

SkyAzúl
EQUIPMENT SOLUTIONS



iFLEX E5/1

Load Moment Indicator



OPERATOR'S MANUAL

NOTICE

SkyAzúl makes no warranty of any kind with regard to this material, including, but not limited to, the implied warranties of merchantability and/or its fitness for a particular purpose.

SkyAzúl will not be liable for errors contained in this manual or for incidental or consequential damages in connection with the furnishing, performance, or use of this manual. This document contains proprietary information, which is protected by copyright, and all rights are reserved.

No part of this document may be photocopied, reproduced, or translated to another language without the prior written consent of SkyAzúl.

SkyAzúl reserves proprietary rights to all drawings, photos and the data contained therein. The drawings, photos and data are confidential and cannot be used or reproduced without the written consent of Hirschmann. The drawings and/or photos are subject to technical modification without prior notice.

All information in this document is subject to change without notice.

MANUAL REVISIONS

REV	DATE	NAME	DESCRIPTION
-	08/09/13	SC	iFLEX E5/1 Operator's Manual (SkyAzúl) For XCMG QUY220/QUY250/QUY260/QUY280/QUY300



SkyAzúl, Inc.
16 Walnut Street
Middletown, MD 21769
Fax 301-371-0029
info@skyazul.com

Table of content

1. GENERAL INFORMATION	2
2. IMPORTANT NOTES	3
3. SYSTEM CONFIGURATION	4
3.1 IFLEX E5/1 CONTROLLER	5
3.2 IFLEX C CONTROLLER(OPTIONAL)	6
3.3 IK2001 CONSOLE	7
3.4 FORCE SENSOR	8
3.4.1 Technical Data	8
3.4.2 Installation	8
3.5 WG SERIES ANGLE SENSOR	9
3.5.1 Technical datas	9
3.5.2 Installation	9
3.6 DAVS PRESSURE TRANSDUCER (OPTIONAL)	10
3.6.1 Technical data	10
3.6.2 Installation	10
3.7 ANTI-TWO BLOCK SWITCH	11
3.7.1 Technical data	11
3.7.2 Installation	11
3.8 WIND TRANSMITTER (OPTIONAL)	12
4. DISPLAY AND INTERFACE	13
4.1 STATUS DISPLAY	14
4.2 IMAGE AREA (VALUES ARE NOT REAL)	15
4.3 FUNCTION KEY SYMBOLS	17
4.3 FUNCTION KEYS	17
5. OPERATING METHOD (VALUES ARE NOT REAL)	18
5.1 OM AND REEVING SETUP	19
5.1.1 OM code information	20
5.1.2 Numerical OM code setup	20
5.1.3 Geometrical OM setup	21
5.1.4 Reeving setup	21
5.2 SYSTEM INFORMATION	22
5.2.1 Signal overview	22
5.2.2 Load chart information	24
5.2.3 Error code information	25
5.2.4 CAN bus status overview	25
5.3 DISPLAY SETUP	26
5.3.1 Time setting	26
5.3.2 Brightness adjusting	27
5.3.3 Metric unit / Imperial unit selection	27
5.3.4 Chinese/English language selection	27
6 INSPECTION MAINTENANCE AND CONSIDERATIONS	28
6.1 INSPECTION BEFORE OPERATION	28
6.2 ROUTINE MAINTENANCE	28
6.3 ROUTINE CONSIDERATION	28
6.4 BUZZER ALARMS	28
6.5 ANGLE SENSOR ADJUSTMENT	28
7. TROUBLE SHOOTING	29

1. General Information

The Hirschmann load moment indicator (herein refer to LMI) iFLEX E5/1 and control system are designed for all types of mobile cranes.

The iFLEX E5/1 can provide the crane operator with important information necessary for the operation of the crane within the areas of operation specified by the manufacturer. The LMI uses a variety of different sensors to monitor different crane functions and communicates the crane performance data to the crane operator on a continuous basis. This data changes constantly in connection with the crane movements.

The LMI provides the operator with the information of the length and angle of the boom, tip height, working radius, rated load and the actual load weight and so on.

If the crane nears its safe load limit, the system will warn the crane operator by means of both acoustic and optical signals. In addition, as soon as the crane reaches an unauthorized operating status, all crane movements will be switched off that would increase the load moment on the crane.

This manual only introduced the operating method of the LMI. Details of the crane operating standards please refer to the crane operating manual provided by the crane manufacturers.

This manual is for XMGC QUY220/QUY250/QUY260/QUY280/QUY300 crawler crane. Please read it carefully before starting the operation and take the actual crane console display as standard.

2. Important Notes

The LMI control system is an assistant collocation for safe operation that warns a machine 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

Safe operation is the responsibility for every machine operator. Every machine operator must ensure that they read all warnings and instructions carefully and fully understand. Correct operation depends on daily careful checking and serious study of the Manual.

WARNING

The LMI is not able to provide aid to the machine operator unless it has been properly adjusted and unless the correct load capacity chart and the correct operating code have been entered for the respective rigging configuration. The correctness of the SLI settings must be guaranteed before beginning machine work in order to avoid damage to property and severe or even fatal injuries to personnel

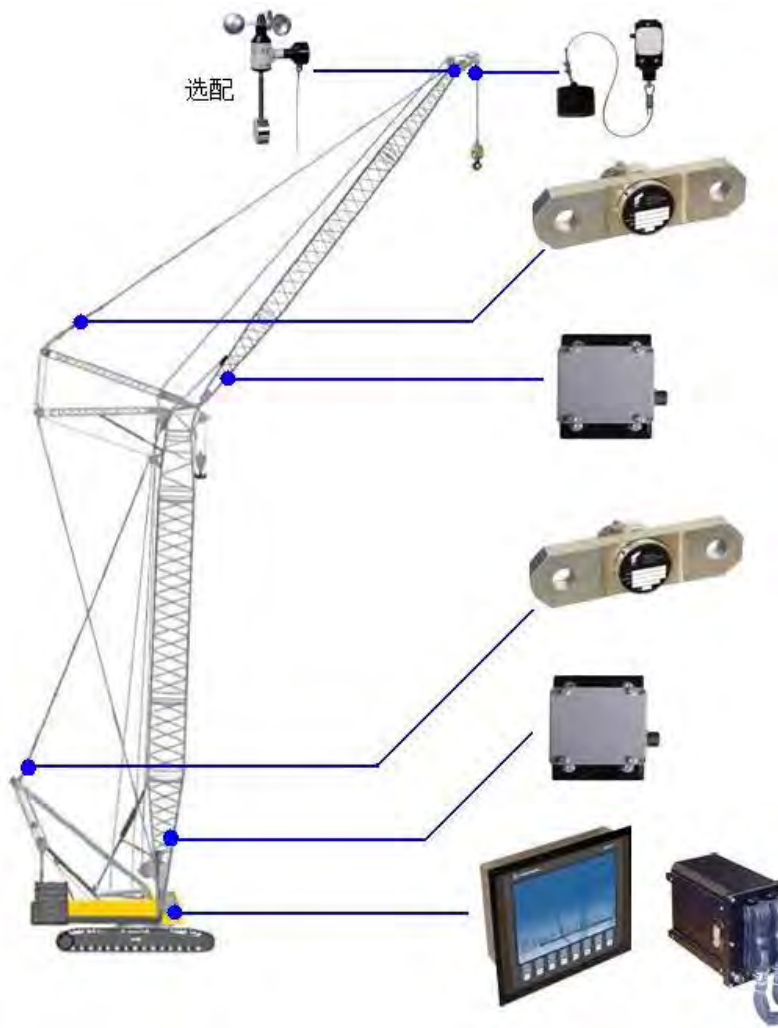
WARNING

If you SLM in use fails or is not functioning properly, please do stop the operation of the crane, and contact expert service engineer. SkyAul does not assume any responsibility for undesirable consequences resulted from this continued action!

WARNING

SkyAzul shall not be liable for damages caused by welding crane without power off the controller.

3. System Configuration



System configuration graph

The LMI and control system consist of an iFLEX E5/1 central unit, an iSCOUT expert 2001 console and various sensors for recording the measured values.

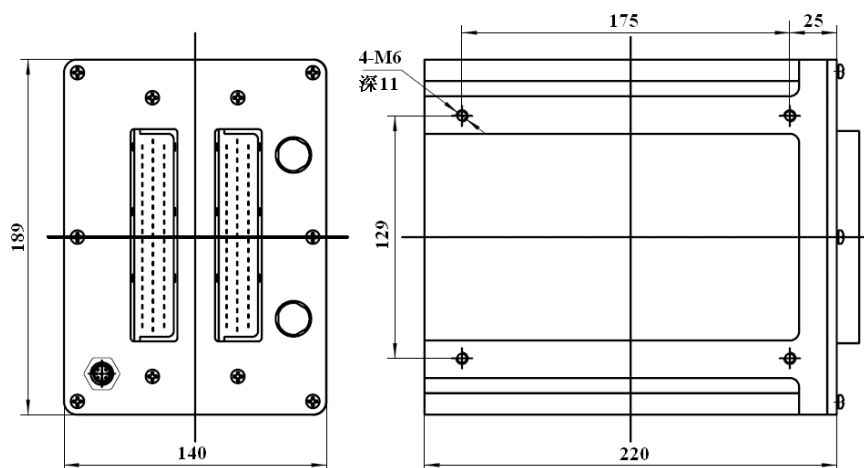
The system operates on the principle of reference/real comparison. The actual value is compared with the calculated reference values and evaluated by the system. An overload warning signal is triggered on the display and operating console once limit values are reached. All machine movements that increase the load moment are switched off at the same time.

