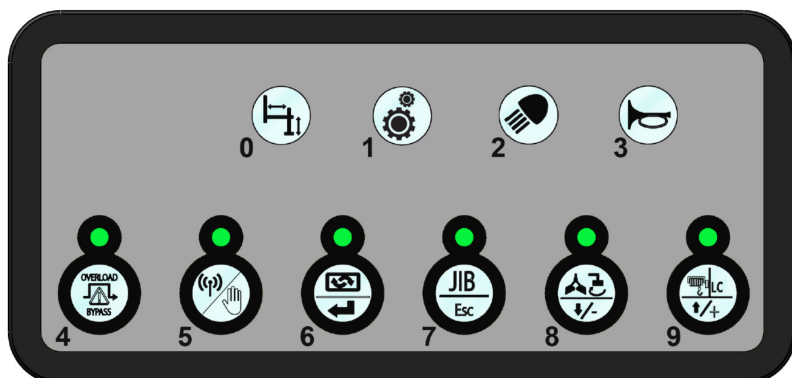


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SYMBOLS

Symbols	Description
P1	Working pressure Current pressure in the 1 st boom cylinder detected by the moment limiter
PJ	Working pressure Current pressure in the articulation jib cylinder detected by the moment limiter
P1L	Pressure limit for the 1 st boom cylinder Max allowable working pressure in the 1st boom cylinder depending on stabilizer spreads and slewing angle
PJL	Pressure limit for the articulation jib cylinder Max allowable working pressure in the articulation jib cylinder. Constant value
L	Load suspended from the hook For the crane: load suspended from the hook of the last hydraulic extension For the winch: load hoisted with the winch, rope pull For a manual extension: load suspended from the hook of the manual extension
RL	Rated load For the crane hook: max lifting capacity at a given outreach For the winch: max pull capacity (constant value) For a manual extension: max lifting capacity, setting value for the load cell (constant value)
MINREC	Minimum value for activating the "Recovery Simulation" function
MAXREC	Maximum value for activating the "Recovery Simulation" function
MINSIM	Minimum value for activating the "Stability Simulation" function
MAXSIM	Maximum value for activating the "Stability Simulation" function



A WARNINGS

A.1 IMPACT HAZARD

Impacts against the dashboard could cause malfunction of the System.

Residual hazards are associated with:

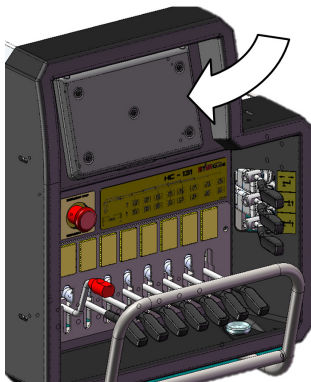
- impact with the suspended load
- impact caused by release of the load
- Impact during crane transport

WARNINGS

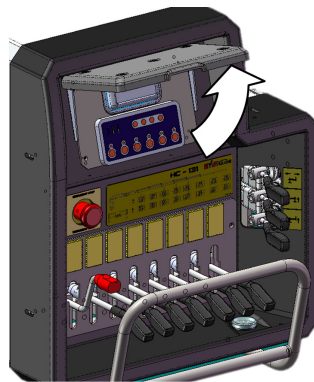
- Be sure the load does Not bump against the dashboard during working operations.
- Be sure the dashboard is protected by its cover during crane inactivity.



Open the cover before starting any crane operation.



Cover closed during crane inactivity



Cover lifted during work

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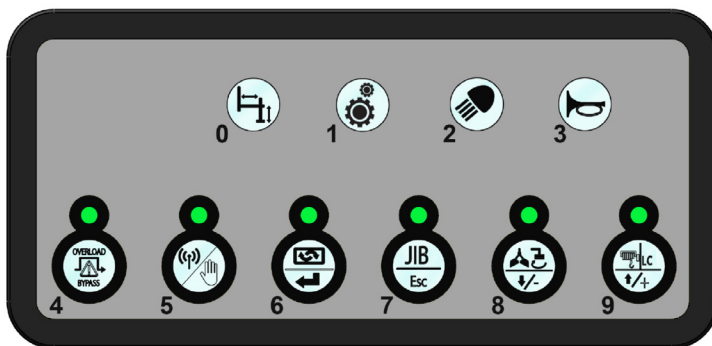
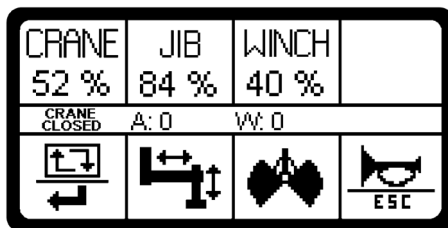
USE

B DESCRIPTION OF THE SYSTEM

This electronic limiter includes stability control functions.

The system includes a moment limiter which monitors in real time the pressure inside the cylinder of the 1st boom (P1) and compares it with the pressure limits (P1L) obtained from the stability test (calibration) and calculated for any rotation angle by the system; these limits establish the max lifting capacity, ensuring stability based on the opening and positioning of the stabilizer extensions. The system offers a wide series of functions as described below.

