps			Nominal voltage 400 V – Amps		
						Voltage range 220–240 V			Voltage range 380–415 V – Amps		
						Io	In	Ist	Io	In	Ist
MT06CA200	2	0.2	1370	0.60	2	1.6	1.7	4.9	0.9	1.0	2.8
MT07CA200	2	0.23	1410	0.71	2	1.2	1.4	5.1	0.7	0.8	2.9
MT07CA104	1/4	0.45	2630	0.73	1	2.6	3.2	11.2	1.5	1.8	6.6
MT08CA200	2	0.45	1390	0.82	2	2	2.4	10.5	1.1	1.4	6.2
MT08CA106	1/6	0.9	2850	0.77	1	3.6	4.4	18.3	2	2.5	10.5
MT10CA200	2	0.9	1350	0.70	2	3.3	4	16.8	1.9	2.3	9.8
MT10CA106	1/6	1.8	2780	0.68	1	7.9	9.8	33.5	3.8	4.9	20.9
MT10CC200	2	1.8	1370	0.86	2	3.3	6.6	33	1.9	3.8	19
MT10CC106	1/6	3.6	2800	0.87	1	7.8	14	68	4.5	8.2	39

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

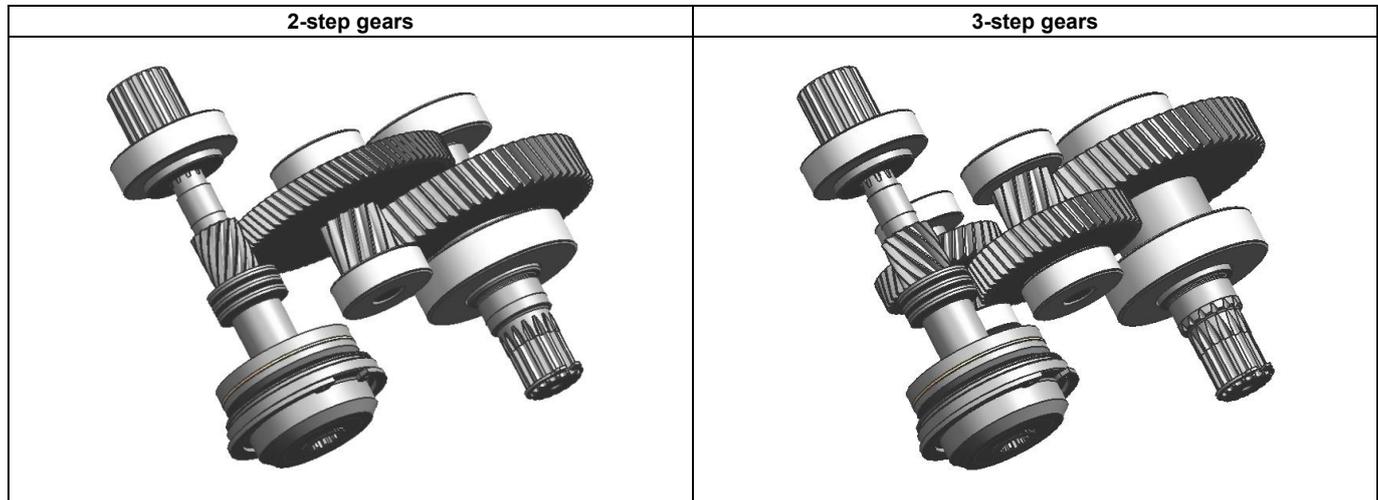
Motor voltages – Power supply main fuse			
Frame size	Voltage range		
	208–240 V [50/60Hz]	380–415 V [50 Hz]	440–480V [60 Hz]
01	6A gG / 4A Am	6A gG / 4A Am	6A gG / 4A Am
02	10A gG / 6A Am	6A gG / 4A Am	6A gG / 4A Am
05	12A gG / 8A Am	10A gG / 6A Am	6A gG / 4A Am
10	16A gG / 10A Am	12A gG / 8A Am	10A gG / 6A Am
25	25A gG / 20A Am	20A gG / 16A Am	16A gG / 10A Am

Abbreviations	
Io	Current without load
In	Nominal current
Ist	Starting current

3.2 Gear

3.2.1 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.



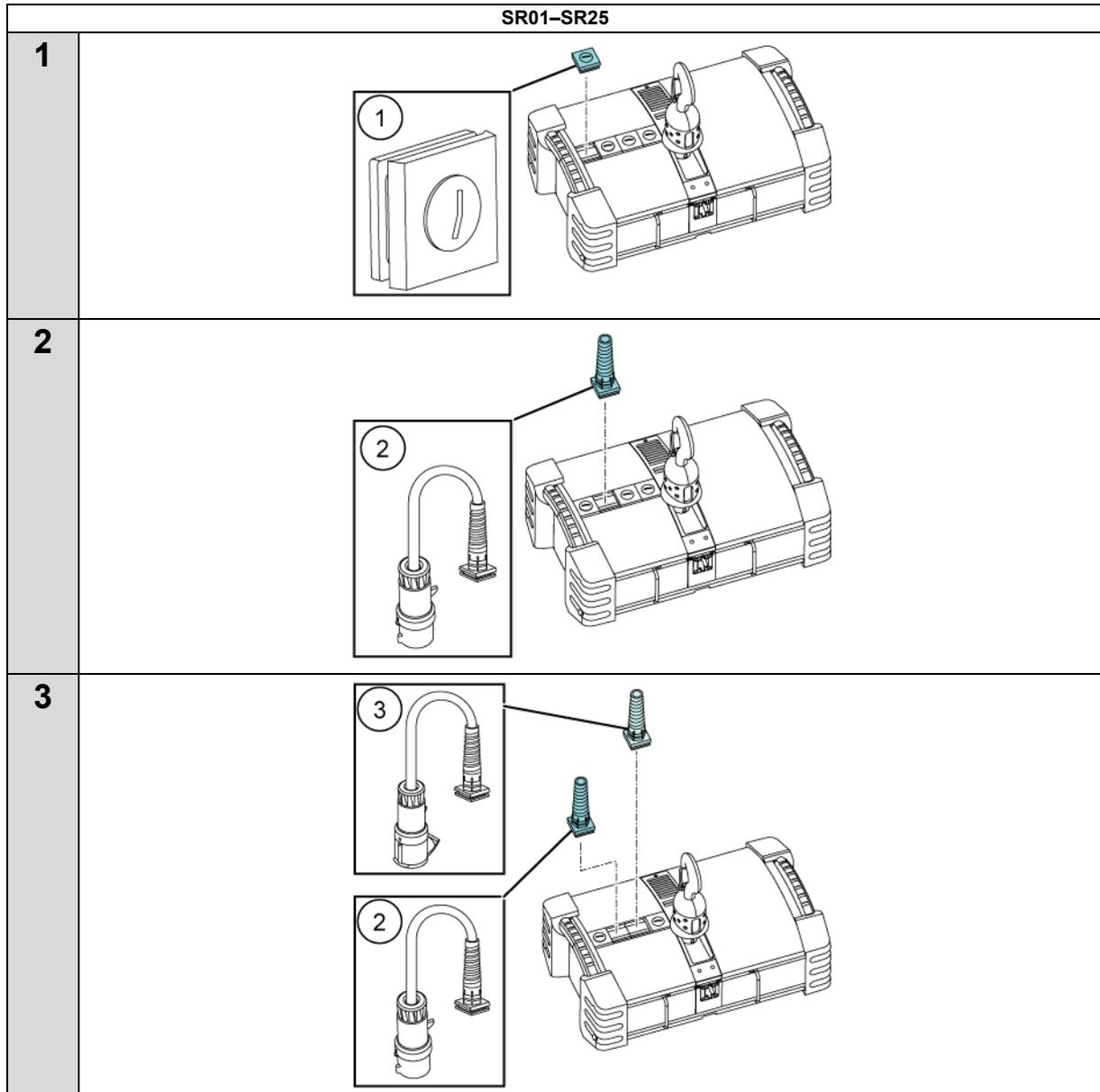
Frame size	Main hoisting speed [1 fall (m/min.)]	Gear type	Gear ratio
01	4	2-step	41.599
02	4	2-step	39.382
02	8	2-step	39.382
05	4	3-step	49.894
05	8	3-step	49.894
05	16	3-step	25.286
10	4	3-step	71.777
10	8	3-step	71.777
10	16	3-step	35.832
25	4	3-step	110.783
25	8	3-step	110.783

3.2.2 AGMA rating

The hoisting gears for the SR01–SR25 have the AGMA class 10 (AGMA 390.03 and AGMA 2000-A88).

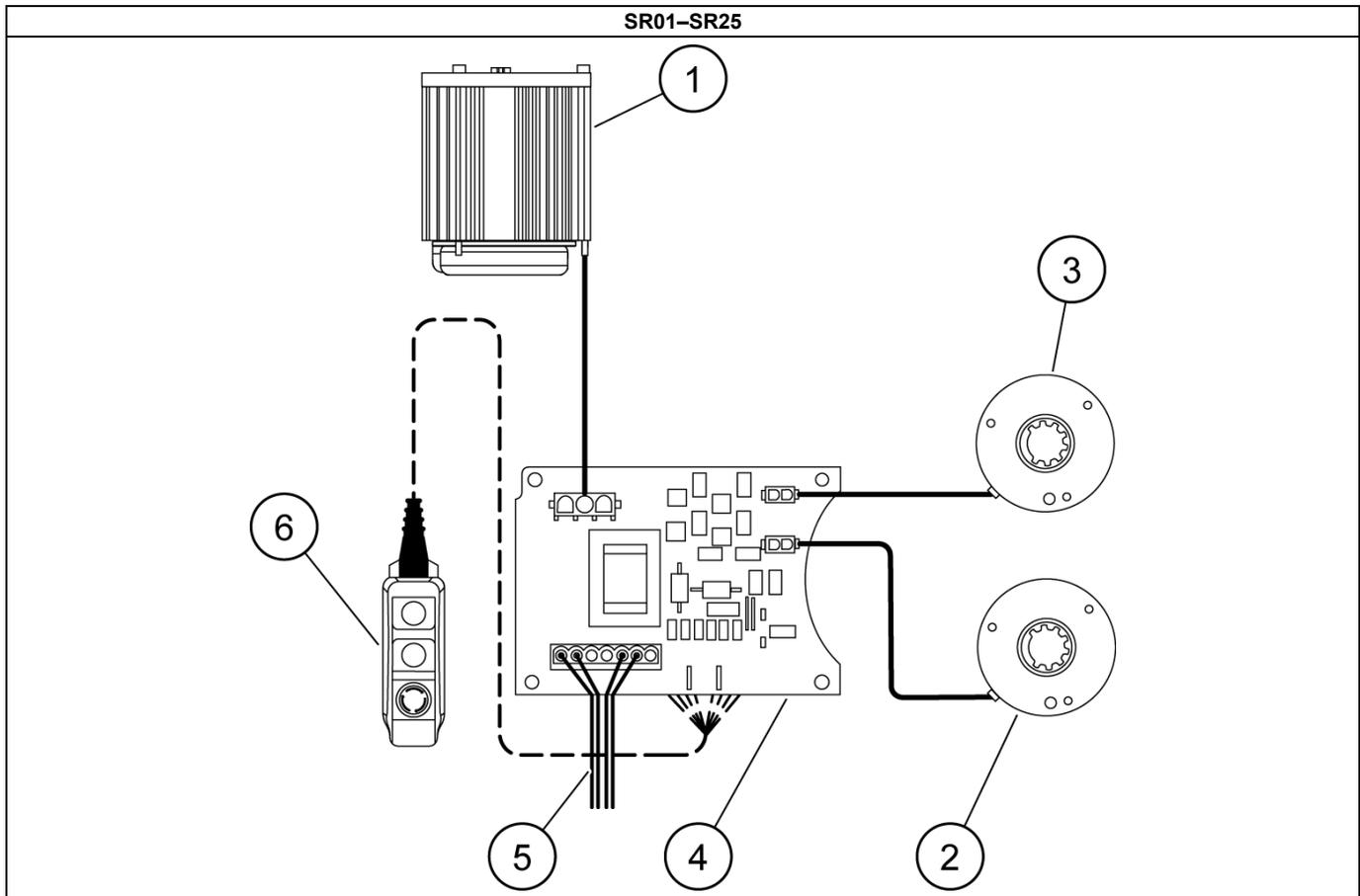
3.3 Electrics

3.3.1 Cable inputs



Pos.	Part	Size (class)
1	Free cable gland	M25
2	Power supply	M25
3	Control cable	M25

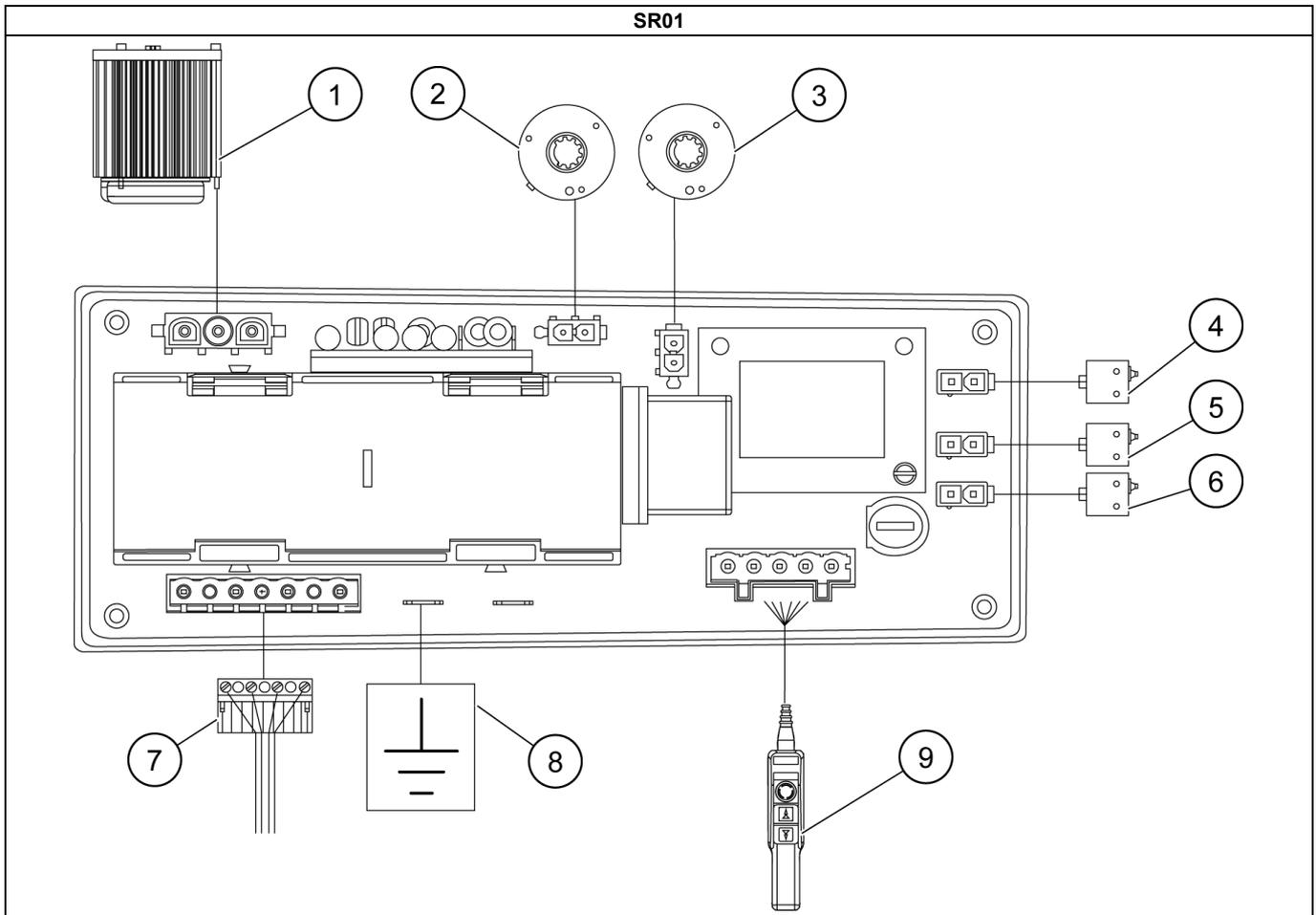
3.3.2 Wiring principle – Configuration A



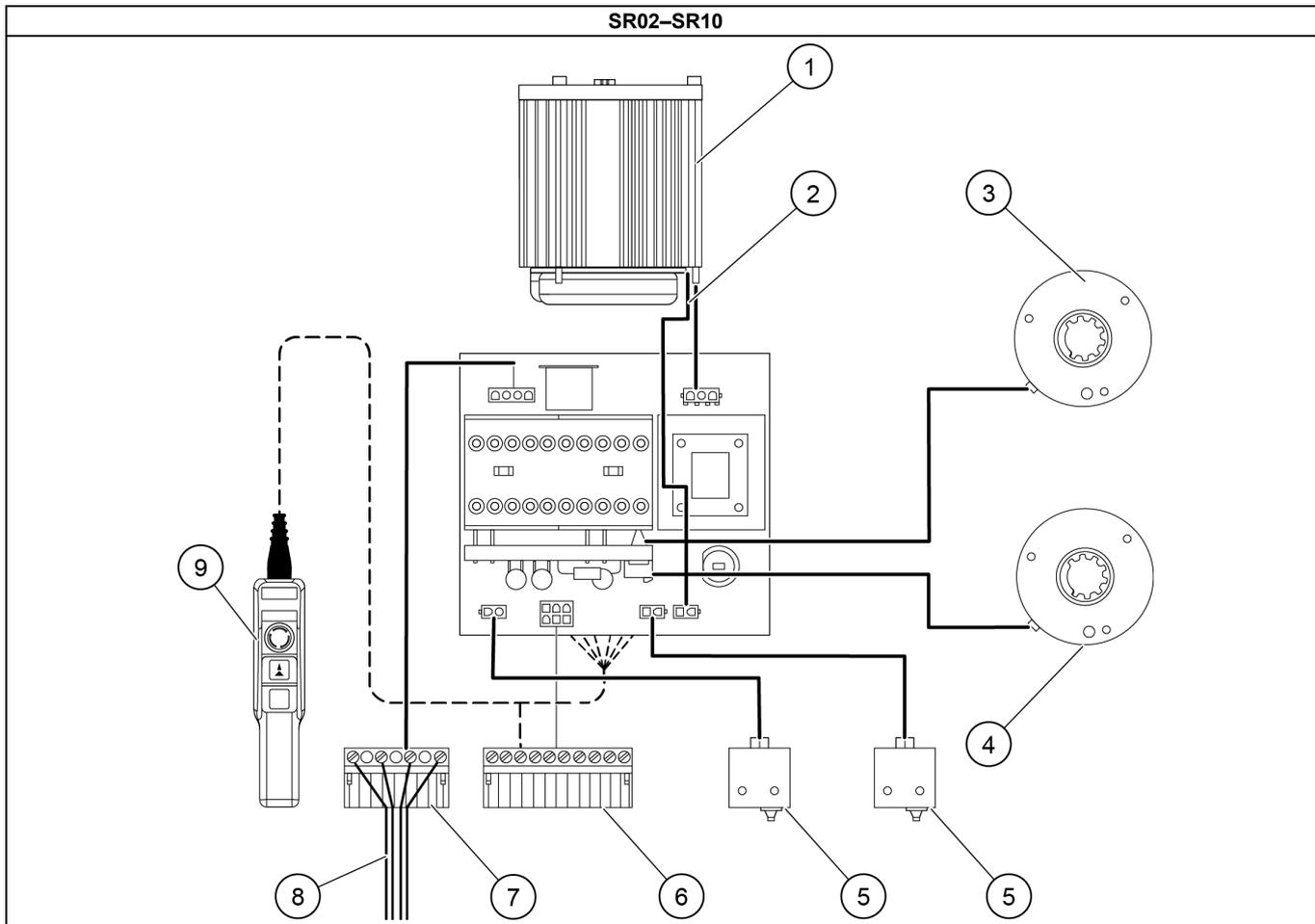
Pos.	Part
1	Hoisting motor
2	Main brake
3	Secondary brake
4	Direct control voltage board
5	Power supply
6	Pendant (optional)*

*NOTE: Not available in North America for the direct control hoist.

