3B6

LOAD MOMENT INDICATOR (LMI)
TELESCOPIC CRANES

TROUBLESHOOTING MANUAL

LTB1	Name				Code	Ballast		Outrigger		Jib Angle		Jib Length		Zone	
	C71_1: BOOM ON OUTRIGGERS				300	2,5		6,3						0	

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	Length	9,4		14,4		19,5		24,7		28,9		30,4			
2	I	0		24		48		73		93		100			
3	II	0		24		48		73		93		100			
4	III	0		24		48		73		93		100			
5	IV														
6															
7															
8	Amax	79	32	79	19	79	17	79	14	79	10	79	9		
9	Amin	0	8	0	4,3	0	2	0	1,05	0	0,5	18	0,8		
10		2		2		2		2		2		2		2	
11	3	62,4	32	71,9	20										
12	3,5	58,4	27,45	69,8	20,35	75,9	18								
13	4	54,1	24,4	67,4	20,75	74,5	18,45	76	14						
14	4,5	49,5	21,8	65,2	21,2	73,1	18,7	75,2	14,5						
15	5	45	19,4	62,8	19,3	71,7	17,3	74,6	14,3						
16	6	33,4	15,5	58	14,75	68,6	13,45	72,9	12,35	77,2	10	78,2	9		
17	7	19,1	11,5	53	11,7	65,2	10,9	71,2	10,1	75,2	9,55	76,4	8,85		
18	8			47,7	9,4	61,7	9,05	69,2	8,5	73,2	8,05	74,5	7,9		
19	9			41,8	7,65	57,8	7,7	67,9	7,25	71,2	6,9	72,5	6,8		
20	10			35	6,4	53,7	6,45	64,4	6,25	69	6	70,4	5,9		
21	11			24,7	5,4	49,4	5,4	61,8	5,4	66,8	5,25	68,2	5,15		
22	12			11	4,65	43	4,7	59	4,75	64,4	4,6	65,8	4,55		
23	13					40,4	4,05	55,8	4,1	62	4,1	63,4	4,05		
24	14					35,6	3,55	52,6	3,6	59,4	3,6	61	3,6		
25	15					30,6	3,05	48,9	3,1	57	3,1	59,5	3,1		
26	16					23,7	2,75	45	2,75	54,2	2,8	55,6	2,8		
27	17					12,9	2,35	40,8	2,4	51,4	2,4	53	2,4		
28	18							36,2	2,15	48,6	2,2	50,1	2,2		
29	19							31,4	1,95	45,8	1,95	47,2	1,95		
30	20							26,4	1,7	42,8	1,7	44,2	1,7		
31	21							22,6	1,5	40	1,5	43,3	1,5		
32	22							12,4	1,35	36	1,35	37,8	1,35		
33	23									31,2	1,2	33,8	1,2		
34	24									26	1,05	29,2	1,05		
35	25									19,2	0,9	24	0,9		
36	26									11	0,8	18	0,8		
37	27										0,5				
38	28														
39	29														
40															

Rev. 01/08/05

Complies to the MACHINES DIRECTIVE Standards: EN60204-1, EN954, EN12077-2
EMC according to the " Heavy Industrial Environment" category: EN50081-2, EN50082-

TEREX

INDEX

ACCESS PROCEDURES
LOAD MONITORING SYSTEM (LMI)

This systems has been conceived and developed to offer two different levels of functionality of access to internal data, according to the actions to be done.
The basic access level (Operator) does not need any password; this one, in fact, is required for possible assistances, only by Technical Service Personnel (failure detecting and repairing).