MAIN DASHBOARD, HOME SCREEN

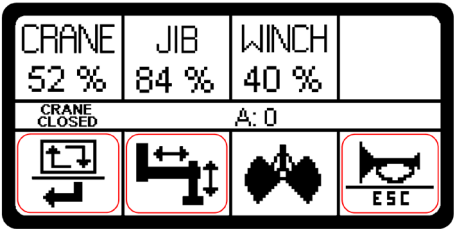


#	Functions	#	Functions
0	Stabilizers	5	Radio / Manual mode
1	Settings	6	Data scroll Enter, confirms changes
2	Work lights Turns on/off the work lights on the 2nd boom	7	Activates the jib boom When Esc is pressed, the system exits the current function and returns to the previous one
3	Horn When pressed, activates the truck horn	8	Activates lifting tools Allows to navigate menus, down Decreases the selected value
4	Overload bypass	9	Activates winch - LC (load cell) Allows to navigate menus, up Increases the selected value
0+4	"Stability Simulation" (option) Push 0 + 4 at the same time to activate		



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AUXILIARY DASHBOARD WITH TOUCH-SCREEN, HOME SCREEN



#	Functions
	Data scroll Enter, confirms changes Corresponds to function "6" of main dashboard
	Stabilizers Corresponds to function "0" of main dashboard
	Lifting tools Corresponds to function "8" of main dashboard as regards to function described above
 ESC	Horn/Esc When pressed in the main screen, activates the truck horn When pressed in a submenu, exits the current function and returns to the previous one Corresponds to function "3" and "7" of main dashboard as regards to functions described above
	Touch-sensing areas



The auxiliary dashboard is present only on cranes without radio remote control.

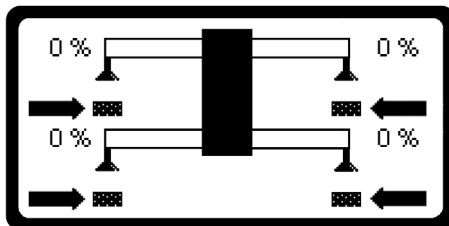
FUNCTIONS FOR ENSURING CRANE SAFETY
See B.13





B.1 0 - STABILIZERS

When the Home Screen is active, the user can enable the stabilizing controls and disable the crane controls either by pushing "0" button on the main dashboard or by touching "Stabilizers" on the auxiliary dashboard. If the crane is folded in transport position, "Stabilizer Home Screens" appear.

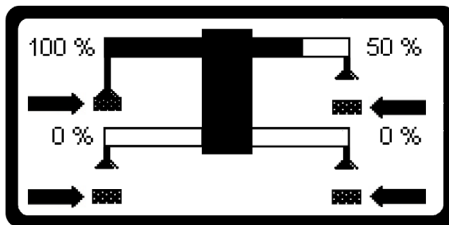


Each display shows all installed stabilizers (upper beams represent the stabilizers near the front axle of the vehicle) and their current configuration: it indicates if the stabilizer feet are on the ground and gives the spread ratio for every stabilizer extension: 0% = fully retracted; 100% = fully extended.

Percentage extension can assume only 3 possible values:

- 0% for extension between 0% and 49%
- 50% for extension between 50% and 99%
- 100% for 100% extension

The stabilizers on the display become black when extended (half black for 50% extension, fully black for 100% extension).



The figure above shows the left crane's stabilizer fully extended and with foot on the ground, the right crane's stabilizer 50% extended with foot lifted off the ground, additional stabilizers fully retracted with feet lifted off the ground.

After performing stabilization, push Esc (7) on main dashboard or touch "ESC" in the center of the auxiliary screen to exit the function: the stabilizers controls are disabled and the crane controls enabled.



When this function is activated/deactivated from the main dashboard, it is also activated/deactivated on the auxiliary dashboard, and vice versa.

The user can move only the stabilizers indicated by arrows.





If the function is activated when the crane is open but not equipped with "Recovery Simulation", both displays show this message:

FUNCTION NOT PERMITTED !
FOLD THE CRANE BEFORE
MOVING THE STABILIZERS

Push "7" button (Esc) or ESC on touch-screen to exit.

If the function is activated when the crane is open and equipped with "Recovery Simulation" the following screens appear:

On the main dashboard

RECOVERY SIMULATION

← TO ENABLE
Esc TO EXIT

The "Recovery Simulation" function can be activated from main dashboard only.





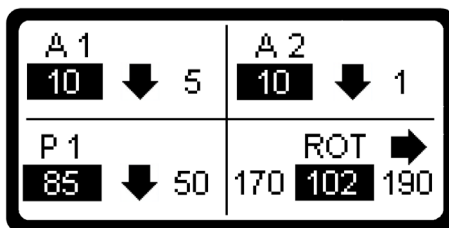
Push "7" button (Esc) to exit the function and to return to the Home Screen.

Push "6" button (Enter) to enter the "Stabilizer Function".

If the activating conditions below are not fulfilled:

- $A1 < A1_MAXREC$
- $A2 < A2_MAXREC$
- $P1 < P1_MAXREC$
- ROT between ROT_MINREC and ROT_MAXREC

The following screen appears.



Current values for angles (A1 and A2) and pressure (P1) are written in white on black background. Limit values are written in black on white background.

The arrows indicate the user how to change the current values in order to bring the operational parameters within the limits:

- down arrow requires lowering the booms inclination or decreasing the P1 pressure;
- left arrow requires rotating the crane counter-clockwise (ROT decreases)
- right arrow requires rotating the crane clockwise (ROT increases)

If an arrow disappears, this means that the respective parameter is within the allowed range, i.e. the activating condition is fulfilled.

When all activating conditions are fulfilled, the "Stabilizer Home Screen" appears automatically: from now on the stabilizers controls are enabled and the crane controls are disabled.



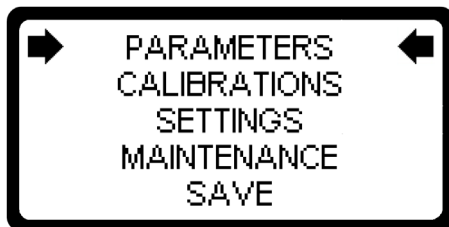
Limit values can be set by the installer only.





B.2 1 - SETTINGS

When the Home Screen is active, "1" button enters the Settings Home Screen.



The user cannot enter the submenus because password protected.

B.3 2 - WORK LIGHTS

When the Home Screen is active, "2" button is used to switch work lights on and off.