The crane-specific data specified by the manufacturer, such as load capacity charts, boom weights, centers of gravity and dimensions, are stored in the central data memory. This data is the reference information used to calculate the operating conditions.

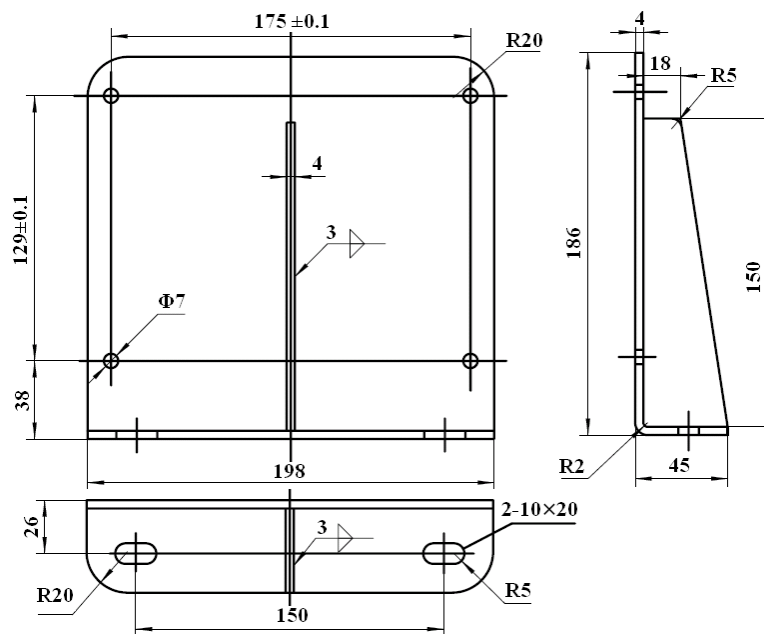
The boom angle is measured by means of angle sensors that are mounted on the boom. The crane load is determined indirectly with the aid of force transducers.

3.1 iFLEX E5/1 Controller

iFLEX E5/1 Controller: 32 digit industrial control PLC system and high-powered processor qualify the requirements of harsh environment for all kinds of industrial system. iFLEX E5/1 module is composed of base board and extended board. Customers could choose different iFLEX E5/1 module according to their own needs. Each module can be connected by CANBUS. Due to the building block mode, the iFLEX E5/1 is not only applicable to medium and small control systems, but also to big and complicated control systems.



iFLEX E5/1 controller dimension graph



iFLEX E5/1 controller installation graph

Technical datas:

CPU: 32BitRISC-processor 48MHz

Memory: 8MB Flash(can upload to16MB)

Protection class: IP67

Field Bus: 1×CANopen2.0B ; 1×SAE J1939

Connection: 2×RS232, 1×RS485

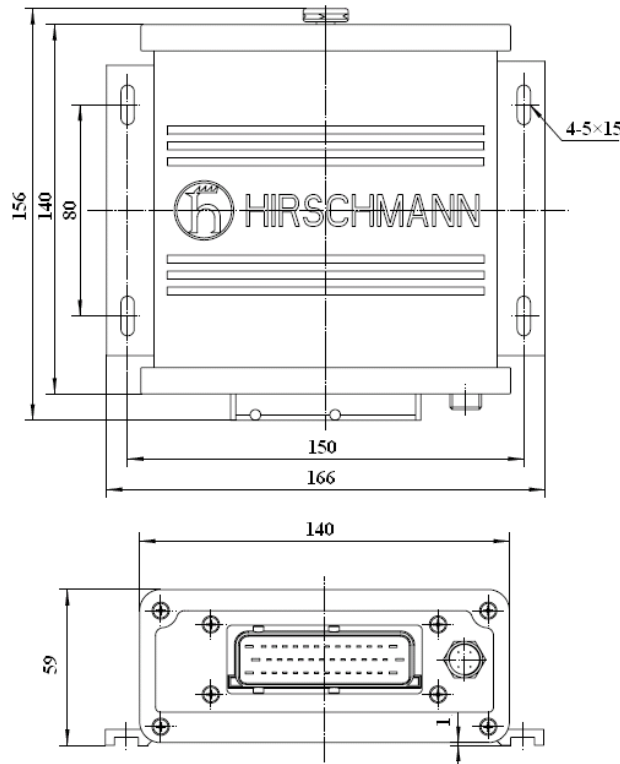
Operating voltage: 10V~30VDC

Operating temperature: -30℃~+70℃

Storing temperature: -40℃~+85℃

3.2 iFLEX C Controller(optional)

iFLEX C (compact class) product series are programmable and flexible configuration of the inputs and outputs. The CANopen interface allows the set up of a decentralized network which offer minimal installation and servicing costs.



iFLEX C3 controller dimension graph

Technical data:

CPU: 16Bit or 32Bit

Protection class: IP65

Bus: 1×CANopen+1×RS485

Interface: 1×RS232

Operating voltage: 10V~36VDC

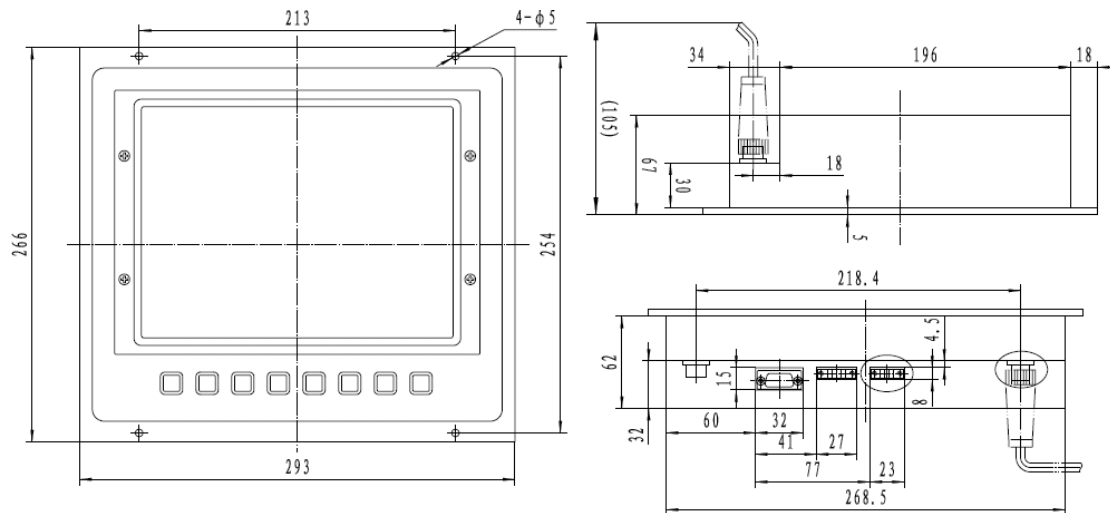
Analog input: 4~20 mA, 0~5V

Operating temperature: -20°C~+70°C

Storing temperature: -30°C~+80°C

3.3 IK2001 console

IK2001 console –BestVIEW adaptive display can show all the operational data that you concerned. The combination between the Graphical display and Genersys software achieve the on-line program for graph. The strong graph compiled capability is incomparable with other Industrial displays.



IK2001console dimension graph

Technical datas:

type: in-dash/ on-dash

housing: metal

protection class: front panel IP65, back panel IP65/IP20

Operating voltage: 10V~36VDC

Operating temperature: -20°C~+70°C

Storing temperature: -35°C~+80°C

Display: resolution VGA(640×480)

Dimention10.4Zoll(diagonal), color 256colors

Dimention: front panel (W×H) 293×265.9

Section panel dimention: (W×H×D) 270×232×64

Connection: 2×CANopen2.0B/1×Ethernet, RS232+RS485, MMC/SD Slot

3.4 Force sensor

Force sensor is up to shock, vibration and electromagnetism resistance standards and has simple direct installation and high level of precision. The extremely overload capacity and fatigue limit with low temperature drift and function of temperature compensation makes the quality never change even in continuous and extreme operation.

