HIAB SWP3 V1



Operator's Manual EN

737 3984



Congratulations!

You are now the owner of a quality Product manufactured by Hiab (part of Cargotec Corporation).

The aim of this manual is to help you handle, maintain your crane safely and with full satisfaction.

This Manual provides detailed information about your Product, its control systems and its practical management and maintenance.

Please read the complete Manual carefully and make sure that you understand its contents. Please also carefully familiarise yourself with your Product before you start to use it.

Help us to improve this manual. Please send your comments and suggestions to **documentation@hiab.com**

This Operator's Manual is an original instruction and applies to cranes with serial number from:

BLSWP3000001

Type designation of the crane:

SWP3 V1 WLL1000 150M FRQ0 WO/EM SWP3 V1 WLL1000 175M FRQ0 WO/EM

2023-01

Overview of changes for this document

Version	Date	Description
v1.0	01/2023	Released

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1. Knowledge required

1.1. Target group and scope of this manual

This manual describes:

- · Operation
- · Safety precautions and warnings
- · The crane safety system
- · Maintenance and troubleshooting

Enclosed to this manual:

• Technical Data for your crane and hoist.

Study these instructions carefully and keep them



DANGER

If you do not study the complete Operator's Manual for your crane carefully, it could lead to fatal accidents or serious damage.



NOTE

Keep these instructions for future reference.

Therefore you should:

- · Study the entire Operator's Manual carefully.
- · Use the crane only after having done so.
- Follow the directions for use, operation and maintenance of the crane exactly.





NOTE

The English version of the manual is the original version.

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1.2. The Machinery Directive 2006/42/EC

- The Declaration of Conformity, delivered with the crane contains (1):
- Business name and full address where the crane is manufactured (2):

Factory addresses:

Hiab Cranes S.L.U. Pol. Ind. Malpica, calle E, 86 50016 Zaragoza, Spain

Cargotec Poland Sp. z o. o. Ul. Metalowa 2, 73-102 Stargard, Poland

Hiab Italia S.r.l. Via IV Novembre 12, 40061 Minerbio (BO), Italy

 Description and identification of the loader crane (3): Mark

Type: see chapter Identification of the crane.

Serial number

Manufact. year

Declaration of which provisions the loader crane fulfils.

• Name and address of the person authorised to compile the technical file (4):

Name

Address

• Identity and signature of the person who drawn up the declaration (5):

Name

Position

Date and Signature

Declara Machi	ation of conformity with the inery Directive 2006/42/EC	(
We	······	(
hereby decl	ares that the loader crane:	_
Mark: Type: Serial nun Manufact.	nber:	
compl directi also co directi 2004/1 Technical f	ies with the provisions of the machinery ve 2006/42/EC; omplies with the provisions of the ve on electromagnetic compatibility 108/EC as amended. ile in accordance with Directive	
2006/42/EC	C, Annex VII A is compiled by:	
Name: Address:		(
This declar	ation is drawned up by:	
Name		-
Name Position	······································	

CE

1.3. The Machinery (Safety) Regulations 2008

- The Declaration of Conformity, delivered with the crane contains (1):
- Business name and full address where the crane is manufactured (2):

Factory addresses:

Hiab Cranes S.L.U. Pol. Ind. Malpica, calle E, 86 50016 Zaragoza, Spain

Cargotec Poland Sp. z o. o. UI. Metalowa 2, 73-102 Stargard, Poland

Hiab Italia S.r.I. Via IV Novembre 12, 40061 Minerbio (BO), Italy

 Description and identification of the loader crane (3): Mark

Type: see chapter Identification of the crane. Serial number

Manufact. year

Declaration of which provisions the loader crane fulfils.

• Name and address of the person authorised to compile the technical file (4):

Name

Address

 Identity and signature of the person who drawn up the declaration (5): Name

Position

Date and Signature

1.4. Indications in the Operator's Manual

What must you do and not do?

The following indications are used in the Operator's Manual:



DANGER

Danger to life for yourself or to bystanders. Follow the instructions carefully!



WARNING

Danger of injury to yourself or to bystanders, or danger of serious damage to the crane or other objects.

Follow the instructions carefully.



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CAUTION

Hazard for the crane or crane components. Follow the instructions carefully.

Important:

If actions are numbered, do them in numerical order!

- 1. Do this
- 2. Do that
- 3.



NOTE

Extra information that can prevent problems.



TIP

Tip to make the work easier to carry out.

Symbol for reference to a component in an illustration

(1) Refers to a component in an illustration.





1.5. Required training



DANGER

- The crane shall be operated by certified employees.
- Employees under influence of alcohol, drugs or sedative medicine shall not operate the crane.
- All employees who need to operate the HIAB SWP service cranes must attend and pass the latest training, as stipulated by Hiab or Siemens Gamesa Renewable Energy, with regards to the use of the HIAB SWP service cranes. The training can be performed by Siemens Gamesa Renewable Energy employees that have been approved and certified in the 'Train the Trainers' programme of Siemens Gamesa Renewable Energy.
- · Ensure that every defect is rectified immediately, according to the instructions.
- · Follow the instructions exactly!

Ensure that you comply with the statutory requirements of the country in which you use the crane (for example, certificate, obligatory safety-helmet, etc.).

1.6. Definition of a HIAB crane

Usage of the crane

This HIAB crane is used to lift and move loads in the working area permitted by the load plate and the load diagram. The crane is mounted on a fixed base plate and equipped with hoist.

Permitted duties:

- · Lifting of loads from the ground to a higher place.
- · Hoisting tools and spare parts for the turbine.

Forbidden duties:

- Lifting loads that are partially loaded or fastened by other means, without making sure the capacity of the crane is enough for the entire load.
- · Lifting loads exceeding the lifting capacity.
- Lifting people.
- To drag loads with the boom or the hoist.
- Direct loading and unloading of vessels and set down load to vessel.
- Push/pull with the boom system against any type of obstacle (wall, ground...).
- To block an operating lever by tools or other means while operating the crane.

Allowed crane configurations:

- Hoist mode (standard mode).
- Hook mode.
- With add-on tools for special operations.

