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HIRSCHMANN

Load Moment Indicator

for Crawler Crane

HC3901

Operator's Manual

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Applied Scope

This manual is made for the following crane manufacturer

- **Zoomlion**

This manual can be applied to the following types of crawler cranes manufactured by the partner:

- ZCC1100H

Special Notice

Using components of LMI rather than from Hirschmann may cause problems of inaccuracy and even malfunction of the LMI system. We recommend you use genuine Hirschmann components and parts during repairing and service. Hirschmann is not liable of any responsibilities in case genuine parts are not used.

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01	2014-08-04	Guo Tao	Zhou Fei	First issue, English HC3901for Zoomlion ZCC1100H

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1. GENERAL INFORMATION

The load moment indicator HC3901 (hereinafter referred to as LMI) is applicable to the telescopic boom crane, lattice boom crane, all- terrain crane and other types of cranes.

The HC3901 LMI can provide the crane operator with essential information required to operate the crane within its design parameters. Using different sensors, LMI can provide the crane operator with information on real time basis regarding boom length, boom angle, working height, working radius, rated load and actual weight being lifted by the crane

The system operates on the principle of reference/real comparison. The boom angle is measured by angle sensor that is mounted on the boom. The crane load is measured by force transducers attached to the boom pendants. The real value, resulting from all the sensors measurement is compared with the reference data, stored in the controller. If non-permitted conditions are approached, the LMI will warn the operator by audible alarm, warning light and at the same time, some dangerous movements such as lifting and luffing down will be stopped with the help of the crane control system.

This manual only gives guide for the LMI operation. Please refer to the Crane Operator’s Manual provided by the crane manufacturer for detailed operating procedures of the crane.

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2. IMPORTANT NOTES

The LMI and control system is an operational aid that warns a crane operator of approaching overload conditions and of over-hoist conditions that could cause damage to equipment and personnel.

The device is not, and shall not, be a substitute for good operator judgment, experience and use of accepted safe machine operating procedures.

CAUTION

The responsibility for safe operation shall remain with the crane operator who shall ensure that all warnings and instructions supplied are fully understood and observed, Prior to operating the crane ,the operator must carefully and thoroughly read and understand the information in this manual to ensure that he knows the operation and limitations of the LMI.

The LMI can only protect overload of the crane in boom vertical range without crane overturn resulted from non-vertical lifting, ground inclination, derailed wheel etc. Therefore, the operators should not neglect the crane safety management and operation regulation even if the crane is equipped with LIM.

WARNING

The LMI can only work correctly after all adjustments have been properly set. To prevent material damage and serious or even fatal accidents, operating mode, reeving and limit data have to be properly set up before operating the crane.

If there is any change in the crane's configuration data, the LMI needs to be re-calibrated.

Make sure to disconnect the power supply of the LMI from the crane before applying any welding work on the crane body or booms. The pulse may cause damage to the electrical and electronics parts. Hirschmann shall not be liable for any damage caused by this.

Make sure to disconnect the power supply of the LMI during thunderstorm weather. Hirschmann shall not be liable for any damage caused by lightning.

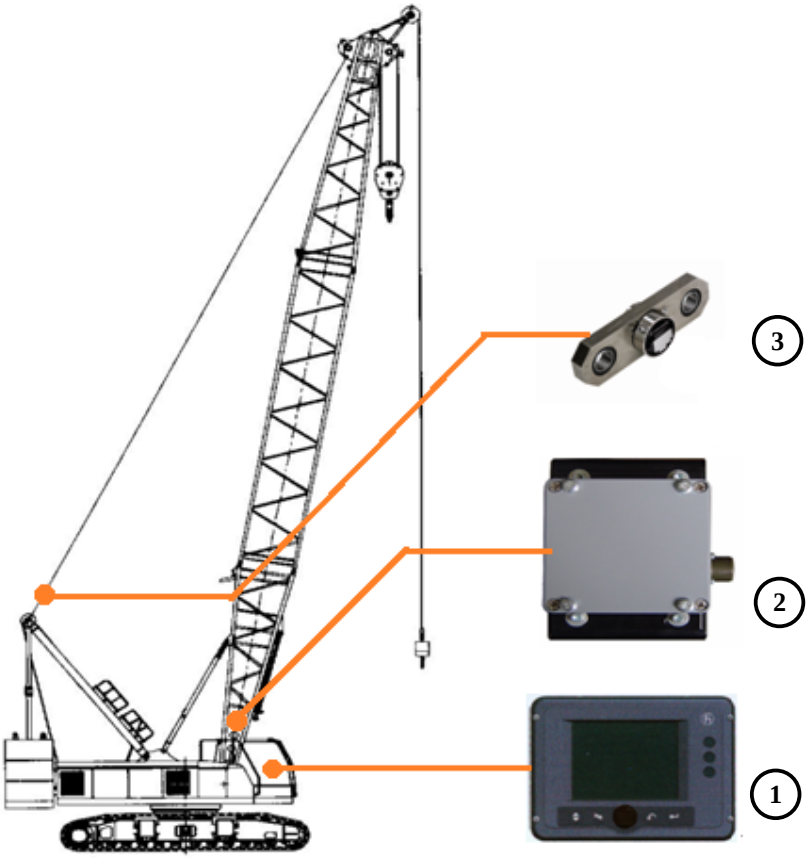
DANGER

This system can be equipped with an external key-operated switch located in the crane operator's cab. This key-operated switch overrides control lever function switch-off by the LMI or by the hoist limit switch system.

This switch may only be used during emergency situations, and even then only by authorized personnel. Failure to observe these instructions could result in damage to property and severe or even fatal injuries to personnel.

If the LMI in use fails or is not properly functioning, please do stop the operation of the crane, and contact the service of Hirschmann or crane manufacturer. Hirschmann does not assume any responsibility for undesirable consequences resulted from the continued operation!

3. SYSTEM DESCRIPTION



Components of LMI System

Generally, the LMI system consists of

1. HC3901 Controller	1 pc
2. WG103 Angle Sensor	1 pc
3. KMD force Sensor	1 pc

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3.1 HC3901 Controller

HC3901 controller uses 16 bit high performance processors and the CANopen communication technology. It is the safety protector specially designed to meet the required safety standards under the harsh environment.

Technical data：

Operating temperature: –20°C ～ +70°C.
Operating voltage: 11 ... 36V DC
Operating current: 200mA@24V
Communication interface: 1×CANopen, 1×RS232
Installation: External and horizontal
Display Size: 5.7 inch
Program memory: 2 x 2 MB
Data memory: 2 x 1 MB
Communiacation interface: 1×SAEJ1939，1×CANopen2.0B，2×RS232
Input analog: 6
Input digital: 6
Output digital: 6 (It can be set to PWM output, but it will reduce the no. of output digital.)
Relay output: 1 (max. 5A)
Protection class: IP65

Installation：

When the system is on, it's forbidden to plug and unplug the cable connecting with the controller.

Before implementing any welding work on the crane body, the operator must take off cables connecting the controller in order to avoid damage.

This system uses scaffolding installation.

3.2 WG Angle Sensor

Angle sensor WG accurately measures the boom angle. The high sealed housing keeps the inside component away from the influence of temperature, humidity etc.