3.4.1 Technical Data



Force sensor KMD

Technical data:

Accuracy class: 0.3

Linearity range: 200%

Charge of measuring body up to flow Limit: 300%

Safe to breaking point: 500%

Operating temperature: $-40^{\circ}\text{C} \sim +70^{\circ}\text{C}$

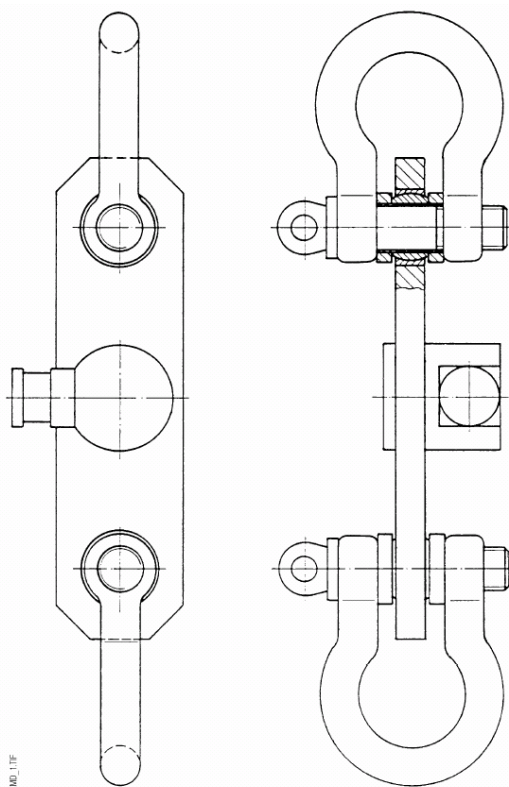
Protection class: IP65 (IP67 optional)

Operating voltage: 10V~30VDC

Housing: stainless steel

connection: M12

3.4.2 Installation



KMD force sensor installation graph

KMD's are measuring units and require the conscientious and careful treatment which is common with all measuring units. Be sure to obtain the fits and tolerances suggested by Hirschmann or SkyAzul.

Observance of the specified installation situation is the condition for impeccable measurements.

Make sure that no elastic parts are used in the force transmission as they might affect the measurements.

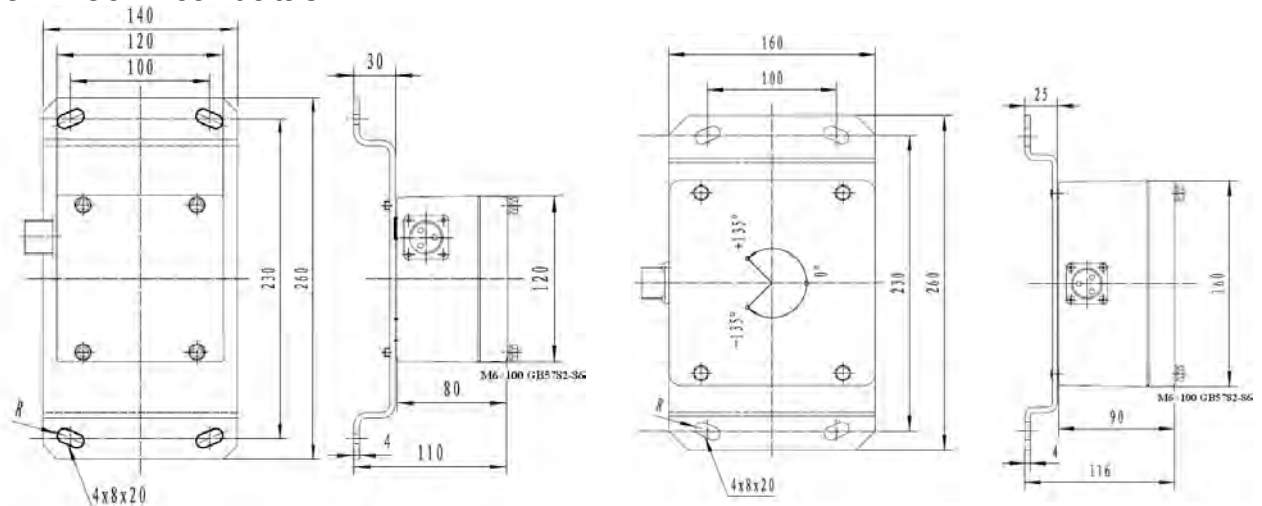
The bores in the locking pins must be in alignment.

When using self-aligning bearings, observe the corresponding clearances

3.5 WG series Angle Sensor

WG absolute value angle sensor is simple direct installation and compact and can precisely measure the angle of boom. The sealed housing keeps the inside component away from infection of temperature, humidity, etc.

3.5.1 Technical datas



WG angle sensor installation dimension graph

Measuring range: WG103_0-90° WG104_0-270°

Operating voltage: 9-33VDC

Output signal: current 4-20mA

Linearity tolerance: $<\pm 0.2^\circ$

Hysteresis tolerance: $<\pm 0.1^\circ$

Operating temperature: $-40^\circ\text{C} \sim +85^\circ\text{C}$

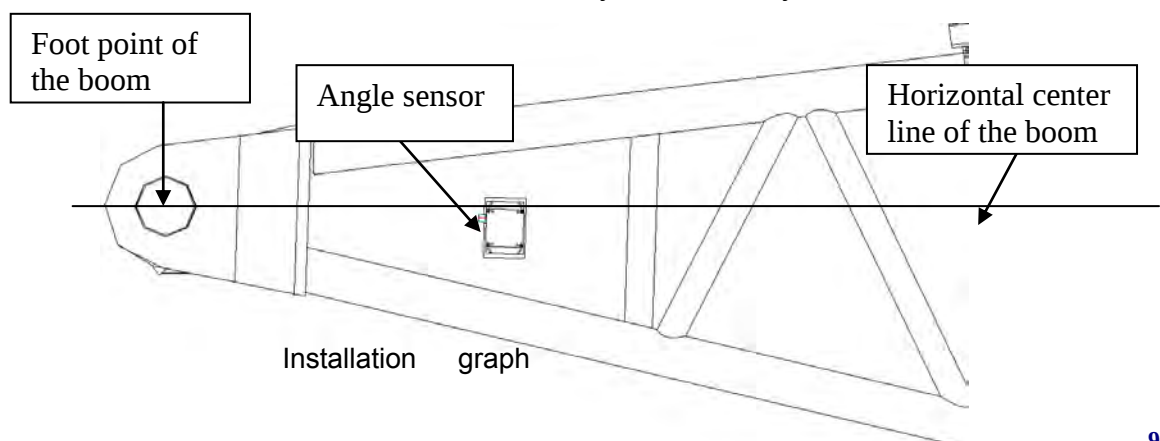
Storing temperature: $-40^\circ\text{C} \sim +85^\circ\text{C}$

Protection class: IP67

3.5.2 Installation

When install an angle sensor, the position shall be well considered. Generally along the the foot points of boom to the top direction, the angle sensor is installed inside the right boom foot (left location); on the contrary it is the right location. With no particular explanation, all the angle sensors should be installed on the left location.

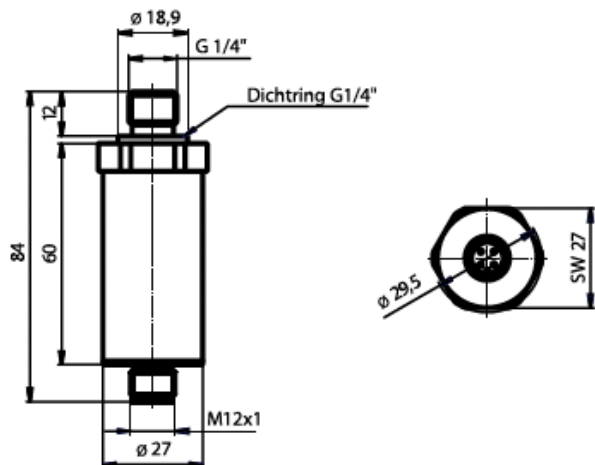
When install an angle sensor, the boom shall be put on an horizontal supporter and make sure horizontal center of the sensor and the boom are in parallel. After the installation, do remember to exam the reliability and security.



3.6 DAVS pressure transducer (optional)

DAVS pressure transducers measure high static and dynamic pressure values of liquids or gases in rough operating environment. Measuring precision is maintained even during continuous operation at extremely dynamic pressure. The pressure transducer come with a pressure connector with standardized G1/4 thread.

3.6.1 Technical data



Operating voltage: 8~32VDC
 Output signal: current 4-20mA
 CANopen(optional)
 Operating temperature: -40°C ~ +85°C
 Storing temperature: -40°C ~ +100°C
 Protection class: IP67
 Life expectancy: > 10million cycles
 Hysteresis tolerance: < ±0.1%FS max.

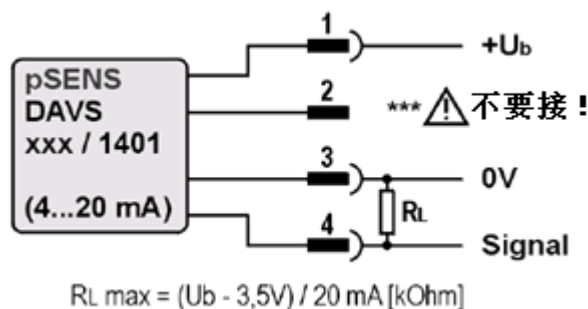
DAVS dimension graph

3.6.2 Installation

Please notice the location of hydraulic piping and valve when install the pressure transducer. By thread connection (such as follow graph), screw the pressure transducer in the hydraulic piping or seat of the balancing valves or hydraulic valves.