Emergency situations to consider

- Crane control system does not work.
- · Use of an alternative hoisting tool if the rope is damaged.



1.6.1. Noise declaration

The following values for emitted noise may be taken as general and conservative values for ordinary installations of service crane. Hydraulic power supply units are not included in the noise measurement. Declared dual-number noise emission values in accordance with ISO 4871:

- Emitted A-weighted sound power level for basic service cranes in accordance with ISO 3744: LwA = 69 dB (Uncertainty: KwA = 2 dB)
- Emitted A-weighted sound power level for service cranes with hoist in accordance with ISO 3744: LwA = 79 dB (Uncertainty: KwA = 2 dB)
- A-weighted sound pressure level at loader crane control stations in accordance with ISO 11201: LpA = 77 dB (Uncertainty: KpA = 3 dB)

It is recommended for operators and persons near to the crane to use suitable hearing protection when crane is in use.

1.7. Identification of the loader crane

The information below is to be filled in by the installer. The same information will be found on the serial number plate on the crane:

Mark: HIAB

Туре:
Serial number:
Manufact. year:

	C	E	UK CA	0
ТҮРЕ]
SERIAL NO				j
MANUF. YEAR]
0				0



2. Structure and parts of the crane

2.1. Main groups

The HIAB crane consists of the following main groups:

- · Crane base with column and slewing system
- · Boom system
- Hoist
- Operating system
- · LHV Load holding valves

2.2. Crane base with column and slewing system

The crane base, column and the slewing system consist of the following components:

- Crane base (1)
- Column (2) fitted to the crane base and turns in an upper and a lower bearing.
- Slewing system (3)



2.3. Boom system

The boom system consists of the following components:

- 1st boom (1)
- · Hydraulic extensions (2)





2.4. Hoist

• The hoist is placed underneath the first boom.



2.5. Operating system - hydraulic components

The operating system consists of the following components:



- · Control valve V200 (1)
- · Cylinders:
 - Slewing cylinders (2)
 - 1st Boom cylinder (3)
 - Boom extension cylinders (4)
- · Hydraulic hoses and pipes (5)

2.6. Load holding valves (LHV)

All cylinders are equipped with load-holding valves. After a crane movement, they hold the crane in position.

If there is a leak or a component fractures, such as a pipe, hose or a coupling, the load-holding valves will stop the booms from collapsing down, even when the hydraulic system is switched off, and you operate a particular crane function.



To operate a hydraulic cylinder equipped with a load holding valve, it is necessary to get an opening pressure.



2.7. Description of HIAB SWP3 V1

The HIAB SWP3 V1 is a hydraulically operated crane that complies with the provisions of the Machinery Directive 2006/42/EC and the harmonised standard EN 12999. The HIAB SWP3 V1 is designed according to EN 13001.

Net lifting capacity:

 HIAB SWP3 V1 = 10 Tm / 97.1 kNm Hydraulic outreach from 2.1 m to 8.37 m.

The V200 control valve, the SPACEevo safety system, and the HIAB CD4 4F remote controller are the standard equipment.

The crane type and the manufacturer are marked on the serial number plate.



NOTE

The exact technical information for your crane is shown in the Technical Data.



3. Safety precautions and warnings

3.1. Pre-start check (crane operation not required)

Refer to the Section 9.1: Pre-start checklist (page 57) at the end of this manual to photocopy.

3.1.1 Presence of the signs on the crane

• Make sure that all the signs shown in the <u>Section 3.4: Warning signs (page 24)</u> are in position and in good conditions.

3.1.2 Crane stop buttons

- Do a check of the crane emergency stop button on the UI (User Interface) for damage and make sure that it works properly.
- Do a check of the crane stop button on the remote controller for damage and make sure that it works properly.

3.1.3 Slewing housing oil level

- Check the oil level in the slewing housing. Oil level eye (1) (maximum) and eye (2) (minimum).
- Check that there are no leaks from the drain plug (3).
- · If necessary, top up.
- Check if the 6 bolts with which the slewing house is bolted to the foundation are in place and appear to be tightened.







3.1.4 Crane condition

Check the condition of:

- Shaft and shaft locking between the 1st boom cylinder and the 1st boom; visually check if bolts are tightened.
- Shaft and shaft locking between the column and the 1st boom; visually check if bolts are tightened.
- Shaft and shaft locking between 1st boom cylinder and the column; visually check if bolts are tightened.

Check for any deformations in the cranes main steel structure.





DANGER

In the event of damage that presents a safety risk:

- Do not use the crane.
- · Repair the damage immediately.

3.1.5 Hydraulic system

- Make sure that the wire security seal on the dump valve is still in place and undamaged.
- Make sure that all tamper proof sealing caps are in place and undamaged in all load holding valves.
- Do a check of all hydraulic pipes, couplings, hoses, cylinders and valves for damages and deformations.
- Do a check of the levers.
 - · Check that the levers operate smoothly.
 - · Check that the levers return to neutral position.





NOTE After every use:

Check that there are no leaks from the hydraulic hoses, lines and connections.

Spillage of oil might indicate a leak in the hydraulic system.

3.1.6 Electronic components

- · Check that these are in good condition.
- · Check for visual damages of the boxes which could indicate a possible failure.
- · Check for wires who appear to be (partly) pulled out of any of the boxes.
- · Make sure that the horn works correctly.
- Do a check of the LEDs on the User Interface.

LED Test on the UI box:

- 1. Push and hold the ON/OFF button for at least 3 seconds. The test is activated.
- Release the button. The test starts showing all green LEDs, all red LEDs and all blue LEDs for 3 seconds per colour. The test is finished when all LEDs are off.



3.2. Pre-start check (crane operation required)

Refer to the Section 9.1: Pre-start checklist (page 57) at the end of this manual to photocopy.



NOTE

To start the crane, refer to the Section 5: Starting crane operation (page 45).



3.2.1 Hook, counterweight, rubber damper and ferrule



NOTE

At every use: do a visual check-up of the complete hoist system.