Technical data

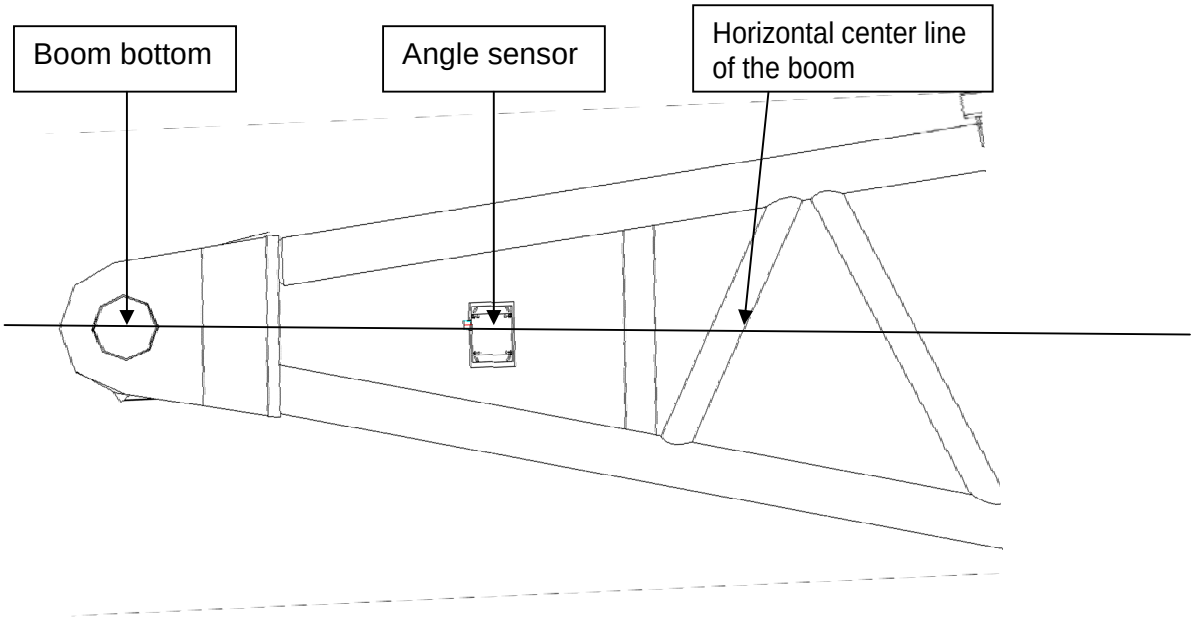
Measuring range: 0-90°
Output signal: 4-20mA
Linearity tolerance: <±0.2°
Hysteresis tolerance: <±0.1°
Operating temperature: -25□～+70□
Storing temperature: -40□～+70□
Protection class: IP65

Installation

The correct positioning is important for installing angle sensors.

The angle sensors are usually installed along the right side boom, at the inner side of boom base, if it's viewed from the boom base to boom tip. (as shown below).

Make sure the horizontal line of sensor is parallel to the horizontal center line of the boom. Adjust the bolts of the sensor to reduce the angle deviation between actual measured boom angle and displayed boom angle on the console.



Angle Sensor Installation Graph

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3.3 Force Sensor

Force sensor KMD is perfectly designed for static and dynamic tensile force measurements. The sensor stands out for high overload capacity, high fatigue strength, good corrosion resistance and maintenance-free operation.

Technical data:

Nominal load range: from 1T up to 500T
Charge of measuring body: 200%
Charge of measuring body up to flow limit: 300%
Safe to breaking point: 500%
Linearity: < 0.3% typ.
Hysteresis: < 0.5% typ.
Protection class: IP65
Operating temperature range: -40℃ to +70℃

Installation

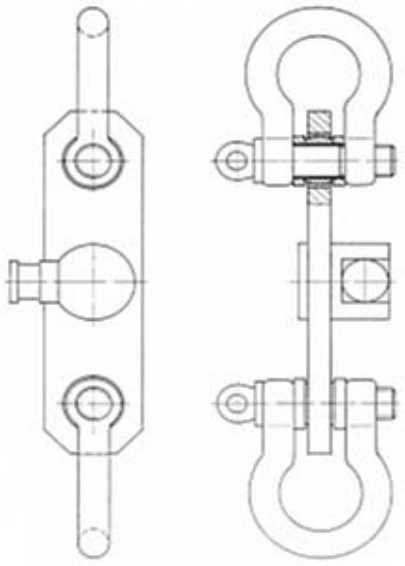
KMD force sensor is measuring unit, it should require the conscientious and careful treatment.

Be sure to obtain the fittings and the relative tolerance data suggested by KMD force sensor.

Observe the installation situation to make sure that no elastic parts are used in the force transmission which might affect the measurements.

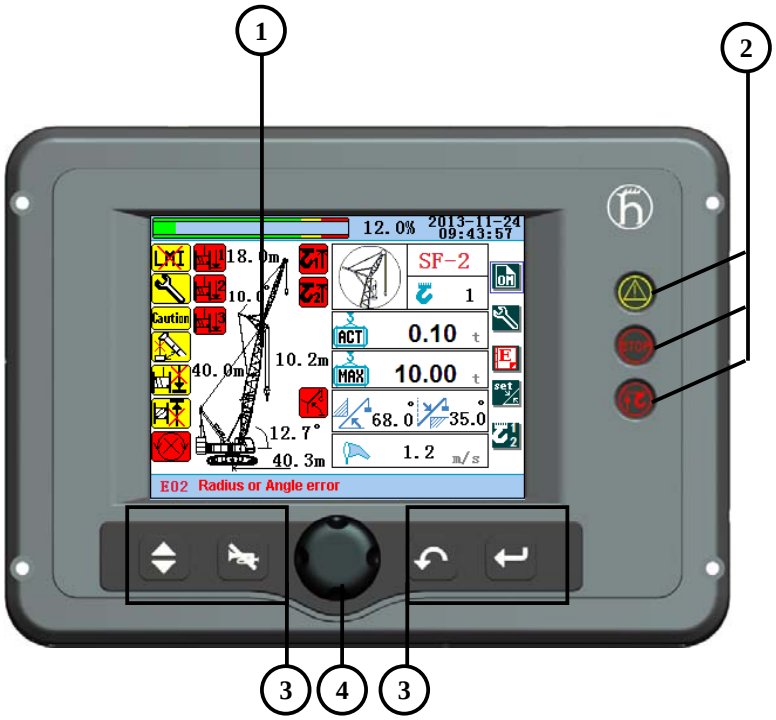
The bores in the locking pins must be in alignment.

Make sure force sensor not to bear side force.



KMD Force Sensor Installation Graph

4. OPERATION AND DISPLAY INTERFACE



1.Data display(see 4.1)
2.Indicator light
3.Function keys: from left to right, menu key/buzzer key/back key/confirmation key.(the function keys have one-to-one relationships with the key symbols on the display.)
4.Rotary button： They can be used to select function items on the display by rotating the button and confirm the selection by pushing the button.