Add the appropriate seal to the interface to prevent oil leakage. Guarantee the installation position is safe, considerable and easy for cable connecting.

Make sure the pressure sensor and hydraulic adaptor connect tightly. The tightening moment of G1/4 connector is 20Nm

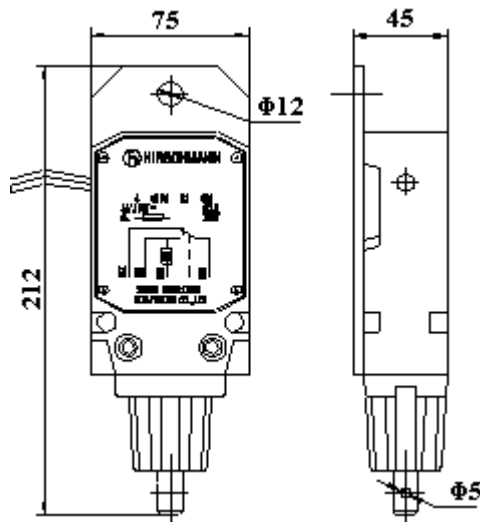


connector pin assignment

3.7 Anti-Two Block Switch

Anti-Two Block Switch is positive opening limit switch for winches, lifting devices and cranes and is simple direct installation and compact. The sealed housing keeps the inside component away from infection of temperature, humidity ,etc.

3.7.1 Technical data



Operating voltage: 15~30V

Operating temperature: $-25^{\circ}\text{C} \sim +70^{\circ}\text{C}$

Storing temperature: $-40^{\circ}\text{C} \sim +70^{\circ}\text{C}$

Protection class: IP67

Life expectancy: $>5 \times 10^6$ 次

housing: aluminium

Weight: 1.2kg

3.7.2 Installation

The switch should be installed in the side of boom header which the beginning of the lifting rope is fixed. Make sure the hammer is stuck in the beginning of the lifting rope and connect the hammer with the switch by the specific rope.

The signal connector and cable must be waterproof and connected correctly.



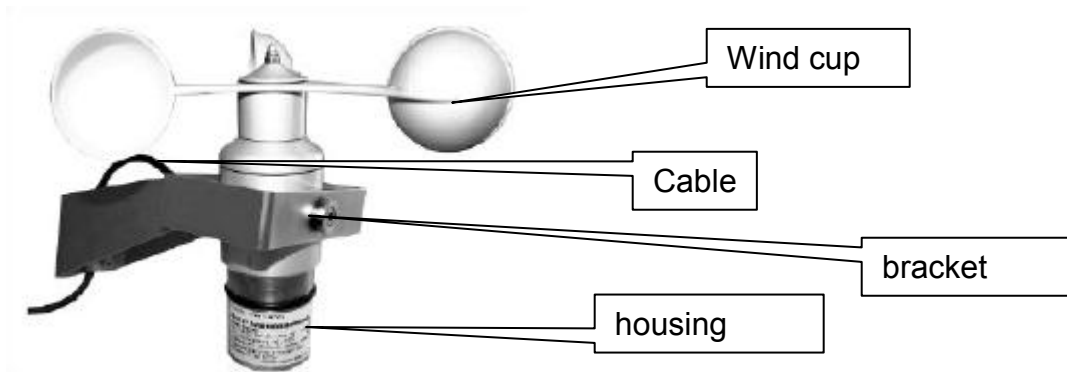
Ati-Two block switch

3.8 Wind transmitter (optional)

The wind transmitter is suitable for measuring wind speed in the field for cranes and is generally installed on the head of the boom which guarantee to measure the maximum wind speed.

It is not affected by the change of boom angle and can guarantee the wind cup parallel to the ground all the time.

It mainly consists of wind cup, housing, pendulum and cable. (refer to the below graph)



Installation graph

Technical data :

Operating voltage: 10V-30VDC

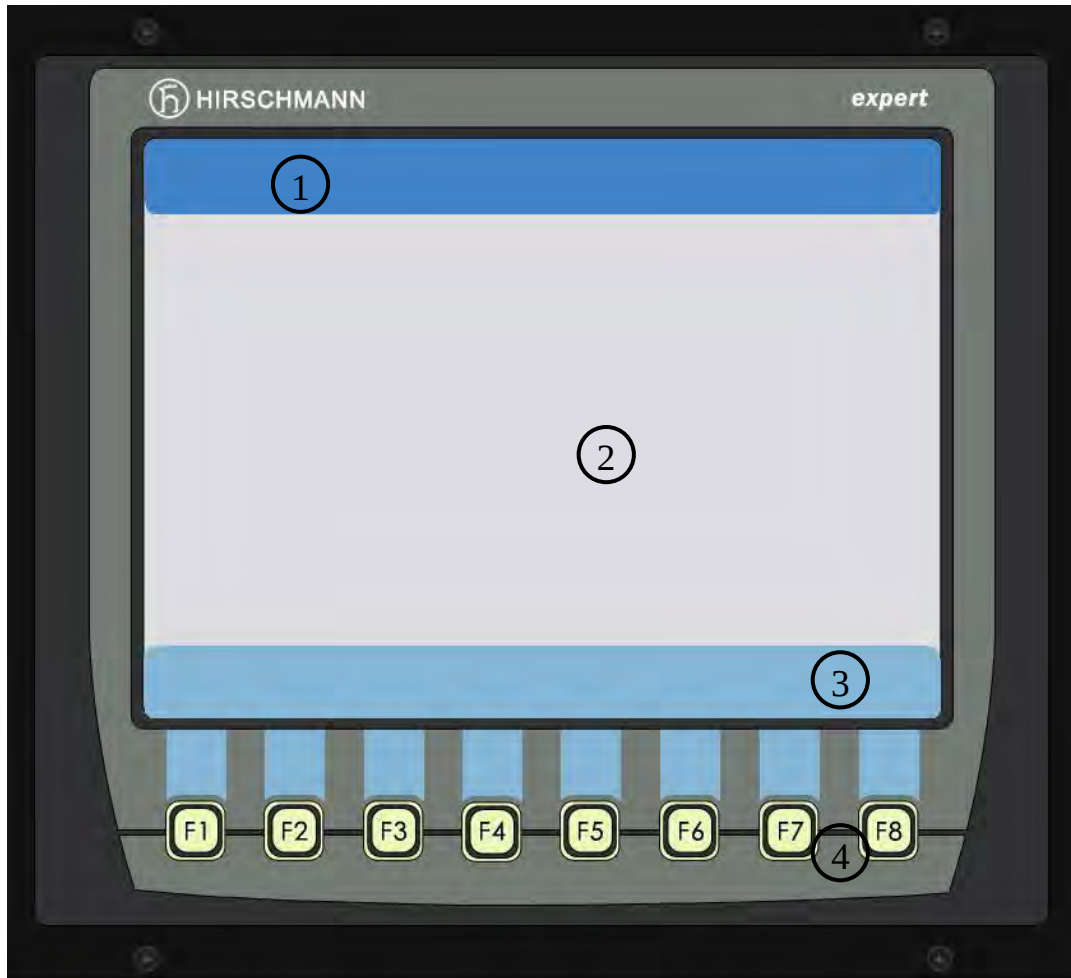
Output signal: 4-20mA

Measurement range: 0-40m/s

Resolution: 0.1m/s

Strength: for wind speed of 80m/s (max.30 min)

4. Display and interface



- ① Status display (status information symbols could at most present 8 ones in the line at the same time, refer to 4.1)
- ② Image area (refer to 4.2)
- ③ Function keys symbol line (key symbols presents at this line, and the means of the related 8 function keys from F1—F8 please refer to 4.3)
- ④ From F1 to F8, there are totally 8 function keys.

4.1 Status display



Notice

The crane operator can learn the crane operating status from the status symbols which appear on top of the console. Before the operation, operators shall fully understand the meaning of the follow symbols and make correct judgment accordingly.

A.error code symbol



Operators can find out the failure cause according to the error code

B.Reeving symbol



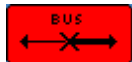
Current reeving

C.OM code symbol



Current OM code.

D. CANBUS symbol



CAN communication between the console and controller is error.

E.A2B switch warning symbol



This red symbol lights up when the contacts of the lifting limit switch open, i.e. a lifting limit has been reached. The audio alarm sounds and any load moment-increasing crane movements are immediately switched off.

F.Loadmoment Pre-warning symbol



This yellow symbol lights up when the crane load exceeds 90 % of the respective reference safe working load and an overload situation is imminent.

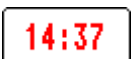
G.Overload symbol



This red symbol lights up when the crane load has reached 100% of the maximum safe working load for the current operating situation and indicates to the crane operator that an overload situation has occurred.

The audio alarm is sounded. Any load moment-increasing crane movements are immediately switched off.