- 1. Start the crane and operate the boom system together with the hoist to a position where you can rest the counterweight on the ground for inspection.
- 2. Do a check of the hook (1) for deformation or surface damage with significant depth. To extract the hook, remove the lower shaft (2) of the counterweight.
 - Check spring loaded safety latch of hook.
 - Check if the cotter pin is in place within the central nut of the hook and does not start to run
 out.
 - Do a check of the shaft (2), the nut (3) and the locking pin (4) for deformation or damage.
- 3. Remove the upper shaft (6), the nut (3) and the locking pin (4) to extract both the rope ferrule (8) and the rubber damper (7).
 - Do a check of the shaft (6), the nut (3) and the locking pin (4) for deformation or damage.
 - Do a check of the rubber damper (7). Pay attention to cracks or ruptures. If there are deep grooves in the inlet opening (5 mm deep or more) or it exceeds 18 mm in diameter, discard and replace.
- 4. Do a check of the rubber bumpers (5) around the counterweight. Pay attention to cracks or ruptures. If there are cracks or heavy wear, discard and replace.



- 5. Do a check of the rope ferrule (8). Replace the complete rope if any of the following damage is present:
 - Broken single wire just above the ferrule.
 - · Deformed ferrule.
 - · Birdcaging on the rope.
 - Damaged fitting above the ferrule.

3.2.2 Top Roller



- 1. Operate the boom system to a position where you can rest the top roller on the ground for inspection.
- 2. Do a check the wear parts of the top roller. The plastic parts will most likely show signs of wear which is normal. Deep grooves in the plastic parts (5 mm or more from original surface) or possible direct contact of the wire rope with metal parts due to wear of the plastic parts, should be considered reason for the replacement of the parts. Initiate the replacement if there is excessive wear in any of the following components:
 - Rope guides (1)
 - Plastic guide rollers (2)
- 3. Make sure that the protective bow (3) is in place and correctly secured by the locking clips (4) at both sides.
- 4. Make sure that the safety cable (5) is in place and in good condition.
- 5. Do a check of the inner rubber damper (6) inside the top roller. Pay attention to cracks or ruptures. If there are cracks or heavy wear, discard and replace



- 6. Do a check of the shaft (7), the nut (8) and the locking pin (9) for deformation or damage.
- 7. Do a check of the rope (10) for deformation or damage according to the provisions included in the next section, "Hoist rope". Pay special attention to the first 5 m of the rope.

3.2.3 Hoist rope



NOTE

During winding and unwinding, the hoist rope must remain tensioned. Always verify that the rope is spooled correctly on the drum:

- Each turn of rope must be closed to the previous turn.
- There should not be any gap between each turn that allows the rope to move down into the layer below.

Safety precautions and warnings

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WARNING

As ropes undergo very heavy strain and are not of permanent durability, it is important for the safety of the hoist system and like this for their operating personnel, to carry out a thorough check-up and to renew the rope in time.

After every use the rope must be checked for damage according to the national regulations of the country of application.

Various types of damage are illustrated on the right that indicate when the rope needs to be replaced:

- Reduction of rope nominal diameter by more than 10%
- Corkscrew-type
 deformation
- · Kinked rope
- · Contractioned rope
- · Flattening rope
- Loop formation of wires on the rope
- · Knots on the rope
- Splicing on the rope
- Basket formation on the rope
- · Loose wires in the rope
- · Individual wire breakages.



WARNING

A rope has to be discarded, when there are (number of ruptures in the outer layers according to ISO 4309):

For rope diameter Ø d= 8 mm

- 2 ruptures on a length of 6 x d. (6 x 8 mm = 48 mm)
- 4 ruptures on a length of 30 x d. (30 x 8 mm = 240 mm)







NOTE

After every use:

- · Do a visual check of the rope
- if the rope is very dirty, you must clean it and brush it before you wind it on the hoist drum again.

3.3. Operating conditions

You may only use the crane under the following conditions:

• The crane is designed for wind speed up to 18 m/s. Above 18 m/s it is not allowed to use the crane.



DANGER

- Never use the crane at temperatures below -20°C, as the steel properties deteriorate below this temperature..
- It is prohibited to use the crane with the hydraulic oil temperature at -15°C (5°F) or below.





WARNING

- At temperatures below 0°C (32°F), the hydraulic oil is thicker than normal.
- Before using the crane in low temperature, start the hydraulic system and let it run until the oil temperature is increased.
- At temperatures below 0°C (32°F), do not touch the operating levers during the first few minutes.
- In cold weather, the wear on the hydraulic system is greater than at normal working temperatures.

In cold weather, start the crane as follows:

- · Allow the system to idle for a few minutes.
- Operate all crane functions for one minute in order to warm up the oil.



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3.4. Warning signs

Signs (1) - (4) placed on the operating base

- (1) Warning sign.
- (2) Load plate.
- (3) Load diagram.
- (4) Control sign.





- (5) Warning sign placed on the boom tip.
- (6) Warning sign placed on the hoist cover.
- (7) Punched signs to be placed on the crane stop buttons.
- (8) WLL (Work Load Limit) sign placed on the counterweight.
- (9) Warning sign placed on the counterweight.



3.5. Maximum load

Lifting capacity

Your crane has a certain lifting capacity, expressed in kNm or tm. This lifting capacity is also known as the load moment. The lifting capacity is: the payload at hook multiplied by the outreach in metres that the crane can operate at different positions. The lifting capacity of your crane determines the maximum load your crane may lift within its working zone. However take careful note; the greater the operating radius of the crane, the lower the lifting capacity will be because of the weight of the boom system itself. The load plate and the load diagram on your crane show the maximum loads you may lift in the operating reach of your crane.





DANGER

- Overloading could result in damage to the crane or in the worst case, personal injury or death
- Never increase a hanging load, since that may cause a load holding valve to open.
- · Never use the crane with the OLP system switched off.



NOTE

When you use equipment such as hoist, JIB, lifting accessories or interchangeable equipment and their necessary components, you add weight to the load. Because of this, the load you can lift is less heavy.

Load plate

You will find the load plate next to the control valve. On the plate is the maximum weight that you may lift at a given reach, with the first boom in the optimum position.