When the work lights are switched on, the backlight of the function buttons is enabled and the "work lights" icon on main screen is highlighted by inverted colour.

Lights switched off



Lights switched on



This function is enabled only if work lights are installed.
The backlight is always available.

B.4 3 - HORN

The user can activate the horn of the vehicle either by keeping the "3" button pushed or by touching "Horn/Esc" on the auxiliary dashboard.

While the horn is active, the icons on both screens are highlighted by inverted colour.

Horn not active



Horn active



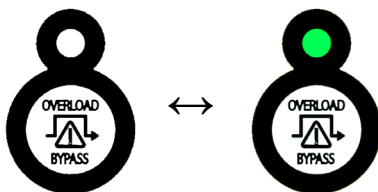


B.5 4 - OVERLOAD BYPASS

In overload condition, this function allows the user to increase the pressure limit (P1L) ensuring anyhow the stability and the structural strength.

Therefore the user can enable for 5 seconds the descent of the 1st boom, 2nd boom and jib boom (at reduced speed) in order to restore the ordinary operating conditions. If the overload persists, these controls are disabled for another 30 seconds, after which it is possible to push the button again. This procedure can be repeated 4 times.

Keep the "4" button pushed to maintain the bypass active: the green led turns on.



Use this function in emergency only.

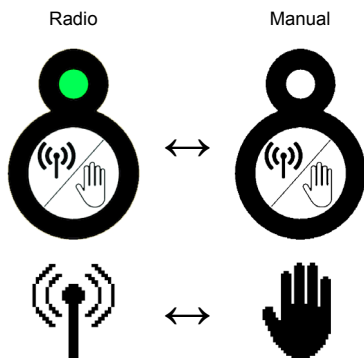
Before lowering the booms, the user must fully retract the hydraulic extensions.

B.6 5 - RADIO/MANUAL MODE

When the Home Screen is active, "5" button enables/disables Radio/Manual controls.

If the Radio Mode is active, the green led is ON and the radio icon is displayed on main screen.

If the Manual Mode is active (radio control disabled), the green led is OFF and the hand icon is displayed on main screen.



The Radio Mode can be activated only when provided in current settings.





B.7 6 - DATA SCROLL

When the Home Screen is active, the user can scroll through the dataset visualized on the upper side of both screens, either by pushing the "6" button or by touching "Data scroll" on the auxiliary dashboard. However, if another function is being performed, "6" button allows to confirm changes (Enter). The green led is inactive.



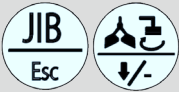
Param.	Description	Dataset sequence
CRANE	Load / capacity ratio	
JIB	Load / capacity ratio for jib (*)	
WINCH	Load ratio for winch (*)	
E-EES	Displayed when the E-EES is active (***)	
A1	Angle of 1 st boom with respect to the horizontal (*)	
A2	Angle of 2 nd boom with respect to the horizontal	
AJ	Angle of jib with respect to the horizontal (*)	
ROT	Slewing angle with respect to direction of dead point	
P1	pressure in the 1 st boom cylinder (bar)	
PJ	pressure in the articulation jib cylinder (bar) (*)	
LC	load suspended from the man. extension No X (*)	
OIL T	current oil temperature (*) (**)	
h	Total operating hours	
E-EES	Activation of E-EES valve Select "Enabled" or "Disabled" by pushing "8" and "9" buttons, then confirm with "Enter" ("6" button). This page is available only if E-EES valve is installed.	

Notes: the auxiliary dashboard can visualize the first 3 screens only.

(*): if this parameter is not available, there is no value in the box.

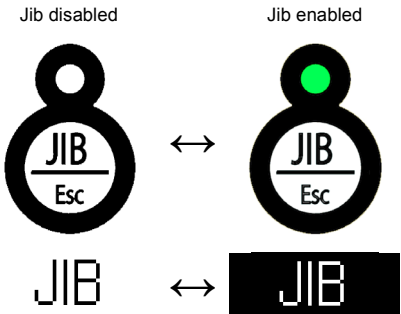
(**): standard for radio controlled cranes, optional for manual cranes.

(***): E-EES is disabled at every crane's start-up.



B.8 7 - JIB/ESC

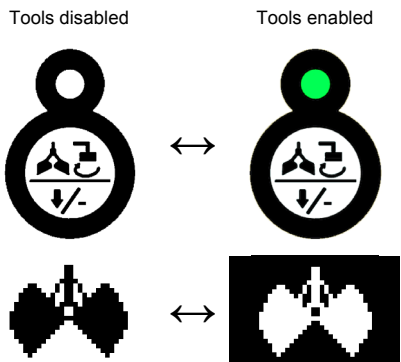
When the Home Screen is active, this function allows to enable/disable the use of jib: the green led is ON and "JIB" is highlighted by inverted colour. However, if another function is being performed, "7" button (Esc) allows to exit the active function.



 The jib can be enabled only when provided in current settings.

B.9 8 - LIFTING TOOLS / DOWN / MINUS

When the Home Screen is active, the user can enable/disable the use of additional lifting tools (grab, bucket, polyp, rotor powered by supplementary activations at booms tip) by pushing "8" button. However, if another function is being performed, "8" button allows to navigate menus (Down) or decrease a selected value (Minus). If lifting tools are enabled, the green led is ON and the "Lifting tool" icons on both screens are highlighted by inverted colour.



 Lifting tools can be enabled only when provided in current settings.





B.10 9 - WINCH / LC / UP / PLUS

When the Home Screen is active, the user can enable/disable the use of winch and LC by pushing "9" button.

However, if another function is being performed, "9" button allows to navigate menus (Up) or increase a selected value (Plus).



Winch and LC can be enabled only when provided in current settings.