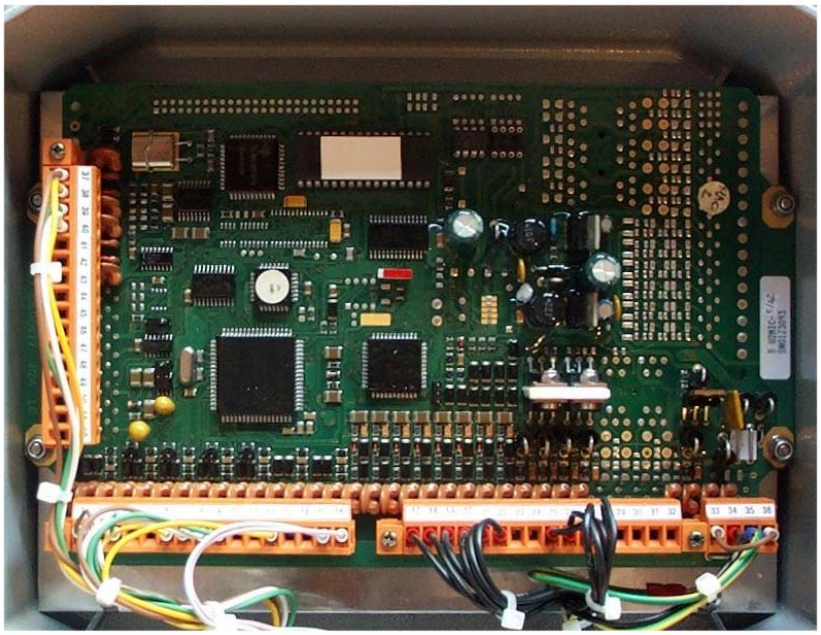
1° LEVEL:
OPERATOR:
Without needing PASSWORD (also see OPERATOR MANUAL) all working information of the machine are available through several monitoring given by the display panel; starting from basic working data: lifted load, max admitted load, outreach, working conditions, tilting percentage;
Just pressing the GREEN button key, it is possible to show machine working data in a graphic way.
The aim to give to the Operator the possibility of entering these readings, allowing to communicate them to the Technical Assistance Department, giving relevant data, possibly avoiding a direct Service on site.
The Operator can also find some information to solve easy troubles in his OPERATOR MANUAL

2° LEVEL: (PASSWORD) SENSORS REPLACEMENTS :
TECHNICAL ASSISTANCE DEPT. AND AUTHORIZED DEALERS
The second level corresponds to the information contained in this TROUBLE SHOOTING MANUAL, where all details referred to system components are included (Main Unit, Transducers, Display Panel), troubleshooting codes introduction, and the useful information to remove the problems without specific tools (except a voltmeter).
As far as Pressure Transducers are concerned, please note that they do not need any calibration, as they are totally interchangeable.

FINE CALIBRATION.
This means the complete machine calibration, that is done at the first start-up of the machine.
To this aim a **PASSWORD** is given, allowing to enter into the functions of the program, as the fine calibration of geometrical data and lifted load, and to perform their on-site calibration. These calibrations need the use of a PC.

COMPONENTS LOCATION ON THE MACHINE

MAIN CONTROL UNIT
CODE: U2MIC-2/XX



U2MIC-2/XX Main Control Unit is equipped with memories for Data and program storage not erasable EPROM type or erasable EEPROM type for calibration parameters storage.

INPUT/OUTPUT circuits are self-protected against overloads and short circuits.

Power supply internal circuits are designed to operate at low voltage and are provided with all protection for hard environment.

U2MIC-2/XX Main Control Unit is provided with all EMC necessary components.

GENERAL CHARACTERISTICS

☐ ***POWER SUPPLY***

- From vehicle battery :10-28 V
- Current consumption, without loads : ~0,35A

☐ ***INPUT / OUTPUT***

- **14 Digital Inputs**
- **14+1 Digital Outputs**
- **6 (+2) Analog Inputs**
- Watch Dog Dynamic Output
- Voltage working range : 10-28 VCC
- Output Current : 2A
- Analog Inputs Voltage : 0- 5V
- Serial Links RS232, CAN BUS
- Clock and Buffer Battery
- Epoxy Resin Coating
- 32 Kb E2prom for Data Recording