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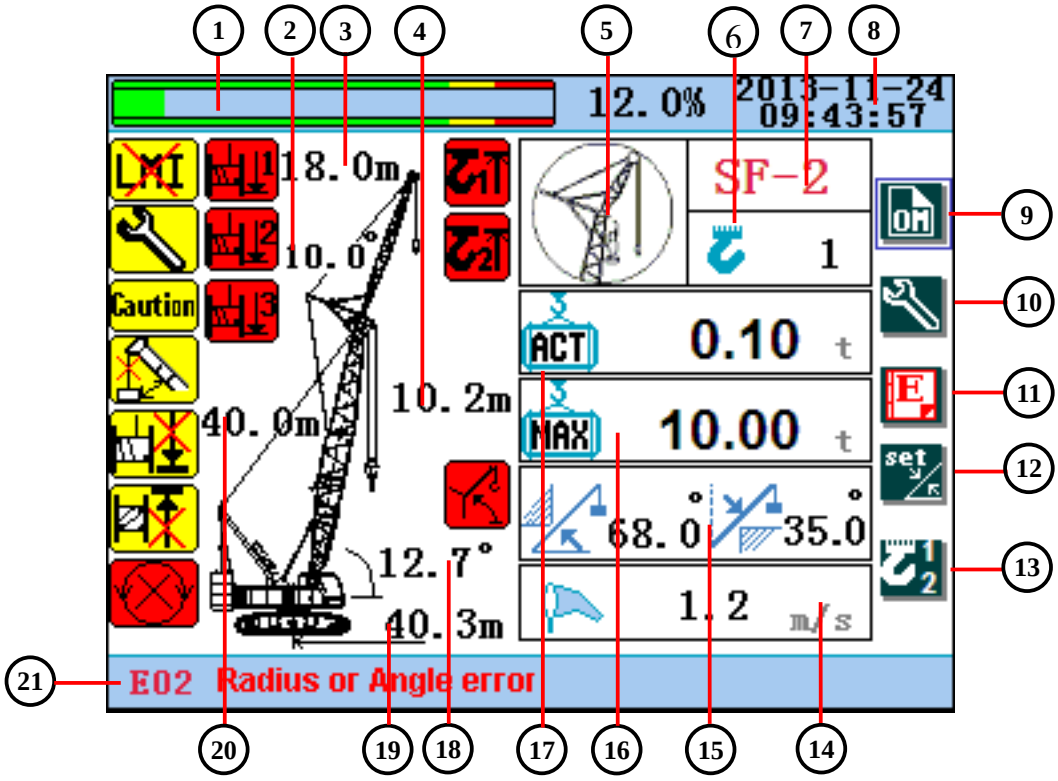
4.1 Data display（values are only for example）



1. Height status bar and percentage display
2. Jib angle
3. Jib length
4. Height
5. OM information display
6. Reeving
7. OM code
8. Date and Time display(year/month/day/hour/minute/second)
9. OM information setting
10. Function setting key symbol
11. Error code information key symbol
12. Upper and low angle setting
13. Main Hook/ Subhook Switch
14. Wind speed
15. Upper and low angle
16. Rated load weight
17. Actual load weight
18. Boom angle
19. Radius
20. Boom length
21. Error code information

4.2 EN13000

The yellow icon is force-active warning icon: when the crane is forced to be active, corresponding warning icon will display on the main interface to remind that the crane is at force-active state now and LMI will not have corresponding protection function.

LMI override activated

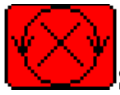
SET-UP mode activated

SET-UP mode activated alarm

Derricking in activated

Rope limit override activated

A2B switch activated


Slewing limit alarm

Main hoist three times protection alarm

Auxiliary hoist three times protection alarm

Third hoist three times protection alarm

A2B switch on the main hoist alarm

A2B switch on the auxiliary hoist alarm

Main Boom luffing angle limit alarm

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4.3Weight status bar

The weight percentage status bar indicates the relationship between the actual load weight and the rated load weight during the crane operation and the weight percentage value is subject to the relationship changes.

Green zone: safe range （weight percentage0-90%）
Yellow zone: pre-warning range （weight percentage 90-100%）
Red zone: over-load warning range （weight percentage exceeding100%）

4.4 Indicator light

Prewarning light

This yellow prewarning light comes up when the load on the machine amounts to more than 90% of the respective nominal carrying load, which indicates that an overload situation is immediately pending.

For the operator, this means that the machine work can continue only with the greatest amount of caution

Overload warning light

This red Overload warning light indicates to the machine operator that an overload condition has occurred. It lights up when the crane load has reached 100% of maximum load carrying capacity permitted for the current operating status. The acoustic alarm sounds. The load-moment-increasing crane movements are switched off at the same time

A2B switch lamp

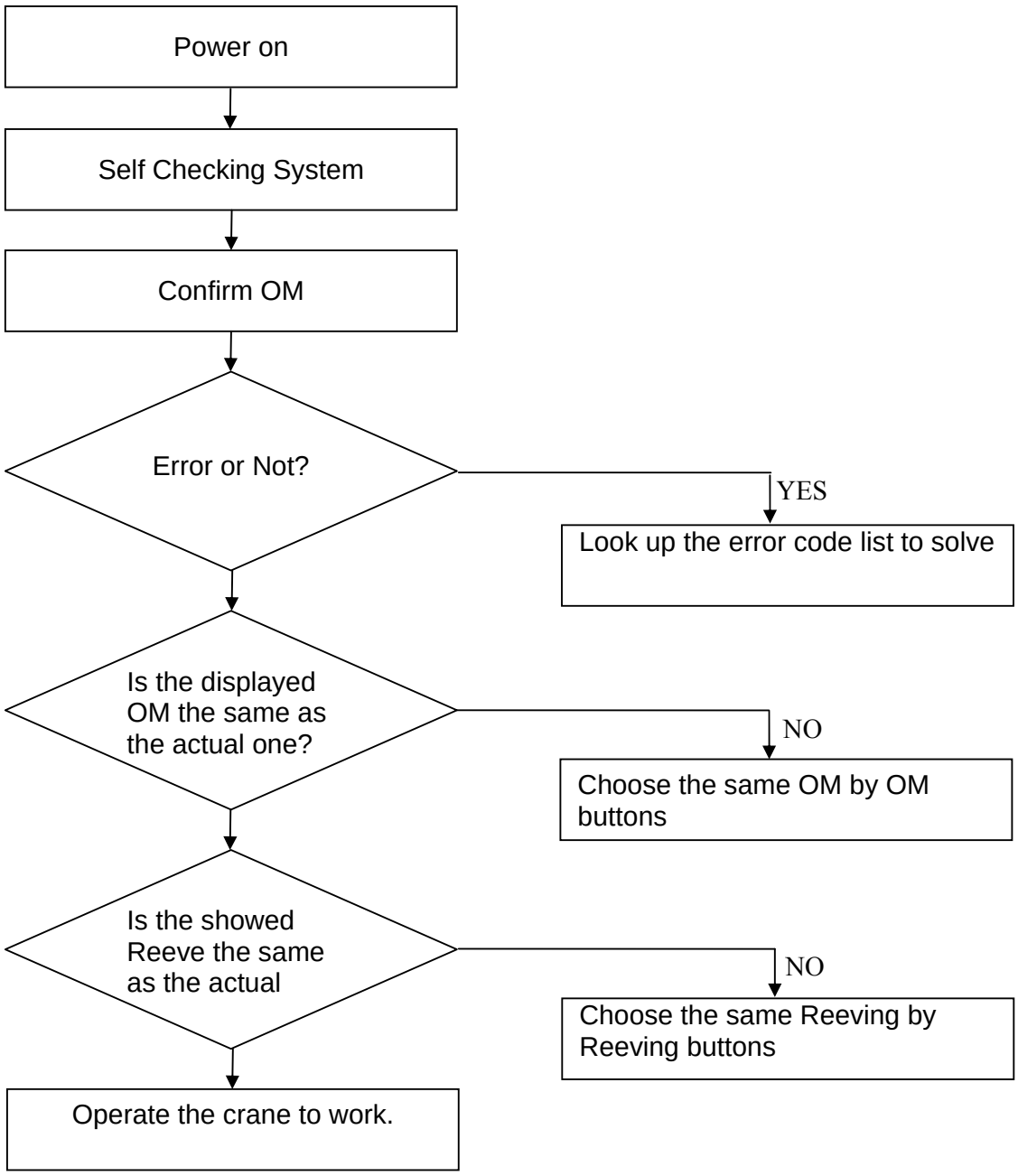
This red warning light lights up when the heavy bob and spreader of A2B switch meet each other and are hoisted. In the meanwhile, the buzzer alarms, which indicates the hook block has arised the height maximum. Combining with the electric system, the crane movements from hoisting and extending boom to luffing down are stopped. Please check A2B switch before operating the crane in order to prevent human body and the crane from being injured.