HOW TO ENABLE THE WINCH

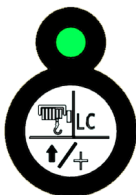
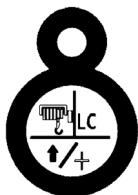
When the Home Screen is active, push "6" button (Data scroll) till the dataset with winch load is displayed (see below).

CRANE	JIB	WINCH	
52 %	84 %	40 %	

Then push the "9" button: the green led is ON and "WINCH" is highlighted by inverted colour.

Winch disabled

Winch enabled



WINCH



WINCH





HOW TO ENABLE THE LC

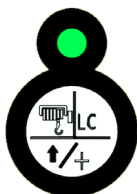
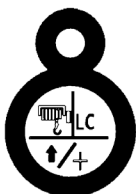
When the Home Screen is active, push "6" button (Data scroll) till the dataset with load cell is displayed (see below).

P 1	P J	LC 0	OIL T
120 b	85 b	0 kg	45 °C

Then push the "9" button: the green led is ON and "LC" is highlighted by inverted colour.

LC disabled

LC enabled



LC 0



LC 0

Then push "1" button (Settings) and select the load threshold (from P1 to P4) based on the number of manual extensions installed (P1 = 1 man. extension, P4 = 4 man. extensions).

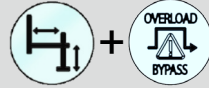
LC CONFIGURATION		
↑	P1	1000 kg

Press the "9" buttons (Up) to scroll the preset load thresholds.

Push the "7" button (Esc) to confirm the selection: the selected threshold appears on the screens on the right side of "LC".

P 1	P J	LC 1	OIL T
120 b	85 b	0 kg	45 °C





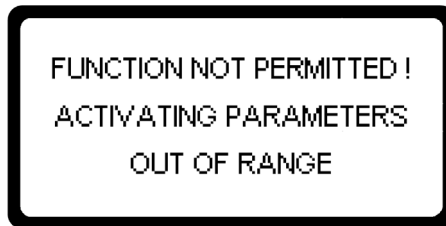
B.11 0+4 - STABILITY SIMULATION

This function is optional and provided with the "Recovery Simulation".

The "Stability Simulation" allows to move the crane (only under certain conditions) even if there are stabilizers not deployed on the ground.

Push the "0" and "4" buttons at the same time to activate this function.

If the activating conditions are not fulfilled, the system shows the following screen.

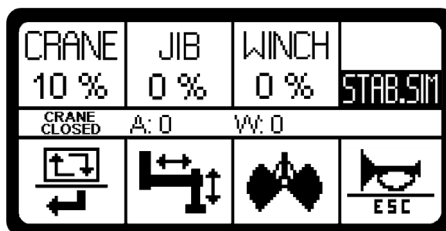


To enable the "Stability Simulation", the user shall return to Home Screen pushing the "7" button (Esc), move the crane in order to fulfill the following activating conditions:

- $A2 < A2_MAXSIM$
- $P1 < P1_MAXSIM$
- ROT included between ROT_MINSIM and ROT_MAXSIM

When all conditions are fulfilled, the user can activate the "Stability Simulation" by again pushing "0" and "4" buttons at the same time.

The message "STAB SIM" is visualized on the Home Screen highlighted by inverted colour.



Enter the Stability Function ("0" button or "Stabilizers" on touch-screen) to stop "Stability Simulation".

HOW THE CRANE WORKS IN "STABILITY SIMULATION" MODE

While the "Stability Simulation" is active, the yellow tower light is ON and the audible alarm is active and intermittent: all crane movements are permitted if the pressure in the 1st boom cylinder does not exceed the max pressure preset for the "Recovery Simulation" mode.

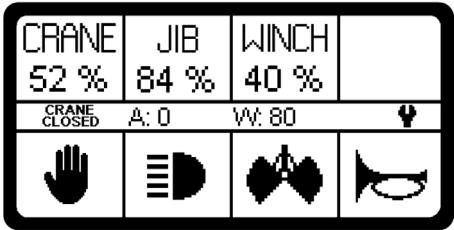
However if the pressure exceeds the max preset value, the system intervenes activating the "Overload Mode" (see B.13.1).



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B.12 CRANE MAINTENANCE

When crane maintenance is required, a wrench icon appears on the right side of the Home Screen and a warning ID appears:



The user can visualize the maintenance to perform entering the Setting Home Screen by pushing "1" button. Push "8" button until the arrow indicates "MAINTENANCE".



Push "6" button (Enter) to enter the maintenance viewer.



The display shows on which component (crane, jib, winch or grab) maintenance must be done: in the example above, maintenance for the crane after 10 operating hours is required. After maintenance is performed by an authorized assistance center, the wrench icon and "SERVICE XXh" disappear and the warning ID returns to "0".

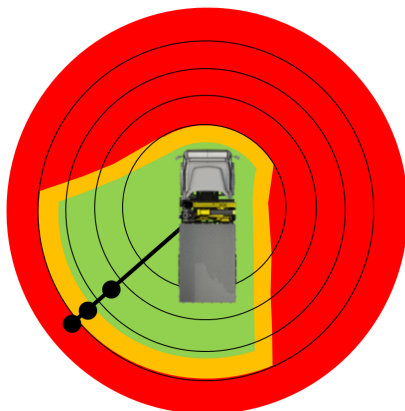


B.13 LOAD LIMITING FUNCTIONS

B.13.1 MOMENT LIMITER

The purpose of the moment limiter is to protect the crane's structure and ensure machine stability. It constantly analyses the configuration of the crane and the load and intervenes when the lifting moment exceeds the max setting value.

In order to better understand how the limiter works, you may refer to the figure below that shows an iso-load diagram resulting from a generic input load and from stabilizer extensions retracted on the right side of the vehicle.