MECHANICAL CHARACTERISTICS

☐ ***MECHANICAL DIMENSIONS***

- Case Dimension : 260 x 160 x 91 mm
- Fixing holes : 240 x110 mm

☐ ***VIBRATIONS***

- Continuous : 5g's from 20 to 400Hz Over 3 AXIS
- Shock : 10g's

☐ ***ENVIROMENTAL***

- Salt spray resistance over 48 Hours

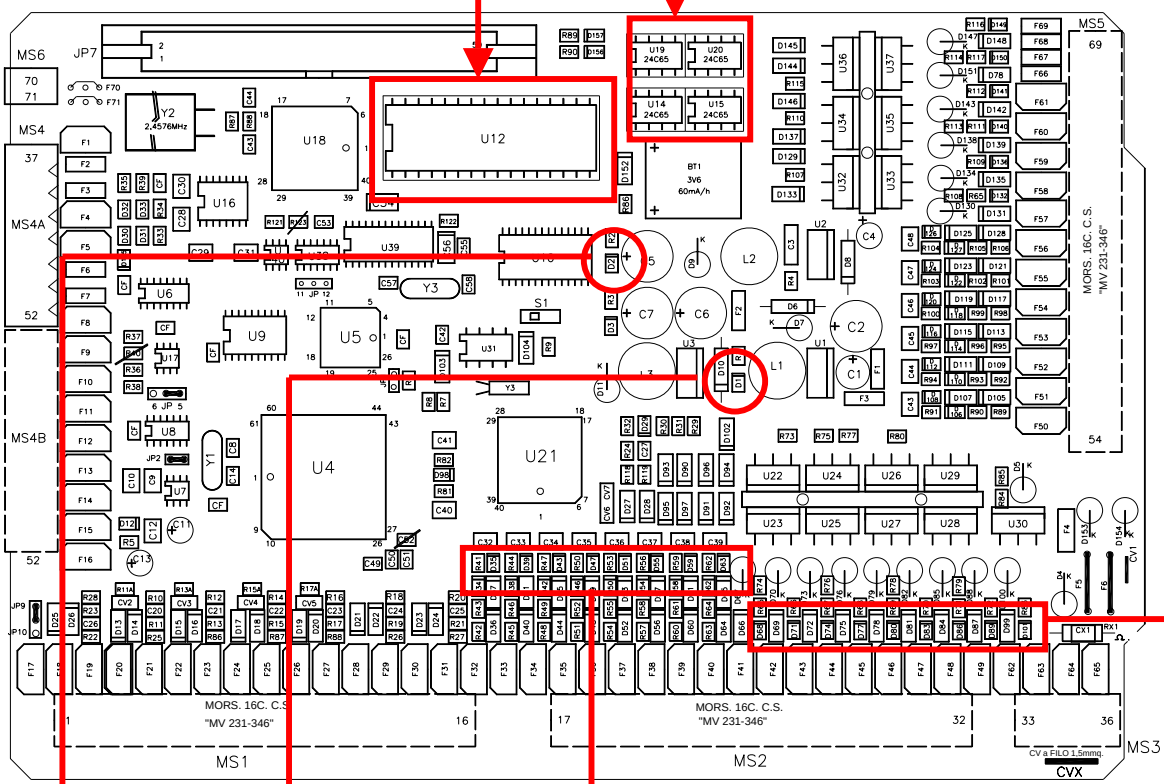
☐ ***TEMPERATURE***

- Working range :-30 -+70°C
- Storage range :-45 - +85°C

MAIN CONTROL UNIT : CONNECTIONS and SIGNALS

EEPROM:
PROGRAM AND
LOAD TABLES

EEPROM:
CALIBRATION DATA,
BLACK BOX



D2 = RED LED
When lit means
that +15V Voltage
is active

D1 = RED LED
When lit means
that +5V Voltage
is actiive

Note :
D1 et D2 always have to be
lit when the system is ON

R41 D35 R44 D39 R47 D43 R50 D47 R53 D51 R56 D55 R59 D59 R62 D63

D35, D39, D43, D47, D51, D55, D59, D63 = RED LED's
They show the INPUT status
ON = ACTIVE INPUT

D68 D69 D71 D72 D74 D75 D77 D78 D80 D81 D83 D84 D86 D87 D89 D99 D101

D68, D71, D74, D77, D80, D83, D86, D89, D101 = RED LED's
They show the OUTPUT status ON = ACTIVE OUTPUT

NOTE:

CODE	DIODE	PIN	FUNCTION
DI0	D35	17	(Turret position sensor) Length type
DI1	D39	18	Anti two block
DI2	D43	19	Turret micro switch stop
DI3	D47	20	Not used
DI4	D51	21	Not used
DI5	D55	22	Not used
DI6	D59	23	Not used
DI7	D63	24	Main by pass key

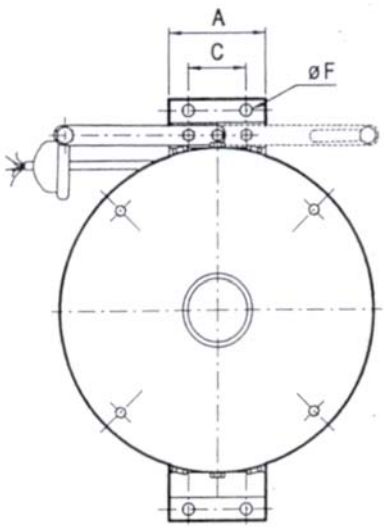
NOTE:

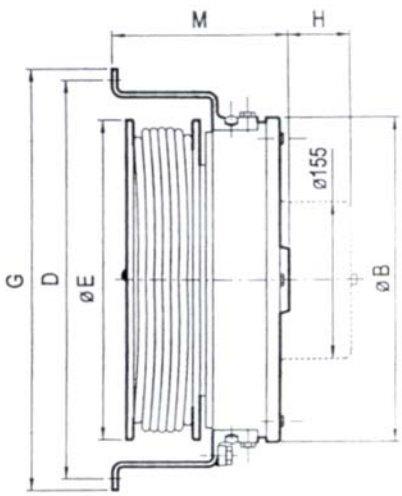
CODE	DIODE	PIN	FUNCTION
DO0	D68	25	Movement's shut off
DO1	D71		Not used
DO2	D74		Not used
DO3	D77		Not used
DO4	D80		Not used
DO5	D83		Not used
DO6	D86		Not used
DO7	D89		Not used
DO8	D101		Not used