Attention: Since A2B switch signal does not input into LMI system, this A2B switch lamp is used invalid.

5. OPERATION METHOD and PROCESS (only for example)

When controller and console of the system is powered on, the data initialization automatically starts. This progress cannot be directly observed, but a welcoming display (Logo display) will appear at the console to present the manufacturer and the initializing status.

The crane drivers shall be very familiar with the operation of LMI system and correctly adjust it before start to work.



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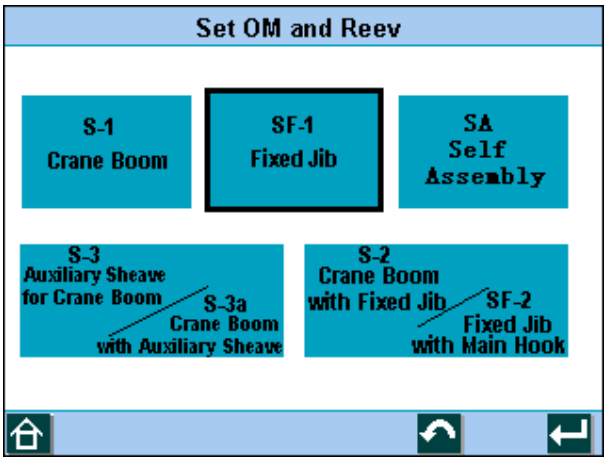
5.1 Set OM and Reev

Reeving setting is to set the LMI reeving identical to the actual reeving.Operators shall carefully adjust the displayed reeving equal to the actual reeving before start to work.

> **WARNING**
>
> The Reeving must be set equal to the actual reeving, otherwise the LMI may not be able to work properly.

At the main display, select icon by rotary button, press it or confirmation key to enter into "Set OM and Reev" Display1 as followed:

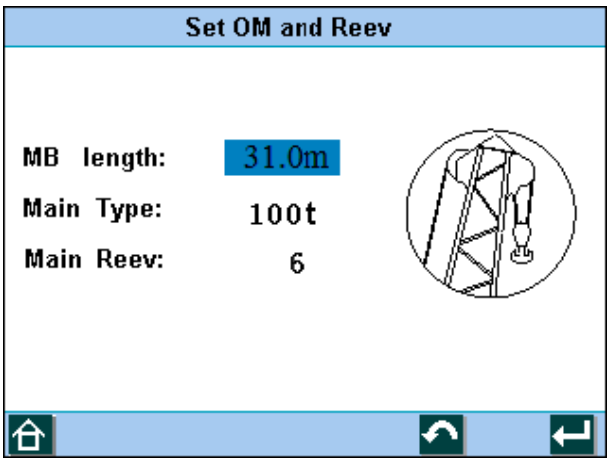


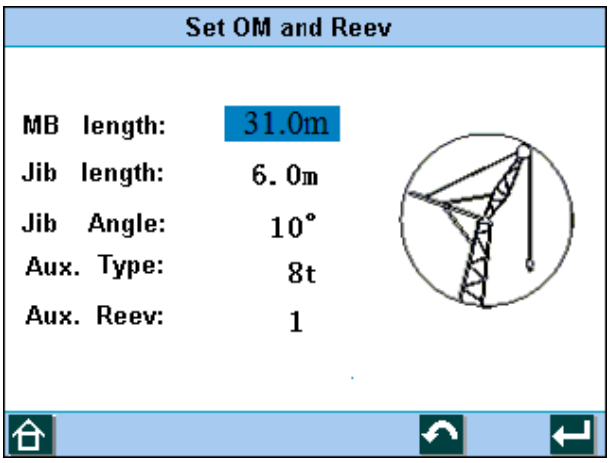
Back to the previous display.

Confirm the select value.

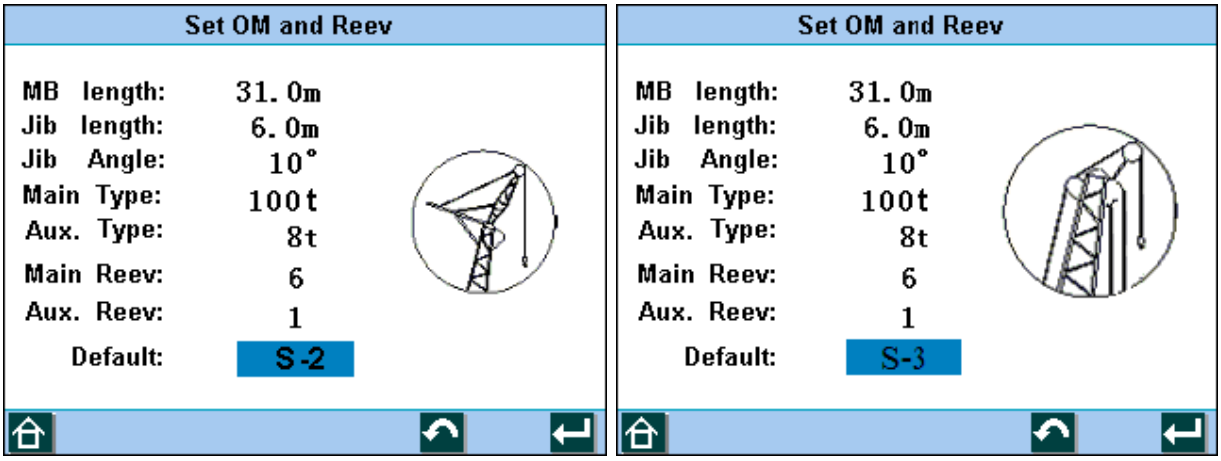
Back to the main display.