Symbols:

● : position of the load

— : direction of boom extensions

Depending on different levels of working pressure ($P1$) with respect to the pressure limits ($P1L$), the working area is divided in:

- green area, permitted: where $P1 < 90\% P1L$
- yellow area, permitted: where $90\% \leq P1 < 100\% P1L$
- red area, forbidden: where $P1 \geq 100\% P1L$
- white area, inaccessible: area outside the max. crane's outreach

The moment limiter works as follows:

If 90% $P1L$ is not exceeded ($P1 < 90\% P1L$):

- the yellow and red tower lights are off
- the audible alarm is deactivated

If 90% $P1L$ is exceeded ($90\% \leq P1 < 100\% P1L$):

- the yellow tower light is on, the red light is off
- the audible alarm is active and intermittent

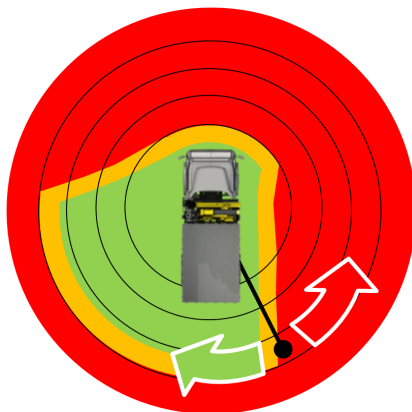
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If 100% P1L is reached, the system activates the "Overload Mode" ($P1 \geq 100\% P1L$):

- the yellow and red tower lights are on
- the audible alarm is active and continuous
- the system disables the boom movements which don't ensure safety (see D.3)
- the alarm message #6 is displayed on the Home Screen
- the system disables the slewing toward a working area where $P1 > P1L$ (toward the red area). In the iso-load diagram below, green and red arrows indicate the permitted and forbidden slewing direction, respectively.



Only after the working pressure has fallen below P1L, the system restores the normal working conditions and allows all crane movements.



When the 1st boom cylinder is fully extended and if you continue to push the lever to extend it, the load limiter could intervene even if the crane is not loaded. In this case push the bypass button (F7) to unblock the crane and then close the 1st boom cylinder slowly.

B.13.2 MOMENT LIMITER FOR THE JIB

If a crane is equipped with the jib, the moment limiter detects also the current pressure in the articulation jib cylinder and intervenes when the moment acting on the jib exceeds the max setting value. The moment limiter works in the same way as described for the pressure overload in the 1st boom cylinder, comparing PJ with PJL.

If 90% PJL is exceeded ($90\% \leq PJ < 100\% PJL$):

- the yellow tower light is on, the red light is off
- the audible alarm is active and intermittent

If 100% PJL is reached, the system activates the "Overload Mode" ($PJ \geq 100\% PJL$):

- the yellow and red tower lights are on
- the audible alarm is active and continuous
- the system disables the boom movements which don't ensure safety (see D.3)
- the alarm message #7 is displayed on the Home Screen



B.13.3 WINCH PULL LIMITER

The system monitors in real time the rope pull and shows the load ratio (WINCH%) in the Home Screen.

If 90% winch rated pull (RL) is exceeded ($90\% \leq L < 100\%$ RL):

- the yellow tower light is on, the red light is off
- the audible alarm is active and intermittent.

If 100% winch rated pull (RL) is reached ($L \geq 100\%$ RL):

- the yellow and red tower lights are on
- the audible alarm is active and continuous
- the system disables the movements which don't ensure safety (see D.3)
- the warning message #16 is displayed on the Home Screen

Only after the load is placed on the ground, the system restores the normal working conditions and allows all crane movements.



When the counterweight bumps against the top roller and if you continue to operate the lever for winding the rope, the pull limiter could intervene even if the crane is not loaded: in this case the pull limiter acts as rope ascent limiter.

B.13.4 WINCH ROPE DESCENT LIMITER

The system monitors in real time the number of rope wraps on the drum: when the number of wraps reaches the minimum safety value:

- the system disables the movements which don't ensure safety (see D.3)
- the warning message #18 is displayed on the Home Screen

B.13.5 LOAD CELL LIMITER (LIS)

The load cell limiter monitors in real time the weight of the load suspended from the hook: the system shows its value in the Home Screen.

If 100% rated load (RL) is reached ($L \geq 100\%$ RL):

- the yellow tower light is off, the red light is on
- the audible alarm is active and continuous
- the system disables the movements which don't ensure safety (see D.3)
- the alarm message #103 is displayed on the Home Screen

Only after the load is placed on the ground, the system restores the normal working conditions and allows all crane movements.



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MAINTENANCE

C MAINTENANCE FOR DASHBOARD

All modifications to the system must be performed exclusively by an authorised assistance centre.

C.1 ORDINARY MAINTENANCE

Periodically wipe the display with a soft cloth dampened in diluted biodegradable neutral detergent, then wipe clean with a dry cloth.

In any case it is forbidden to direct pressurized jets close to the dashboard.

C.2 PLANNED MAINTENANCE

The System must be tested by an authorised assistance centre in accordance with the maintenance register attached to the crane User Manual.

The checks to be performed are indicated as follows:

	Setting
	Operating test

C.3 EXTRAORDINARY MAINTENANCE

Extraordinary maintenance must be performed by an authorized assistance centre.