* Upper row: Hook mode

* Lower row: Hoist mode



DANGER

Never exceed the maximum weight on the load plate.

Load diagram

 The load diagram is placed on the operating base and shows the maximum loads that your crane can lift along the entire working zone in hook mode. The maximum load that the crane can lift in hoist mode is 1000 kg.

The white area is the working zone of the crane in hook mode.

- The load curves show the maximum load that may be lifted at a given reach and height. For a given maximum load, the possible working zone is to the left of the load curve.
- The maximum loads in the upper row represent the crane in hook mode and those placed in the lower row represent the crane in hoist mode.



Lifting the load

You obtain the best from your crane in this way: Ensure that you always have the work in clear view. If you cannot see the load properly, you could cause a fatal accident or serious damage.



NOTE

Make sure that you, as the crane operator, are always in a position where you have a clear view of the crane operation. If you cannot see the load properly, you will need the support of a banksman who guides you during the full operation.

Sling length

Always attach the load using the shortest possible sling. The angle between the legs of the sling must not exceed 120°. The maximum working load (usually known as the working load limit (WLL) in standards) of a multilegged sling for general purposes is calculated by multiplying the WLL of a single leg by a mode factor, in accordance with the table.



Max. angle to the vertical of any sling leg (degrees)	Mode factor two legged sling	Mode factor three and four legged sling	
0-45	1.4	2.1	
45-60	1.0	1.5	



If the angle between the legs of the sling exceeds 90°, the slings should not be hung directly on the hook, but rather be slung from a ring that is hung on the hook.



WARNING

Make sure that ropes do not touch or slide over corners, cutting edges or other obstacles, for example sharp edges on surfaces close to the wire rope.



Working close to the load

Always try to lift the load with the extensions retracted, however not completely. The crane then has the greatest lifting capacity.



DANGER

Never exceed the maximum permissible loading of the hook.



CAUTION

Make smooth crane movements: operate the crane with various functions simultaneously. In this way you will also prevent the hydraulic system heating up quickly. Avoid abrupt stops and high speeds when controlling the crane. This could lead to excessive swinging of the load which could lead to damage of the load and the crane/parts of the crane.

The swing can occur with or without load. The swing amplitude increase extensively while the counterweight approach the top roller.

if the swinging movement is too large, stop the crane operation until the swing stops.

3.6. Signals when using a crane



DANGER

• If it is not possible to see the load and the entire working area clearly the crane operator is obliged to follow the instructions and signals given by a qualified person.

Either via radio communication or trough hand signals.

• The country-specific regulations for crane operator signals are to be used.

Signals in this manual give a number of standard signals that can be used.



Lift

Raised arm and index finger raised. Circular motion with hand.

Lower

Arm pointing downwards and index finger down. Circular motion with hand.





Stop all crane movements

Also: Hold the load in position.

Raise the open hand, with the palm clearly visible, and arm at shoulder height.

Keep the hand still.

Emergency stop for all movements by the crane

Raise the hands and the arms to an oblique angle.





Very short movement

Place the hands a very short distance apart, with the palms facing each other. The hands may be held either horizontally or vertically. The next movement may be: Lift, lower, move the lifting gear, change the reach, or turn.

Change the reach

Signal with your hands.

- Sideways movement outwards with both hands. Thumbs outwards.
- Sideways movement inwards with both hands. Thumbs inwards.





Turn in the direction indicated

Indicate the direction with the hands.



3.7. Wind speeds

The crane is designed for wind speed up to 18 m/s. Above 18 m/s it is not allowed to use the crane.



DANGER

Shape, size and weight are among a few aspects, which can greatly affect the behavior of a load when hoisting. Siemens Gamesa Renewable Energy basic health and safety rules as well as local requirements must be followed at all times in addition to the maximum allowable wind speed set by Hiab.





WARNING

If a sudden strong wind during the crane operation creates swinging movements, return the load to its initial position.

if the swinging movement is too large, stop the crane operation until the swing stops.

3.8. Use of the crane

Preparations for use



DANGER

- · Wear a safety helmet.
- Always use safety gloves when handling ropes or slings.
- Do the pre-start check before you start operating the crane!
- Make sure that there are no unauthorised persons within the operating range of your crane!
- Make sure that ropes do not touch or slide over corners, cutting edges or other obstacles.
- Never guide a moving rope with your hands!



Crane operation

Your crane has a safety system.



DANGER

The safety system will help you to work safely. Nevertheless, you remain responsible for safe use of the crane!

Therefore, always work according to the operating instructions!

In an emergency

Immediately switch off all crane movements:

- Push the crane emergency stop button of the User Interface.
- Push the stop button on the controller.

To avoid unexpected load movements and at every interruption in crane operation.





DANGER

- · Never walk or stand under a suspended load!
- · During operation, never stand below the boom system or load!
- Keep checking that there are no unauthorised persons within the operating reach of the crane!
- Make certain that you can always see the load!
 If your view of the load is not adequate, have someone else give you signals.
 See the list of signals. Make certain that you and the person assisting you know these signals.
- · Pay attention to the safety of the person giving the signals!
- Never slew at full speed to the final position. This will damage the slewing system.

WARNING

- Never push a load with the extension boom. This can cause damage to the extension cylinders. This will lead to expensive repairs.
- Never use the extension boom as a jack. This could damage the slewing bearings and the connection between the crane column and the crane base.
- Always lift the load before you start to slew. Do not tow the load over the ground. This can damage the boom system.
- If you are working with loads in restricted spaces: Check that the boom system can move up and down freely. The boom system will bend somewhat, when loading and unloading the crane.

CAUTION

- · Operate the crane using smooth and gentle lever movements.
- If a cylinder is at its end position, free the operating lever. Otherwise overheating can occur.

Ending crane operation

DANGER

Always end crane operation as follows:

- After use, always park the crane.
- Switch off the operating system.
- Disengage the hydraulic power after work.

3.9. Use of the Hoist

The hoist is a crane component included in the standard configuration which lets the load handling without any or only limited boom movement.

Lifting and lowering is achieved by winding/unwinding the drum rope.

During hoist operation, the rope must not be pulled off the hoist drum completely. The hoist safety system is fitted with an automatic system to prevent that. Four safety windings will always remain on the drum.