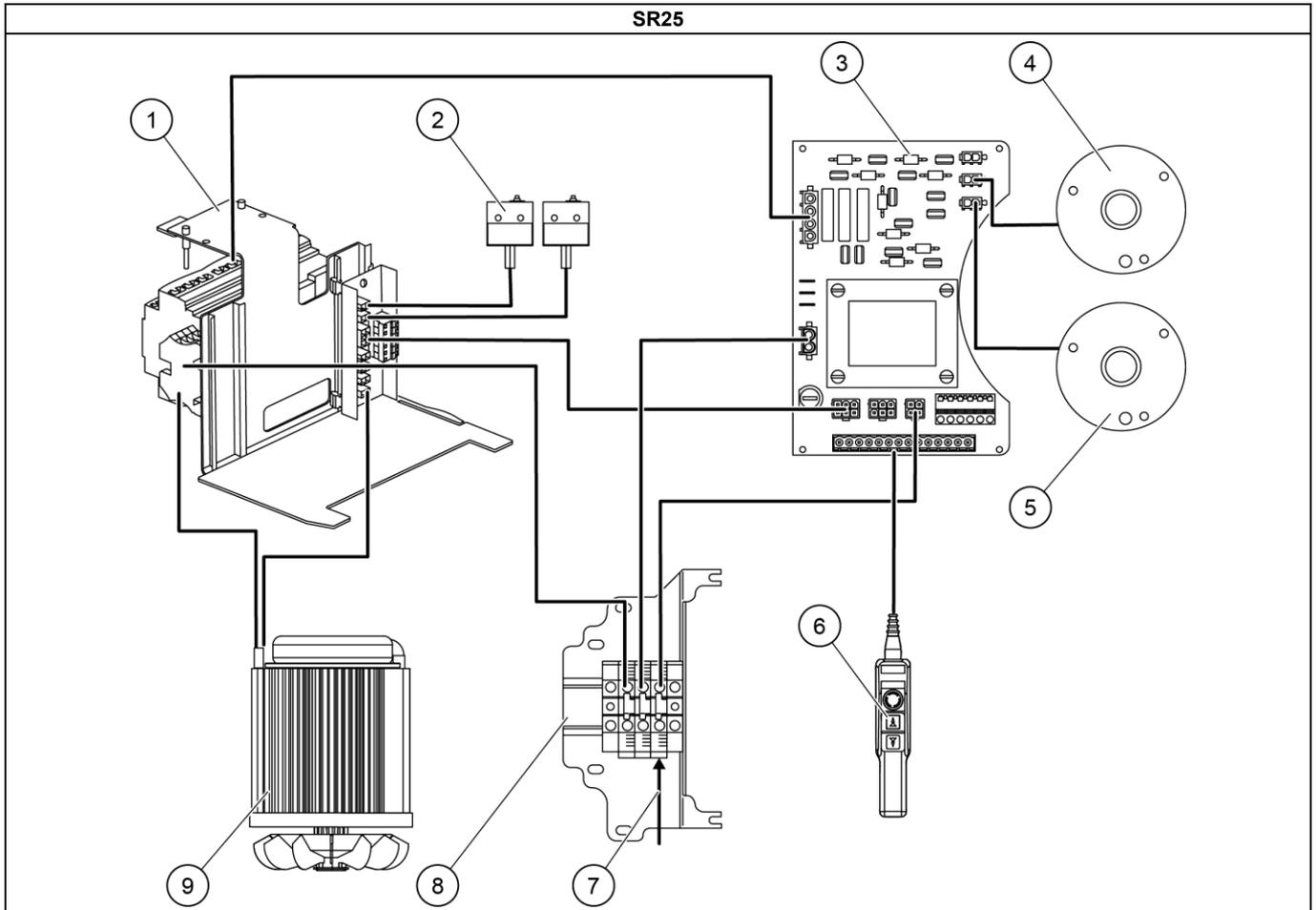
3.3.3 Wiring principle – Configuration B



Pos.	Part
1	Hoisting motor
2	Secondary brake
3	Main brake
4	Limit switch down
5	Thermal sensor
6	Limit switch up
7	Power supply
8	Grounding
9	Pendant / control plug



Pos.	Part
1	Hoisting motor
2	Thermal sensor
3	Main brake
4	Secondary brake
5	Limit switches
6	Control plug
7	Power plug
8	Power supply
9	Pendant



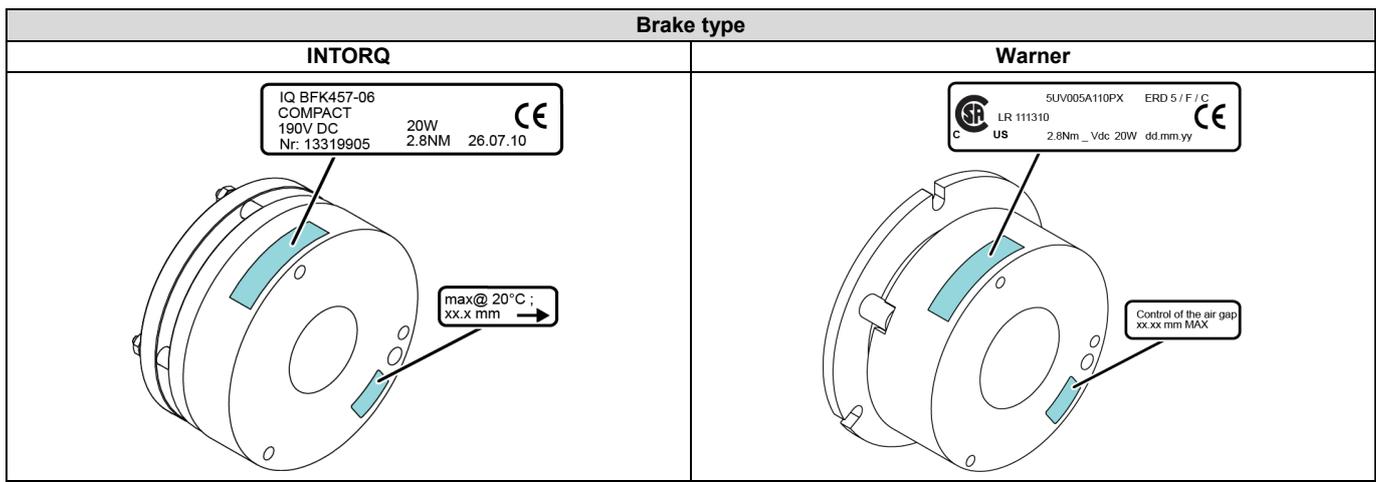
Pos.	Part
1	Motor board
2	Hoisting limit switches
3	Power board
4	Main brake
5	Secondary brake
6	Pendant
7	Main power supply
8	Terminals
9	Hoisting motor

3.4 Hoisting brakes

3.4.1 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. If the brake wear exceeds the allowed measurement criteria, contact authorized service personnel for a brake change.



BRAKE CHARACTERISTICS

Frame size	Brake torque [Nm/lbf]		Brake measurement [20 °C] [mm]*	
	[Nm]	[lbf]	Brake type	
			INTORQ	Warner
01	2.8	2.1	-	20.7
02	2.8	2.1	25.3	20.7
05	6.8	5.0	25.3	-
10	14	10.3	30	-
25	21	15.48	33.5	-

*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 you are not allowed to exceed is indicated on the brake sticker that is located on the brake.

3.4.2 Double brake

The double brake assembly consists of a main brake and a secondary brake that are assembled on the same hub. During the hoisting motion, the brake board energizes the main and the secondary brake simultaneously. When the hoisting motion stops, the main brake switches off immediately. The secondary brake remains energized for a few milliseconds by the motor inductive effect.

The main brake holds the first position (located 'on the top') in the double brake assembly, which makes the checking of the brake wear easier.

The secondary brake works as a back-up brake for the main brake. It becomes the functional brake only if the main brake is damaged in a way that it cannot hold the load. If the main brake operates normally, there is no need to check the wear on the secondary brake.

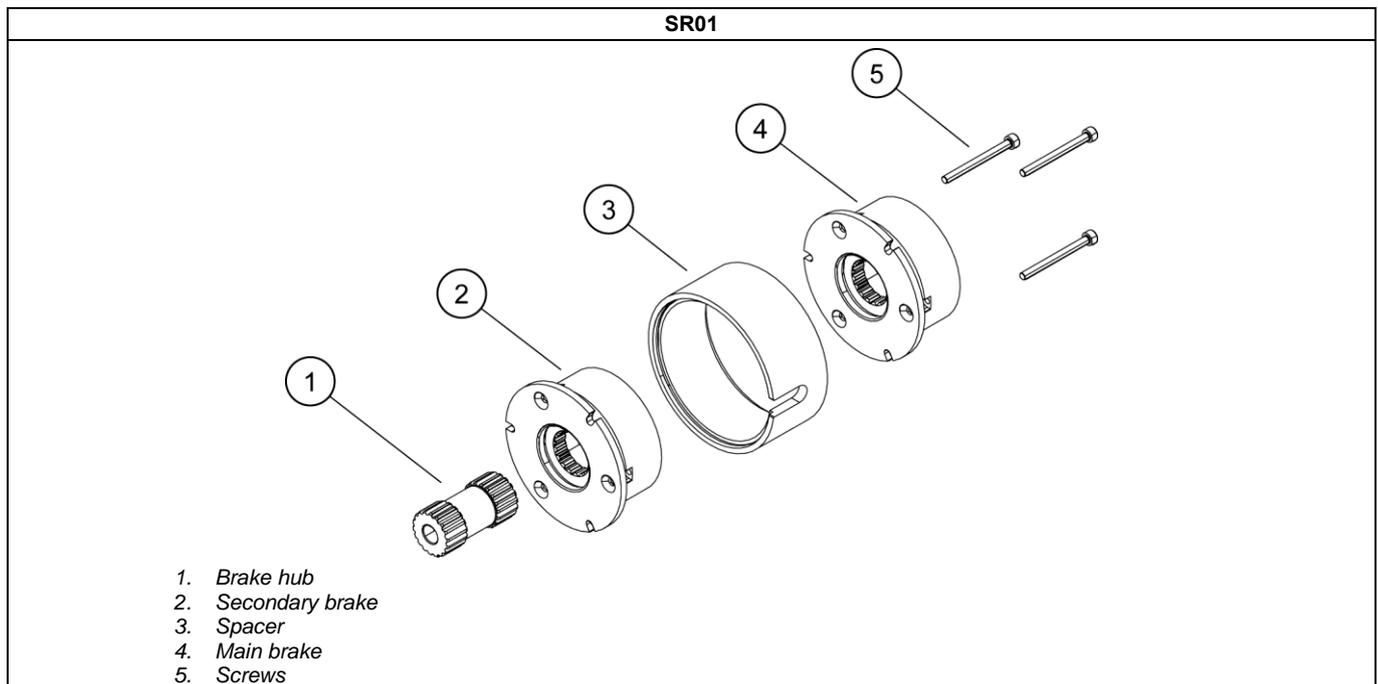


Figure 1. Double brake assembly – Warner brake

BRAKE CHARACTERISTICS

Frame size	Brake amount (pcs)		Brake torque [Nm/lbf]				Brake measurement [20 °C] [mm] ²	
	Single brake	Double brake	Main brake		Secondary brake ¹⁾		Brake type	
			[Nm]	[lbf]	[Nm]	[lbf]	INTORQ	Warner
01	1	2	2.8	2.1	2.8	2.1	-	20.7
02	1	2	2.8	2.1	2.8	2.1	25.3	20.7
05	1	2	6.8	5.0	6.8	5.0	25.3	-
10	1	2	14	10.3	14	10.3	30	-
25	1	2	21	15.48	21	15.48	33.5	-

1) The secondary brake is only a back-up brake for the main brake. If the main brake operates normally, there is no need to check the wear on the secondary brake.

2) 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 you are not allowed to exceed is indicated on the brake sticker on the brake.

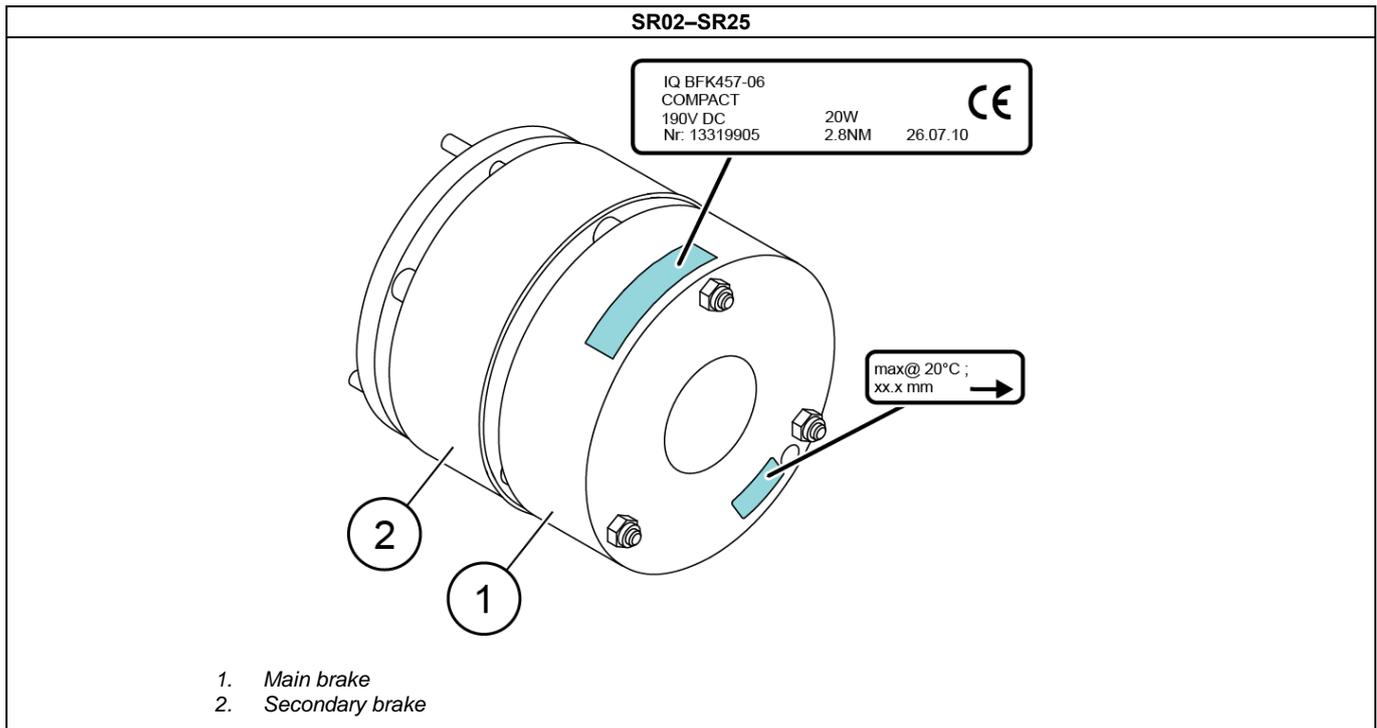
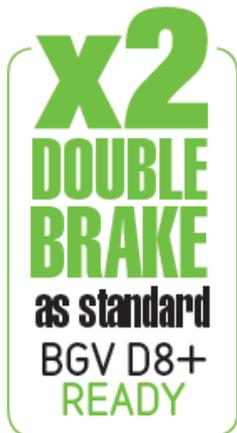


Figure 2. Double brake assembly – INTORQ brake



LENGTH EXTENSION

The double brake assembly extends the hoist length as follows:

Frame size	Length extension [mm]
01	37
02	52
05	30
10	52
25	112

3.4.3 Manual brake release (option)

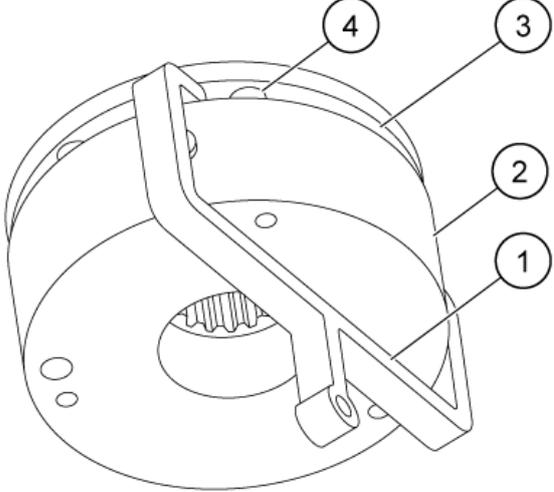
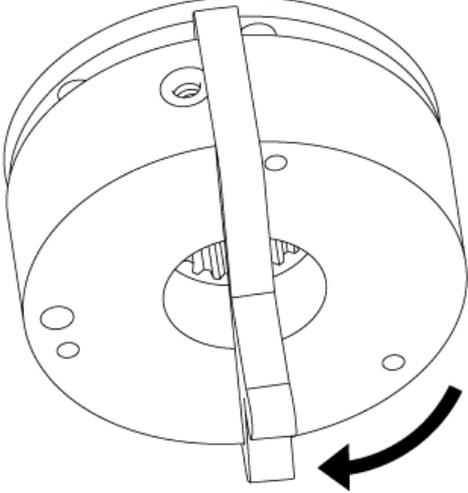
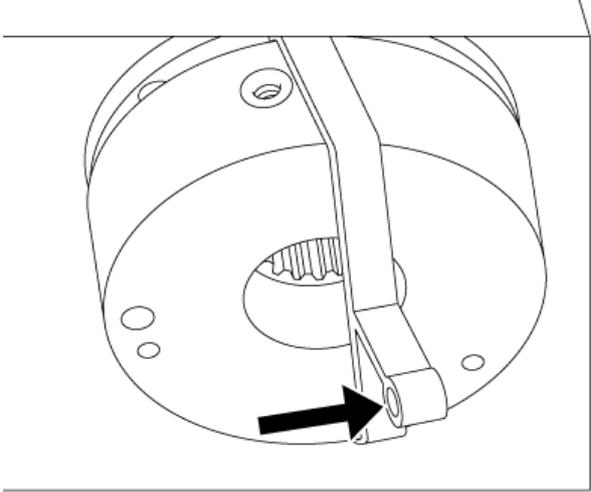
The manual brake release is available as an optional feature. With the manual brake release, the brake can be released by hand in situations that require lowering the load manually.

Use the manual brake release function only in emergency situations where the brake cannot be released normally. Extensive use of this feature as well as high lowering speed can result in immediate wear-out of the brake lining. Note the following warnings that are related to the use of the manual brake release feature.

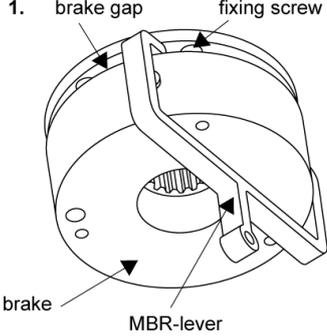
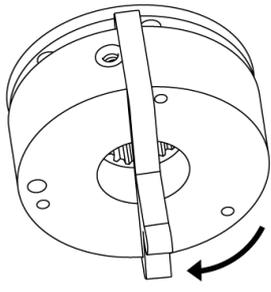
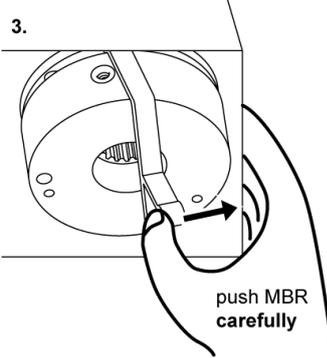
Important information before starting to use the manual brake release:

 <p>WARNING</p>	<p>Extensive use and high lowering-speed can result in an immediate wear-out of the brake lining.</p>
 <p>WARNING</p>	<p>Make sure that the hoist is not connected to any source of electricity and that the electricity cannot be activated accidentally.</p> 
 <p>WARNING</p>	<p>Do not stand within the danger area of the moving load. Clear and secure the danger area.</p> 
 <p>WARNING</p>	<p>Before using the hoist again, make sure that the manual brake release is stored safely.</p>

How to use the manual brake release:

<p>1</p>	<p>Take the manual brake release lever and place it on the brake. Insert one arm of the lever into the brake gap on the left side of the upper fixing screw.</p>	 <p>1. MBR-lever 2. Brake 3. Brake gap 4. Fixing screw</p>
<p>2</p>	<p>Turn the manual brake release lever in a way that its second arm fits into the brake gap on the opposite side of the brake.</p>	
<p>3</p>	<p>Tilt the manual brake release lever in the brake gap and push it carefully to open the brake.</p> <p>Do not open the brake for more than one (1) second before stopping again.</p> <p>Repeat the procedures for pushing the lever and lowering the load within short intervals.</p>	

The instructions for the use of the manual brake release can be found on a sticker that is attached to the housing of the hoist. See the following example illustration.