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D.1 TECHNICAL DATA

Supply voltage	9V to 32V
Environment working temperature	-20°C to 70°C
Environment storage temperature	-35°C to 85°C
IP protection class for the mail panel	IP 69K
IP protection class for the auxiliary panel	IP 65



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D.2 WARNING SIGNALS

	Home Screen	Light tower	Audible alarm
Crane hook P1 < 90% P1L	CRANE P1 %		
Crane hook 90% ≤ P1 < 100% P1L	CRANE P1 %		
Crane hook P1 ≥ 100% P1L	CRANE P1 %		
Jib hook PJ < 90% PJL	JIB PJ %		
Jib hook 90% ≤ PJ < 100% PJL	JIB PJ %		
Jib hook PJ ≥ 100% PJL	JIB PJ %		
Winch 90% ≤ L < 100% RL	WINCH L %		
Winch L ≥ 100% RL	WINCH L %		
Load cell L ≥ 100% RL	LC 1 L kg		
Crane folded in transport position	CRANE CLOSED	-	-
Stability Simulation activated (option)	STAB.SIM		
Maintenance request		-	-

Legend

					
off	flashing	on	deactivated	intermittent	continuous



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D.3 MOVEMENTS PERMITTED UNDER OVERLOAD CONDITIONS

PRESSURE OVERLOAD IN THE CRANE'S ARTICULATION CYLINDERS

CRANE CONFIGURATION			CONTROLS ENABLED								
Slope of 1st boom	Slope of 2nd boom	Slope of jib boom									
		NO									
		NO									
		NO									
		NO									
											
											
											
											
											
											
											
											



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OTHER OVERLOAD CONDITIONS

OVERLOAD CONDITIONS	CONTROLS ENABLED								
									
WINCH OVERLOAD (WINCH ROPE ASCENT LIMIT)									
WINCH ROPE DESCENT LIMIT									
LIS OVERLOAD									

Legend

				
Boom inclined above the horizontal	Boom inclined below the horizontal	Lever up enabled	Lever down enabled	Lever enabled only with angular sensor on 1st boom



D.4 WARNING MESSAGES

ID	WARNING MESSAGE	DESCRIPTION
14	MAX ANGLE	Electric limit 1st boom rising
15	ROTATION LIMIT	Electric limit for slewing (CW and CCW)
16	WINCH OVERLOAD	Overload on winch
17	WINCH UP	Winch rising limit, it's possible going down only
18	WINCH DOWN	Winch down limit, it's possible rising only
19	OUTRIGGER NOT ON GROUND	At least one of the feet is off the ground
20	CLOSE THE SECOND BOOM (SAFE OPEN SYSTEM)	With crane folded and as soon as switched on, close the 2 nd boom for 5 s.
30	WARNING! PRESSURE REDUCTION ACTIVE	Pressure reduction active for connecting the tools (grab/rotor)
40	PQUADRO FUNCTION ACTIVE	Slow down active due to load over 80% of max load with Pquadro
43	SLOW MOVEMENT	Slow down active due to load over 80% of max load without Pquadro
44	SLOW VERTICAL	Slow down during rising or going down for 2 nd boom above a specific angle
45	DANGEROUS POSITION JIB	A dangerous position of jib is reached
46	ROTATION OVERLOAD	Slewing not possible due to access to lower stability area
47	OFF	The crane stop before entering in OFF zone
48	STAND UP PLATFORM	The crane stop before entering in stand up platform zone
49	STAND UP PLATFORM OPEN	Close the stand up platform before folding the crane
80	CRANE SERVICE 10 HOURS	The crane has been working for more than 10 hours
81	CRANE SERVICE 100 HOURS	The crane has been working for more than 100 hours
82	CRANE SERVICE 500 HOURS	The crane has been working for more than 500 hours
83	CRANE SERVICE 1000 HOURS	The crane has been working for more than 1000 hours
84	JIB SERVICE 10 HOURS	The Jib has been working for more than 10 hours
85	JIB SERVICE 100 HOURS	The Jib has been working for more than 100 hours
86	JIB SERVICE 500 HOURS	The Jib has been working for more than 500 hours
87	JIB SERVICE 1000 HOURS	The Jib has been working for more than 1000 hours
88	GRAB SERVICE 50 HOURS	The grab has been working for more than 10 hours
89	GRAB SERVICE 100 HOURS	The grab has been working for more than 100 hours
90	GRAB SERVICE 500 HOURS	The grab has been working for more than 500 hours
91	GRAB SERVICE 1000 HOURS	The grab has been working for more than 1000 hours
92	WINCH SERVICE 10 HOURS	The winch has been working for more than 10 hours
93	WINCH SERVICE 100 HOURS	The winch has been working for more than 100 hours
94	WINCH SERVICE 500 HOURS	The winch has been working for more than 500 hours
95	WINCH SERVICE 1000 HOURS	The winch has been working for more than 1000 hours
99	NEW CAN DEVICE	New device has been detected on CAN-Bus