H.time symbol

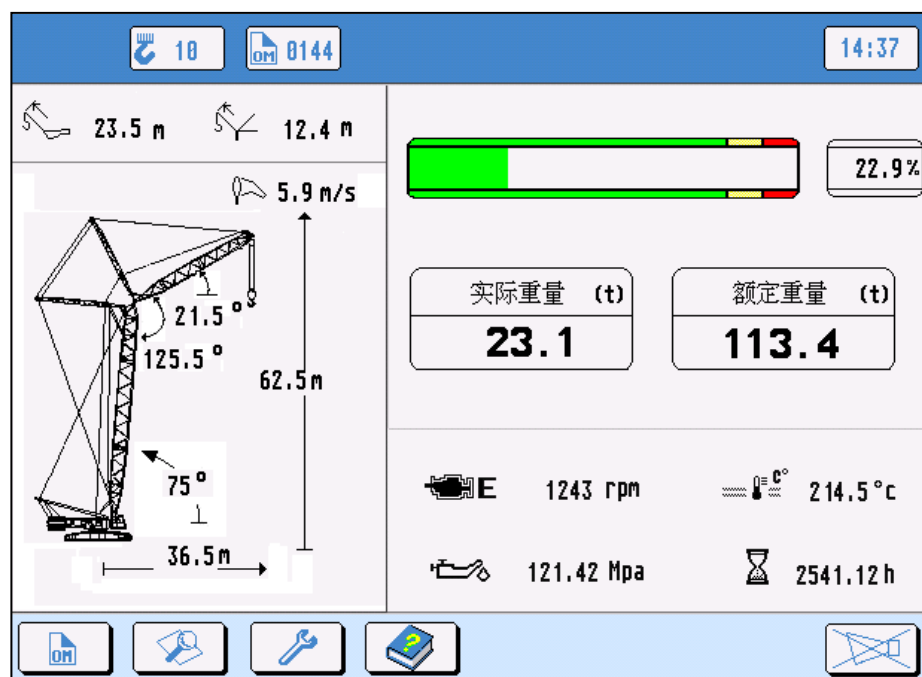


Display local time

4.2 Image area (values are not real)

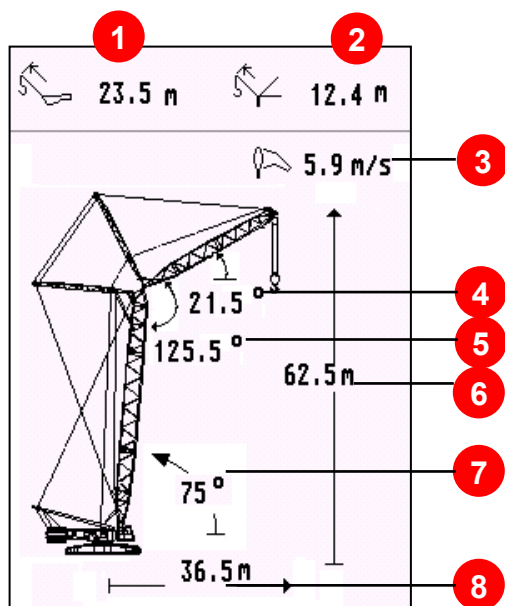
IK2001 console VGA (640×480) can display all the operational data. The Bestview patent technology can help to provide clear and visual graphic display either under blazing sun or in dark night.

Main display(take luffing jib OM for example):



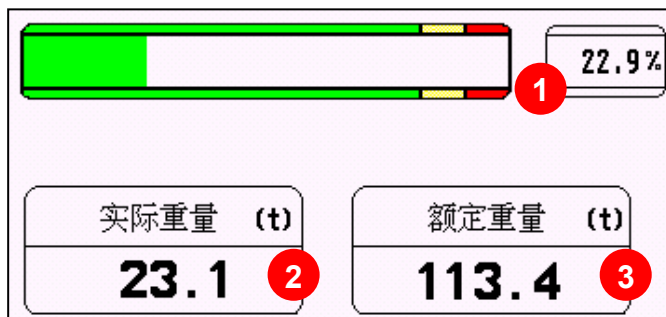
Main display

(1) Crane operation geometrical data



- ① Length of the main boom length(value related to OM code)
- ② Length of the Jib length(value related to OM code)
- ③ Wind speed
- ④ Angle of the jib
- ⑤ Angle between the main boom and the jib
- ⑥ Work height
- ⑦ Angle of the main boom
- ⑧ Work radius

(2) Load moment percentage bar graph and load moment percentage value



① The load moment percentage bar displays the relationship between the actual load moment and the rated load moment during the crane operation and the percentage value changes constantly as the relationship changes.

Green zone: safe range (load moment percentage 0-90%)

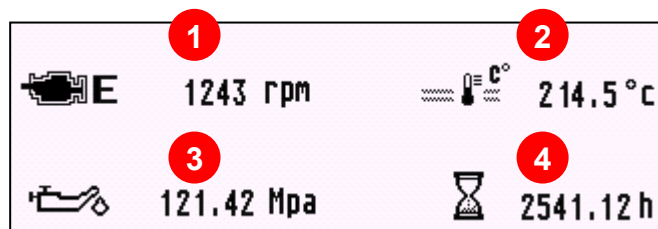
Yellow zone: pre-warning range (load moment percentage 90-100%)

Red zone: over-load warning range (load moment percentage exceed 100%)

② Actual load

③ Rated load at current OM

(3) Motor Parameter monitoring



① The rotate speed of motor

② Temperature of water or cooling fluid

③ Hydraulic pressure OF motor

④ Operating time of motor

4.3 Function key symbols

There are totally 8 function keys symbols in the keys symbol line (no display means not available) . Different interface may present different key symbols. Operators need to operate the LMI by the related function keys.

Introduce the meanings of the key symbols in the main display as below:



F1: OM and reeving setup key symbol



F2: System checking key symbol



F3: System setup key symbol



F4: Help key symbol



F8: "Alarm off" key symbol

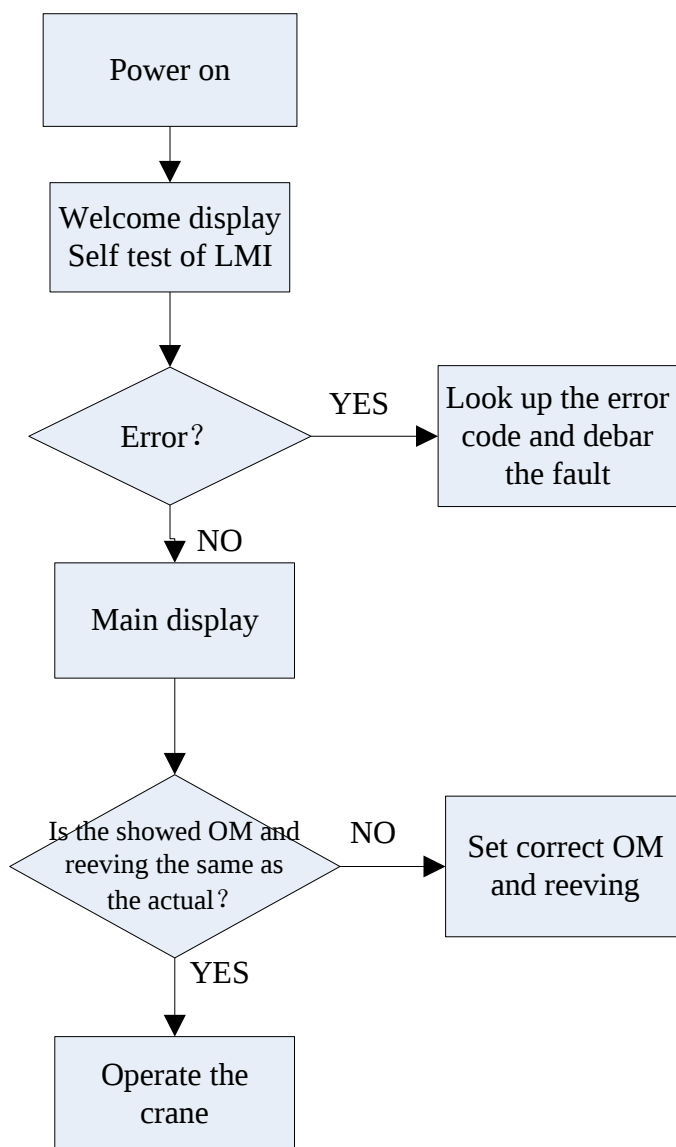
The acoustic alarm can be suppressed temporarily by pressing this function key.

4.4 Function keys

There are totally 8 function keys from F1toF8. Each of the keys is corresponding with the function key symbol.



5. Operating method (values are not real)



System operating diagram

When the iFLEX E5/1 LMI is power on, the console will display “welcome display” and automatically system process self-examination, if there’s no error detected, system will enter into the main interface after 4~5 second.