<p>Before usage of Manual Brake Release (MBR)</p> <ul style="list-style-type: none"> ➤ WARNING: Extensive use and high lowering-speed can wear out the brake lining immediately! ➤ Make sure, hoist is not connected to any source of electricity and electricity cannot be activated accidentally! ➤ No-one must stand within the danger area of the moving load! Clear and secure danger area! ➤ Before using the hoist again, make sure the MBR is stored safely! 			 
<p>How to use the MBR</p>			
<p>1. brake gap fixing screw</p> 	<p>2.</p> 	<p>3.</p> 	

3.4.4 Brake coil voltages and resistance

Brake coil voltage

Motor voltage [Vac]		Frequency [Hz]	Brake voltage [Vd]
208–240 V	3 phases	50/60	103
380–415 V	3 phases	50	190
440–480 V	3 phases	60	190

Brake coil resistance

Frame size	Brake type [single brake]		Brake torque		Rated voltage [V]	Coil resistance [20 °C]	
	INTORQ	Warner	[Nm]	[lbf]		min. [Ohm]	max. [Ohm]
01	-	5UV005A110P2	2.8	2.1	103	400	550
01	-	5UV005A110P1	2.8	2.1	190	1500	2030
02	-	5UV005A110P2	2.8	2.1	103	400	550
02	-	5UV005A110P1	2.8	2.1	190	1500	2030
02	BFK457-06	-	2.8	2.063	103	496.6	564.9
02	BFK457-06	-	2.8	2.063	190	1661	1949
05	BFK457-06	-	6.8	5.012	103	496.6	564.9
05	BFK457-06	-	6.8	5.012	190	1661	1949
10	BFK457-08	-	14	10.318	103	398.9	449.8
10	BFK457-08	-	14	10.318	190	1366	1552
25	BFK457-10	-	21	15.48	103	313	350
25	BFK457-10	-	21	15.48	190	1125	1282
25	BFK457-10	-	21	15.48	255	2060	2285
25	BFK457-10	-	21	15.48	320	3227	3614

3.5 Overload device: Slipping clutch

The overload protection of the hoisting unit is ensured through a direct acting limiting device of slipping clutch type. The device meets the requirements of the EN14492-2 standard that are set for this type of hoisting units.

The slipping clutch mechanism is built in a way that allows the hoisting unit to lift a load corresponding to the dynamic test load – 110% (EUR) / 125% (US) of SWL (safe working load). It prevents the unit from lifting a load of 160% of the SWL. The slipping clutch construction enables the brake to hold the load without any interaction with the clutch when the brake is not energized. The wet clutch is situated inside the gear case.

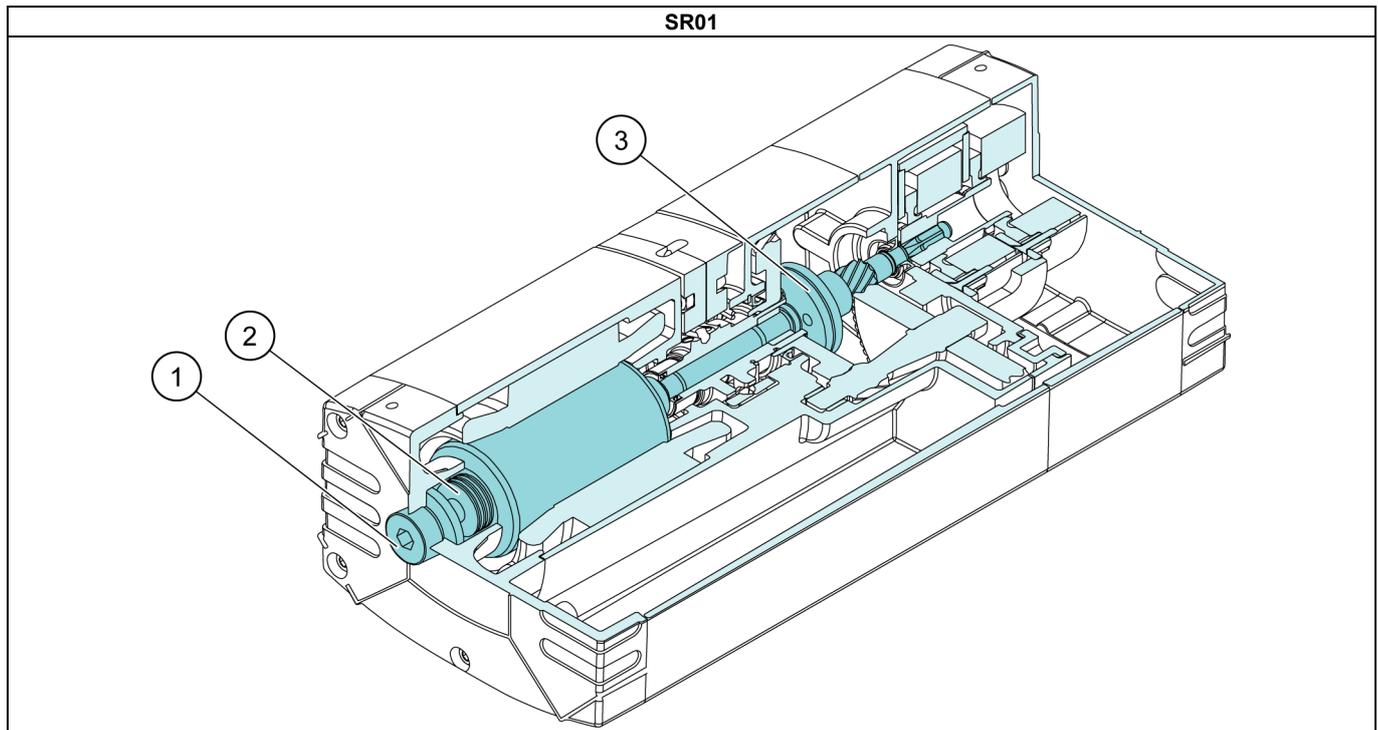


Figure 3. The clutch and the clutch adjustment principle of the SR01 hoist where the clutch adjustment is done from the motor side.

Pos.	Part
1	Setting screw
2	Belleville washers
3	Clutch discs with lining

In the SR02–SR25 hoists, the clutch adjustment is done from the brake side (setting screw on the brake side). The clutch construction varies according to the hoist frame size: The SR02 and SR05 hoists use a similar clutch with just one clutch disc, whereas the bigger models SR10 and SR25 are built with a slipping clutch with two clutch discs. An intermediate disc is placed between the two clutch discs providing the construction with altogether three friction surfaces to increase the torque.

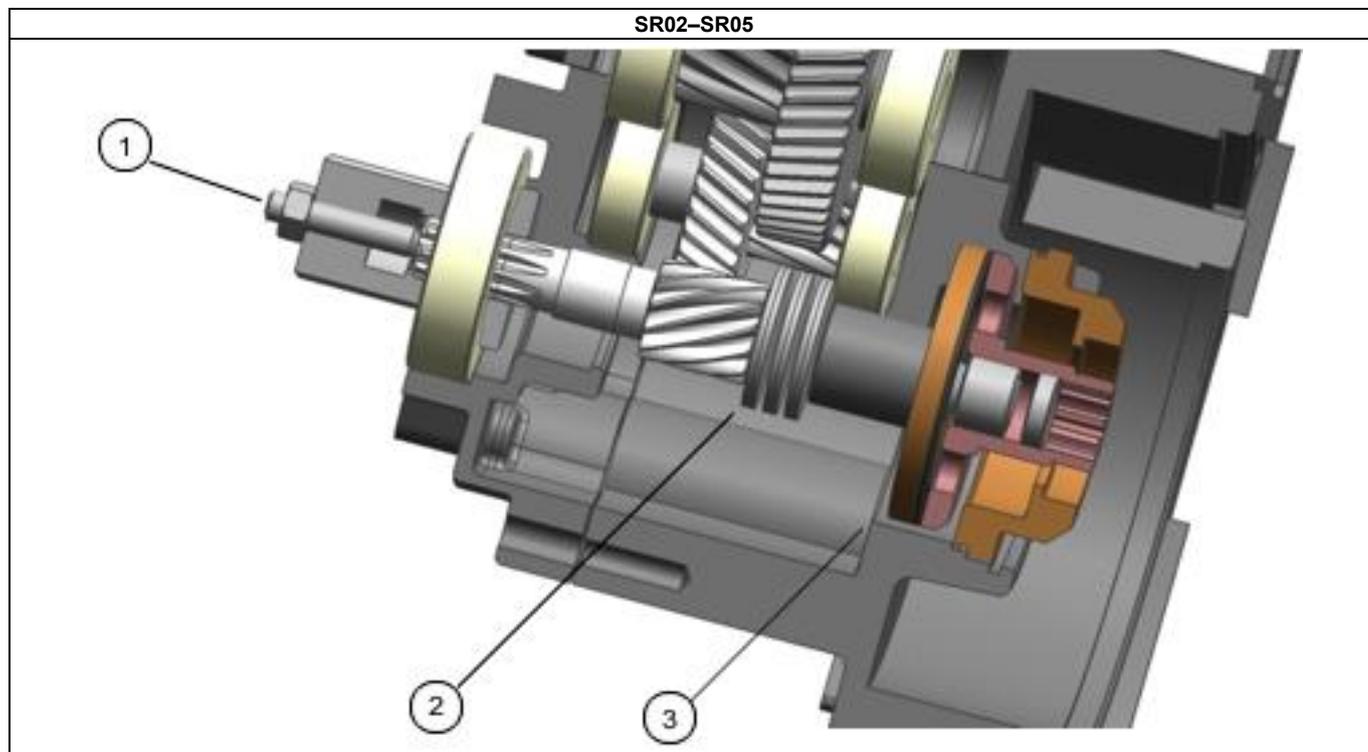


Figure 4. The following illustration presents the clutch type that is used in the SR02 and SR05 hoists. It has only one clutch disc.

Pos.	Part
1	Setting screw
2	Belleville washers
3	Clutch disc with lining

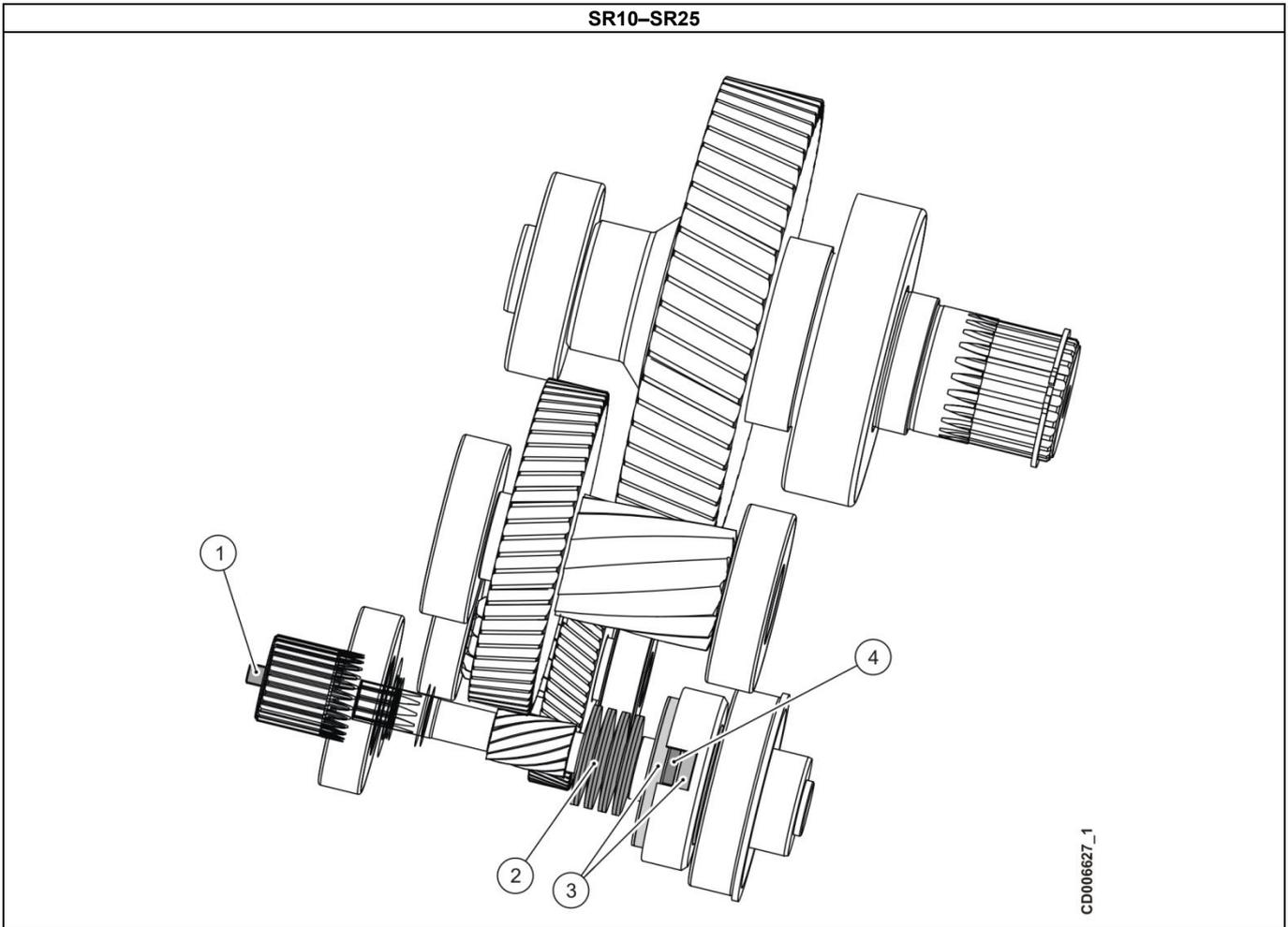


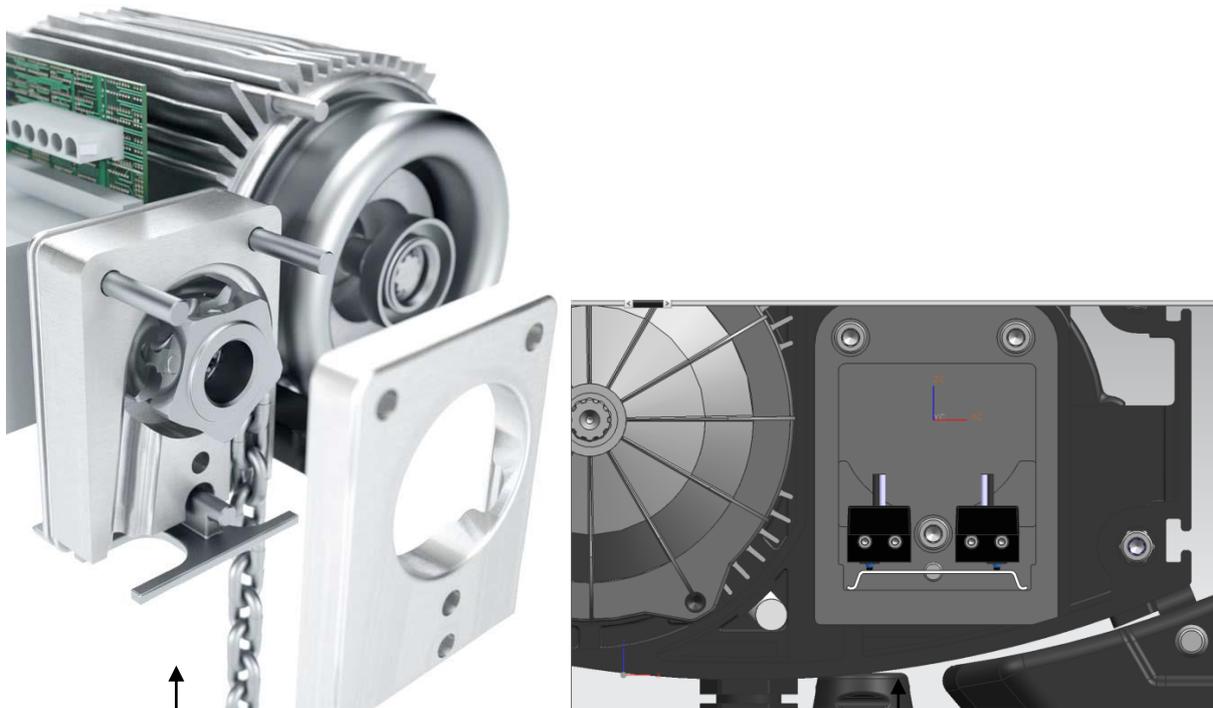
Figure 5. The slipping clutch that is used for the SR10–SR25 is built with two clutch discs and an intermediate disc between them to engage altogether three friction surfaces – resulting in an increased torque.

Pos.	Part
1	Setting screw
2	Belleville washers
3	Clutch discs with lining
4	Intermediate clutch disc

3.6 Limit switch (on B type)

3.6.1 Micro switch operated limit switch with industrial chain guide (Std on SR1 and SR25)

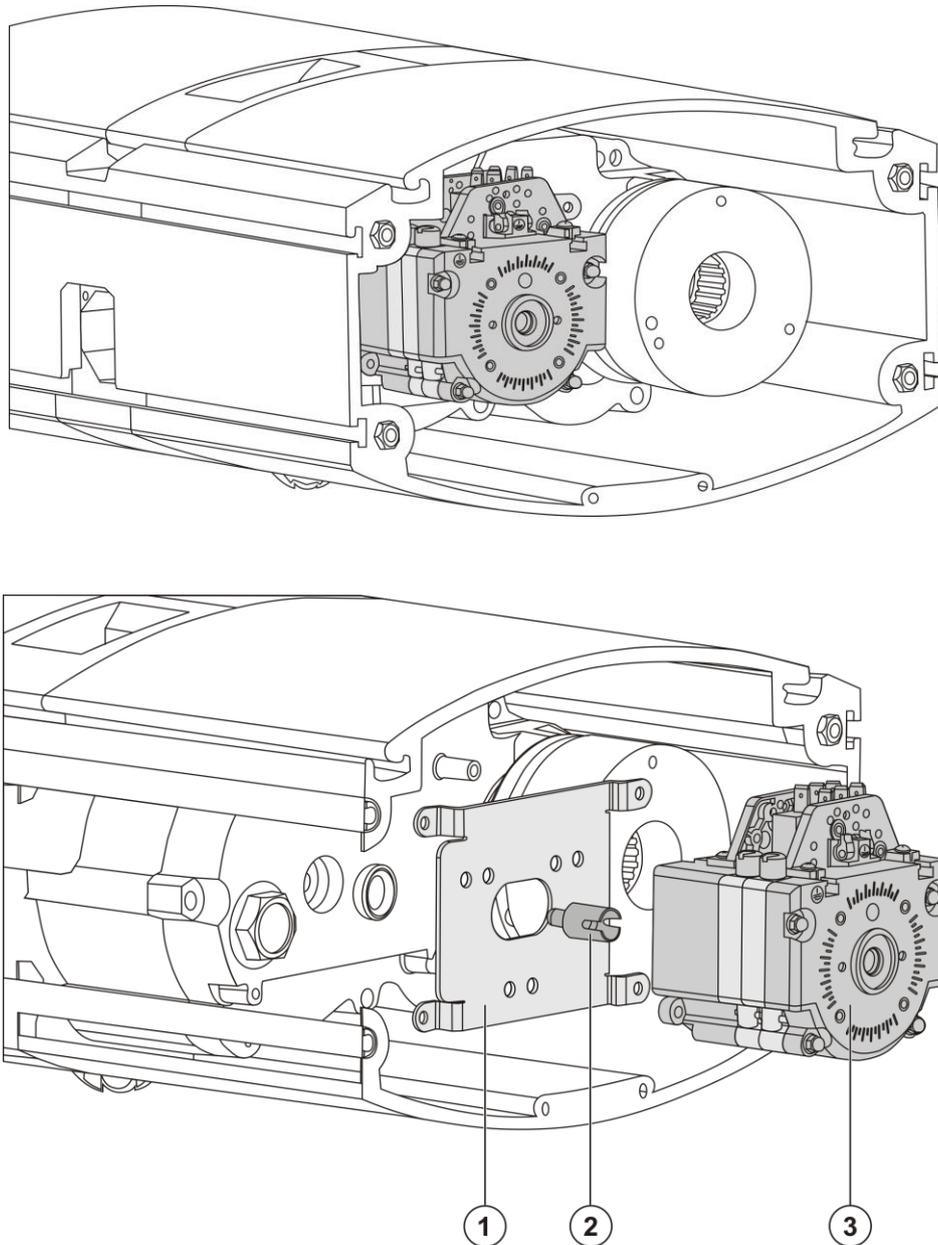
The lifting hook's maximum up and down positions are secured by the electric limit switch located under the chain guidance system. The switches are activated alternately by the lifting hook's upper cone and the slack fall stop.



electric limit switch

3.6.2 Rotating geared limit switch*

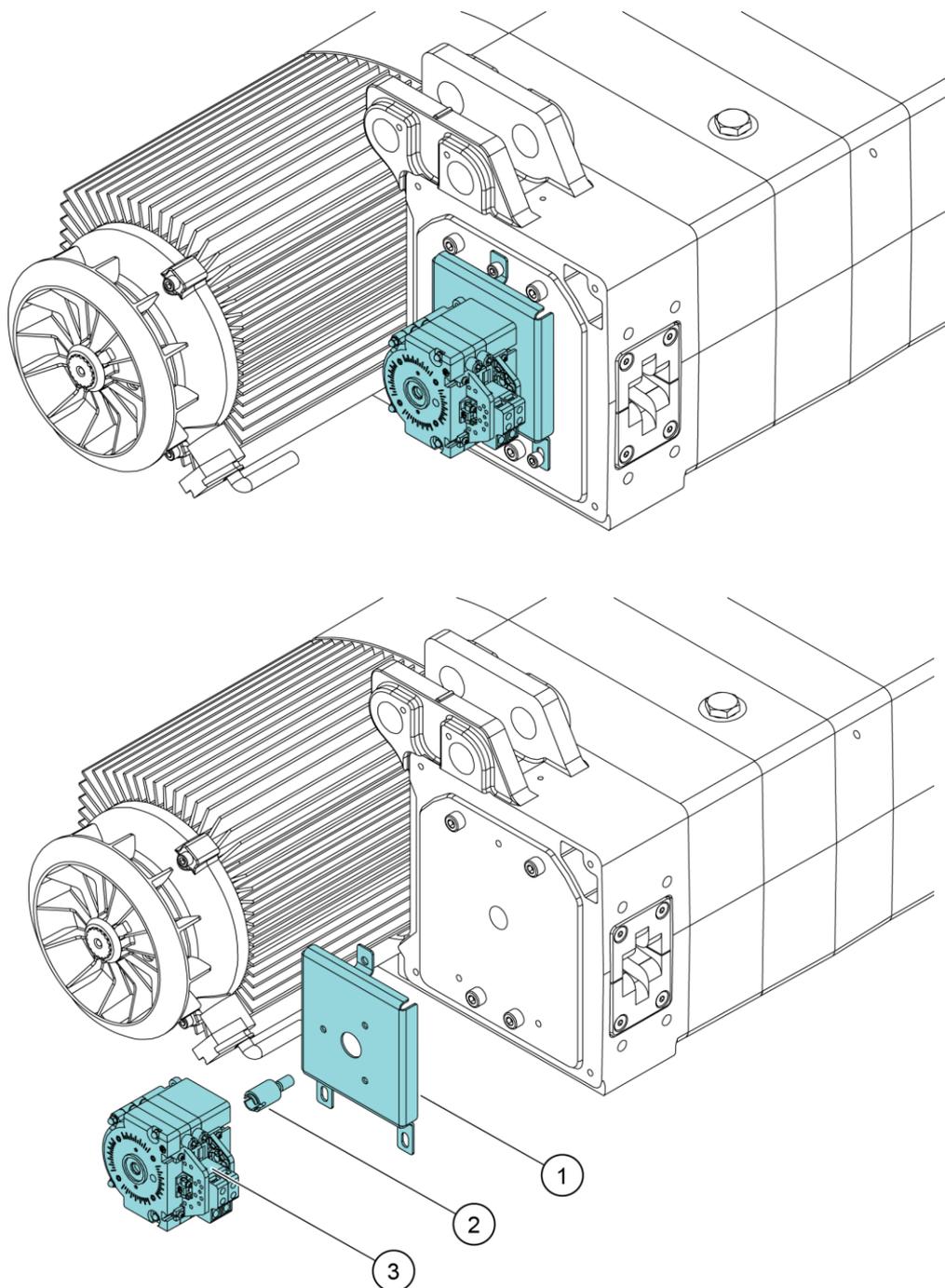
2-step rotating geared limit switch for SR02–SR10



Pos.	Part
1	Fixing plate
2	Coupling
3	Rotating geared limit switch

*NOTE: Available as follows: (In configuration B) SR02–SR10: optional; SR25: 2-step version a standard feature, 4-step version optional; SR01: not available.