D.5 ALARM MESSAGES

ID	ALARM MESSAGE	DESCRIPTION
1 ... 4	ALARM CRC	Data write error
5	BYPASS ACTIVE!	Overload Bypass is active
6	CRANE OVERLOAD	Pressure in the 1st cylinder exceeds the pressure limit
7	JIB OVERLOAD	Pressure in the jib cylinder exceeds the pressure limit
8	EMERGENCY BUTTON	Emergency stop button on the crane is pushed
9	EMERGENCY RADIO BUTTON	Emergency stop button on the radio transmitter is pushed
12	CAN BUS MTS 1	No signal from CAN-Bus of the crane slewing
13	CAN BUS MTS 2	No signal from CAN-Bus of the crane slewing
14	CAN BUS HETRONIC 1	No signal from Radio CAN-Bus 1
15	CAN BUS HETRONIC 2	No signal from Radio CAN-Bus 1
18	CAN BUS CROSS-BEAM ENCODER 1	No signal from cross-beam encoder 1
19	CAN BUS CROSS-BEAM ENCODER 1 REDUNDANCY	No signal from cross-beam encoder 1 redundancy
20	CAN BUS CROSS-BEAM ENCODER 2	No signal from cross-beam encoder 2
21	CAN BUS CROSS-BEAM ENCODER 2 REDUNDANCY	No signal from cross-beam encoder 2 redundancy
22	CAN BUS CROSS-BEAM ENCODER 3	No signal from cross-beam encoder 3
23	CAN BUS CROSS-BEAM ENCODER 3 REDUNDANCY	No signal from cross-beam encoder 3 redundancy
24	CAN BUS CROSS-BEAM ENCODER 4	No signal from cross-beam encoder 4
25	CAN BUS CROSS-BEAM ENCODER 4 REDUNDANCY	No signal from cross-beam encoder 4 redundancy
30	CAN BUS DANFOSS 1	No signal from Danfoss CAN element 1
31	CAN BUS DANFOSS 2	No signal from Danfoss CAN element 2
32	CAN BUS DANFOSS 3	No signal from Danfoss CAN element 3
33	CAN BUS DANFOSS 4	No signal from Danfoss CAN element 4
34	CAN BUS DANFOSS 5	No signal from Danfoss CAN element 5
35	CAN BUS DANFOSS 6	No signal from Danfoss CAN element 6
36	CAN BUS DANFOSS 7	No signal from Danfoss CAN element 7
37	CAN BUS DANFOSS 8	No signal from Danfoss CAN element 8
38	CAN BUS DANFOSS 9	No signal from Danfoss CAN element 9
40	BOOM ANGLE 1A LOW VALUE	1st signal of 1st boom angle less than 4 mA
41	BOOM ANGLE 1A HIGH VALUE	1st signal of 1st boom angle more than 20 mA
42	BOOM ANGLE 1B LOW VALUE	2nd signal of 1st boom angle less than 4 mA
43	BOOM ANGLE 1B HIGH VALUE	2nd signal of 1st boom angle more than 20 mA
44	BOOM ANGLE 2A LOW VALUE	Signal of 2nd boom angle less than 4 mA
45	BOOM ANGLE 2A HIGH VALUE	Signal of 2nd boom angle more than 20 mA
46	BOOM ANGLE 2B LOW VALUE	2nd signal of 2nd boom angle less than 4 mA
47	BOOM ANGLE 2B HIGH VALUE	2nd signal of 2nd boom angle more than 20 mA
48	BOOM ANGLE JA LOW VALUE	1st signal of jib boom angle less than 4 mA
49	BOOM ANGLE JA HIGH VALUE	1st signal of jib boom angle more than 20 mA
50	BOOM ANGLE JB LOW VALUE	2nd signal of jib boom angle less than 4 mA
51	BOOM ANGLE JB HIGH VALUE	2nd signal of jib boom angle more than 20 mA
52	PRESSURE TRASD 1A LOW VALUE	1st signal of pressure transducer on 1st boom cyl. less than 4 mA
53	PRESSURE TRASD 1A HIGH VALUE	1st signal of pressure transducer on 1st boom cyl. more than 20 mA
54	PRESSURE TRASD 1B LOW VALUE	2nd signal of pressure transducer on 1st boom cyl. less than 4 mA
55	PRESSURE TRASD 1B HIGH VALUE	2nd signal of pressure transducer on 1st boom cyl. more than 20 mA
56	PRESSURE TRASD JA LOW VALUE	1st signal of pressure transducer on jib boom cyl. less than 4 mA
57	PRESSURE TRASD JA HIGH VALUE	1st signal of pressure transducer on jib boom cyl. more than 20 mA
58	PRESSURE TRASD JB LOW VALUE	2nd signal of pressure transducer on jib boom cyl. less than 4 mA
59	PRESSURE TRASD JB HIGH VALUE	2nd signal of pressure transducer on jib boom cyl. more than 20 mA
60	EV CROSS-BEAM 1 DOWN FBK	Negative feedback for output of cross-beam leg down, electrovalve 1
61	EV CROSS-BEAM 2 DOWN FBK	Negative feedback for output of cross-beam leg down, electrovalve 2
62	EV CROSS-BEAM 3 DOWN FBK	Negative feedback for output of cross-beam leg down, electrovalve 3
63	EV CROSS-BEAM 4 DOWN FBK	Negative feedback for output of cross-beam leg down, electrovalve 4
64	EV CROSS-BEAM 1 OUT FBK	Negative feedback for output of cross-beam out, electrovalve 1
65	EV CROSS-BEAM 2 OUT FBK	Negative feedback for output of cross-beam out, electrovalve 2
66	EV CROSS-BEAM 3 OUT FBK	Negative feedback for output of cross-beam out, electrovalve 3
67	EV CROSS-BEAM 4 OUT FBK	Negative feedback for output of cross-beam out, electrovalve 4
68	EV CROSS-BEAM 1 UP FBK	Negative feedback for output of cross-beam leg up, electrovalve 1
69	EV CROSS-BEAM 2 UP FBK	Negative feedback for output of cross-beam leg up, electrovalve 2
70	EV CROSS-BEAM 3 UP FBK	Negative feedback for output of cross-beam leg up, electrovalve 3
71	EV CROSS-BEAM 4 UP FBK	Negative feedback for output of cross-beam leg up, electrovalve 4
72	EV CROSS-BEAM 1 IN FBK	Negative feedback for output of cross-beam in, electrovalve 1
73	EV CROSS-BEAM 2 IN FBK	Negative feedback for output of cross-beam in, electrovalve 2
74	EV CROSS-BEAM 3 IN FBK	Negative feedback for output of cross-beam in, electrovalve 3
75	EV CROSS-BEAM 4 IN FBK	Negative feedback for output of cross-beam in, electrovalve 4
76	OUTPUT YELLOW TOWER LIGHT FBK	Negative feedback for output of yellow tower light
77	OUTPUT RED TOWER LIGHT FBK	Negative feedback for output of red tower light