In the "Set OM and Reev" Display1, circumgyrate the rotary button, press it or confirmation key to enter into the "Set OM and Reev" Display2 (Self_assembly OM enter into the main display directly) as followed:





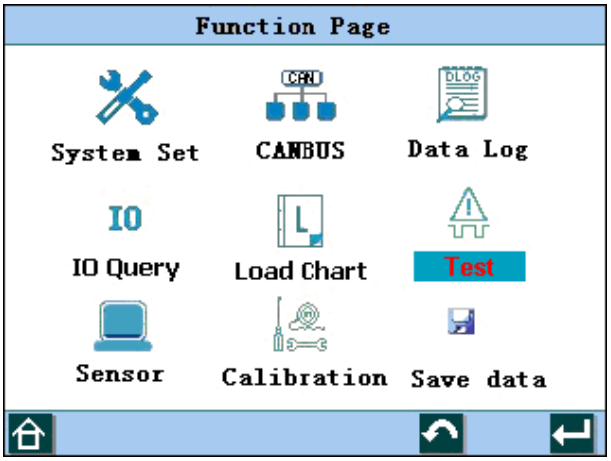
After selecting OM parameter by pressing and rotating rotary button, press the confirmation key twice to enter into main interface, then OM setting succeeds. After pressing confirmation key, press turn back key, which means that setting is cancelled and OM can be reset.



Two switchable OMs can be selected by default OM option.

5.2 Function Setting

At the main display, select icon by rotate button, press the button or confirmation key to enter into ”Function Page” as followed:



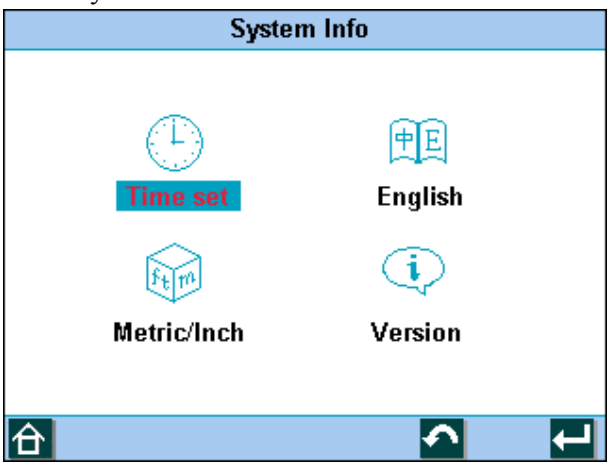
Back to the previous display.

Confirm the select value.

Back to the main display.

5.2.1 System setting

At the “Function Display”, select “System Set” icon by rotary button, press it or confirmation key to enter into ”System info” as followed:



Back to the previous display.

Confirm the select value.

Back to the main display.

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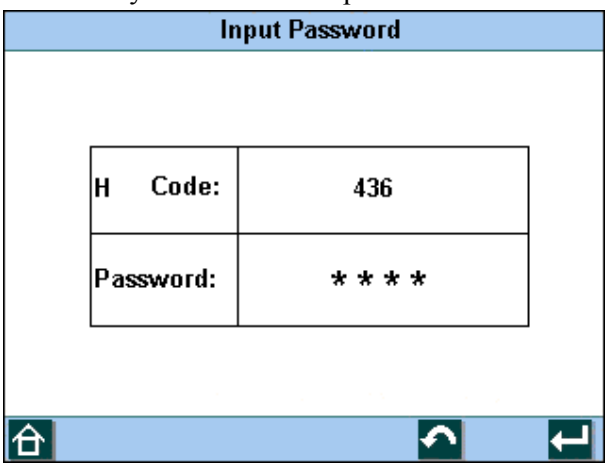
Time Setting

Before setting time, the first step is to input the password. If the display shows the wrong time, please connect with the manufacture first. DO NOT set time yourself.

The setting steps are as followed:

At first, select "Time Set" icon by rotating button at the "Function Display", press the button or confirmation key to enter into "Input Password" as the following:



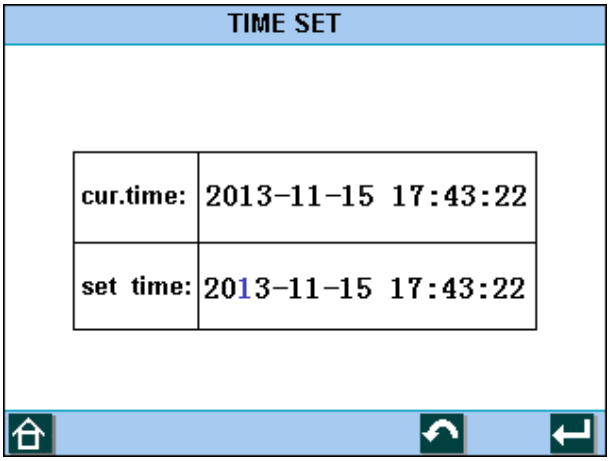
Back to the previous display.

Confirm the select value.

Back to the main display.

At the "Input Password", the first password " * " is showed automatically number "0". Operator can select the correct number by rotate button, then press it or confirmation key, the system will transfer to the second " * ".

After inputting four numbers, press the button or confirmation key to enter into "Time Set Display" as the following:



Back to the previous display.

Confirm the select value.

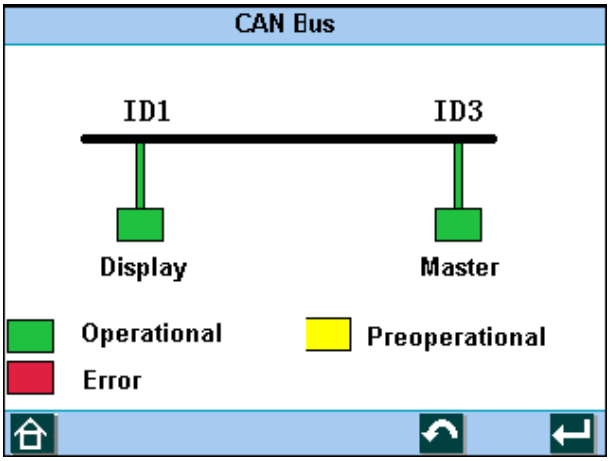
Back to the main display.

In "Time setting", when the year number turns blue, select actual year number by rotating button and press it or confirmation key, the next number will automatically become blue.

After setting all numbers, "Confirm?" will appear on the interface. Press button or confirmation key, and the "current time" will be modified to the actual time.

5.2.2 CANbus Status Overview

At the “Function Display”, select “Can Bus” icon by rotary button, press it or confirmation key to enter into ”CANbus Status Overview Display” as followed:



Back to the previous display.

Confirm the select value.

Back to the main display.