2-step rotating geared limit switch for SR25



Pos.	Part
1	Fixing plate
2	Coupling
3	Rotating geared limit switch

*NOTE: Available as follows: (In configuration B) SR02–SR10: optional; SR25: 2-step version a standard feature, 4-step version optional; SR01: not available.

FUNCTIONAL DESCRIPTION OF THE GEARED LIMIT SWITCH

2-step geared limit switch

The 2-step geared limit switch works as an adjustable upper and lower stop limit together with the controls.

4-step geared limit switch

The 4-step geared limit switch provides an adjustable upper and lower stop limit that are connected to the internal controls. Two (2) of the cams are not connected to the controls, so they can be freely used for end-user requirements.

ADJUSTING THE GEARED LIMIT SWITCH

If the hoist is equipped with a geared limit switch, adjust the cutting points (upper and lower limits) of the limit switch before starting to operate the hoist. Instructions on how to set the limits as well as concerning the use of the different geared limit switch versions can be found on a sticker that is placed next to the limit switch adjustment holes on the hoist profile.

To set the limits, access the geared limit switch by opening the small black rubber plugs on top of the hoist profile. Remove the plugs and follow the instructions given on the sticker next to the adjustment holes to set the upper (UP) and lower (DOWN) limits:

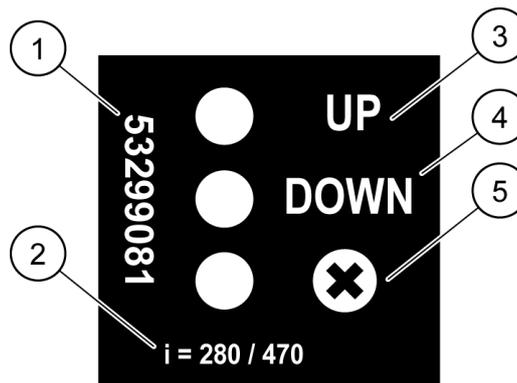


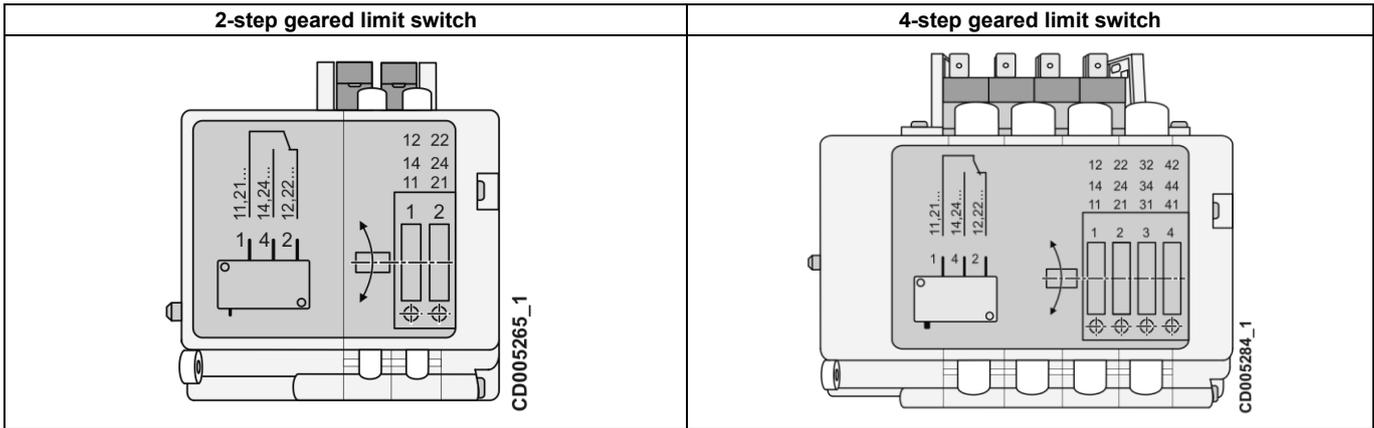
Figure 6. Information sticker for the limit switch adjustment (example of a 2-step geared limit switch).

- ID number*
- Limit switch ratio (e.g. 280/470)*
- Upper (UP) limit*
- Lower (DOWN) limit*
- 'X' = Adjustment hole not in use*

Set the limits by turning the setscrews (1) ... (4) (depending on the number of the switching elements):

Turn to the left: switching point is moved "downwards".

Turn to the right: switching point is moved "upwards".



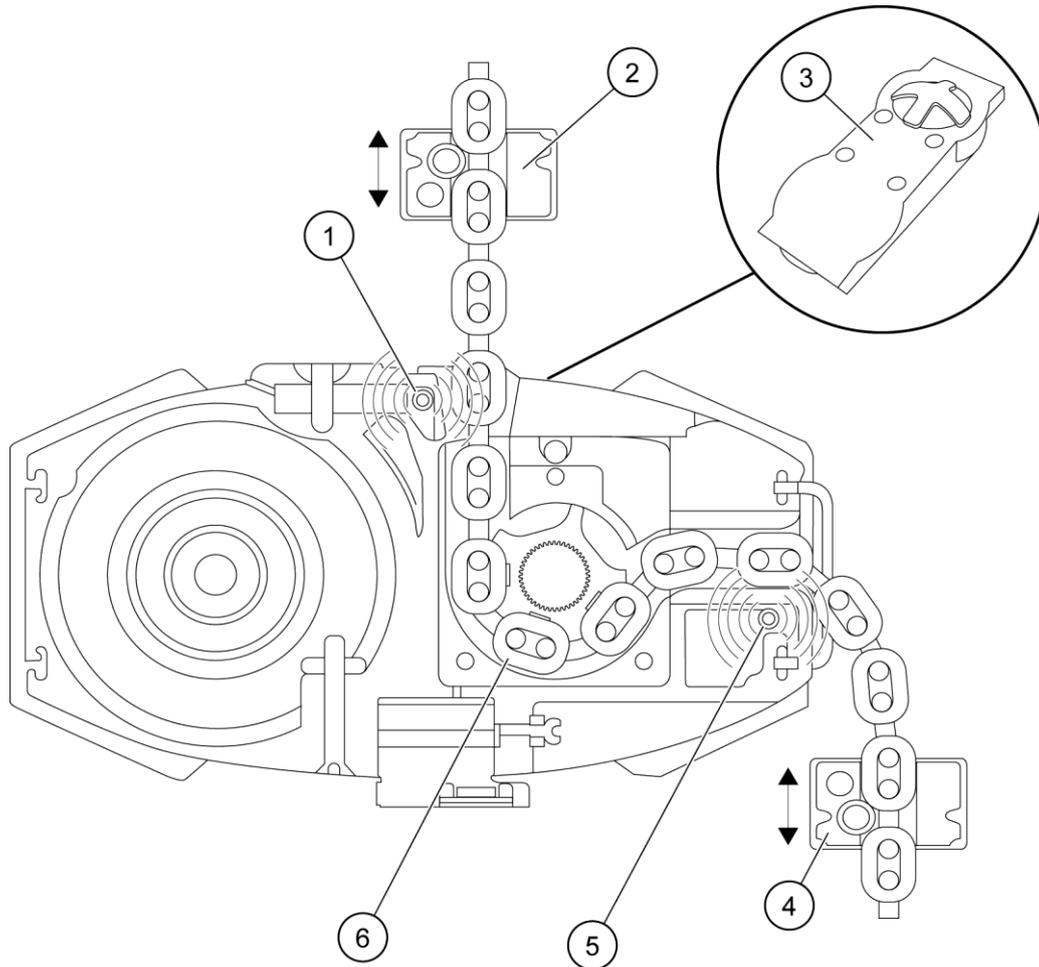
2-step geared limit switch	4-step geared limit switch
Setscrew 1 is the down limit and setscrew 2 the upper limit.	Setscrews 1 and 2 are the down limit and setscrews 3 and 4 the upper limit.

The operational limits for a standard geared limit switch are as follows:

Frame size	Chain	Max. HOL [m]		
		Ratio 180	Ratio 180	Ratio 180
02	4 x 11	20	30	53
05	5 x 14	25	39	67
10 1/1	7 x 20	36	56	94
10 2/1	7 x 20	18.5	28.5	48
25 1/1	11.3 x 31	55	86	145
25 2/1	11.3 x 31	22.5	43	72.5

*NOTE: Higher heights of lift are available on request. Hoist length can increase. For the frame sizes SR02–SR10, the hoist length increases in configurations with a 4-step limit switch and a bigger gear ratio. Also note that the standard chain bag size is limited to the standard lifting height.

3.6.3 LimitFlux : magnetic operated limit switch with Chainflux (Std on SR5 & 10) PRINCIPLES



- > The Limitflux is a built-in limit switch device in the CHAINFlux MKII® that's allow to control setting of hoist or hook position in industrial suspension or climbing configuration.
- > Accuracy of the system is given at one link of lifting chain.

Pos.	Part
1	Magnetic sensor for upper limit switch
2	Upper setting ring
3	Input chain guide
4	Lower setting ring
5	Magnetic sensor for lower limit switch
6	Chain flux MKII

*NOTE: Available as follows: SR05–SR10: standard feature (in configuration B, 1-fall hoists, speed up to 8 m/min.); SR01, SR02 and SR25: not available.

FUNCTIONAL DESCRIPTION OF THE MAGNETIC LIMIT SWITCH

The operation of the magnetic limit switch is based on an adjustable upper and lower stop limit that are activated by a magnet. The limit positions (upper and lower hook positions) are set by using setting rings which contain a magnet. The setting rings are placed along the chain. To adjust the limits, the rings can be slid along the chain manually.

The magnetic limit switch feature consists of:

- an upper and lower limit switch (magnetic sensors)
- upper and lower setting rings (containing chain lockers)
- an additional input chain guide (chain entry)

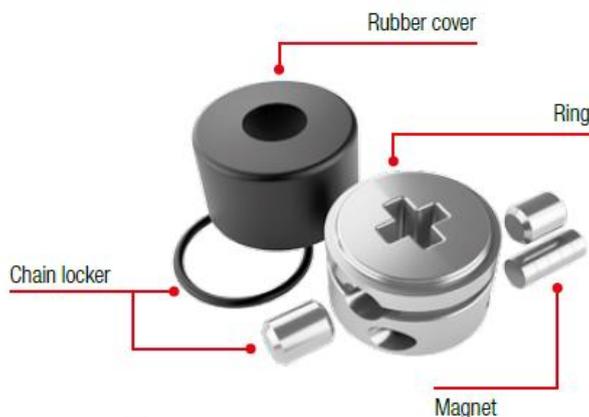
The chain entry prevents the chain from twisting at the entrance of the chain guide. It also protects the upper limit switch from external damages.

The magnetic limit switch is only available for a hoisting speed of up to max. 8 m/min. Configurations with a faster speed are delivered with a geared limit switch. The magnetic limit switch feature is not available for the 2-fall hoist versions. It can be used in both hoist positions, 'body up' (industrial) or 'body down' (inverted), and it is available for the hoist configurations that are equipped with a low control voltage.

ADJUSTING THE MAGNETIC LIMIT SWITCH

To adjust the magnetic limit switch:

- Slide the setting rings up or down on the chain to reach the desired position. When sliding the rings, hold the chain with one hand and slide the ring along the chain with the other.
- Adjust each setting ring separately. The setting ring is properly in place when it cannot be moved easily (the chain lockers inside the setting rings are located between two chain links).
- Because the chain lockers must be placed between two links, the chain pitch defines the minimum setting distance: For example, for an SR10 hoist with a 7 x 20 chain, the minimum setting distance is 20 mm.



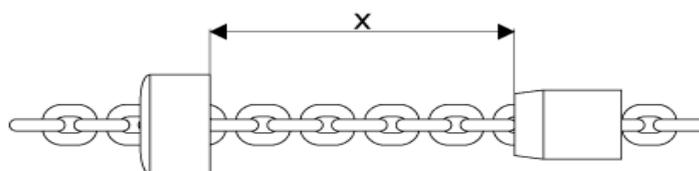
Setting the upper and lower stop limit

To set the upper stop limit (upper position of the hook):

- Slide the upper setting ring along the chain. Place the ring between the hook and the input chain guide.

To set the lower stop limit (lower position of the hook):

- Slide the lower setting ring on the chain. Place the ring between the chain side output and the slack fall stop.



X = min. 50 cm

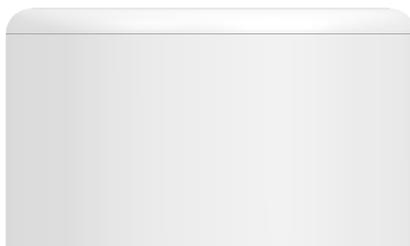
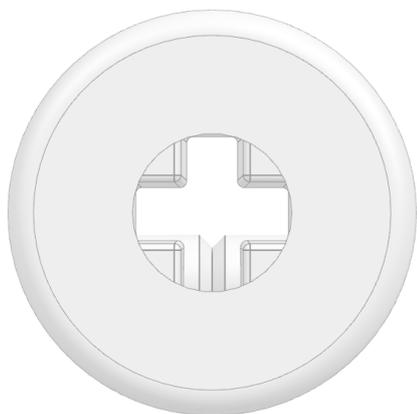


Note: Keep a minimum of 50 cm (X) between the ring and the slack fall stop to allow a smooth flow of the chain out of the chain bag.

DIMENSIONS

The ring size is the same for all hoists, regardless of the frame size. The difference is only in the chain path.

Setting ring dimensions [mm]	
Diameter	64
Height	38

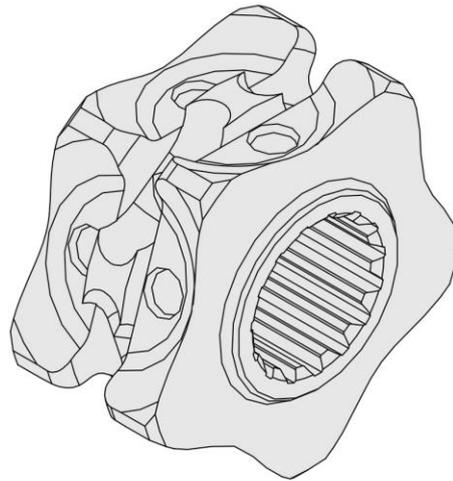


3.7 Chain reeving components

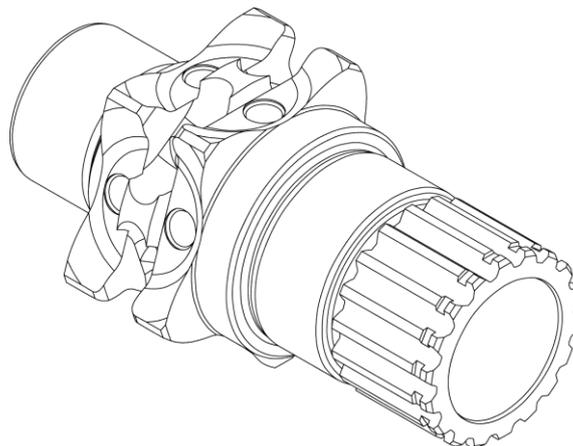
3.7.1 Chain drive

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.