AC MCP ANGLE / EXTENSION SENSOR Code : AC MCP214A/3P

AC MCP servocable-reels are used where telescopic boom extensions over 12 meters are needs.
The unwinding transducer (or transducers) is formed by drum cable servo-winders on which a cable is wound that is attached to the arm head (or to intermediate elements).
With the unwinding extension, the wire unwinds measuring the unwinding length thanks to a potentiometric sensing device.
In the use of the crane, it is always necessary to carefully survey the cable unwinding along the arm, because it can be subjected to accidental break if collided.
The replacement of this element is to be done by qualified personnel only.

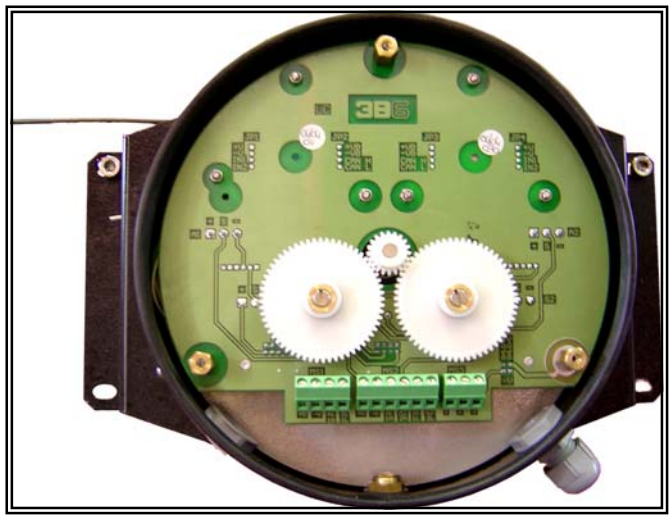
The angle transducer (inside to cable reel) detects the absolute angle of the crane arm thanks to a potentiometric sensing device.
The signal is used by the limiter to compute the geometry.
The replacement of this element is delicate and for this reason it must be done by qualified personnel.





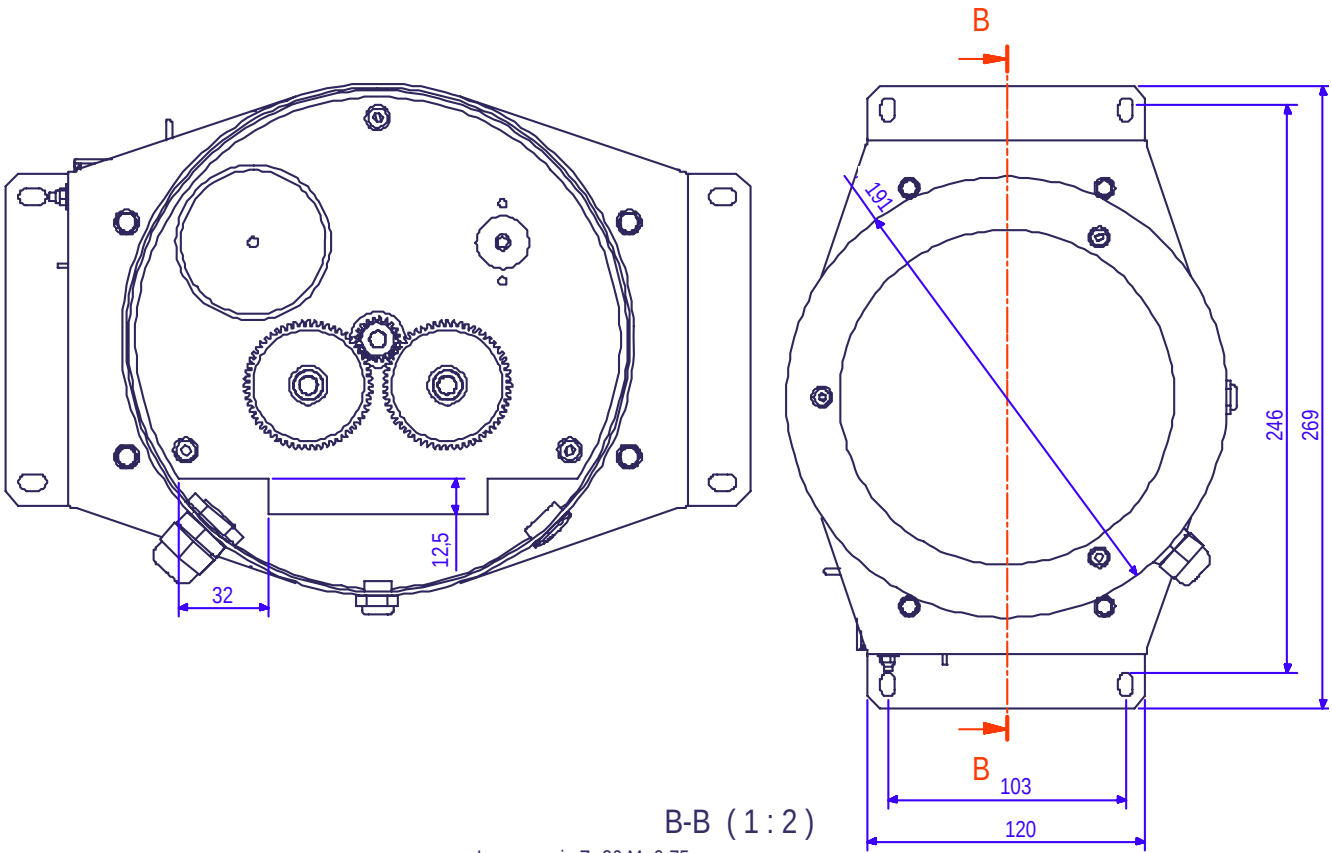
Slip Rings	Type	Length mm	Diam mm	A mm	B mm	C mm	D mm	E mm	F mm	G mm	H mm	M mm	MODEL
3	3x0,22 shields.	32000	3,8	100	323	60	460	420	11	495	0	180	AC MCP214I/3P