WARNING

During operation, the rubber damper on top of the counterweight should not touch the top roller. As a safety measure, the distance between them should preferably not be less than a visible gap to allow getting out of an overload situation and avoid unnecessary stresses in the boom system. Special attention shall be given to avoid contact when the rubber damper is close to the top position.

WARNING

Make sure that ropes do not touch or slide over corners, cutting edges or other obstacles, for example sharp edges on surfaces close to the wire rope.

The swing is mainly caused by the wind and can occur with or without load.

WARNING

The load should not swing excessively. Max permissible swing angle (pendulum angle) e.g. 20°. If the load starts to swing, it shall be stabilized and return to a calm state especially in the last 1,5-2 meter towards the top roller. The swing amplitude increase extensively while the counterweight approach the top roller.

DANGER

- · When using the hoist, follow the instructions carefully!
- · Watch out for hazards!
- Always stay clear of the hoist, hoist cable, top roller and counterweight when operating the hoist.

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4. The Safety system

4.1. Control system SPACEevo

SPACEevo is a crane control system.

The control system:

- · Monitors the crane's operation and prevents unsafe actions.
- · Increases the precision with which you can work.
- · Makes operation easier.
- · Makes troubleshooting easier.

Control valve	Control System	Remote controller
V200	SPACEevo	HIAB CD4 4F

NOTE

The control system provides a large number of functions.

If you do not use the system for 30 minutes, it will switch itself off.

4.2. How the safety system works

On the crane there are sensors and indicators that send signals about the crane load, position and movements to the main ECU located in the operating base. The main ECU decides how the crane can be operated and stops/reduces forbidden movements/speeds according to the following:

- When forbidden movements/speeds are approached, a warning is given.
- · When forbidden movements/speeds are reached, the crane stops.

Fault monitoring

Error indicator on the controller

When an error takes place, the wrench symbol appears enlarged in the display.

If it is a non-critical error, after 3 seconds it becomes smaller and returns to the upper part of the display.

If it is a critical error, the wrench symbol remains enlarged in the display until it is acknowledged with the padlock button **a**.

Depending on the error, the crane speed and/or the load capacity will be reduced. When it is a critical error, the crane stops.

4.3. Components of the SPACEevo safety system

Control valve

- When the operator activates the SPACE system, remote mode is selected by default and it is not possible to operate the crane from the main control valve.
- As a general rule, the crane can ONLY be operated from the levers in the main control valve for emergency operations. To do this, the operator needs to push the remote button on the User Interface.

User Interface

This is the User Interface for SPACEevo. From this box, the operator can:

- · Activate and deactivate the SPACE system.
- Use the OLP release function.
- Push the crane emergency stop button.
- Activate the crane horn.

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Filter

• The remote control valve V200 is equipped with an integrated pressure-reducer filter for the positioners.

Dump valve

 To prevent high pressure and thereby unnecessary heating of the oil there is an automatic dumping function. When no lever movement has been made for 3 seconds SPACE system opens the dump valve and the oil is returned directly to the hydraulic system. As soon as the operator moves a lever the valve closes.

Remote controller

• The controller is the device that the operator use to control the crane. There is also a stop button on the controller.

Warning LED lamp

The warning LED lamp located at the slewing cylinder to give information to the operator about the status of the crane.

- System ON: the LED lamp lights up.
- Remote control ON: the LED lamp blinks.
- 90% pre-warning and OLP: the LED lamp flashes twice.

4.4. Operating base

- (1) UI (User Interface) SPACEevo.
- (2) Service CAN connector [P4]
- (3) Connector for the remote controller with the 15 m cable.
- (4) Control valve V200.
- (5) Main control levers (slewing, 1st boom, boom
- extensions and hoist).
- (6) Storage basket for the 15 m cable
- (7) Dump valve.
- (8) Battery charger.
- (9) Remote controller HIAB CD4 4F.
- (10) Holder for the remote controller.
- (11) Transceiver with antenna.

4.5. Buttons on the UI (User Interface)

(1) ON/OFF button

Activates or deactivates the SPACE system.

(2) Not in use

(3) OLP release button

For OLP release if the crane is in an OLP situation.

(4) Crane emergency stop button

Button to push in case of emergency. It stops all crane movements.

(5) Horn button

Crane horn activation.

(6) Not in use

(7) Remote button

Activates or deactivates the controller.

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4.6. Indicator LEDs on the User Interface

0	Power ON/OFF	(1)	Green LED on: The system is on.
			Green LED blinking: System on and the emergency stop button has been pushed.
			Red LED flashing: CAN communication has been lost.
Ч		(2)	O Not in use in this configuration.
	OLP Release	(3)	Red LED on: OLP
			Red LED blinking: OLP Release active
			Green LED flashing: Critical error.
₽3		(4)	O Not in use in this configuration.
a the second sec	Remote control	(5)	Green LED on: Remote control is active.
			Green LED blinking: Button for remote control has been pushed, waiting for connection to hand unit.
			Red LED on: Radio interference.
Ρ		(6)	O Not in use in this configuration.

~	Service	(7)	Red LED on: Error in the system.
			Red LED blinking: Critical error.
	Dump valve	(8)	Blue LED on: Dump activated.
			Blue LED fast blinking: Startup sequence ongoing.
ADC		(9)	O Not in use in this configuration.
	Hoist	(10)	Green LED on: Hoist mode.
			Red LED fast blinking: 4 windings left on the hoist drum.
			Red LED blinking: 90% of OLP pressure.
			Red LED on: 100% of OLP pressure.
JDC		(11)	O Not in use in this configuration.
		(12)	O Not in use in this configuration.
		(13)	\bigcirc Not in use in this configuration.
	Working sectors	(14)	O LED off: Correct operation.
			Green LED on: Correct operation.
	Cylinder pressure	(15)	1 of 4 green LED on: 50% of maximum pressure reached.
			2 of 4 green LED on: 70% of maximum pressure reached.
			3 of 4 red blinking LED: 90% of maximum pressure reached.
			4 of 4 red LED on: 100% of maximum pressure reached.
			• 4 of 4 red running LED: OLP release activated.