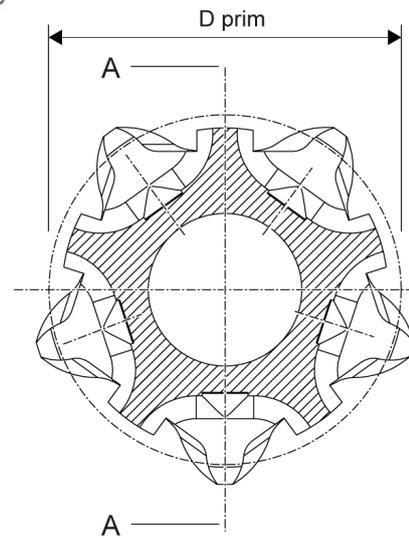
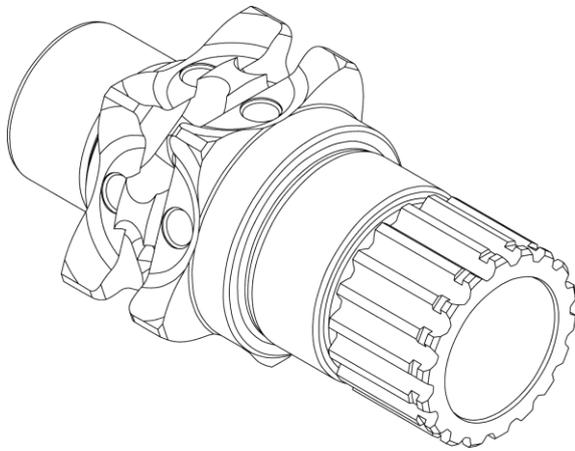


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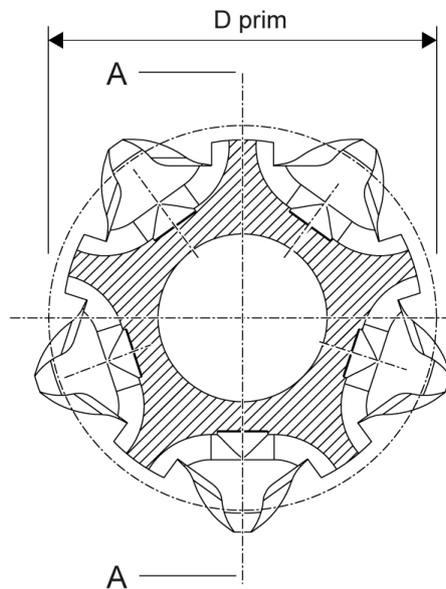
3.7.2 Chain sprocket

PERFECT PUSH



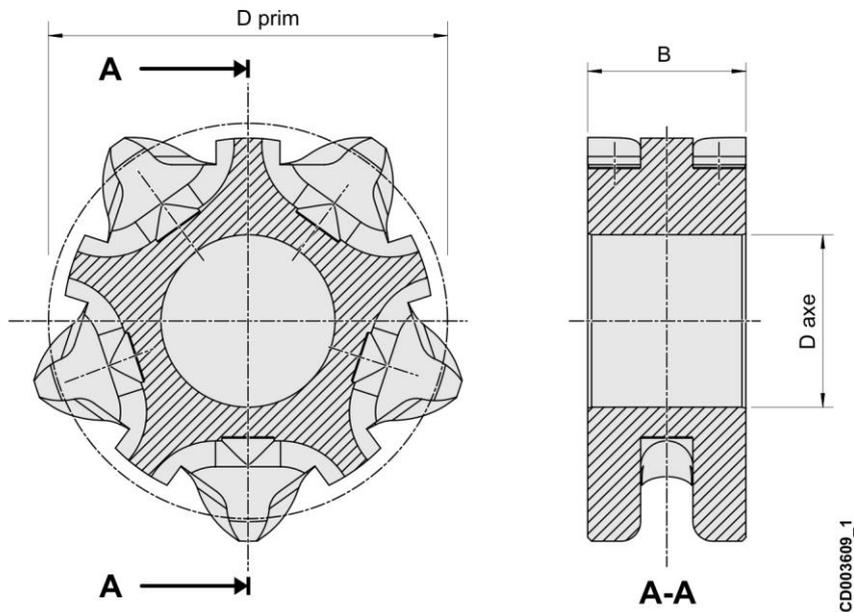
Frame size	Chain sprocket	Chain	Nbr. of pockets	D prim [mm]
01	SINGLE	4 x 11	5	35.01

PERFECT PUSH



Frame size	Chain sprocket	Chain	Nbr. of pockets	D prim [mm]
02	SINGLE	4 x 11	5	35.01
05	SINGLE	5 x 14	5	45.61
10	SINGLE	7 x 20	5	65.45
25	SINGLE	11.3 x 31	5	98.69

3.7.3 Return sprocket



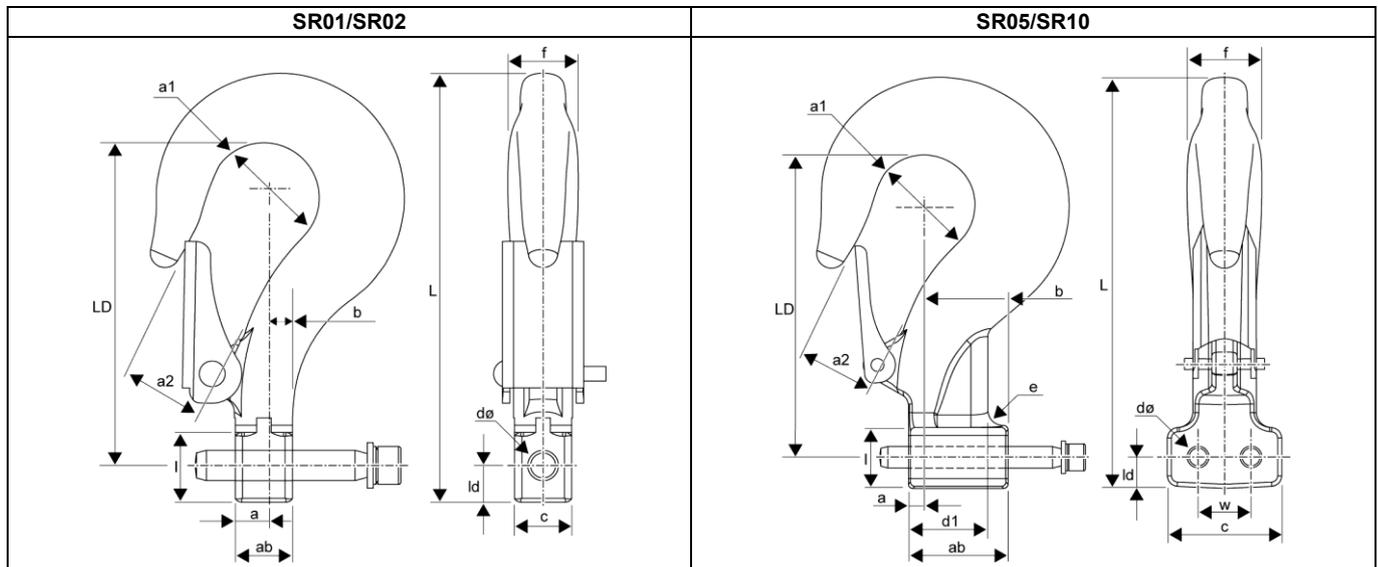
Frame size	Chain sprocket	Chain	Nbr. of pockets	D prim [mm]	D axe [mm] [Ø]	B [mm]
01	SINGLE	4 x 11	5	35.01	14h8	20 -0.1
10	SINGLE	7 x 20	5	65.35	32h7	33 -0.1
25	SINGLE	11.3 x 31	5	100.98	44F6	40 -0.1

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

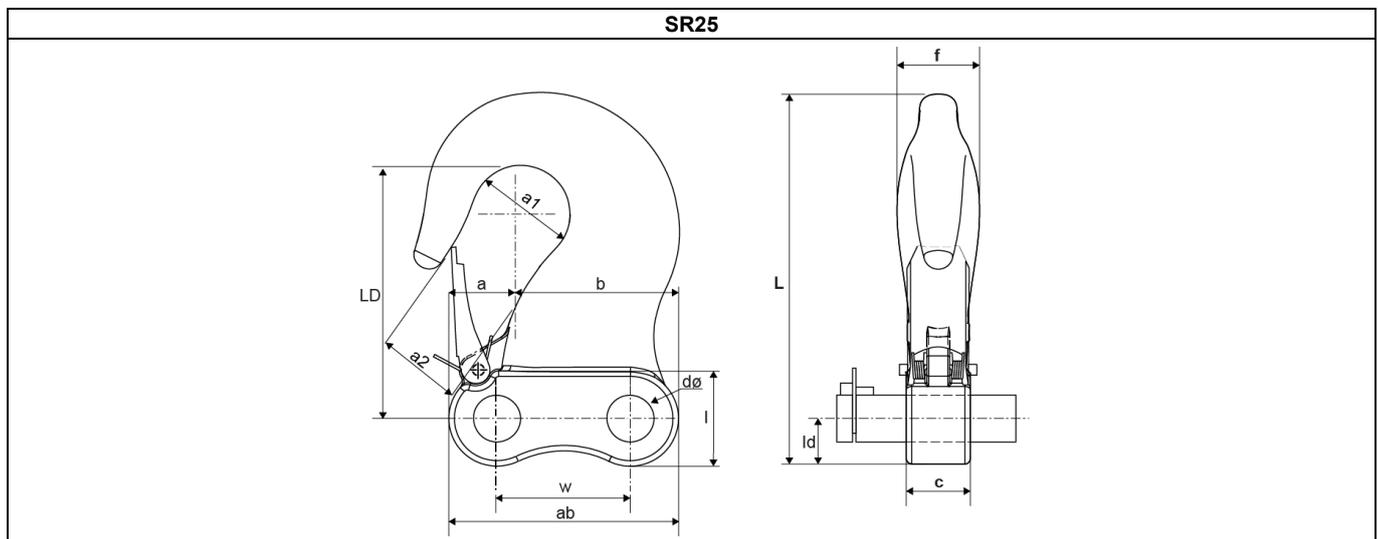
3.8 Hooks and hook blocks

3.8.1 Suspension hook

FIXED UPPER HOOK



Frame size	Hook size [RSN]	Dimensions [mm]														
		a	ab	a1	a2*	b	c	dØ**	d1	e	f	l	ld	L	LD	W
01	012T	5	10	30	22	5	16	8.3	-	-	19	26	10	115	86	-
02	012T	7.75	15.5	30	22	7.75	15.5	8.3	-	-	19	19	10	117	98	-
05	020T	9	50	34	25	41	33	8.2	29	8	21	22	10	139	90	16
10	08V	7.5	47	48	36	39.5	54	12	37.5	7	35	30	14	196	134	26

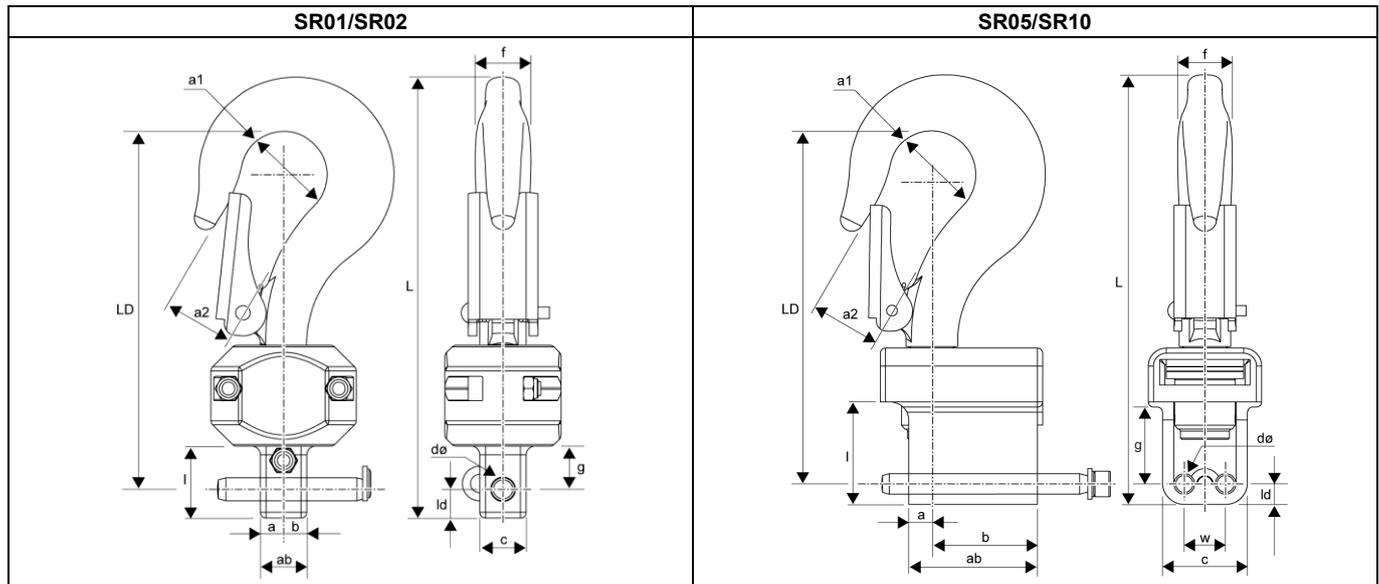


Frame size	Forging	Dimensions [mm]												
		a	ab	a1	a2*	b	c	dØ**	F	l	ld	L	LD	W
25		39	124	53	41	85	35	25.1	45	51	26	204	138	72

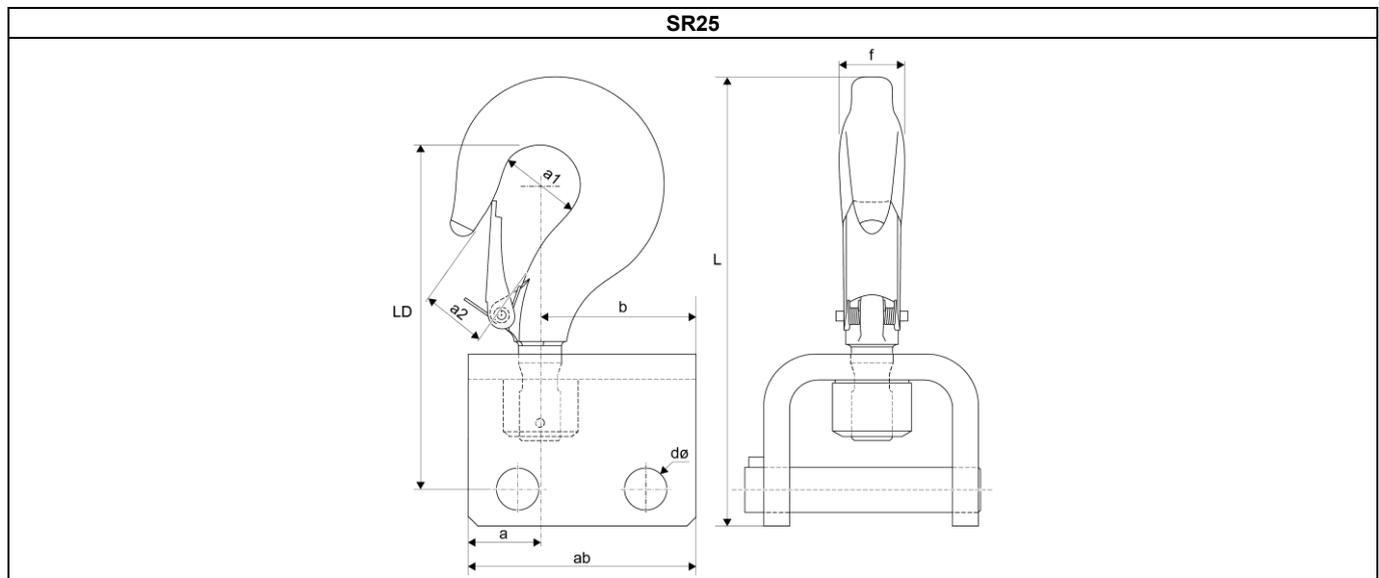
*NOTE: The a2 dimension is the free space with the hook latch.

**NOTE: For the SR05 and the SR25, the dimension 'dØ' is needed for both (x 2) pins.

ROTATING UPPER HOOK



Frame size	Hook size [RSN]	Dimensions [mm]													
		a	ab	a1	a2*	b	c	dø**	f	g	l	ld	L	LD	w
01	012T	8	16	30	22	8	10	8.3	19	15	25	10	150	123	-
02	012T	8	16	30	22	8	16	8.3	19	15	25	10	153	134	-
05	020T	9	50	34	25	41	32	8.2	21	30	38	8	168	145	16
10	05V	7	46.5	40	32	39.5	50	12	29	21.5	33.5	12	212	181	26

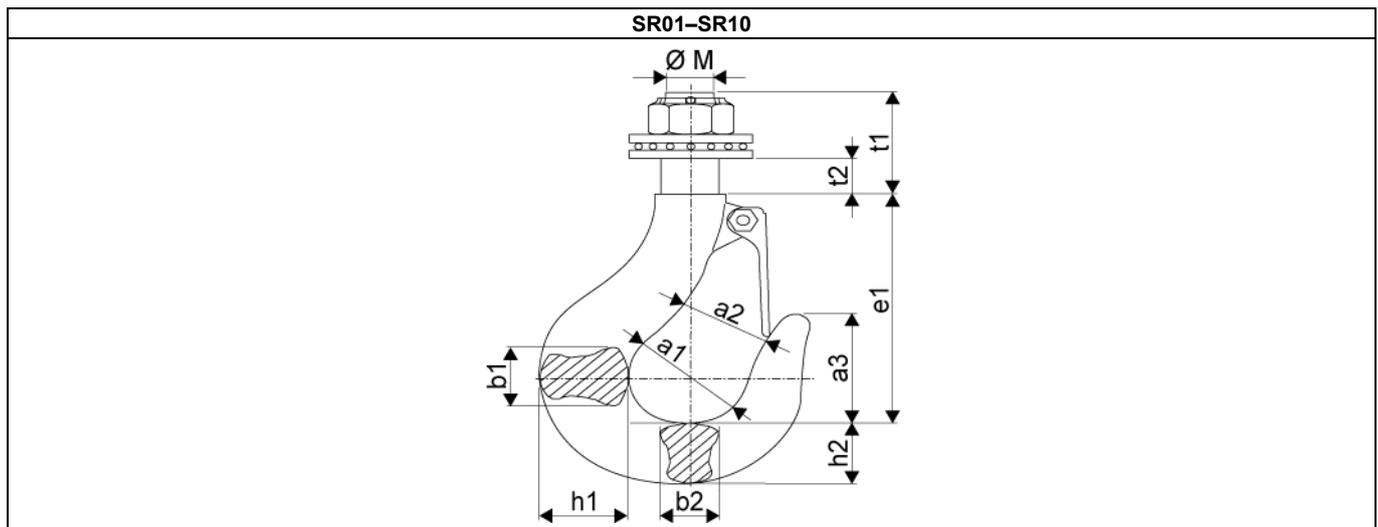


Frame size	Hook size [RSN]	Dimensions [mm]													
		a	Ab	a1	a2*	B	c	dø**	f	g	l	ld	L	LD	w
25	1.6V	40.5	127	56	41	86.5	120	25.5	45	84	104	20	299.5	231.5	72

*NOTE: The a2 dimension is the free space with the hook latch.

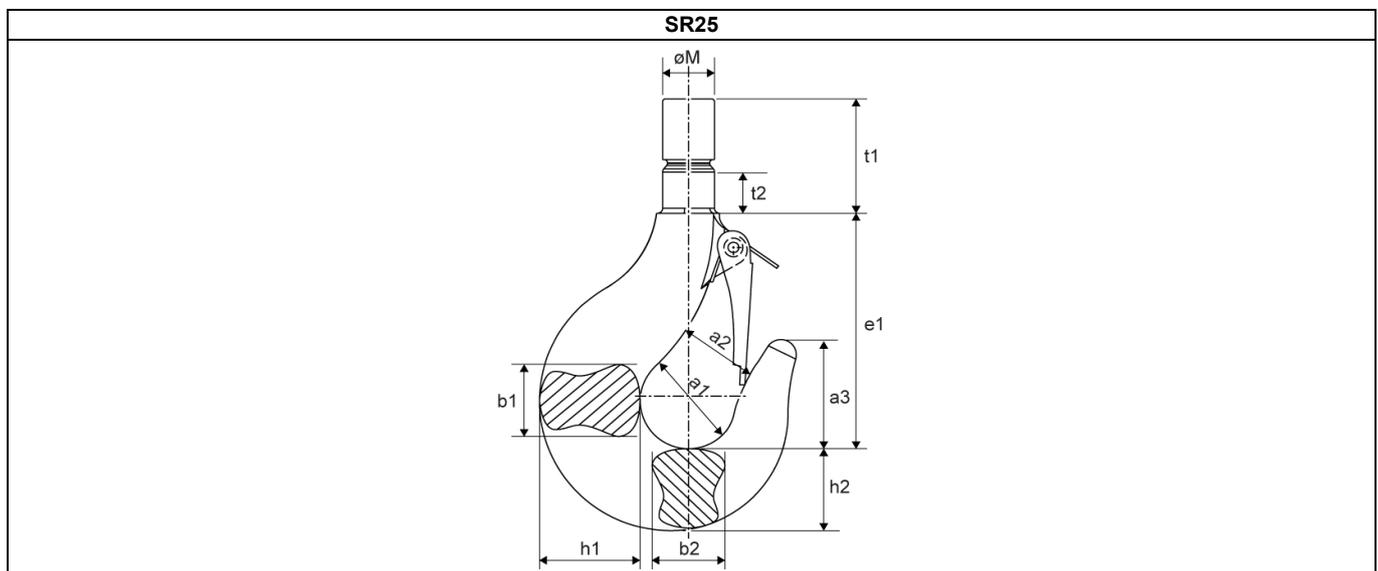
**NOTE: For the SR05 and the SR25, the dimension 'dø' is needed for both (x 2) pins.

3.8.2 Lower hook



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).

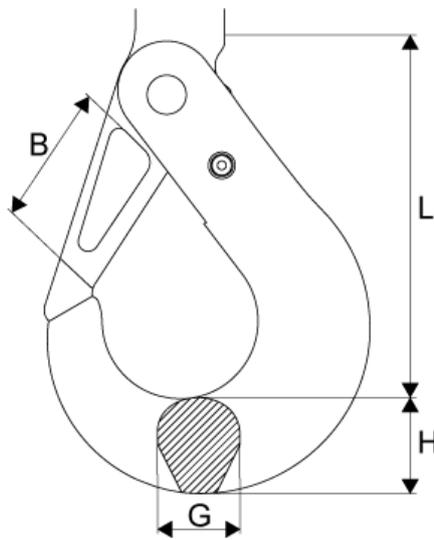
Frame size	Reeving	Hook size [RSN]	Dimensions [mm]										
			øM	a1	a2*	a3	b1	b2	e1	h1	h2	t1	t2
01	1/1	012T	12	30	22	34	19	15	73	22	19	28.5	10.5
	2/1	012T	12	30	22	34	19	15	73	22	19	28.5	10.5
02	1/1	012T	12	30	22	34	19	15	73	22	19	32	10.5
05	1/1	020T	16	34	25	39	21	18	84	26	22	36	13.5
10	1/1	05V	20	43	32	49	29	24	105	37	31	39	14.5
	2/1	08V	20	48	36	54	35	29	116	44	37	43	14.5



Frame size	Reeving	Hook size [RSN]	Dimensions [mm]										
			øM	a1	a2*	a3	b1	b2	e1	h1	h2	t1	t2
25	1/1	08V	24	48	35	54	35	29	116	44	37	55	20.5
	2/1	1.6V	30	56	43	64	45	38	138	56	48	67	24.5

*NOTE: The a2 dimension is the free space with the hook latch.