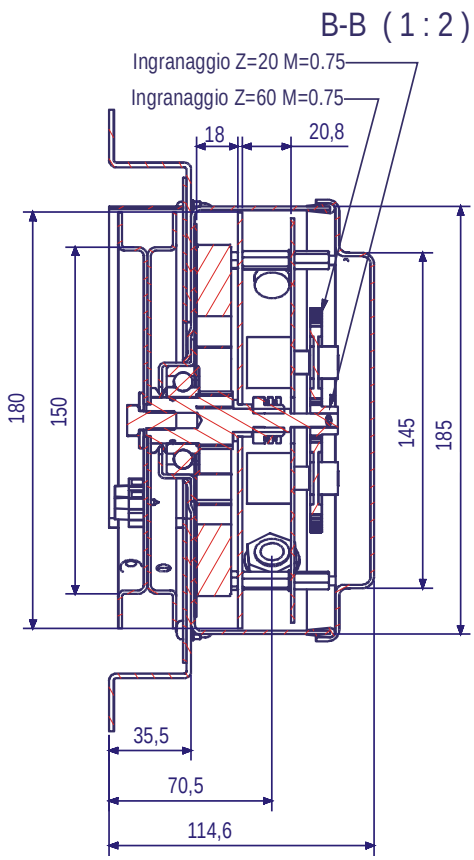
EXTENSION SENSOR CODE : ACT



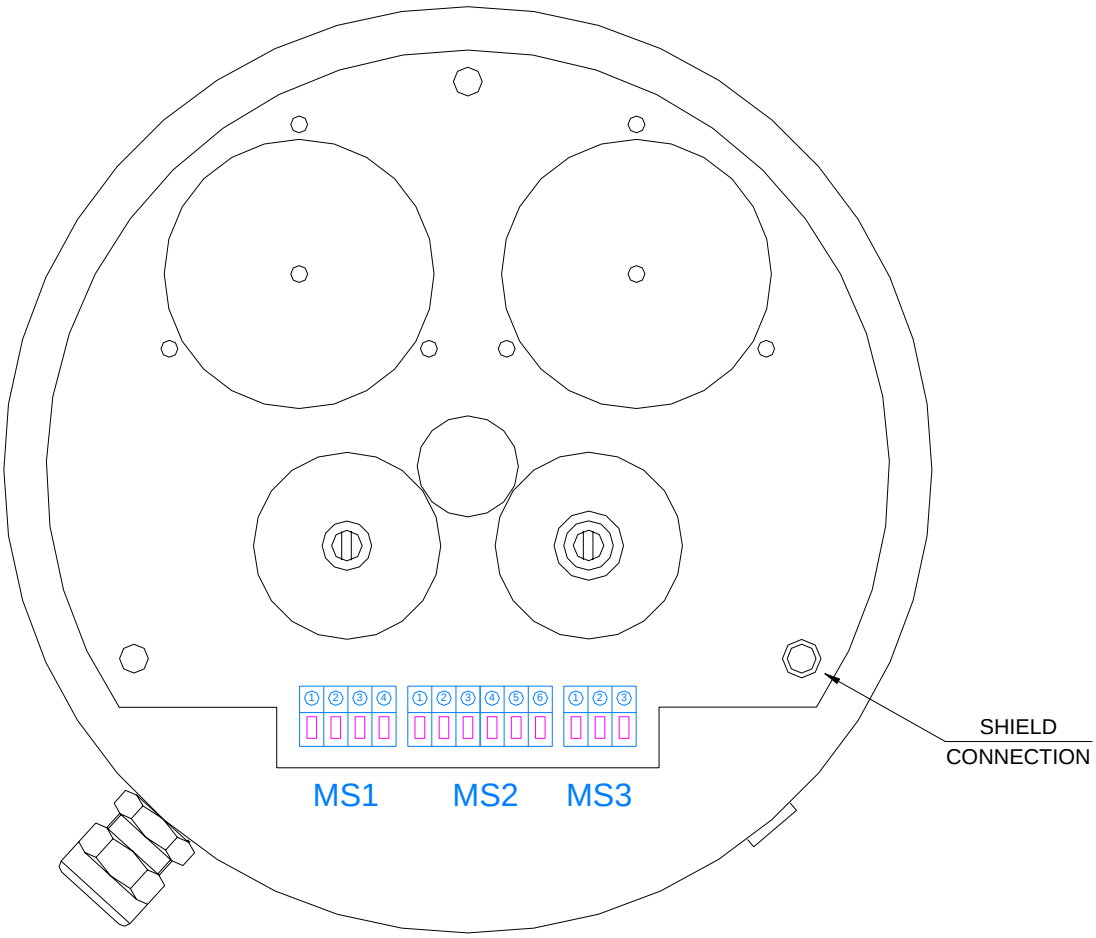
The boom and angle sensor is formed by a cable reel having pulley on which a cable is wounded; the other side is attached to the boom head (or to the first telescopic element in case of proportional extension).
Extending the boom, the cable unwinds (max. 12 mt.) measuring the extension length signal through 10-turns servo potentiometer.
While using the machine, it is always necessary to carefully survey the unwinding cable along the boom, because it can be subject to accidental break if collided.
The replacement of this element has to be done by Qualified Personnel only.
The angle sensor (inside the cable reel) detects the absolute angle of the boom.
Analog signals from above potentiometers are used by the LMI to compute the boom geometrical data.