5.1 OM and Reeving setup

Since the working conditions of the crane are different, data of the LMI is divided into several OM codes and presented by OM code. Before operating the crane, find out the matched OM code according to your crane type and the actual OM, then adjust the displayed OM identical to the actual OM.; and the reeving shall also be identical to the actual reeving.



CAUTION

Correctly setting the OM and reeving would guarantee proper functioning of the system and the crane. Only operators who are thoroughly familiar with the crane and the operation of the system are qualified for the OM and reeving setting. The OM code and reeving must be set equal to the actual OM and reeving value, otherwise the LMI may not be able to work properly.



Press F1 key at the main display to enter into "OM and reeving setup display":

	OM code information
	Numerical OM code
	setup
	Geometrical OM setup
	Reeving setup
	Alarm off
	Return to the main display

OM and reeving setup display

5.1.1 OM code information

At the OM and reeving setup display", press  key to enter into OM code information display". Please take the actual crane for reference.

 10		 0144		14:37			
重型主臂工况代码 (Heavy Main Boom OM Code)			0010EF (EF:01-05, 27)				
普通主臂工况代码 (Normal Main Boom OM Code)			0110EF (EF:06-14)				
轻型主臂工况代码 (Light Main Boom OM Code)			0210EF (EF:15-26)				
固定副臂工况代码 (Fixed Jib OM Code)			0020EF (EF:09-14)				
变幅副臂工况代码 (Luffing Jib OM Code)							
JL	OC	JL	OC	JL	OC	JL	OC
24.0m	0141EF (EF:07-09)	36.0m	0143EF (EF:07-12)	48.0m	0145EF (EF:07-12)	60.0m	0147EF (EF:07-12)
30.0m	0142EF (EF:07-12)	42.0m	0144EF (EF:07-12)	54.0m	0146EF (EF:07-12)		
EF与主臂长度对应关系 (EF & Main Boom Length conversion table)							
EF	ML	EF	ML	EF	ML	EF	ML
01	18.0m	08	36.0m	15	30.0m	22	72.0m
02	24.0m	09	42.0m	16	36.0m	23	78.0m
03	30.0m	10	48.0m	17	42.0m	24	84.0m
04	36.0m	11	54.0m	18	48.0m	25	90.0m
05	42.0m	12	60.0m	19	54.0m	26	96.0m
06	24.0m	13	66.0m	20	60.0m	27	48.0m
07	30.0m	14	72.0m	21	66.0m		
JLA 副臂长度-角度 Jib Length-Angle OC 工况代码 OM Code JL 副臂长度 Jib Length ML 主臂长度 MB Length							
							



Back to the previous display

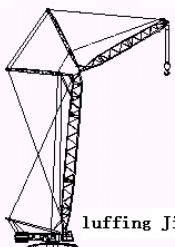
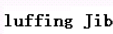
OM code information display

Operator can get OM code information in the above display.

OM code is presented by ABCDEF for totally six characters. The value of ABCD is according to different OM and value of EF represent the length of the main boom.

5.1.2 Numerical OM code setup

At the OM and reeving setup display", press  key to enter into numerical OM code setup display"

 10		 0144		14:37					
 014409 OM Code Display  014401 Set OM code  11 Set Reeve									
									
 Jib Angle  Jib Length 42.0 m  Main Boom Length									
 luffing Jib									



Alarm off



Cursor to the left position



Cursor to the right position



Decrease marked numeric value



Increase marked numeric value



Setup finished

Numerical OM code setup display

In "Set OM code" line, the numeric character turns red when it is set.

After setup, press  key to enter into —select saving or not key line”:

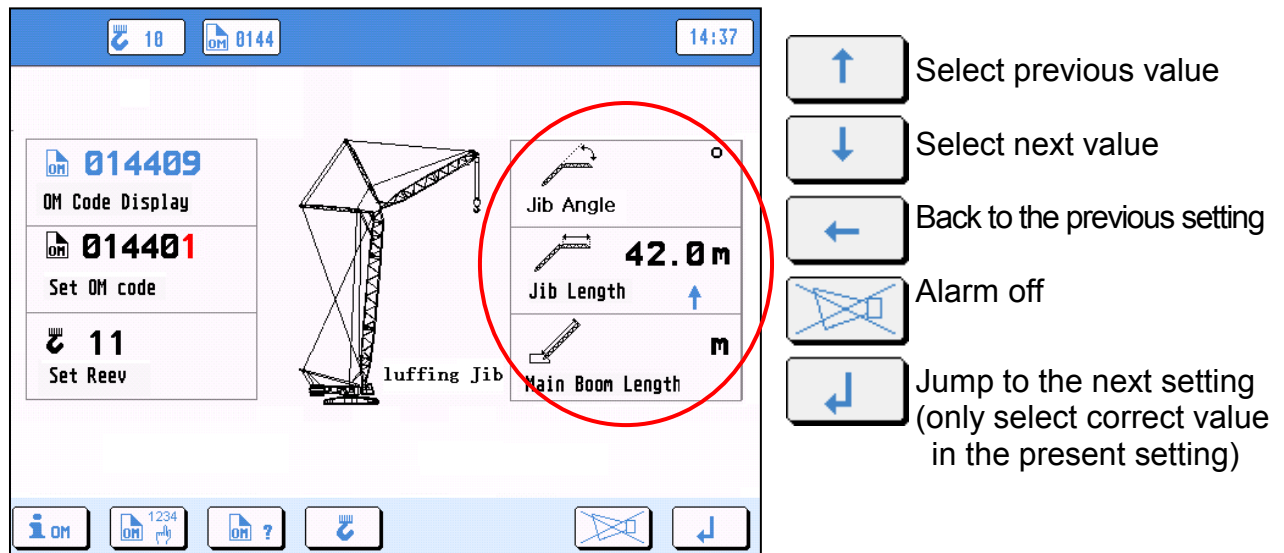


Y Saving the setup (The OM code display line will change into the new set OM code)

N Cancel the setup (The OM code display line will remain)

5.1.3 Geometrical OM setup

At the OM and reeving setup display”, press  key to enter into —Geometrical OM setup”:



Geometrical OM setup

There are four setting in the —Geometrical OM setup”- OM type setting, main boom length setting, jib length setting and jib angle setting.

Firstly select OM type, then select jib angle (only in fixed jib OM available) and jib length (only in luffing jib and fixed jib OM available) and lastly select main boom length.

After setup, press  key to enter into —select saving or not key line”:



Y Saving the setup (The OM code display line will change into the new set OM code)

N Cancel the setup (The OM code display line will remain)

5.1.4 Reeving setup

At the OM and reeving setup display”, press  to enter into reeving setup display:

In —Set Reeve” line, the numeric character turns red when it is set. And please refer the setup method to —numerical OM code setup” chapter.

5.2 System information



Press F2 key at the main display to enter into "system information key line" as follow:



Signal overview



Load chart information



Error code information



The status of CANbus overview



Alarm off



Back to the key line in main display

5.2.1 Signal overview



Press  key to enter into "signal overview display"

There are analog channel pins (B stands for base board, E stands for extended board), A/D value, analog description and corresponding actual value in the "analog inputs display".

Channel	Pin	Description	A/D Value	Actual Value
Ain 0	B34		1234.5	
Ain 1	B35		1234.5	
Ain 2	B36	Wind Speed	1234.5	123.4 m/s
Ain 3	B37	Main Boom angle	1234.5	123.4 °
Ain 4	B38	Jib angle	1234.5	123.4 °
Ain 5	B39	Force Main Boom pendant	1234.5	123.4 t
Ain 6	B40	Force Jib pendant	1234.5	123.4 t
Ain 7	B41		1234.5	
Ain 0	E34		1234.5	
Ain 1	E35		1234.5	
Ain 2	E36		1234.5	
Ain 3	E37		1234.5	
Ain 4	E38		1234.5	
Ain 5	E39		1234.5	
Ain 6	E40		1234.5	
Ain 7	E41		1234.5	



TO digital inputs overview



TO digital outputs overview



TO analog inputs overview



TO PWM outputs overview



Back

Analog inputs display

There are digital channel pins (B stands for base board, E stands for extended board) and the status of digital signal (the filled stands for signal available, the empty stands for signal not available) in the –digital inputs/outputs display.

Digit inputs status inquiry												Digit outputs status inquiry											
Base Board						Extension Board						Base Board						Extension Board					
DIN	PIN					DIN	PIN					DOUT	PIN					DOUT	PIN				
1	49					13	61					1	2					13	18				
2	50					14	62					2	3					14	19				
3	51					15	63					3	4					15	20				
4	52					16	64					4	5					16	21				
5	53					17	65					5	6					17	26				
6	54					18	66					6	7					18	27				
7	55					19	67					7	8					19	28				
8	56					20	68					8	9					20	29				
9	57											9	14					21	42				
10	58											10	15					22	43				
11	59											11	16					23	44				
12	60											12	17					24	45				

Digital inputs display

Digital outputs display

There are PWM channel pins (B stands for base board, E stands for extended board), output current, feedback current, PWM description and corresponding status.