Led test for the User Interface, see <u>Section 3.1: Pre-start check (crane operation not</u> required) (page 16).

4.7. Remote controller HIAB CD4 4F

- The remote controller has 4 levers and a display that continuously provides you with information about the crane operation.
- The remote controller operates wirelessly but it can also be operated via cable.

Cable connection

A 15 meters cable is supplied with the controller. The cable is intended to be used for a short-term operation and when pairing in conjunction with the replacement of the remote controller or the transceiver. The cable connects to the system through the connector (1) at the operating base.

When the cable (2) is connected to the remote controller (3), the centre display shows the symbol for cable operation.

4.7.1. Display of the controller

(1)	50 1 %	Crane capacity (%) It shows the crane capacity in % according to the pressure in the 1st boom cylinder.	Battery power Battery capacity left in the controller.	ľ	(6)
(2)	50 چې	Hoist capacity (%) It shows the hoist capacity.	Radio signal Radio signal strength.	(p)	(7)
(3)	. %	Feature information It shows information about the crane when it is in parking position. See <u>Section 6.1.2: RTP</u> <u>Rope Tension Parking</u> (page 47).	Crane functions Symbols to indicate the crane function of each lever.	Ĵ	(8)
(4)		Error information It shows the error and service indicators. See <u>Section 4.2.: Fault</u> monitoring (page 34).	Speed indication Symbol to indicate that the button n°2 is set to select the speed mode. See Section 6.1.1: Crane speed and SRZ (Speed Reduction Zone) (page 47).	Ĩ	(9)
(5)	\odot	Speed mode It shows the current speed mode selected: 'Medium' and 'Low'. When 'Full' mode is selected, nothing is shown on the display.	Full hoist capacity Symbol to indicate that the button nº3 is set to override the RTP feature and allow the hoist to work at full capacity. See <u>Section 6.1.2: RTP</u> <u>Rope Tension Parking</u> (page 47).	2	(10)

Symbols of the crane functions (8)

NOTE

These symbols are located in both the remote controller and in the levers of the operating base.

SYMBOLS	FUNCTIONS
L L	Slewing
$\overline{\mathbf{v}}$	1st boom

4.7.2. Buttons on the controller

(1)	 ON/OFF buttons The controller has six configurable push buttons for controlling ON/OFF functions. 1-4-5-6: Not in use. 2: Push to select the speed mode. 3: Push to override the RTP (Rope Tension Parking) feature. 	OLP release Push and hold to activate OLP release. See <u>Section 6.3: To release OLP</u> (page 49).	(6)
(2)	Not in use.	Horn Push to activate the horn.	(7)
(3)	Not in use.	Stop button Push to deactivate the controller. Release to activate.	(8)
(4)	Not in use.	Not in use.	(9)
(5)	Not in use.	Not in use.	(10)

4.7.3. Battery and battery charger

Battery

Install a fully-charged battery in the controller as shown on the right. It is important to fit the battery the right way round and lock it by turning the switch on the battery (A).

In order to keep your battery in good condition for a long time, there are a few simple rules to follow:

- Regularly clean the connectors on the batteries (B) and the battery charger (C).
- A new battery needs a bit of running-in before it will reach full capacity. The first 4-5 cycles, charge the battery completely. Then, use the battery until it stops because of low battery power in the controller.

NOTE

During this time, do not take a halfway charged battery from the charger or a halfway discharged battery from the controller.

Battery charger

The battery charger is to be fitted in a protected environment. Two batteries are delivered with each unit, one of which can always be placed in the battery charger.

Normal charging time for a flat battery, is approximately 1.5 hours. Operating ambient temp: Battery = 0° to +45°C (32°F to 113°F).

LEDs status

The green LED (D) on: when the charger is active.

The LED (E) indicates the status of the charger and the battery:

- Green LED blinking: during charging the battery.
- Green LED on: when the battery is fully charged.
- Red LED blinking: when the temperature is too high.
- Red LED on: Error. The battery charger is not working.

How to charge the battery:

- 1. Place the battery in the correct position of the charger. The two connectors on the battery must be in contact with the connectors in the battery charger.
- 2. Push the battery into the charger until it stops. The LED (E) starts blinking green.
- 3. Lock the battery position by turning the switch on the battery (A).
- 4. When the LED (E) is steady green, the battery is fully charged.

NOTE

A charged battery is a concentrated energy source. Never store a charged battery in a toolbox or similar, where there is a risk of a short due to metal components. Used batteries should be taken care of according to the local regulations.

5. Starting crane operation

5.1. Starting operations

Engage the hydraulic power from turbine

Start the safety system

Always make sure that the crane is in good condition, that no visual damage or oil leaks exist.

The operating levers must be in neutral position before start up. To start the control system, push the ON/OFF button 0 on the User Interface.

- The LED above the button will light up.
- The system will check itself. (2-4 seconds).
- The warning LED lamp will light up.

Start the controller

- 1. Fasten the controller to a waist belt, or shoulder-/neck strap, in the most comfortable operating position. The crane stop button should be on the right-hand side.
- To activate the controller, release the crane stop button by turning it clockwise. The LED above the remote button on the User Interface will become steady and the warning LED lamp on the slewing cylinder will start blinking.

NOTE

When the control system starts, remote control mode is active by default.

5.2. Operate the crane out of parked position

- 1. Raise the first boom.
- 2. Slew the crane to working position. The crane is ready for use.

NOTE

As soon as you have selected remote control operation, it is impossible to operate the main control valve levers.

5.3. Starting the crane in manual mode for emergency operation

WARNING

Manual mode ONLY allowed for emergency operations.

- 1. Make sure that you have previously pushed the crane stop button of the controller and it is on its holder.
- 2. Push the remote button of the UI. The LED above the remote button on the UI will become off.
- 3. Operate the crane with the levers in the operating base.

4	

NOTE

The hoist SRZ feature (Speed Reduction Zone) is also active in manual mode. When you operate the hoist into a low speed zone at maximum allowed stroke of the lever, the crane will stop. Reduce the stroke of the lever until hoist operation starts again and keep it in that position.