At this display:

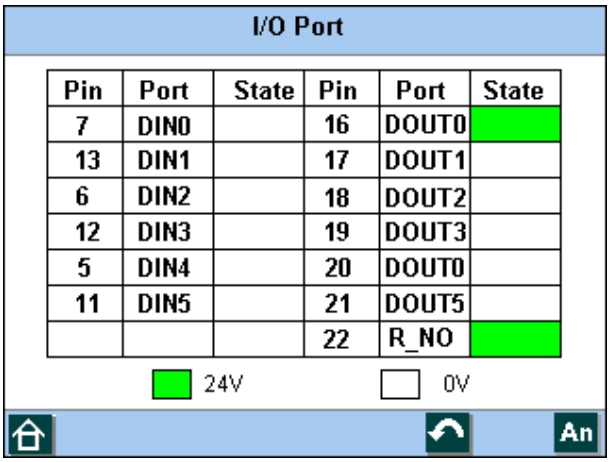
If the pane shows green, it means working normally.

If the pane shows yellow, it means preparing.

If the pane shows red, it means error or not-in-use status. At this moment, operators need to check the system.

5.2.3 I/O Port Inquiry

At the main display, select “port inquiry” icon by rotate button, press the button or confirmation key to enter into “I/O Port Inquiry Display” as followed:



Back to the previous display.

transfer to Analog Input Port Display

Back to the main display.

This display shows the information of Digital I/O port.The state pane shows green, it means high level, DIN stands for digital input and DOUT is digital output.

If operators want to inquire analog information, please press menu key which represents An icon and transfer to “Analog Value” as followed:

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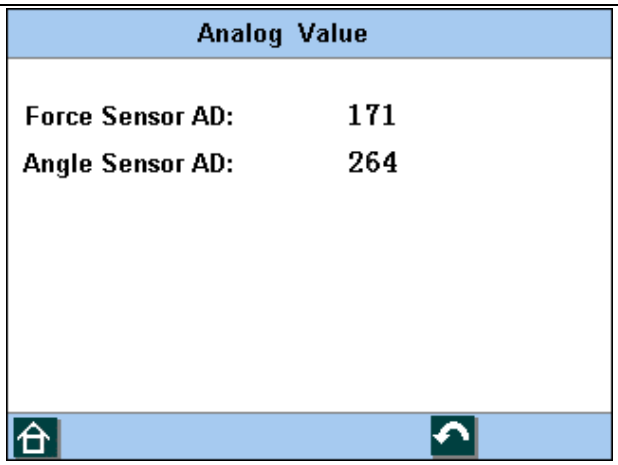
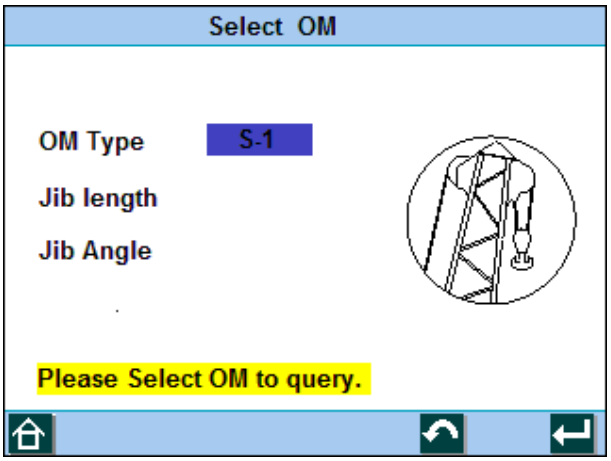


Back to the previous display.

Back to the main display.

5.2.4 Load Inquriy

At the "Function Display", select "Load Chart" icon by rotary button, press it or confirmation button to enter into the "OM select" display:

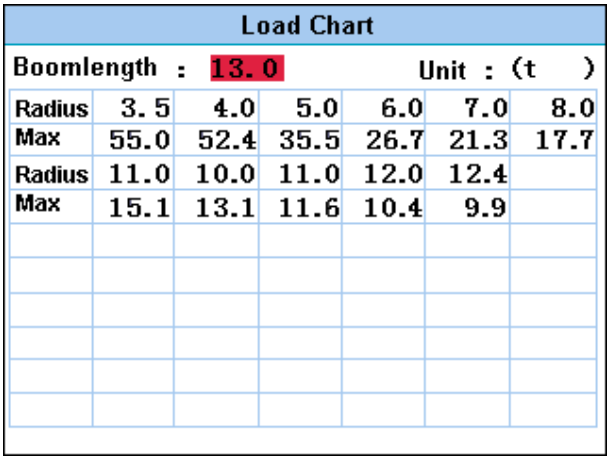


Back to the previous display.

Confirm the select value.

Back to the main display.

Select the OM by rotary button, press the confirmation button to enter into the"load chart" display, as the followed:



Radius	3.5	4.0	5.0	6.0	7.0	8.0
Max	55.0	52.4	35.5	26.7	21.3	17.7
Radius	11.0	10.0	11.0	12.0	12.4	
Max	15.1	13.1	11.6	10.4	9.9	

Select the BM length by the rotary button, press the confirmation button ,then transfer to the corresponding load data.

Note: All values in the chart are only for example.

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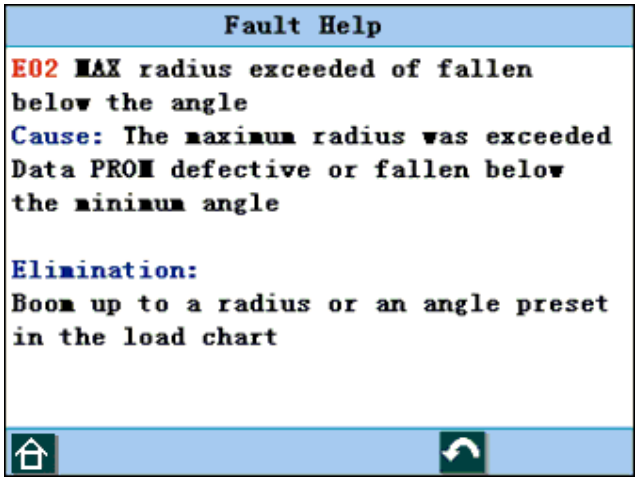
5.3 Error Code Information

When the system appears malfunction, the error code would appear at the main display.Through the error code information, crane operators and service engineers can better understand what the error code stands for, and quickly find out the fault reasons and suggested solutions. (Operators can inquire the error code by two ways: The error code inquiry in the display and the “troubleshooting” item in the menual.)

At the main display, select icon by rotary button, press the button or confirmation key to enter into “Fault Help” as followed:



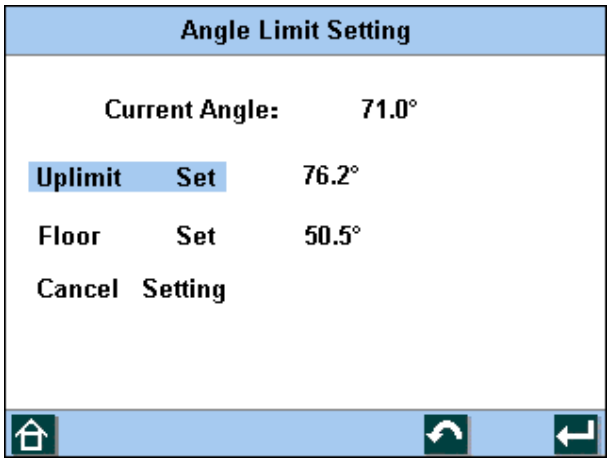
Back to the previous display.