3.8.3 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

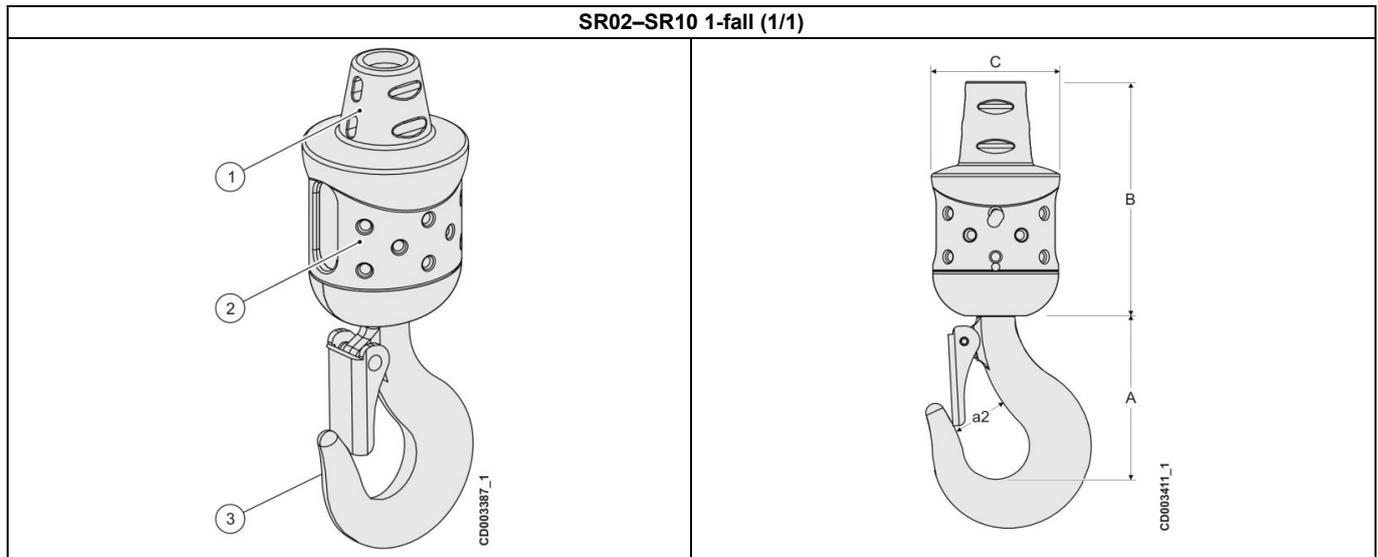
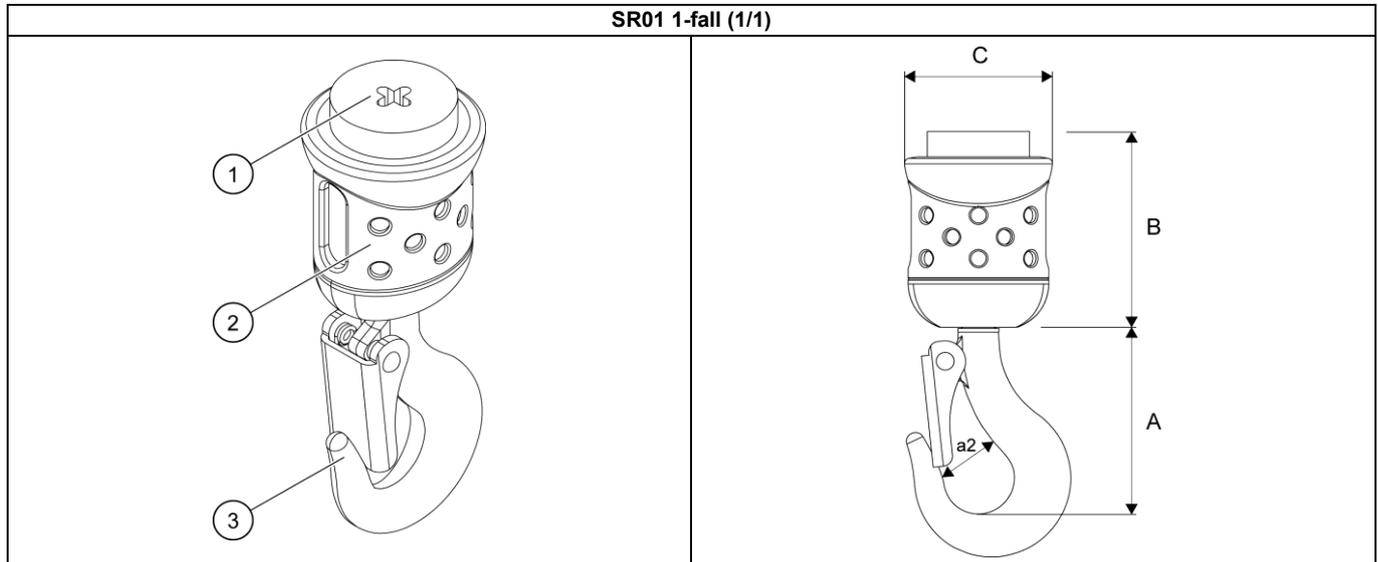
Frame size	Falls	Hook type [BKT]	Influence to C-dimension [+mm]
01	1/1	6-10	15
	2/1	6-10	15
02	1/1	6-10	16
05	1/1	6-10	3
10	1/1	7/8-10	5
	2/1	10-10	13
25		-	

*NOTE: Currently not available for the SR25.

3.8.4 Hook blocks

The dimensions for the stainless steel hook blocks are the same as given in the following for the standard hook blocks.

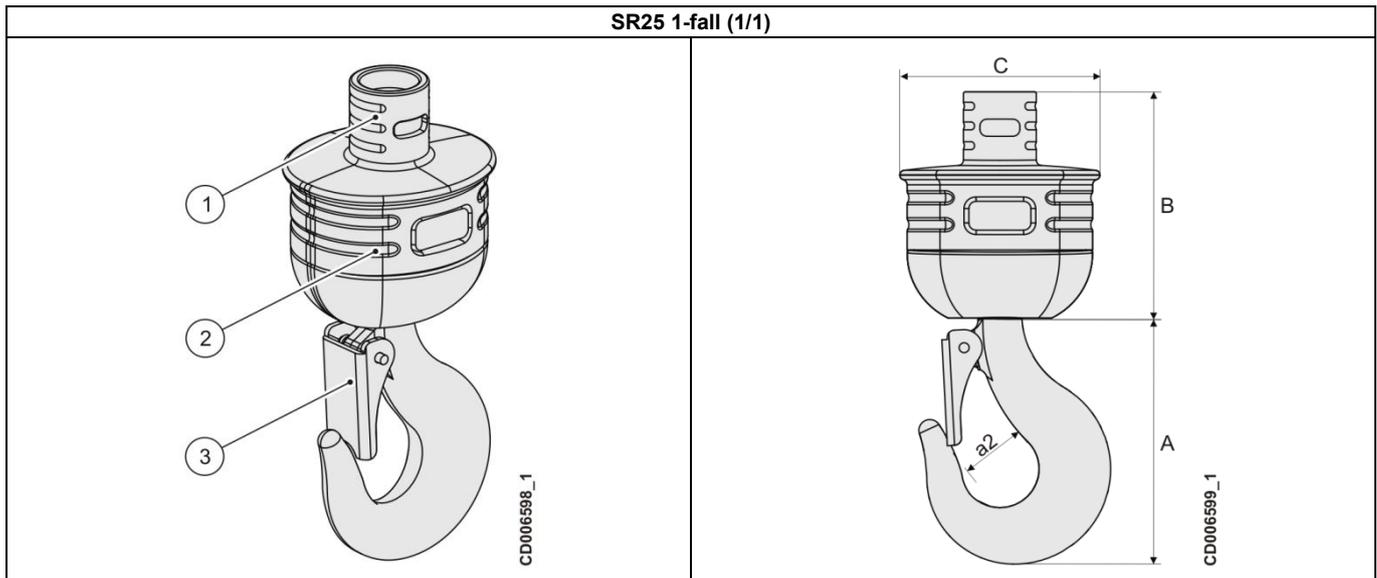
The material of the hook block rubber part is Santoprene-8221.65.



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

DIMENSIONS:

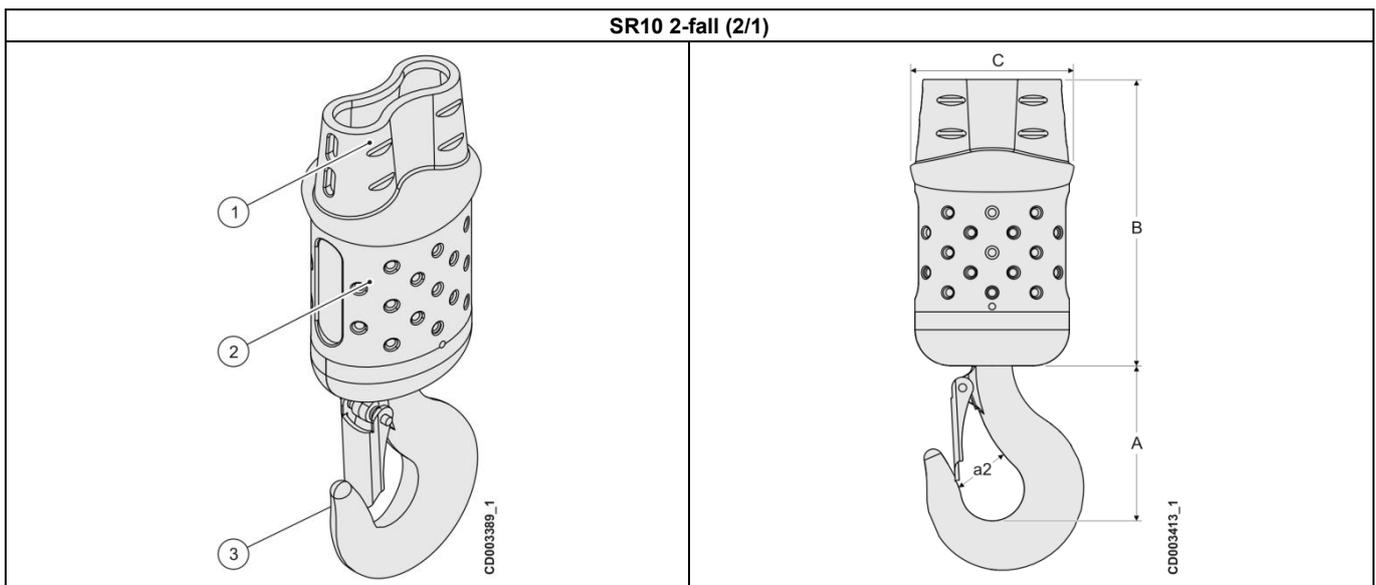
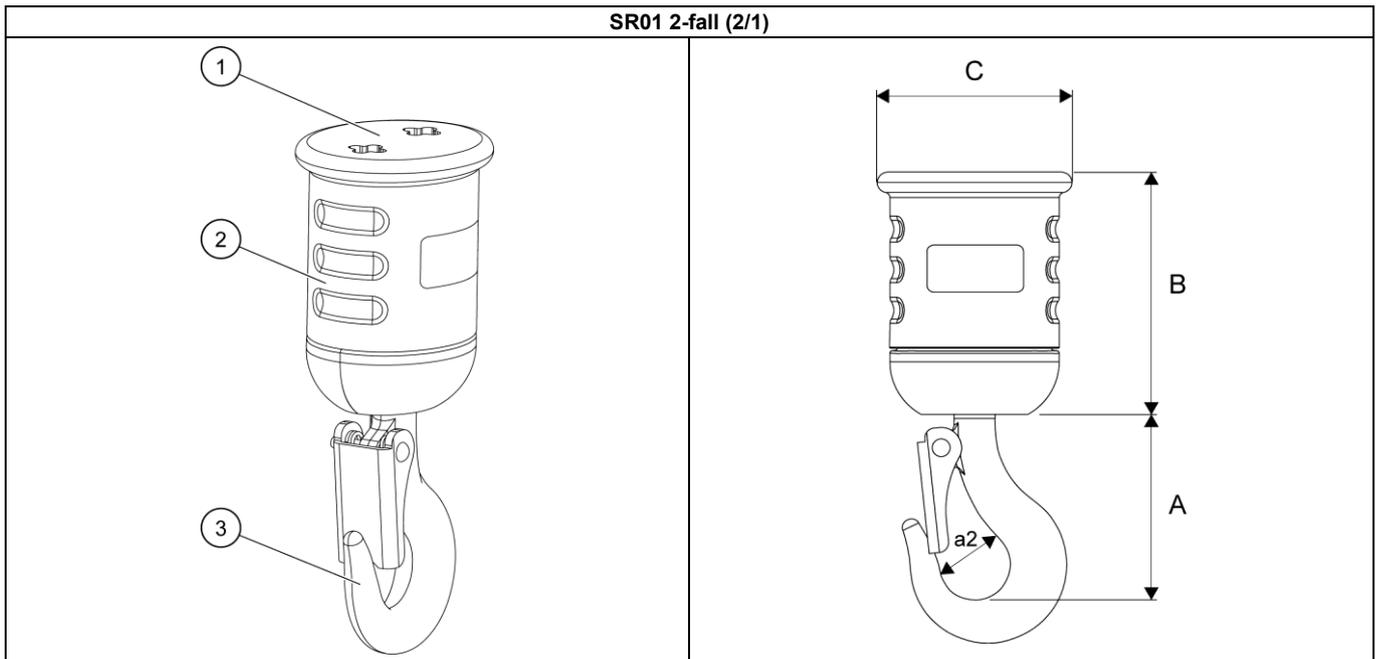
Frame size	Reeving	Dimensions [mm]			
		A	B	C	a2
01	1/1	73	77.5	55	22
02	1/1	73	103	55	15
05	1/1	84	116.5	72	17
10	1/1	105.5	115	92	20



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

DIMENSIONS:

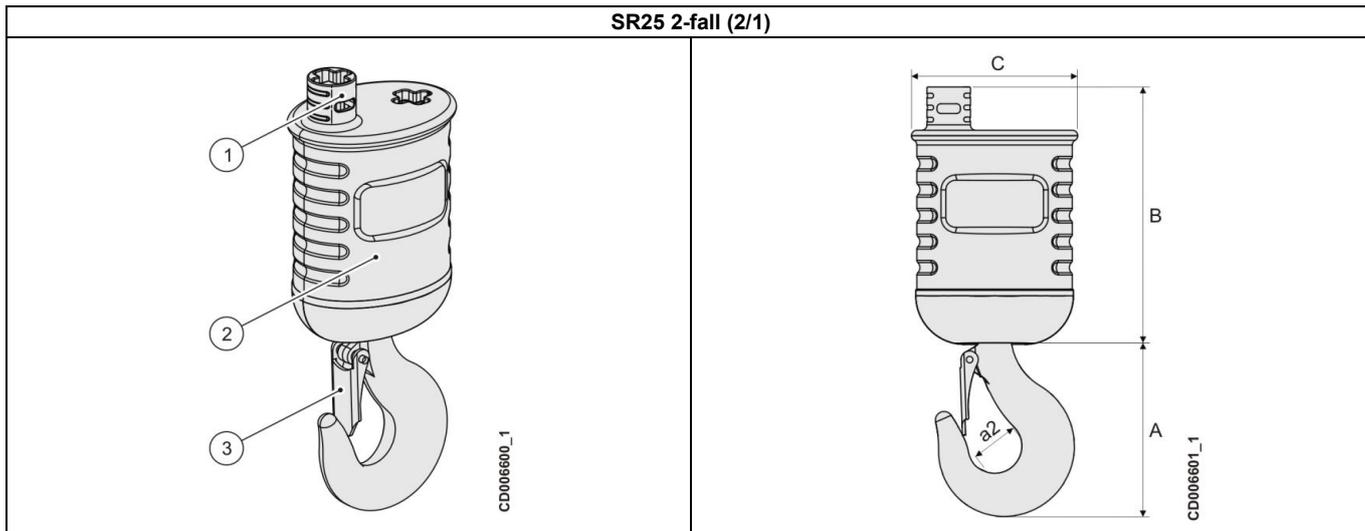
Frame size	Reeving	Dimensions [mm]			
		A	B	C	a2
25	1/1	155.5	140	120	48



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	a2
01	2/1	73	96	76	22
10	2/1	116	215	124	24



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

DIMENSIONS:

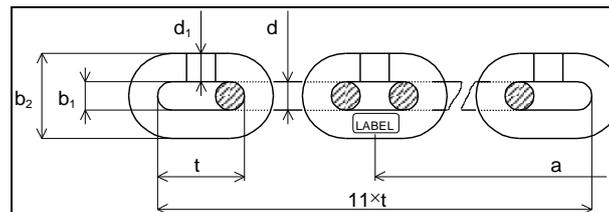
Frame size	Reeving	Dimensions [mm]			
		A	B	C	a2
25	2/1	186.5	270	176	55.6

3.9 Hoisting chains

3.9.1 Safety factors

Frame size	Nominal load [kg] (D8 hoists)	Static safety factor (G80 chain)	Static safety factor (G100 chain)
01	250	6.4	8.1
02	320	6.4	8.1
05	500	5	8.1
10	1000	6.27	8.1
25	2500	6.52	-

3.9.2 Chain 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.

The weld in the chain can either go towards the chain sprocket or away from it. The weld direction does not affect the chain behavior.

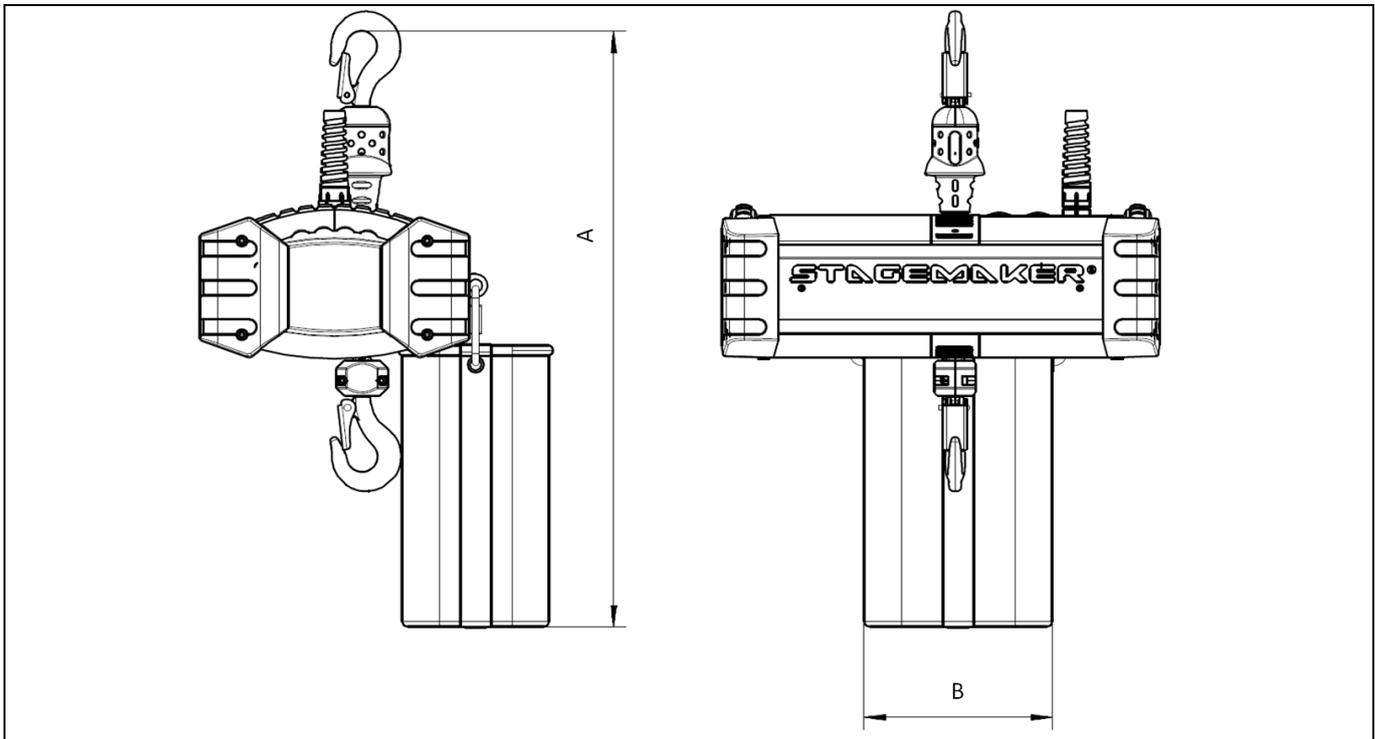
DIMENSIONS:

Chain size	Unit	01/02		05		10		25	
		4 x 11		5 x 14		7 x 20		11.3 x 31	
Diameter	d [mm]	4	+0.2 -0.2	5	+0.2 -0.2	7	+0.03 -0.03	11.3	+0.1 -0.4
Pitch	t [mm]	11	+0.15 -0.05	14	+0.2 -0.1	20	+0.25 -0.15	31	+0.4 -0.2
Control length	11 x t [mm]	121	+0.4 -0.2	154	+0.5 -0.25	220	+0.7 -0.35	341	+1.1 -0.5
Weld seam	d1 [mm], max.	4.3		5.4		7.5		12	
Internal width	b1 [mm], min.	4.8		6		8.4		12.6	
External width	b2 [mm], max.	13.6		16.8		23.6		36.6	
Label spacing	a [m], min.	0.22		0.3		0.4		1	
Label mark height	[mm]	1.5		1.8		2		3.0	
Weight	G [kg/m]	0.37		0.57		1.1		2.81	

TECHNICAL CHARACTERISTICS:

Chain size	Unit	01/02		05		10		25
		4 x 11		5 x 14		7 x 20		11.3 x 31
		G80	G100	G80	G100	G80	G100	G80
Cross section	A [mm ²]	25.12		39.25		76.93		200.52
Max. working load	mSWP [kg]	320		630		1250		2500
Stress at max. working load	σ [MPa]	125		157.5		159.4		125
Test force	Fm [kN]	12.6	15.8	20	100	40	48.5	100
Min. breaking force	FB [kN]	20.10	25.1	32	160	61.9	98.1	160
Min. breaking elongation	[%]	10	15	10	10	10	10	10
Min. surface hardness	[HV]	400	420	400	380HV10	400	420	380HV10
Corrosion protection		Black finish		Black finish		Black finish		Zinc plated
Grade		80	100	80	80	80	100	80
Class		T	T	T	T	T	T	T

3.9.3 Chain bags



CHAIN BAGS:

Frame size	Falls	Bag capacity [m]	HOL [m]	Dimension [mm]*	
				A	B
01	1/1	16	16	603	143
01	1/1	20	20	652	143
01	1/1	30	30	792	143
01	2/1	16	8	534	143
01	2/1	20	10	556	143
01	2/1	30	15	688	143
02	1/1	40	40	588	185
05	1/1	20	20	618	183
05	1/1	40	40	743	213
10	1/1	20	20	701	213
10	1/1	50	50	901	213
10	2/1	20	10	701	213
10	2/1	50	25	901	213
25	1/1	20	20	1100	232
25	1/1	50	50	1400	410
25	2/1	20	10	1250	232
25	2/1	50	25	1550	410

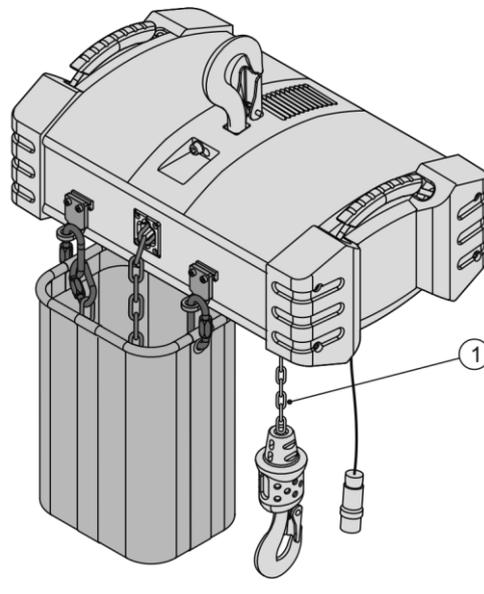
*NOTE: The values are given with a normal hook block and with the hoist in inverted position. With the (1-/2-fall) safety hook (optional), the chain bag values increase around 15 to 35 mm.

CHAIN BAG CHARACTERISTICS:

Item	Material
Textil 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

4 LUBRICATION

4.1 Lubrication charts



Pos.	Component	Intervals
1	Chain	From min. 1 week up to a year (depending on the usage)
2	Hoisting transmission (gear)	Lubricated for the designed working period of the product



Note: Only lubricate the instructed components. Other parts are lubricated for the designed working period of the product.

1	<p>Chain</p> <ul style="list-style-type: none"> Lubricate the chain carefully before the first run (commissioning). Grease the chain with a substantial amount of lubricant and make sure that the chain is lubricated all over its surface and links, especially on all contact areas between the chain links. To extend chain lifetime, continue to lubricate the chain within regular intervals. The lubrication interval varies from a minimum of one week to one year, depending on the usage. Perform the lubrication before any signs of corrosion or dryness. Using the chain without proper and sufficient lubrication will result in a strong increase of the chain wear. Lubricate the chain with a suitable lubricant. The lubricant for chain shall be water resistant, non-adhesive oil or grease which is able to penetrate. Excessive lubrication may cause dribbling. <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Installation</th> <th style="text-align: left;">Trade name and number</th> <th style="text-align: left;">Quantity</th> </tr> </thead> <tbody> <tr> <td>Factory installed</td> <td>Mobil Gear 632</td> <td>As required</td> </tr> </tbody> </table>	Installation	Trade name and number	Quantity	Factory installed	Mobil Gear 632	As required													
Installation	Trade name and number	Quantity																		
Factory installed	Mobil Gear 632	As required																		
2	<p>Hoisting transmission (gear)</p> <ul style="list-style-type: none"> Lubricated with oil. Lubrication will last for the designed working period of the hoist. <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Installation</th> <th style="text-align: left;">Trade name and number</th> <th style="text-align: left;">Quantity</th> </tr> </thead> <tbody> <tr> <td>Factory installed</td> <td>Dexron III</td> <td>Lubricated for the designed working period of the hoist (for information, see following table)</td> </tr> </tbody> </table> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Frame size</th> <th style="text-align: left;">Quantity of oil needed [l]</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">01</td> <td style="text-align: center;">0.25</td> </tr> <tr> <td style="text-align: center;">02</td> <td style="text-align: center;">0.25</td> </tr> <tr> <td style="text-align: center;">05</td> <td style="text-align: center;">0.23</td> </tr> <tr> <td style="text-align: center;">10</td> <td style="text-align: center;">0.6</td> </tr> <tr> <td style="text-align: center;">25</td> <td style="text-align: center;">2.5</td> </tr> </tbody> </table>	Installation	Trade name and number	Quantity	Factory installed	Dexron III	Lubricated for the designed working period of the hoist (for information, see following table)	Frame size	Quantity of oil needed [l]	01	0.25	02	0.25	05	0.23	10	0.6	25	2.5	
Installation	Trade name and number	Quantity																		
Factory installed	Dexron III	Lubricated for the designed working period of the hoist (for information, see following table)																		
Frame size	Quantity of oil needed [l]																			
01	0.25																			
02	0.25																			
05	0.23																			
10	0.6																			
25	2.5																			

5 LIST OF MATERIALS AND COATINGS

MATERIALS:

Part	Fabrication	Material type	Norm
Frame	Pressure die-casted aluminum	GD-ALSi9CU3	EN AC – AlSi9Cu3
Covers	Pressure die-casted aluminum	GD-ALSi9CU3	EN AC – AlSi9Cu3
Profiles	Extruded aluminum alloy	AlMg0.7Si	EN AW - 6063
Gear wheels	Alloy steel	20NiCrMo2-2	EN 10060
		16MnCr5	
Suspension hook	Forged steel	34CrNiMo6	EN10250-3
Chain bags	TER 630		
Hooks	Forged steel	34CrMo4	EN 10083
Hook blocks	Pressure die-casted aluminum	GD-ALSi9CU3	EN AC – AlSi9Cu3
Chains	Black finish*, **	-	-
	Bended and welded alloy steel	Special steel***	EN 818-7
Rubber parts (hook block)	Molded neoprene	Santoprene	8221.65

LUBRICANTS:

Component	Lubricant
Hoisting transmission (gear)	Dexron III
Chain	Mobil Gear 632

COATINGS:

Component	Coating
Aluminum alloy components	Epoxy polyester powder painting (70 µm) (C2-M painting)
Steel components	C2-M painting
Chain	Black finish*, ** / Zinc plating***

COLOR CODES:

Component	Color code	Color
Body	RAL 7021	Dark grey
End caps	RAL 7021*	Dark grey
	RAL 9005**, ***	Black
Hook	RAL 7021	Dark grey
Chain	-	Black finish*, ** / Electro-galvanized***

*NOTE: For SR02-SR10.

**NOTE: For SR01.

***NOTE: For SR25.

6 STAGEMAHER PRODUCT CODE EXAMPLE

	Code	Feature code	Feature	Available properties
	SR		Hoist type	Stagemaker
	5		Frame size	1 2 5 10 25
	50		SWL	125 kg 12 250 kg 25 500 kg 50 800 kg 80 1000 kg 100 1600 kg 160 2000 kg 200
	4		Hoisting speed	50 Hz [m/min] 60 Hz [ft/min] 60 Hz [m/min] 4 16 4.8 8 32 9.6 16 64 19.2
	m		Number of speed	1 speed m 2 speed b Variable speed v
	1		ISO duty cycle	M4 1Am 1 M5 2m 2
	B		Type	A Direct Control B Low Voltage C Low Voltage + Encoder D VBG C1 E Without electric V Variable speed
	D8		Regulation	D8 D8 D8+ D8+ C1 C1
	DB		Number of brake	1 brake SB 2 Brakes DB
	R		upper hook	Rotating R No Rotating NR
	CHM		Chain guide	Chainflux CH Chainflux + magnetic sensor CHM Industrial Chain guide IN Industrial Chain guide + limit switch INLS
	N		Gear limit switch option	No Gear limit switch N Gear limit switch 2 step G2 Gear limit switch 4 step G4
	405		Power supply	50 Hz 60 Hz 235: 230V 206: 208V 405: 400V 236: 230V 466:460V
	E		Electrics code	C: CSA E: IEC
	1		Control voltage	1: 48VAC 2: 115VAC 3: 230VAC 4: ACF
	20		Height of lift [m]	20 20
	80		Chain grade	80 80 100 100

7 LOAD RANGE AND DUTY CLASSES

7.1 Hoist classifications

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

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

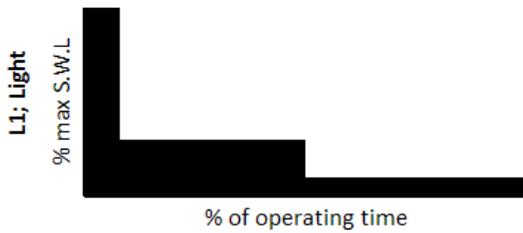
$$O_t = \frac{2 \times \text{HOL(m)} \times \text{No. of cycles} \left(\frac{1}{h}\right) \times \text{working time} \left(\frac{h}{\text{day}}\right)}{60 \left(\frac{\text{min}}{h}\right) \times \text{lifting speed} \left(\frac{m}{\text{min}}\right)}$$

Actual load spectrum factor can be calculated using following table:

Load %	Lifting time %	*	Factor k^3	=	Load spectrum factor
100 %	<input type="text"/>	*	<input type="text" value="1"/>	=	<input type="text"/>
	+				
80 %	<input type="text"/>	*	<input type="text" value="0.51"/>	=	<input type="text"/>
	+				
60 %	<input type="text"/>	*	<input type="text" value="0.22"/>	=	<input type="text"/>
	+				
40 %	<input type="text"/>	*	<input type="text" value="0.06"/>	=	<input type="text"/>
	+				
20 %	<input type="text"/>	*	<input type="text" value="0.01"/>	=	<input type="text"/>
	+				
0 %	<input type="text"/>	*	<input type="text" value="0"/>	=	<input type="text"/>
	=				
Sum:	100 %			Sum:	<input type="text"/>
			Divide by 100:		<input type="text" value="/100 ="/>
			Load spectrum factor, K_m :		<input type="text"/>

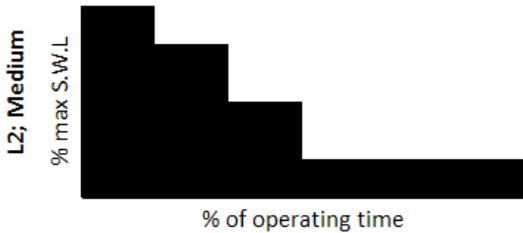
Class of load spectrum	Load spectrum K_m
L1	$K_m \leq 0,125$
L2	$0,125 < K_m \leq 0,250$
L3	$0,250 < K_m \leq 0,500$
L4	$0,500 < K_m \leq 1$

Load spectrum classes:



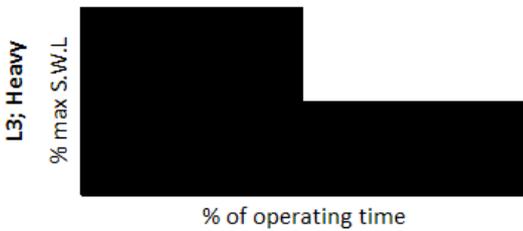
L1 Light

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



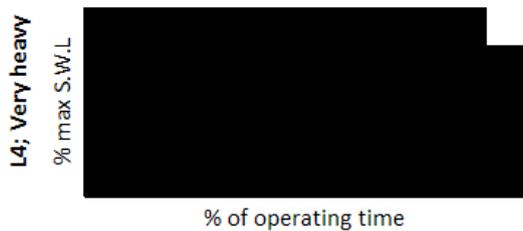
L2 Medium

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	3m/M6

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

8 RANGE OF STAGEMAKER FLIGHT CASES

8.1 Flight cases for hoist /definition

PREMIUM VERSION

- Configuration type "trunk"
- Top hinge cover
- Panel all Birch shot 9 mm finish hexa black ultra resistant
- 2 fasteners recessed Butterfly
- 2 stop cover
- 8 recessed spring-loaded handles
- 4 casters 2 locking on turntables D100
- 4 cup stacking
- Tipage pads on the sides
- 2 visualization windows

INSIDE DISPOSITION

- Mobile Cribs Sheet for easy version or double brake (ajustables)
- 2 Trays chain at the centre



ECO VERSION

- Configuration type "trunk"
- Cover top hinge
- Panel all Birch shot 9 mm
- 2 fasteners recessed Butterfly
- 2 stop cover
- 4 recessed spring-loaded handles
- 4 casters 2 locking on turntables D100

INSIDE DISPOSITION

- Mobile Cribs Sheet for easy version or double brake (ajustables)
- 2 trays chain at the centre



<p>BASE VERSION</p>	
<ul style="list-style-type: none"> • Type tray handling • Panel all Birch black • 2 handles pierced in the side posts • stacking bins, 2 skates on top • separate storage area for the chain 	
	

8.2 Flight cases for controlers /definition

<p>PREMIUM VERSION</p>	
<ul style="list-style-type: none"> • Configuration type flat flight case for Rack 19" and multiple of U dimensions. • Front and back moulded plastic cover. • Panel all Birch shot 9 mm finish hexa black ultra resistant. • 2 recessed spring-loaded handles. • 4 cup stacking. • 4 foot stacking. 	
<p>ECO VERSION</p>	
<ul style="list-style-type: none"> • Configuration type flat flight case for Rack 19" and multiple of U dimensions. • Front and back moulded plastic cover. • Panel all Birch shot 9 mm. • 2 recessed spring-loaded handles. • 4 cup stacking. • 4 foot stacking. 	

8.3 Flight cases range / dimensions

PREMIUM VERSION

Designation	Dimensions (length x wide x height)
Flight case for 2 x SR2 (simple or double brake)	910 x 575 x 540
Flight case for 2 x SR5 (simple or double brake)	1130 x 595 x 605
Flight case for 2 x SR10 (simple or double brake)	1200 x 630 x 655
Flight case for 1 x SR2 (simple or double brake)	575 x 575 x 540
Flight case for 1 x SR5 (simple or double brake)	615 x 600 x 540
Flight case for 1 x SR10 (simple or double brake)	660 x 630 x 590
Flight case Clip top for controllers 19" 3U	662 x 533 x 176
Flight case Clip top for controlers 19" 3U	662 x 533 x 352

ECO VERSION

<i>Designation</i>	<i>Dimensions</i> (length x wide x height)
Flight case for 2 x SR2 (simple or double brake)	910 x 575 x 540
Flight case for 2 x SR5 (simple or double brake)	1130 x 595 x 605
Flight case for 2 x SR10 (simple or double brake)	1200 x 630 x 655
Flight case for 1 x SR2 (simple or double brake)	575 x 575 x 540
Flight case for 1 x SR5 (simple or double brake)	615 x 600 x 540
Flight case for 1 x SR10 (simple or double brake)	675 x 645 x 590
Flight case Clip top for controllers 19" 3U	662 x 533 x 176
Flight case Clip top for controlers 19" 3U	662 x 533 x 352

BASE VERSION

<i>Designation</i>	<i>Dimensions</i> (length x wide x height)
<i>Tray handling for 1 x SR2 (simple or double brake)</i>	470 x 540 x 405
<i>Tray handling for 1 x SR5 (simple or double brake)</i>	515 x 580 x 405
<i>Tray handling for 1 x SR10 (simple or double brake)</i>	650 x 600 x 440

8.4 Flight cases stickers

Sticker for Stagemaker type / quantity



Production Sticker for Stagemaker flight cases

STAGEMAKER www.stagemaker.com			
Production :		Date :	
Content :		Packed by :	
		Job number :	
Weight :	Storage position :	Out date :	Back date :
		Case nbr. :	of # :

9 STAGEMAKER RADIO LOAD CELL SYSTEM

9.1 Why load monitoring on stage is so important?

Tons of equipment above people: Hanging tons of sound and lighting equipment above spectators and performers is a serious matter, especially in light of the trend of ever increasing load weight and movement.

Statically Indeterminate Structure: Each time there are more than two hoists on a truss or more than three hoists in a structure, it become *statically indeterminate*, resulting in an unpredictable load distribution. In most cases this will cause a load imbalance, in which some of the hoists may reach overload while others carry only a smart part of the load.

The visually leveled truss illusion: The belief that visually leveling a structure will automatically create an even load distribution is a dangerous misconception; no connection exists whatsoever between a visually leveled structure and one with an even load distribution . Because of the unpredictable load distribution, overload situations might happen to the most experienced riggers,

Weather conditions: This phenomenon may be exacerbated by weather effects such as strong winds or snow build-up on a roof. These conditions might reduce the overload tolerance of the structure which carries the rigging.

The solution: In order to ensure safe installations and shows, real-time load monitoring and overload detection is a must - from installation and throughout the entire show until dismantle.



9.2 Advantages of Stagemaker radio load cell system

Safety:

- > Continuous load monitoring: Up to 5000 hour battery life (optional 10,000) “always on” continuous monitoring. Absolutely no sleep or stand-by modes which are not acceptable from a safety perspective as continuous monitoring is curtail to prevent overloads.
- > Fatigue rated load cells: All STAGEMAKER load cells are fatigue rated, an important feature especially for fixed and long-term installations. The load cell's ability to withstand successive load cycles for long periods of time without the risk of failure or damage to the steel, affords peace of mind for the user.
- > Reliable, independent data flow from each load cell: Every load cell reports data independently and directly to the Central Receiver, eliminating the danger that damage to a single load cell will affect the rest of the system's ability to function. This feature is part of both our wired and wireless systems.
- > Wireless Multi-channel transmission to ensure reliable and continuous load monitoring.
- > Verification mechanism: An internal safety check ensures that the displayed data is always an exact match to that being transmitted by the load cells.
- > High quality materials: Including load cells made of aerospace quality, high-strength alloy steel.
- > Perpendicular design: 90° between shackle holes eliminates external moment's influence and therefore increases safety and accuracy.
- > Proven wireless and load cell technology since couple of decade.

Performance:

- > Practically unlimited number of load cells. Up to 200 load cells per laptop monitoring station and an unlimited number of monitoring stations.
- > Longer battery life: Up to 5000 hour battery life (optional 10,000) with a transmission rate of once per second.
- > Longer transmission range: Up to 150 m en standad or couple of kilometer if required (optional).
- > Works with any controller to provide automatic E-stop and overload/under-load alarm (visual and audible).
- > Slave-Master option: For increased range, harsh conditions, and the ability to monitor several halls in one control room.
- > Web server based enables load monitoring to be viewed from anywhere worldwide.
- > Tablet and smart phone compatibility allows for portable browsing.
- > Real time load map. All wireless and wired load cells are displayed on one laptop screen as a real-time load map, overlaid on the stage-plan layout, enabling the rigger to immediately identify the location of an overload and take swift preventative action. In addition, the set points enable immediate motor stop in case of overload occurrence
- > Multiple groups: Up to 15 groups, each with its own overload setting and display.
- > Continuous unlimited data logging: Downloadable data log of months of continuous measurements
- > Group screen view: for viewing individual group rigging plans, each with a specific background. (Included in orders of 50 load cells and up) – option.
- > Real time cellular SMS alert on overload occurrence (options)

Flexibility:

- > Expandability: Easily expandable by simply adding more load cells to an existing system.
- > Multiple system integration: Different Stagemaker load cell users can combine their load cells into one system when necessary, and one large system can be split into several smaller systems. Both wired and wireless, load cells and various capacities and types (SRLI Hoist Integrated and SRLM with shackles) can be used together.
- > Wide variety of frequencies available: To suit various environmental conditions.
- > Easy installation: Completely wireless system, plug and play with no cables required.
- > Wide variety of capacities: Load cells available in 5:1, 10:1 and higher safety factors are available.