6. During operation

6.1. Features

6.1.1. Crane speed and SRZ (Speed Reduction Zone)

Button in the controller

- At startup of the controller for the first time, the crane speed is set to 'Full'. After that, it starts at the last selected speed.
- It is possible to choose between three different speeds. Push button 2 to change.

Hoist SRZ feature (Speed Reduction Zone)

Inside the nacelle where the crane is installed, there is a speed reduction zone set when the hoist hook is close to the boom tip. The same happens when the hoist hook is close to the platform outside (~150 meters down).

The SPACE system is able to measure the number of windings spooled on the hoist drum. If there is a certain rope length spooled on the hoist drum, the SPACE system senses the position of the hoist hook and automatically activates the SRZ feature.

6.1.2. RTP Rope Tension Parking

When you operate the crane to the parking position, the rope must be tightened until a certain value where the hoist function must stop. That value does not correspond to the OLP limit.

NOTE

The RTP feature only works in remote mode.

The SPACE system is able to measure the number of windings spooled on the hoist drum. If there is a certain rope length spooled on the hoist drum and the boom extensions are fully retracted, the SPACE system senses that the crane can be in the parking position and automatically activates the RTP feature.

The RTP feature sets a lower hoist capacity than normal (the hoist load value in the hand controller display changes to 90%) to make the rope tightening possible during parking operation. RTP is only active when the boom extensions are fully retracted. When you extend the boom extensions and/or unwind the hoist rope, RTP is automatically deactivated and the hoist works at full capacity again.

For those situations where the crane meets the RTP requirements but you do not intend to operate the crane to the parking position, there is a button (1) set on the controller to override the RTP feature and allow the hoist to work at full capacity again.

Keep the button (1) pushed to have full capacity. As soon as you release the button (1), the RTP feature is active again.

6.1.3. Supervision of spools

If a valve spool movement is greater than the equivalent lever movement on the controller, a safety function is tripped, and all crane movements stops.

This occurs if a control lever on the valve is moved while the remote control is engaged.

6.1.4. ADO Automatic Dumping of Oil

If a lever is not moved for 3 seconds, this feature diverts the oil to the tank, thereby preventing the oil from overheating. The next lever movement stops the dumping and it functions as normal.

6.2. OLP (Overload protection)

OLP on the User Interface - Boom system

The OLP function is a safety function in SPACE that prevents overloading of the crane and the hoist system.

On the boom system: With 90% of maximum permitted load, a prewarning is given and the cylinder pressure LEDs will flash red.

When 100% of the maximum permitted pressure is reached, OLP cuts in and stops all functions that increase the pressure.

The pressure level in the 1st boom is indicated by the LEDs on the User Interface:

- 50% of maximum pressure 1 of 4 LEDs light green
- 70% of maximum pressure 2 of 4 LEDs light green
- 90% of maximum pressure 3 of 4 LEDs blinking red
- 100% of maximum pressure 4 of 4 LEDs light red

NOTE

Do not operate heavy loads with the extensions fully retracted. In an OLP situation, it is an advantage to be able to retract the extensions.

DANGER

Never exceed the values given on the load plate.

OLP on the User Interface - Hoist

When the hoist reaches 90% of permitted load, the hoist LED on the user interface starts blinking in red. At 100% load OLP cuts in, stopping load increasing movements. The LED has a steady red light until the overload situation is over. When the wire is almost completely unwound (four windings left on drum), the hoist lowering is stopped.

OLP End of stroke operation

If a cylinder reaches its end position while lifting, the cylinder may reach the OLP limit and SPACE will interpret this as an overload.

In this case, SPACE will calculate the pressure increment over time and automatically release OLP.

OLP Audible warning

- The horn will sound once every 10 seconds (one short beep) when the load is at 90% (prewarning).
- The horn will sound three times every 10 seconds (three short beeps) at OLP.

OLP - Indications on the remote controller HIAB CD4 4F

OLP - Boom system

- A percentage of the maximum permitted pressure in the 1st boom cylinder is shown on the display when 50% or more of maximum pressure is reached. The display shows 50%, 70%, 90% and 100% as the pressure increase.
- When the pressure reaches 100%, all functions that would increase pressure are blocked. The crane capacity symbol start flashing between 100% and a locked padlock.

OLP - Hoist

- A percentage of the maximum permitted pressure in the hoist is shown on the display when 90% is reached. The display shows 90%, when it is between 90% and 99%, and 100% as the pressure increase.
- When the pressure reaches 100%, the hoist function is blocked. The hoist capacity symbol start flashing between 100% and a locked padlock.

6.3. To release OLP

If all functions have been blocked due to OLP, it is possible to temporarily release OLP and operate an appropriate crane function to correct the overload situation. OLP release is active in 5-second intervals. After each 5-second interval of OLP release, there is a waiting time before the release operation can be activated again. The waiting time will increase in three steps: 30, 60 and maximum 90 seconds. During each 5-second interval, only one function at a time can be operated. Extension out cannot be operated at all. The 5-second interval starts to count as you move the lever.

DANGER

Only use the OLP release to get the crane out of a locked position. Never use the OLP release to overload the crane deliberately!

NOTE

In case of a crane breakdown, the use of OLP release will be part of the investigation. If the use of OLP release is too excessive, it might affect warranty.

OLP release on User Interface

Push and hold the button **b** while you operate load-reducing functions.

The LEDs of the cylinder in OLP show a running light, and the LED for the padlock symbol blinks red.

OLP release on controller CombiDrive

Push and hold the button **a** on the controller whilst operating load reducing functions. The unlocked padlock will appear in the display. On the User Interface the cylinder pressure LEDs perform a running light. The LED for padlock symbol will blink red.

6.4. Change crane configuration to hook mode

DANGER

Danger of injury, danger of crushing.

An unsecured top roller may drop during the removal or assembly process and cause serious injury and crushing.

- · Secure the top roller with hoisting gear or prop it up professionally.
- · Always wear protective gloves when working with ropes.

WARNING

Take care when working with the rope/top roller. Risk of crushing.