OVERALL DIMENSION





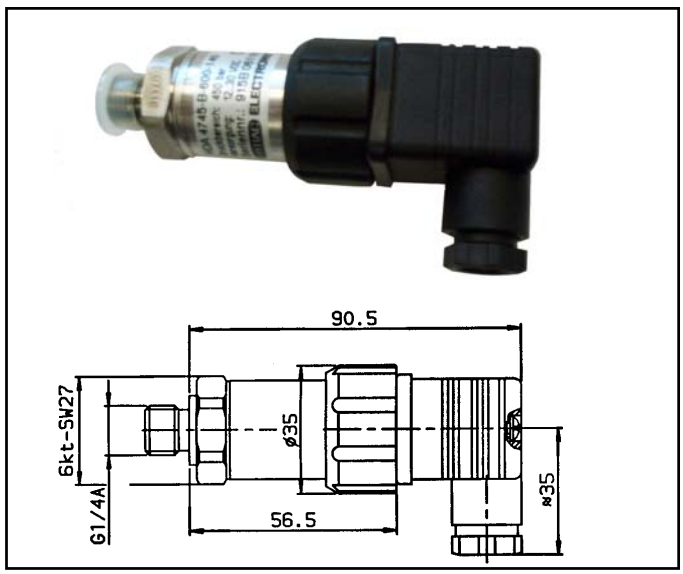
WIRING DIAGRAM



MS2	DESCRIPTION
1	+V (+5V)
2	-V (0V)
3	ANGLE1
4	ANGLE2
5	LENGTH1
6	LENGTH2

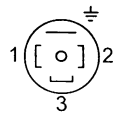
PRESSURE TRANSDUCERS CODE : Y11 4745-350

Pressure transducers detect the pressure into boom lifting cylinders; typically 2 sensors are required for measuring the differential pressure on lifting cylinders : they must be installed on the two cylinder chambers.
By these values, weight computing is taken.
These sensing devices detect the pressure by means of a sensor, which transforms the measured pressure into a direct voltage proportional to the pressure itself.
An on-board amplifier is included in the transducer itself.
Any possible replacement of these elements is very easy because of their are complete compatibility.