Back to the main display.

Switch to query cause and elimination of different fault by rotarying button.

5.4 Angle Limit Setting

At the main display, select icon by rotary button, press the button or confirmation key to enter into “Angle Limit Setting” as followed:



Back to the previous display.

Confirm the select value.

Back to the main display.

After the transformer to the maximum(minimum) in the main boom Angle, according to the confirmed limit Angle value.

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6. SYSTEM FUNCTIONS

6.1 Warning

Under any below conditions, HC3901 LMI system will light up and send out alarm for warning.

- The crane is overload
- The hook approaching height limitation
- System error

6.2 Prohibition

Cooperating with crane electrics system, the LMI system will send alarm warning and any of the following crane's movements will be prohibited:

- Boom luffing down
- Hoisting up

At this moment, only the movements toward safe direction are allowed:

- Boom luffing up
- Hoisting down

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7 INSPECTION MAINTENANCE AND CONSIDERATIONS

7.1 Inspection before Operation

- Check all components of the LMI system to make sure no one damages or breaks off.
- Turn the power on and detect whether the display is normal or there is warning, error indication and so on.
- After display works normally, detect whether all the system works normally and whether the main boom angle, work radius and load display are the same as the actual ones.

7.2 Routine Maintenance

- Check the angle transducer as to oil leakage.
- Check the insulating layer of all the cables. If the insulating layer or the wire inside damaged, please replace new one immediately.
- Check the cable reel as to sufficient tight or not.
- Clean the display regularly to make it clear.

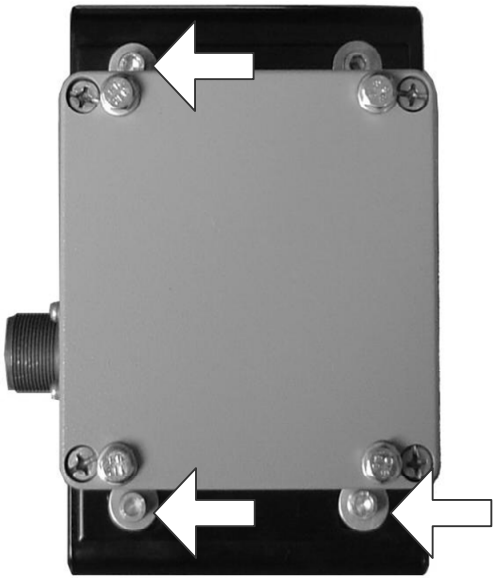
7.3 Routine Consideration

- Prevent the central unit (display)、power supply cabin、transducers from severely shake.
- Each part of the LMI system including central unit, console, transducers etc had been accurate adjusted and checked by protection technology before leaving factory. Anyone not be trained professionally is prohibited from dismantling the housing. Otherwise, the system will probably not work normally because of humidity and dust getting into the components.

7.4 Buzzer Alarms

The buzzer alarms if the system shows normal without any fault codes after started. At this moment, exam whether the conjunction between cable and A2B is junction off or short circuit of water-in.

7.5 Angle Sensor Adjustment



Use the angle instrument to measure if the displayed value is the same when the actual angle is between 0°and 70°. If the displayed value or radius is not the same with the actual value, operators should adjust the angle transducer.

Release the three bolts (see the left picture)，Slowly turn the angle transducer till the displayed value accords with the actual value and then tight the three bolts again.

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8. TROUBLESHOOTING

There are 2 different kinds of errors: system or operation. When an error occurs, this means the system has a fault. The description and code of errors will appear on the screen.

The following Error Code Table gives a brief description of Error Codes elimination.

CAUTION

The errors showed on the table are part of the possible errors of an LMI system. The Elimination on the table only gives the operator some basic guidelines of solving the problems. If the errors cannot be solved by following the instruction in the table, please contact our service team:
Tel： +86-400-887-9936
Fax： +86-516-87793971
Email: infoecs@hirschmann-js.com

Error Code	Error	Cause	Elimination
E01	Fallen below radius range or angle range exceeded	• Fallen below the minimum radius or gone past the maximum angle specified in the respective load chart due to luffing up the boom too far	• Luff down the boom to a radius or angle specified in the load chart.
E02	Radius range exceeded or fallen below angle range	• Gone past the maximum radius or fallen below the minimum angle specified in the respective load chart due to luffing down the boom too far	• Luff up the boom to a radius or angle specified in the load chart.
E04	Operating mode not acknowledged or non permitted slewing zone	• A non existing operating mode has been selected	• Set the correct operating mode for the operating state in question
E05	Main boom length not available	• A non existing main boom length has been selected	• Set the correct main boom length for the operating state in question
E06	Radius range exceeded or fallen below angle range with luffing jib operation	• Maximum radius as specified in the load chart exceeded or fallen below minimum angle due to luffing down the luffing jib too far	• Luff the jib to a radius or angle specified in the load chart.
E07	Overload relais check	• relais = overload active and CU input 20 = on • relais = no overload and CU input 20 = off	• check cable to overload relais and CU input 20 • check relais

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Error Code	Error	Cause	Elimination
E12	Fallen below lower limit value in measuring channel "force main boom(MB) right"	• Cable between the central unit and the force transducer defective or loose. Water inside the plug of the transducer • Force transducer defective • Electronic component in the measuring channel is defective.	• Check cable as well as plugs, replace, if need be • Replace force transducer • Replace sensor unit
E13	Fallen below lower limit value in measuring channel "force jib right"	• Cable between the central unit and the force transducer defective or loose. Water inside the plug of the transducer • Force transducer defective • Electronic component in the measuring channel is defective	• Check cable as well as plugs, replace, if need be • Replace force transducer • Replace sensor unit
E14	Fallen below lower limit value in measuring channel "force main boom left"	• Cable between the central unit and the force transducer defective or loose. Water inside the plug of the transducer • Force transducer defective • Electronic component in the measuring channel is defective.	• Check cable as well as plugs, replace, if need be • Replace force transducer • Replace sensor unit
E15	Fallen below lower limit value in measuring channel "angle main boom foot"	• Cable between the central unit and the angle sensor defective or loose. Water inside the plug of the angle sensor • Angle potentiometer defective • Electronic component in the measuring channel defective.	• Check cable as well as plugs, replace, if need be. • Replace angle sensor • Replace sensor unit
E16	Fallen below lower limit value in measuring channel "angle luffing jib foot"	• refer to E15	• refer to E15
E17	Fallen below lower limit value in measuring channel "force luffing jib left"	• refer to E14	• refer to E14