- 1. Place the counterweight including the hook on solid ground.
- 2. Make sure that there is no tension on the rope.
- 3. Remove the locking pin (1) and the nut (2) from the upper shaft (3) of the counterweight.
- 4. Remove the shaft (3) from the counterweight.
- 5. Remove the rope from the counterweight and position the shaft (3), the nut (2) and the locking pin (1) back so as not to get lost.
- 6. Remove the rubber damper (4) from the rope.
- 7. Remove the locking clips (5) and remove the protective bow (6).
- When you remove the protective bow (6), you can remove the shaft (7) and the roller (8). Then, you can remove the rope through the top roller.
 Assemble and position the shaft (7), the roller (8) and the protecting bow (6) back so as not to get lost.
- 9. Remove locking pin (9) from the main top roller shaft (12).
- 10. Remove the round nut (10) from the main top roller shaft (12).
- 11. Remove the shaft (12) from the top roller assembly.
- 12. Remove the two bushings (11) from the top roller assembly. Hold the top roller so as not to get dropped!
- 13. Remove the top roller from the hook support of the crane.
- 14. Assemble and position the two bushings (11), the shaft (12), the round nut (10) and the locking pin (9) in the top roller assembly and store it correctly.
- 15. Attach the rope end to the support (13) on the boom system and wind the rope on the hoist drum. Secure the rope to the support with the locking clip.

6.5. Change crane configuration to hoist mode

DANGER

Danger of injury, danger of crushing.

An unsecured top roller may drop during the removal or assembly process and cause serious injury and crushing.

- · Secure the top roller with hoisting gear or prop it up professionally.
- · Always wear protective gloves when working with ropes.

WARNING

Take care when working with the rope/top roller. Risk of crushing.

- 1. Loosen the rope from the support (1) on the boom system.
- 2. Remove the locking pin (3), the round nut (5), the shaft (4), and the two bushings (2) from the top roller assembly.
- 3. Lay the rope over the pulley of the top roller assembly and position the top roller in the hook support. Place the two bushings (2) on each side of the top roller in the hook support.
- 4. Make sure that the pins in the two bushings (2) engage in the top roller assembly. (If fitted incorrectly, the locking pin (3) will not fit later on in the process).

NOTE

Do not use a hammer or other tool to assemble the bushings (2).

- 5. Insert the shaft (4) through the bushings (2) and the top roller assembly. Make sure that the rope goes under the shaft (4) and solely runs on the pulley.
- 6. Hand-tighten the round nut (5) and install the locking pin (3). The locking pin (3) will only fit if the two bushings (2), the shaft (4) and the round nut (5) are assembled correctly. If the locking pin (3) cannot be fitted, do a check of the steps 1 to 5 carefully.
- 7. Put the rope through the guide of the top roller.
- 8. Install the roller (6) and the shaft (7). The rope must go between the roller (6) and the roller (8). Install the protective bow (9) and attach it with the locking clips (10).
- 9. Install the rubber damper (14). Insert the rope end through the top inlet opening.
- 10. Install the counterweight including the hook by removing locking pin (11), the round nut (12) and the upper shaft (13) from the counterweight.
- 11. Insert the rope end into the counterweight and align with the upper shaft hole.
- 12. Insert the shaft (13) through the counterweight and the rope end.
- 13. Tighten the round nut (12) and install the locking pin (11).

7. Ending crane operation

7.1. Parking the crane after use

Parking the crane:

When you operate the crane to the parking position until the next use, put the crane in the position illustrated above. Since there is no bracket or eyebolt to fix the hook, fully retract the boom extensions, spool the hoist until the counterweight is fully up, and slew the crane until the arrows are aligned. Once the crane is in that position, fully lower the boom system.

It is recommended to do this operation at 'Medium' or 'Low' speed mode by pushing the speed button on the remote controller. The boom system must be fully retracted.

RTP Rope Tension Parking

When you operate the crane to the parking position, the rope must be tightened until a certain value where the hoist function must stop. That value does not correspond to the OLP limit.

If the SPACE system senses that the crane can be in the parking position under certain criteria, it automatically activates the RTP feature to make rope tightening possible during parking operation.

For further details about the RTP feature, please refer to the <u>Section 6.1.2: RTP Rope Tension</u> Parking (page 47).

7.2. Switching off the control system

• Switch off the control system with the ON/OFF button .

If you are using the remote controller:

- Push in the stop button on the controller and switch off the safety system with the ON/OFF button .
- Stow the remote controller in the bracket.

Disengage the hydraulic power supply from turbine.

WARNING

If the crane or its electric system is broken down, push immediately any of the emergency stop buttons. This will prevent all unexpected crane movements.

The emergency operation to bring the crane to parking position or lower the load to the ground can only be carried out by authorized personnel, following the maintenance instructions. To operate the crane like this is **HIGHLY DANGEROUS**.

8. Warranty

Warranty is only valid if:

- The instructions for maintenance and service have been followed, and original HIAB parts have been used.
- All seals on the valves are still intact.
- Repair and service under warranty is carried out by personnel authorized by Siemens Gamesa Renewable Energy and Cargotec.
- Be aware of legal implications when breaking a seal.
- In case of broken seals on valve, immediately report Siemens Gamesa Renewable Energy Service.

9. Annexes

9.1. Pre-start checklist

Operator name:			ID:
Crane s/n:			Date:
PRE-START CHECK	0	0	Comments
3.1.1 Signs on the crane (page 24).			
3.1.2 Stop buttons (page 16)			
3.1.3 Slewing housing oil level (page 16)			
3.1.4 Crane condition (page 16)			
3.1.5 Hydraulic system (page 16)			
3.1.6 Electronic components (page 16)			
3.2.1 Hook, counterweight, rubber damper and ferrule (page 18)			
3.2.2 Top roller (page 18)			
3.2.3 Hoist rope (page 18)			
FUNCTIONAL TESTS			
Make sure that the remote controller works correctly			
Make sure that the horn works correctly by pushing the horn buttons in the remote controller and in the UI (User Interface)			

If you find a fault that prevents you from operating the crane safely, do not try to repair the fault. It can cause injury or damage to the crane.

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