9.3 Stagemaker radio load cell system Description

One complete system =

- STAGEMAKER Load cell (SRLM with shackles or SRLI integrated)
- STAGEMAKER Central radio receiver and Laptop with software
- Option(s) if necessary



STAGEMAKER SR10 with shackles load cell
SRLM STAGEMAKER RADIO LOAD CELL



STAGEMAKER SR10 with integrated load cell
SRLI STAGEMAKER RADIO LOAD CELL



Model	0 kg	250 kg	500 kg	1000 kg	2000kg	Dedicated hoist
SRLM 25	██████████	██████████				Stagemaker SR2
SRLI 25	██████████	██████████				Stagemaker SR2
SRLM 50	██████████	██████████	██████████			Stagemaker SR5
SRLI 50	██████████	██████████	██████████			Stagemaker SR5
SRLM 100	██████████	██████████	██████████	██████████		Stagemaker SR10
SRLI 100	██████████	██████████	██████████	██████████		Stagemaker SR10
SRLM 200	██████████	██████████	██████████	██████████	██████████	Stagemaker SR10
SRLI 200	██████████	██████████	██████████	██████████	██████████	Stagemaker SR10

9.4 SRLM Stagemaker radio load cell system / Description

“Designed for quick instillation and versatile use”

Technical specifications:

R.F.: 2.4 GHz range – other ranges available.

R.F. transmission range: Up to 450' /150m in normal operation conditions (outdoors line of sight). Longer transmission ranges are optional.

Safety Factor: 5:1 Standard. 10:1 and higher safety factors are available.

Safety features: Fatigue rated load cells that can withstand successive load cycles for long periods of time without the risk of failure or damage to the steel.

Proof load: 200%.

Accuracy: $\pm 0.1\%$ of full range.

Capacities: SRLM with schakles: 250 kg, 500 kg, 1000kg, 2000 kg

Display: Using a laptop or PC, the operator can monitor and control the loads of up to 200 load cells per monitoring station simultaneously, having on one single screen all the relevant information derived from the load cells: Sum (group sum and total structure sum), Max, Tare, Zero, Group (LC), Overload detection, Stage-plan layout, Low battery indication etc.

Functions: Sum, Max, Tare, Zero, Group (LC), Overload detection and alert (visual and audible), Low battery indication, Reports data base, User calibration, Group functions (Sum, Max, Zero, Tare, Overload and customized overload detection), Plan/layout archiving.

Additional Features: Web server based, tablet and smart phones compatible.

Units: Selectable units feature with the following choice of measurement readings: Tons, Kgs, Lbs.

Load Cell Material: Made of high-strength, aerospace quality low alloy steel, polyurethane coated.

Power: 4 x AA ("finger") 1.5 Volt Alkaline disposable batteries rated 3AH for each load cell. Batteries will function up to 5000 hours (optional 10,000 hours). Optional 110/220 VAC operation .

Calibration: User calibration. Initial factory calibration, certified and fully traceable to NIST.

Temperature Range: Load cell: -15°F to +175°F / -25°C to +80°C.

Environmental: Weatherproof, Nema 4, IP 65. Higher sealing levels available.



Options:

- **Additional channels:** 2 standard channels – up to 4 optional channels (recommend for large numbers of load cells and/or harsh conditions).
- **Suitcase for storage and transportation of load cell (for 4 or 8 load cells)**



- **Set point, for integration of STAGEMAKER RADIO LOAD CELL SYSTEM system with any controller** activates E-stop and/or audio visual alarm in case of overloads or underloads.
- **Real time cellular SMS alert on overload occurrence**
- **Single wire option for the wireless receiver**
- **Slave and master STAGEMAKER Central radio receiver:** for increased range, harsh conditions, and the ability to monitor several halls in one control room
- **Group screen view:** for viewing individual group rigging plans, each with a specific background. (Included in orders of 50 load cells and up)

9.5 SRLI Stagemaker radio load cell system Description



“Low headroom– no shackles needed”

Technical specifications:

R.F.: 2.4 GHz range – other ranges available.

R.F. transmission range: Up to 450' /150m in normal operation conditions (outdoors line of sight). Longer transmission ranges are optional.

Safety Factor: 5:1 Standard. 10:1 and higher safety factors are available.

Chain size for SRLI: load cell integrated on lifting chain

Capacity (kg)	Version	Chain	
		Diam. nm max	Pitch mm min.
250	SRLI	4	11
500	SRLI	5	14
1000	SRLI	7	20

Safety features: Fatigue rated load cells that can withstand successive load cycles for long periods of time without the risk of failure or damage to the steel.

Proof load: 200%.

Accuracy: ± 0.1% of full range.

Capacities: SRLM Hoist integrated: 250 kg, 500 kg, 1000kg, 2000 kg

Display: Using a laptop or PC, the operator can monitor and control the loads of up to 200 load cells per monitoring station simultaneously, having on one single screen all the relevant information derived from the load cells: Sum (group sum and total structure sum), Max, Tare, Zero, Group (LC), Overload detection, Stage-plan layout, Low battery indication etc.

Functions: Sum, Max, Tare, Zero, Group (LC), Overload detection and alert (visual and audible), Low battery indication, Reports data base, User calibration, Group functions (Sum, Max, Zero, Tare, Overload and customized overload detection), Plan/layout archiving.

Additional Features: Web server based, tablet and smart phones compatible.

Units: Selectable units feature with the following choice of measurement readings: Tons, Kgs, Lbs.

Load Cell Material: Made of high-strength, aerospace quality low alloy steel, polyurethane coated.

Power: 4 x AA ("finger") 1.5 Volt Alkaline disposable batteries rated 3AH for each load cell. Batteries will function up to 5000 hours (optional 10,000 hours). Optional 110/220 VAC operation .

Calibration: User calibration. Initial factory calibration, certified and fully traceable to NIST.

Temperature Range: Load cell: -15°F to +175°F / -25°C to +80°C.

Environmental: Weatherproof, Nema 4, IP 65. Higher sealing levels available.

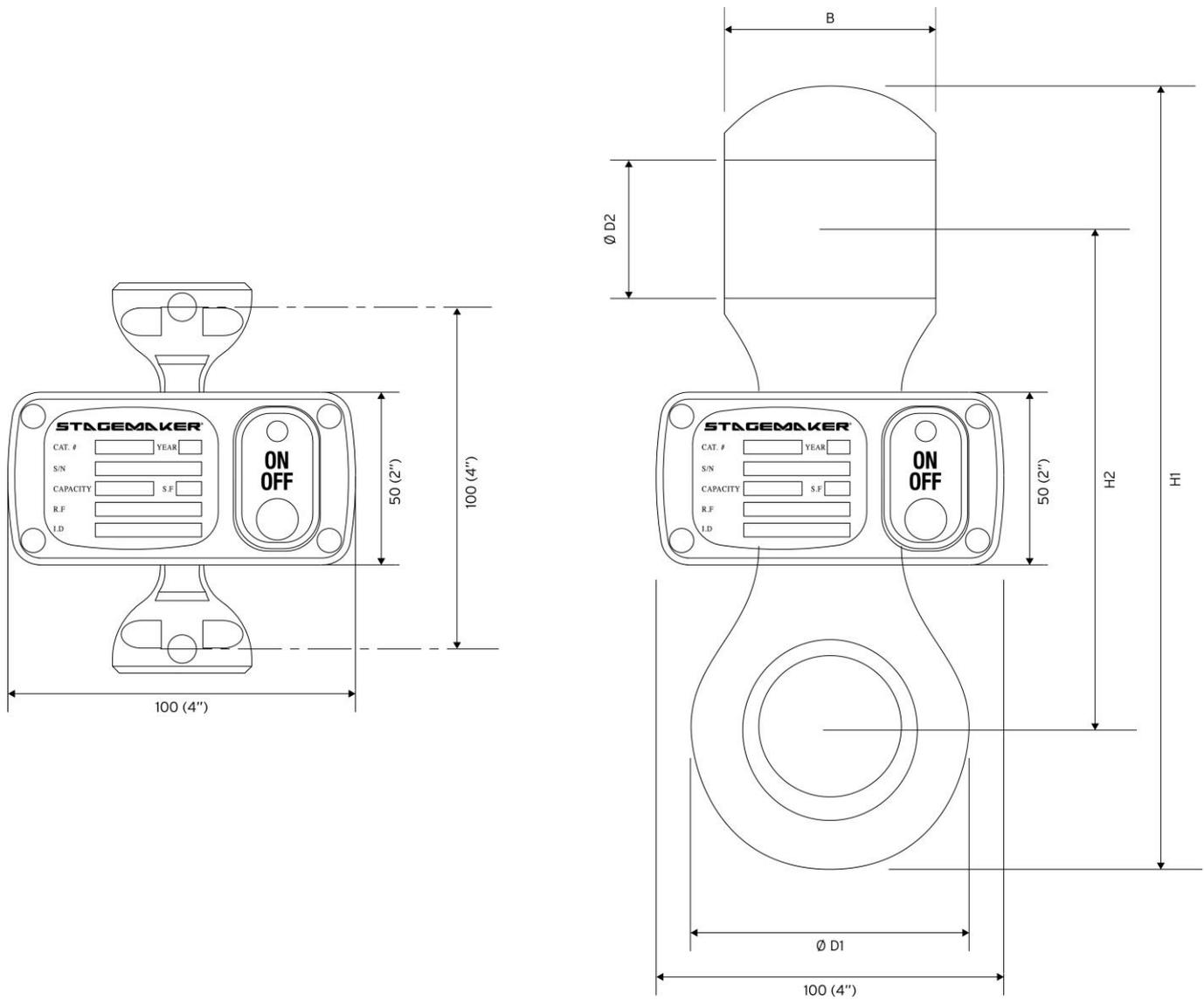
Options:

- **Additional channels:** 2 standard channels – up to 4 optional channels (recommend for large numbers of load cells and/or harsh conditions).
- **Suitcase for storage and transportation of load cell (for 4 or 8 load cells)**



- **Set point, for integration of STAGEMAKER RADIO LOAD CELL SYSTEM system with any controller** activates E-stop and/or audio visual alarm in case of overloads or underloads.
- **Real time cellular SMS alert on overload occurrence**
- **Single wire option for the wireless receiver**
- **Slave and master STAGEMAKER Central radio receiver:** for increased range, harsh conditions, and the ability to monitor several halls in one control room
- **Group screen view:** for viewing individual group rigging plans, each with a specific background. (Included in orders of 50 load cells and up)

9.6 Stagemaker radio load cell system / Dimensions



Load cell type	SWL	Safety factor	Resolution	Load Cell weight	H1	H2	B	D1	D2	Shackle Size*
	(kg)				(max.)	(max.)		(max.)	(max.)	
SRLM25 SF5 - SRLI25 SF5	250	5	0.5	1.1	140	100	19	38	21	5/8, 1/2
SRLM25 SF10 - SRLI25 SF10	250	10	0.5	1.1	140	100	19	38	21	5/8, 1/2
SRLM50 SF5 - SRLI50 SF5	500	5	0.5	1.1	140	100	19	38	21	5/8, 1/2
SRLM50 SF10 - SRLI50 SF10	500	10	0.5	1.1	140	100	19	38	21	5/8, 1/2
SRLM100 SF5 - SRLI100 SF5	1000	5	1	1.1	140	100	19	38	21	5/8, 1/2
SRLM100 SF10 - SRLI100 SF10	1000	10	1	1.1	140	100	19	38	21	5/8, 1/2
SRLM200 SF5 - SRLI200 SF5	2000	5	2	1.1	140	100	19	38	21	5/8, 1/2
SRLM200 SF10 - SRLI200 SF10	2000	10	2	1.2	150	105	26	45	23	3/4, 5/8 **

*) **Shackles not included with load cell**, datas given are Recommended dimensions,
USE SHACKLES WITH S.W.L. (SAFE WORKING LOAD) EQUAL TO, OR GREATER THAN SYSTEM'S FULL RANGE.

) **ALLOY 5 T for 10 :1 safety factor

9.7 Stagemaker Central Radio Receiver

SYSTEM REQUIREMENTS

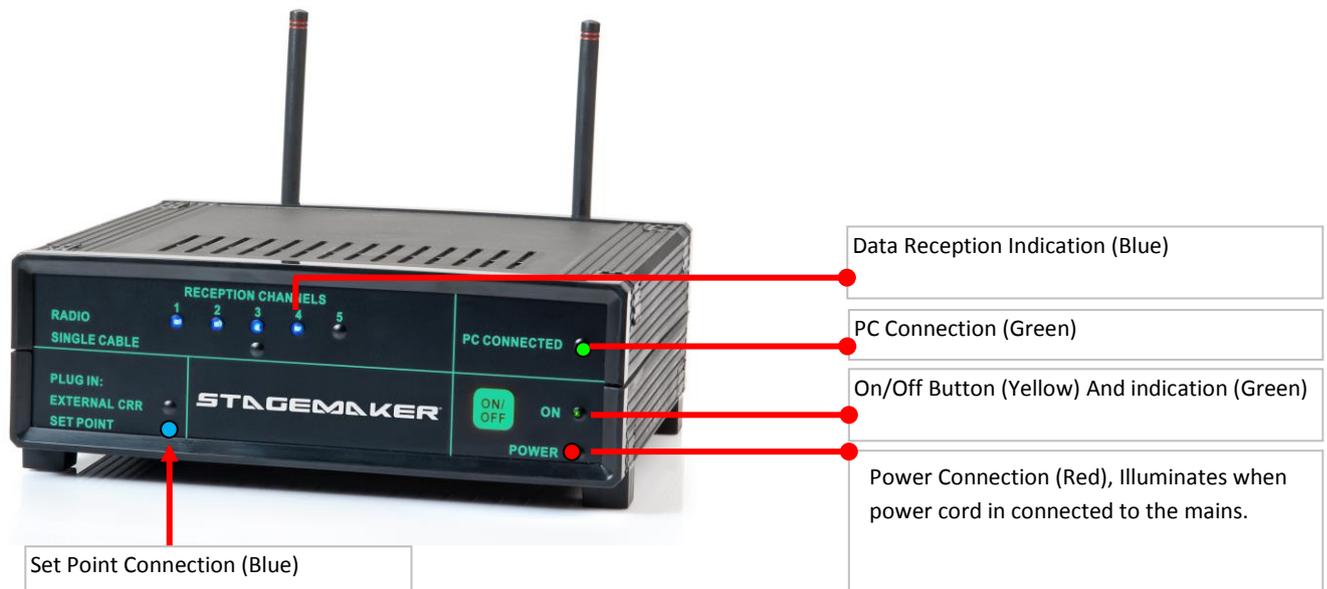
For Stagemaker radio load cell system optimal performance, the following are the minimum system requirements: PC or Laptop equipped with min. 256k cache, CD-ROM, USB 2.0 port, HD 40GB *, Windows (98 / Me / 2000 / XP/VISTA/Win7/Win8/Mac with Win emulator). Screen with resolution of 1024/768 **

* For using the REPORT feature (saving the data collected). The size of the HD will determine how much data (history) can be stored.

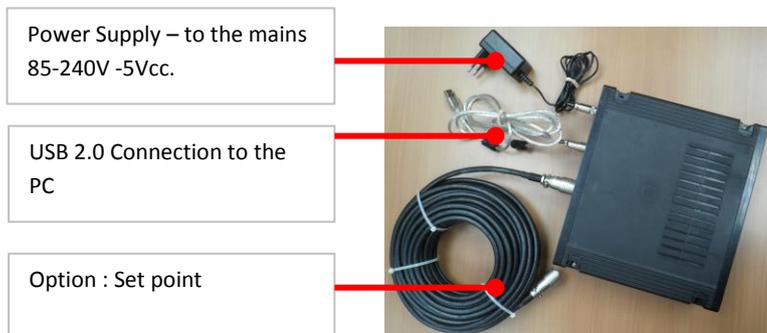
** For optimal graphic display (full screen).

DESCRIPTION

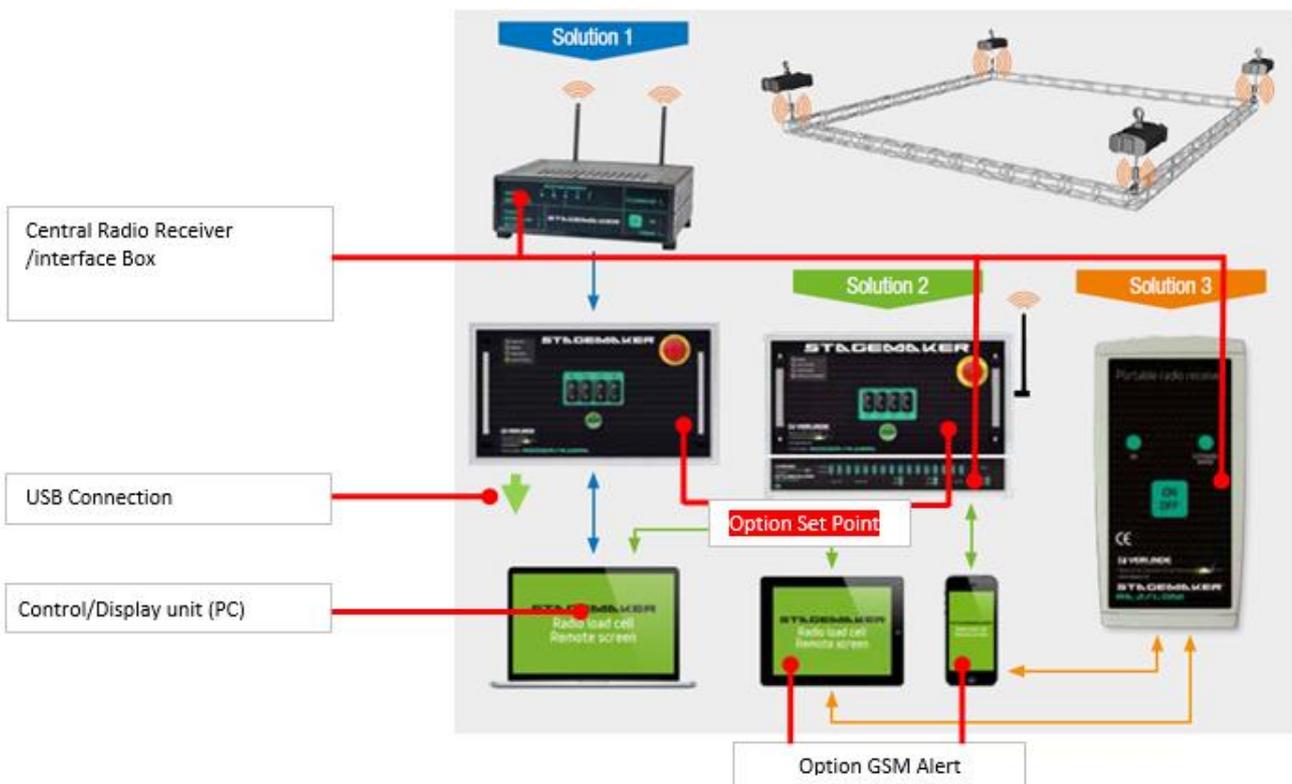
Located next to the PC, it receives the transmissions from the load cells and transfers the data to the control unit (PC) using the USB 2.0 connection.



CENTRAL RADIO RECEIVER CONNECTIONS



CONTROL UNIT – This is essentially a PC or a laptop, which controls the data received from the CENTRAL RADIO RECEIVER, then processes and displays them on the PC or laptop screen and saves the information on the HD.



Central radio receiver	Load cell max	Code
Portable central Radio Receiver running with tablet or smartphone (non supply). Operating Manual.	20	53420174
Central Radio Receiver in carrying case, USB Connector, Laptop, Software, Operating Manual.	200	53277419
Central Radio Receiver in 19" rack format 1,5U, USB Connector, Laptop, Software, Operating Manual.	200	53420200



POWER SUPPLY – The power supply unit's working range is between 85V and 240V from the mains. It is connected to the Central Radio Receiver box using a unique connector.



9.8 Options on Stagemaker radio load cell system / Description

- Set Point - This OPTIONAL feature allows the user to set and control the motors used (stop the motor/sin case of a hazardous situation). It can be applied on any kind of motor controller using a relay(interface unit – see photo below) using dry contact and a basic status of Normally Open or Normally Closed, per user requirement. The output may be applied on activation of any kind of alarm/alerting light along the motor controller stop command. Using the Rigger and the Theatre family Stagemaker controller – there is an optional direct connection from the controller to the set point interface.
- SMS Alert - This OPTIONAL feature is a remote control unit for the senior operative in charge. Used to inform the responsible person of any change/problematic status in the system installed when he absent from the installation site. Until formal update – this application does not operate in Vista OS.