Channel	Pin	Discription	Output current	Read-back Current	Output status
PWM 1	B02		12345	12345	123
PWM 2	B04		12345	12345	123
PWM 3	B06		12345	12345	123
PWM 4	B08		12345	12345	123
PWM 1	E02		12345	12345	123
PWM 2	E04		12345	12345	123
PWM 3	E06		12345	12345	123
PWM 4	E08		12345	12345	123
PWM 5	E14		12345	12345	123
PWM 6	E16		12345	12345	123
PWM 7	E18		12345	12345	123
PWM 8	E20		12345	12345	123

PWM outputs display

5.2.2 Load chart information

Press  key to enter into —Load chart code display—. The Load chart code is according to different load chart in respective OM.

AT — “bad chart code display”, press  key and then input the load chart code for the corresponding load chart information; press  directly back.

input inquiry code

001

Load chart inquiry code & description					
001	Main boom	116	Luffing Jib 42m (85°)	132	Luffing Jib 57m (75°)
101	Luffing Jib 27m (85°)	117	Luffing Jib 42m (75°)	133	Luffing Jib 57m (65°)
102	Luffing Jib 27m (75°)	118	Luffing Jib 42m (85°)	134	Luffing Jib 60m (85°)
103	Luffing Jib 27m (65°)	119	Luffing Jib 45m (85°)	135	Luffing Jib 60m (75°)
104	Luffing Jib 30m (85°)	120	Luffing Jib 45m (75°)	136	Luffing Jib 60m (65°)
105	Luffing Jib 30m (75°)	121	Luffing Jib 45m (65°)	201	Fixed Jib 12m-10°
106	Luffing Jib 30m (65°)	122	Luffing Jib 48m (85°)	202	Fixed Jib 12m-30°
107	Luffing Jib 33m (85°)	123	Luffing Jib 48m (75°)	203	Fixed Jib 18m-10°
108	Luffing Jib 33m (75°)	124	Luffing Jib 48m (65°)	204	Fixed Jib 18m-30°
109	Luffing Jib 33m (65°)	125	Luffing Jib 51m (85°)	205	Fixed Jib 24m-10°
110	Luffing Jib 36m (85°)	126	Luffing Jib 51m (75°)	206	Fixed Jib 24m-30°
111	Luffing Jib 36m (75°)	127	Luffing Jib 51m (65°)	207	Fixed Jib 30m-10°
112	Luffing Jib 36m (65°)	128	Luffing Jib 54m (85°)	208	Fixed Jib 30m-30°
113	Luffing Jib 39m (85°)	129	Luffing Jib 54m (75°)	209	Fixed Jib 36m-10°
114	Luffing Jib 39m (75°)	130	Luffing Jib 54m (65°)	210	Fixed Jib 36m-30°
115	Luffing Jib 39m (65°)	131	Luffing Jib 57m (85°)		

←

→

-

+

OK

Load chart code display

At the load chart information display, the load chart information is very clear- every rated load according to different boom length and different work radius in the selected OM.

[illegible]

Load chart information display

	Cursor to the right position
	Cursor to the left position
	Decrease the marked numeric value
	Increase the marked numeric value
	Confirm the input load chart code, goto the load chart information display

	Decrease the length of main boom
	Increase the length of main boom
	Decrease the work radius
	Increase the work radius
	Alarm off
	Back to the previous display

5.2.3 Error code information

Press  key to enter into —Error code information 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.

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 ■ The boom is in a non-permitted slewing zone	■ Set the correct operating mode for the operating state in question ■ Slew the boom to a permitted area.



Scroll up for the previous error code information



Scroll down for the next error code information



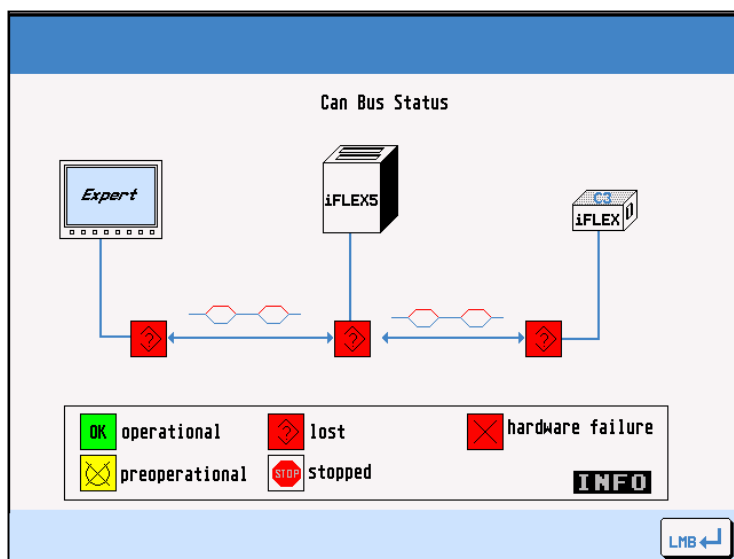
back

Error code information display

5.2.4 CAN bus status overview

Press  key to enter into —CAN bus status display”

The —CAN bus status display” show CAN communication status of all the LMI components and the meanings of the status symbol. When any node is fault, Operators can quickly find out the defective node and defective reasons.



Back

CAN bus status display

5.3 Display setup

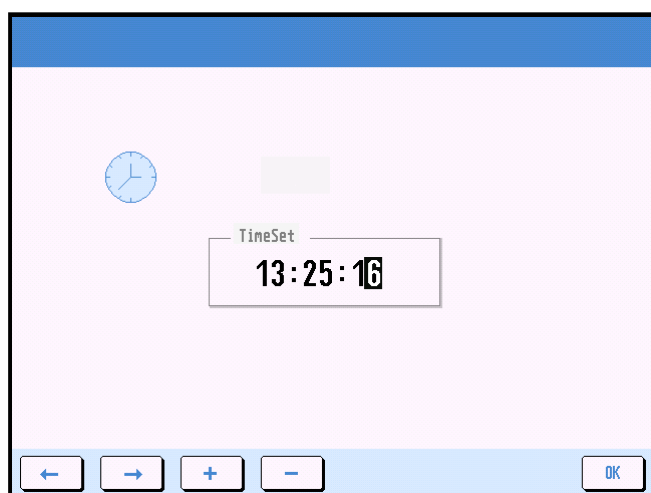


Press F3 key at the main display to enter into "display setup key line" as follow:

- | | |
|--|---------------------------------------|
| | Time setting |
| | Brightness adjusting |
| | Metric unit / Imperial unit selection |
| | Chinese/English version selection |
| | Alarm off |
| | Back |

5.3.1 Time setting

Press key to enter into "time setting display"

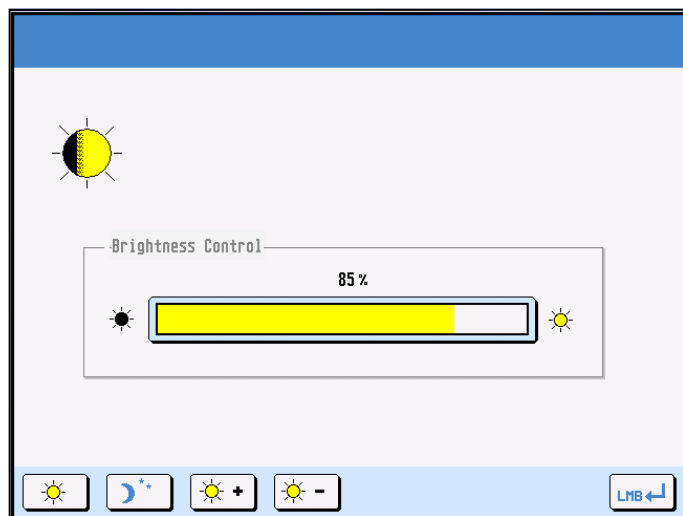


Time setting display

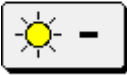
- | | |
|--|-----------------------------------|
| | Cursor to the right position |
| | Cursor to the left position |
| | Decrease the marked numeric value |
| | Increase the marked numeric value |
| | Confirm the time setting and back |

5.3.2 Brightness adjusting

Press  key to enter into —Brightness adjusting display—



Brightness adjusting display

-  daytime mode-
brightness directly to 100%
-  night mode
brightness directly to 65%
-  Brightness progressively
increase —5%
-  Brightness progressively
decrease —5%
-  Confirm the brightness
adjusting and back

5.3.3 Metric unit / Imperial unit selection

Press  key to select Metric unit or imperial unit

In the metric display, the unit of length is “m” and the unit of weight is “t”. In the imperial display, the unit of length is “ft” and the unit of weight is “lbs”.

Metric and Imperial conversion relationship: 1 m = 3.2808 feet; 1 kg = 2.20462 pounds.

5.3.4 Chinese/English language selection

Press  key to select Chinese language or English language.

6 Inspection maintenance and considerations

6.1 Inspection before operation

- Check all components of the LMI system to make sure no one is damaged or break off.
- Turn the power on and detect that if the display is normal and if there is warning, malfunction, error indication and so on.
- After display works normally, detect that if all the system works normally.