TECHNICAL SPECIFICATIONS

PIN CONNECTIONS



PIN	3 Wires
1	+VB
2	output signal 0,5 .. 5,5 V
3	GND

INPUT DATA

• Measuring ranges	350 bar
• Overload ranges	800 bar
• Max pressures	2000 bar
• Parts in contact with oil	Stainless steel ; Viton seal

OUTPUT DATA

• Output Signal	0,5 ... 5,5V
• Temperature compensation	Max ≤0,15%/10K Typ.≤0,08%/10K
• Accuracy	Max ≤0,3%FS Typ.≤0,1%FS
• Hysteresis	Max ≤0,1%FS Typ.≤0,05%FS
• Repeatability	≤0,05%FS

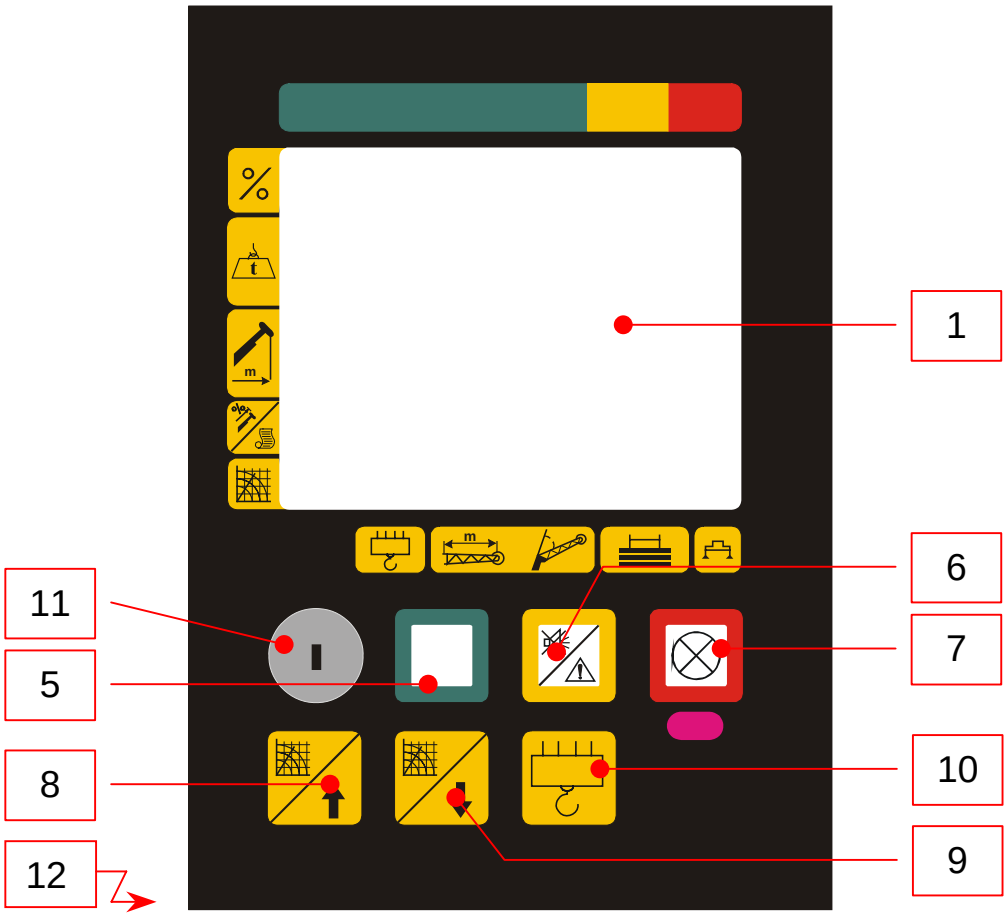
ENVIRONMENTAL CONDITIONS

• Nominal temperature range	-25 ...+85°C
• Operating temperature range	-40 ...+85°C
• Storage temperature range	-40 ... +100°C
• Fluid temperature range	-40 ... +100°C
• Protection class	IP65

OTHER DATA

• Supply voltage	12 ...30V
• Current consumption	ca.15mA
• Life expectancy	10^6 load cycle
• Weight	145g.

CONTROL PANEL DESCRIPTION



1 Working data display;

5 GREEN Button/lamp : if pressed, it allows the operator to scroll the pages
lit = safety

6 AMBER Button/lamp :The lamp lit indicates that the load has reached the pre-alarm condition. Pressing the button, the buzzer will stop.

7 RED Button/lamp :The lamp lit indicates that the load has reached the maximum load allowed and the shut off has been performed;
The flashing light indicates that the machine is in shut down procedures and the by pass key is activated.
The button can also used to confirm a selection.