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Error Code	Error	Cause	Elimination
E18	Fallen below lower limit value in measuring channel "MB backstip pressure"	• Cable between the central unit and the pressure transducer defective or loose. Water inside the plug of the transducer • Force transducer defective • Electronic component in the measuring channel is defective.	• Check cable as well as plugs, replace, if need be • Replace force transducer • Replace sensor unit
E19	Fallen below lower limit value in measuring channel " luffing jib backstip pressure "	• Cable between the central unit and the pressure transducer defective or loose. Water inside the plug of the transducer • Force transducer defective • Electronic component in the measuring channel is defective.	• Check cable as well as plugs, replace, if need be • Replace force transducer • Replace sensor unit
E1B	Fallen below lower limit value in measuring channel "angle luffing jib tip"	• refer to E15	• refer to E15
E1C	Fallen below lower limit value in measuring channel "angle main boom tip"	• Cable between the central unit and the angle sensor defective or loose. Water inside the plug of the angle sensor • Angle potentiometer defective • Electronic component in the measuring channel defective.	• Check cable as well as plugs, replace, if need be. • Replace angle sensor • Replace sensor unit
E1D	Fallen below lower limit value in measuring channel "angle super lift mast"	• Cable between the central unit and the angle sensor defective or loose. Water inside the plug of the angle sensor • Angle potentiometer defective • Electronic component in the measuring channel defective.	• Check cable as well as plugs, replace, if need be. • Replace angle sensor • Replace sensor unit
E22	Upper limit value in measuring channel "force main boom right" has been exceeded.	• refer to E12	• refer to E12
E23	Upper limit value in measuring channel "force jib right" has been exceeded.	• refer to E13	• refer to E13

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Error Code	Error	Cause	Elimination
E24	Upper limit value in measuring channel "force main boom left" has been exceeded.	• refer to E14	• refer to E14
E25	Upper limit value in measuring channel "main boom angle foot" has been exceeded.	• refer to E15	• refer to E15
E26	Upper limit value in measuring channel "luffing jib angle foot" has been exceeded.	• refer to E16	• refer to E16
E27	Upper limit value in measuring channel "force luffing jib left" has been exceeded.	• refer to E17	• refer to E17
E28	Upper limit value in measuring channel "MB backstip pressure " has been exceeded.	• refer to E18	• refer to E18
E29	Upper limit value in measuring channel " jib backstip pressure " has been exceeded.	• refer to E19	• refer to E19
E2B	Upper limit value in measuring channel "jib angle tip" has been exceeded.	• refer to E1B	• refer to E1B
E2C	Upper limit value in measuring channel "main boom angle tip" has been exceeded.	• refer to E1C	• refer to E1C
E2D	Upper limit value in measuring channel "super lift mast angle" has been exceeded (if avail.).	• refer to E1D	• refer to E1D

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Error Code	Error	Cause	Elimination
E37	Error in the logical program flow	• System program file is defective • Flash-EPROM defective	• Upload valid system software • Replace central unit
E38	System program and crane data file do not match.	• The system program in the LMI does not match to the programming in the crane data file	• Upload valid system program file or the valid crane data file
E39	System program and load chart file do not match	• The system program in the LMI and the programming in the load chart file do not match.	• Upload valid system program file or the valid load chart file
E3A	crane data file and load chart file do not match	• Crane type in dat file and load chart file is different	• Cange dat file and/or load chart file
E43	Error in the write/read memory, (RAM)	• Write/read memory (RAM) or central unit defective.	• Replace central unit
E51	Error in the crane data file	• No valid data in the crane data file. • Flash-EPROM defective	• Upload valid crane data file • • Replace central unit
E52	Error in load chart file.	• No valid data in the load chart file • Flash-EPROM defective	• Upload valid load chart file • • Replace central unit
E56	Error in crane data file.	• No valid data in the crane data file during calibration. • Flash-EPROM defective	• Restore or upload valid crane data file • Replace central unit
E57	Error in serial crane data file.	• Calibration data file does not contain valid data. • Flash-EPROM defective	• Upload calibration data file • • Replace central unit
E60	The number of the selected File base and the programmed value are not identical	• No valid data in the load chart file • Base number not programmed • Load chart file wrongly programmed	• Upload valid load chart file • Program the correct base number (1 for base 1, 2 for base 2) • Check base programming in the load chart file.
E61	Error in the CAN bus data transfer for all CAN units	• CAN Bus cable between the central unit and the sensor unit defective or not connected. • Can bus port in the central unit defective • Short circuit in a CAN Bus cable	• Check the connection between the central unit and the sensor units • Replace the central unit • Replace Can Bus cable
E81	Too large difference of the boom angles at tip and base boom (if avail.)	• The angle as to the horizontal on the boom head exceeds the main boom angle by more than 5 degrees.	• Check angle sensor on the boom head. • Check angle sensor on the base boom.

Error Code	Error	Cause	Elimination
E82	Too large difference of the luffing jib angles at tip and base jib.	• The angle as to the horizontal on the jib head exceeds the luffing jib angle by more than 5 degrees.	• Check angle sensor on the jib head. • Check angle sensor on the jib base.
E83	Maximum force in the main boom pendants exceeded	• The force actuating on the main boom pendants has exceeded the programmed value	• Reduce force acting on the main boom pendants.
E84	Wrong rigging condition.	• The selected rigging condition is not contained in the crane data file.	• Select another rigging condition • Check the programming in the crane data file.
E85	Error in the radius determination	• The computed radius is too small (negative deflection)	• Check the programming in the crane data file.
E88	Faulty main boom position during luffing jib operation	• During luffing jib operation the main boom is not in the prescribed angle range • Angle measurement of main boom defective.	• Luff boom to the permitted range • Check angle measurement of the main boom.
E89	Faulty positioning of the jib during operation with fixed angle to the main boom or to a luffing jib	• During operation with fixed jib to the main boom, the jib is not in the permitted angle range • Angle measurement of the jib defective	• Luff the auxiliary jib to the permitted range • Verify angle measurement of the auxiliary jib.
E94	No data transmits from central unit to console	• Can bus defective • The system data transmission defective	• Restart system • Check Can bus cable
E98	LMI watchdog activated	• LMI processing time limit exceeded	• Reset system • Connect PC terminal and watch error messages
EAB	Short circuit in the A2B switch circuit	• Short circuit in the A2B switch • Short circuit in the cable to the A2B switch	• Replace A2B switch • • Replace cable to the A2B switch
EAC	A2B switch circuit disconnected	• Disconnected cable in the A2B switch • Disconnected cable to the A2B switch	• Connect or replace cable in the A2B switch • Connect or replace cable to the A2B switch
EAD	No valid A2B switch status	• Sensor wrong function • CAN bus delay	• Replace A2B switch • Replace cable to the A2B switch

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Error Code	Error	Cause	Elimination
EB1	Fallen below lower limit value in measuring channel "rope length on the winch"	• No rope on the winch (* only EB1) • No sensor for winch measuring available • rope length not calibrated • wrong rope/winch parameters in data-programming • counter input not deefine in configuration • counter input defective	• calibrate rope length • mount sensor or disable function in data-programming • calibrate rope length, layer • check parameter in data-programming • change I/O configuration • change Iflex
EB2	Upper limit value in measuring channel " rope length on the winch" has been exceeded.	• Rope completely rolled up on winch (* only EB2) • See EB1	• calibrate rope length • see EB1
EB3	Upper limit value in measuring channel "hook hight" has been exceeded.	• No rope length between front sheave and hook • see EB1	• see EB1
EDD	Battery empty	• Battery check detected a low voltage of the battery	* change battery, after this setup of RTC
EFD	LMB Watchdog extra time	• Function needs more than 0,5 sec to be activated, e.g. write flash PROM	• Meesage is deactivated automatically after processing