6.2 Routine maintenance

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

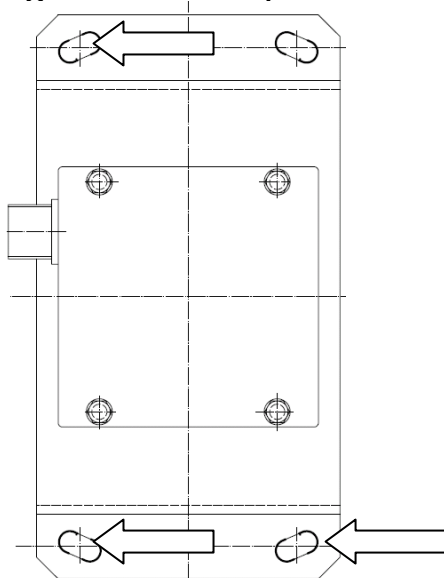
6.3 Routine consideration

- Prevent the central unit (display)、power supply cabin、sensors from severely shake.
- Each part of the LMI system including central unit (display), sensors and so on had been regulated critically and ingress protection checked 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.

6.4 Buzzer alarms

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

6.5 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 sensor. Release the adjusting bolt (see the left pic.), Slowly turn the angle sensor till the displayed value accords with the actual value and then tighten the bolt again.

7. Trouble shooting

In case of any improper operation or LMI malfunction during the crane's operation it will display some certain code (error code) for the user's information. Some errors are caused by illegal operation, some by people's cause and some are caused by other factors.

The following codes can be an aid and help for how to use and maintenance the LMI system:

Notice

If you cannot solve the problem according to the following contents, please contact us as soon as possible.

Tel: 0516-87885700 Fax: 0516-87793971

ERROR CODE	MALFUNCTION	CAUSE	SOLUTION
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
		·The boom is in a non-permitted slewing zone	·Slew the boom to a permitted area.
		·The selected operating mode is not available in the Flash-EPROM or blocked	·Check the Data software in the Flash-EPROM
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
		·The selected main boom length is not available in the Flash-EPROM or blocked	·Check the Data software in the Flash-EPROM
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.

ERROR CODE	MALFUNCTION	CAUSE	SOLUTION
E07	Overload relais check	·relais = overload active and CU input 20 = on	·check cable to overload relais and CU input 20
		·relais = no overload and CU input 20 = off	·check relais
E12	Fallen below lower limit value in measuring channel "force main boom right"	·Cable between the central unit and the force transducer defective or loose. Water inside the plug of the transducer	·Check cable as well as plugs, replace, if need be
		·Force transducer defective	·Replace force transducer
		·Electronic component in the measuring channel is defective.	·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	·Check cable as well as plugs, replace, if need be
		·Force transducer defective	·Replace force transducer
		·Electronic component in the measuring channel is defective.	·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	·Check cable as well as plugs, replace, if need be
		·Force transducer defective	·Replace force transducer
		·Electronic component in the measuring channel is defective.	·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	·Check cable as well as plugs, replace, if need be.
		·Angle potentiometer defective	·Replace angle sensor
		·Electronic component in the measuring channel defective.	·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

ERROR CODE	MALFUNCTION	CAUSE	SOLUTION
E18	Fallen below lower limit value in measuring channel "MB back stop pressure"	·Cable between the central unit and the pressure transducer defective or loose. Water inside the plug of the transducer	·Check cable as well as plugs, replace, if need be
		·Force transducer defective	·Replace force transducer
		·Electronic component in the measuring channel is defective.	·Replace sensor unit
E19	Fallen below lower limit value in measuring channel "jib back stop pressure "	·Cable between the central unit and the pressure transducer defective or loose. Water inside the plug of the transducer	·Check cable as well as plugs, replace, if need be
		·Force transducer defective	·Replace force transducer
		·Electronic component in the measuring channel is defective.	·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	·Check cable as well as plugs, replace, if need be.
		·Angle potentiometer defective	·Replace angle sensor
		·Electronic component in the measuring channel defective.	·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	·Check cable as well as plugs, replace, if need be.
		·Angle potentiometer defective	·Replace angle sensor
		·Electronic component in the measuring channel defective.	·Replace sensor unit
E1E	Fallen below lower limit value in measuring channel "force derricking system left"	·Refer to E14	·Refer to E14

ERROR CODE	MALFUNCTION	CAUSE	SOLUTION
E1F	Fallen below lower limit value in measuring channel "force derricking system right"	·Refer to E14	·Refer to E14
E22	Upper limit value in measuring channel "force main boom right" has been exceeded.	·Refer to E14	·Refer to E14
E23	Upper limit value in measuring channel "force jib right" has been exceeded.	·Refer to E15	·Refer to E15
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 E15	·Refer to E15
E27	Upper limit value in measuring channel "force luffing jib left" has been exceeded.	·Refer to E14	·Refer to E14
E28	Upper limit value in measuring channel "MB back stop pressure" has been exceeded.	·Refer to E14	·Refer to E14
E29	Upper limit value in measuring channel "jib back stop pressure" has been exceeded.	·Refer to E15	·Refer to E15
E2B	Upper limit value in measuring channel "jib angle tip" has been exceeded.	·Refer to E14	·Refer to E14
E2C	Upper limit value in measuring channel "main boom angle tip" has been exceeded.	·Refer to E15	·Refer to E15
E2D	Upper limit value in measuring channel "super lift mast angle" has been exceeded (if avail.).	·Refer to E15	·Refer to E15

ERROR CODE	MALFUNCTION	CAUSE	SOLUTION
E2E	Upper limit value in measuring channel "force derricking system left" has been exceeded.	·Refer to E14	·Refer to E14
E2F	Upper limit value in measuring channel "force derricking system right" has been exceeded.	·Refer to E11	·Refer to E11
E37	Error in the logical program flow	·System program file is defective	·Upload valid system software
		·Flash-EPROM defective	·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 data file and load chart file is different	·Change data 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.	·Upload valid crane data file
		·Flash-EPROM defective	
E52	Error in load chart file.	·No valid data in the load chart file	·Upload valid load chart file
		·Flash-EPROM defective	·Replace central unit
E56	Error in crane data file.	·No valid data in the crane data file during calibration.	·Restore or upload valid crane data file
		·Flash-EPROM defective	·Replace central unit
E57	Error in serial crane data file.	·Calibration data file does not contain valid data.	·Upload calibration data file
		·Flash-EPROM defective	·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	·Upload valid load chart file
		·Base number not programmed	·Program the correct base number (1 for base 1, 2 for base 2)
		·Load chart file wrongly programmed	·Check base programming in the load chart file.

ERROR CODE	MALFUNCTION	CAUSE	SOLUTION
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.	·Check the connection between the central unit and the sensor units
		·Can bus port in the central unit defective	·Replace the central unit
		·Short circuit in a CAN Bus cable	·Replace Can Bus cable
E80	Max force derricking system	·Max force derricking system exceeded	·Reduce force derricking system
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.
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	·Luff boom to the permitted range
		·Angle measurement of main boom defective.	·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	·Luff the auxiliary jib to the permitted range
		·Angle measurement of the jib defective	·Verify angle measurement of the auxiliary jib.

ERROR CODE	MALFUNCTION	CAUSE	SOLUTION
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	·Replace A2B switch
		·Short circuit in the cable to the A2B switch	·Replace cable to the A2B switch
EAC	A2B switch circuit disconnected	·Disconnected cable in the A2B switch	·Connect or replace cable in the A2B switch
		·Disconnected cable to the A2B switch	·Connect or replace cable to the A2B switch
EAD	No valid A2B switch status	·Sensor wrong function	·Replace A2B switch
		·CAN bus delay	·Replace cable to the A2B switch
EB2	Upper limit value in measuring channel" rope length on the winch" has been exceeded.	·Rope completely rolled up on winch (* only EB2)	·Calibrate rope length
		·see EB1	·See EB1
EB3	Upper limit value in measuring channel "hook height" has been exceeded.	·No rope length between front sheave und hook	
		·see EB1	·See EB1
EB1	Fallen below lower limit value in measuring channel "rope length on the winch"	·No rope on the winch(* only EB1)	·Calibrate rope length
		·No sensor for winch measuring available	·Mount sensor or disable function in data-program
		·Rope length not calibrated	· Calibrate rope length, layer
		·Wrong rope/winch parameters in data-programming	·Check parameter in data-program
		·Counter input not define in configuration	·Change I/O configuration
		·Counter input defective	·Change Iflex
EDD	Battery empty	·Battery check detected a low voltage of the battery	·Change battery, after this setup of RTC
			·Temporary: Press horn quit button to work without data logger
EFD	LMB Watchdog extra time	·Function needs more than 0,5 sec ist aktiv, e.g. write flash PROM	·Message is deactivated automatically after processing



www.skyazul.com

SkyAzul, Inc.

16 Walnut Street
Middletown, MD 21769
Phone 301-371-6126
Fax 301-371-0029
info@skyazul.com