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78	EV CROSS-BEAM FBK	Negative feedback for cross-beam electrovalve
79	EV EMERGENCY FBK	Negative feedback for emergency solenoid valve
80	EV AVPS FBK	Negative feedback for AVPS system
81	OUTPUT EMERGENCY STOP BUTTON FBK	Negative feedback for output signal of emergency stop button
82	OUTPUT WORK LIGHT FBK	Negative feedback for output signal of work lights
83	OUTPUT CROSS-BEAM LIGHT FBK	Negative feedback for output signal of cross-beam light strips
84	OUTPUT RPM INCREASE FBK	Negative feedback for output signal of engine speed increase
85	OUTPUT RPM DECREASE FBK	Negative feedback for output signal of engine speed decrease
86	OUTPUT STOP ENGINE FBK	Negative feedback for output signal of engine stop
87	OUTPUT START ENGINE FBK	Negative feedback for output signal of engine start
88	EV OUTPUT CROSS-BEAM DOWN ON CAB SIDE FBK	Negative feedback for output of cross-beam leg down, on cab side
89	EV OUTPUT CROSS-BEAM UP ON CAB SIDE FBK	Negative feedback for output of cross-beam leg up, on cab side
90	OUTPUT LEVER LIGHT FBK	Negative feedback for output signal of lever light
91	OUTPUT HORN FBK	Negative feedback for output signal of horn
94	ALARM! LEVERS NOT CENTERED	Alarm! The levers are not centered correctly
100	CAN BUS LOAD CELL	No signal from load cell CAN-Bus
101	LOAD CELL ALARM ACTIVE	Load cell internal alarm
102	LOAD CELL DOES NOT RECEIVE	Load cell does not receive radio signal
103	LOAD CELL OVERLOAD	The load cell lifts a load higher than its rated capacity
106	STABILIZERS NOT ON THE GROUND	The stabiliser feet are not on the ground
107	SECOND BOOM OPEN	The 2nd boom is open, not folded
108	JIB OPEN	The jib boom is open, not folded
110	WINCH EXTENSIMETER VALUE TO LOW	Output signal of winch pull limiter less than 4 mA
111	WINCH EXTENSIMETER VALUE TO HIGH	Output signal of winch pull limiter more than 20 mA
120	DANFOSS 1 SPN/FMI	Alarm SPN/FMI from Danfoss CAN element 1
121	DANFOSS 2 SPN/FMI	Alarm SPN/FMI from Danfoss CAN element 2
122	DANFOSS 3 SPN/FMI	Alarm SPN/FMI from Danfoss CAN element 3
123	DANFOSS 4 SPN/FMI	Alarm SPN/FMI from Danfoss CAN element 4
124	DANFOSS 5 SPN/FMI	Alarm SPN/FMI from Danfoss CAN element 5
125	DANFOSS 6 SPN/FMI	Alarm SPN/FMI from Danfoss CAN element 6
126	DANFOSS 7 SPN/FMI	Alarm SPN/FMI from Danfoss CAN element 7
127	DANFOSS 8 SPN/FMI	Alarm SPN/FMI from Danfoss CAN element 8
128	DANFOSS 9 SPN/FMI	Alarm SPN/FMI from Danfoss CAN element 9
131	ALARM! LEVER 1 NOT CENTERED	Lever 1 CAN-Bus / Digital distributor not centered at crane switching on
132	ALARM! LEVER 2 NOT CENTERED	Lever 2 CAN-Bus / Digital distributor not centered at crane switching on
133	ALARM! LEVER 3 NOT CENTERED	Lever 3 CAN-Bus / Digital distributor not centered at crane switching on
134	ALARM! LEVER 4 NOT CENTERED	Lever 4 CAN-Bus / Digital distributor not centered at crane switching on
135	ALARM! LEVER 5 NOT CENTERED	Lever 5 CAN-Bus / Digital distributor not centered at crane switching on
136	ALARM! LEVER 6 NOT CENTERED	Lever 6 CAN-Bus / Digital distributor not centered at crane switching on
137	ALARM! LEVER 7 NOT CENTERED	Lever 7 CAN-Bus / Digital distributor not centered at crane switching on
138	ALARM! LEVER 8 NOT CENTERED	Lever 8 CAN-Bus / Digital distributor not centered at crane switching on
139	ALARM! LEVER 9 NOT CENTERED	Lever 9 CAN-Bus / Digital distributor not centered at crane switching on



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D.6 ELECTRIC SCHEMATICS

DESCRIPTION	CODE
COMPLETE SYSTEM	1010227
COMPLETE SCHEMATIC	1010279
MC2M CONTROLLER SUPPLY / EMERGENCY STOP LINE	1010279-12
WARNING LIGHTS	1010279-13
HYDROCONTROL CONTROL VALVE	1010279-14
DANFOSS CONTROL VALVE	1010279-15
SPOOL DRIVE FOR STABILIZERS CONTROL VALVE	1010279-16
CAN BUS DANFOSS CONTROL VALVE	1010279-17
STABILIZERS ACTIVATION FROM RADIO CONTROL	1010279-18
SOLENOID VALVES	1010279-19
HETRONIC RADIO RECEIVER	1010279-20
SCANRECO RADIO RECEIVER	1010279-21
TRUCK LINE	1010279-22
PROXIMITY SENSORS ON STABILIZERS LEGS / EXTENSIONS	1010279-23
INCLINOMETERS / PRESSURE TRANSDUCERS	1010279-25
MULTILINK CAN BUS SENSORS LINE	1010279-26
MULTILINK CAN BUS SENSORS LINE IN CASE OF ADDITIONAL STABILIZERS	1010279-27
WINCH - CRANE RECOVERY - OFF	1010279-28
BALLAST WEIGHT DETECTOR - OIL TEMPERATURE SENSOR - LOAD CELL	1010279-29
CAN BUS DISPLAY - KEYPAD	1010279-30
AVAILABLE WIRES	1010279-31