8 Operating mode selection button: press to increase operating mode value;

9 Operating mode selection button: press to decrease operating mode value;

10 Rope number (tackle) selection key: press as many times as necessary to obtain the required value in order to achieve a correct load reading;

11 Key to exclude the manoeuvre block

Note : The function of the unstable key with return spring consists on disable the automatic alarm function of the safety system.
Only the authorised staff can use the key to by-pass the safety system. In case of improper use, the safety equipment and the crane manufacturer are relieved of any responsibility.

11 Buzzer (positioned on the rear panel) :
Intermittent beeping = pre alarm condition;
Continuous beeping = alarm condition (shut off movements).

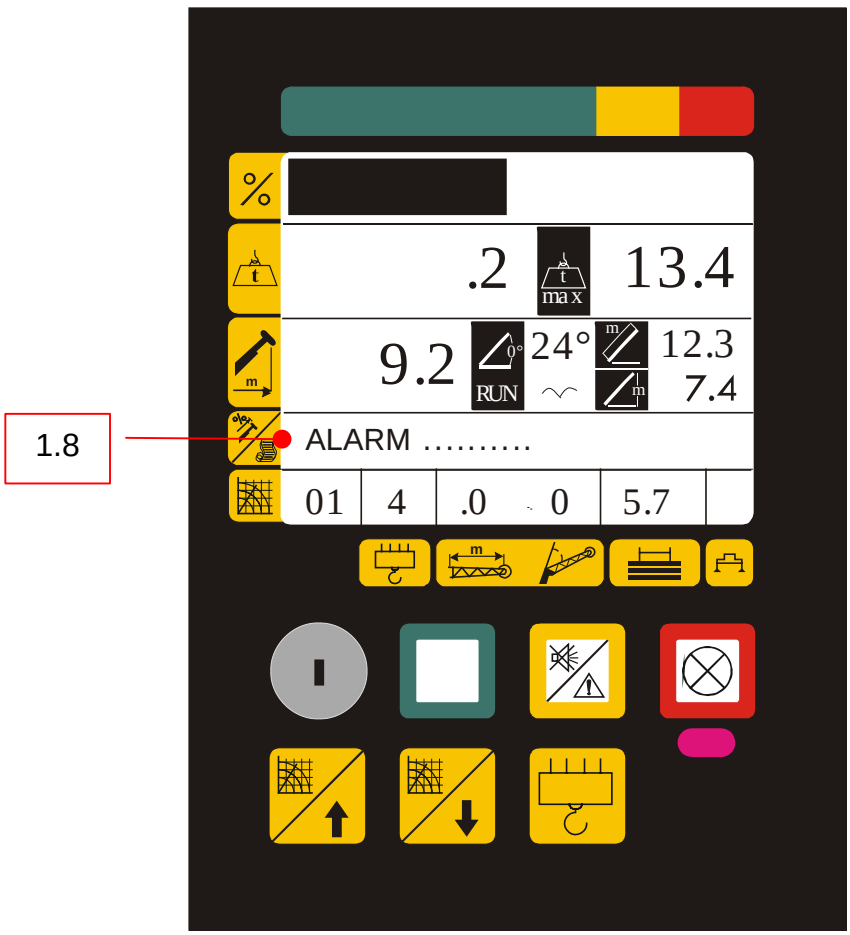
TROUBLESHOOTING

The first step to seek a fault is to identify the problem which occurred to the machine Operator.

Thanks to the auto-diagnostic procedures, which are able to recognise transducers failures, cable breaking and internal electronic faults,alarm codes are automatically shown on the display, allowing the operator to a certain capability of repairing, and also to better inform the Technical Assistance even remotely.

When an alarm occurs, the LMI puts itself in a safe condition (shut down) blocking the dangerous movements and, at the same time, the display shows the alarm corresponding message on the display upper row.

Depending on the message, the fault can be identified.



Alarm codes are listed in the following pages.

The list also includes some hints able to solve the problems and get back to normal working conditions.

ALARM CODES AND ACTIONS TO TAKE

Alarm code	Description	What to do
56 Page 18,32	Memory data not reliable	• Switch the system off and on. If the alarm persists, please, contact Technical Assistance to: •Verify that E2prom chip is fitted properly in its socket. • Re-enter data and save them again • Replace the E2PROM chip and recalibrate the machine
15 Page 19, 20, 21,32	Angle sensor reading lower than the minimum value	• Verify that the wiring and the connectors are not in short circuit. If the alarm persists, please, contact Technical Assistance : • Verify the angle sensor integrity.
25 Page 19, 20, 21, 32	Angle sensor reading higher than the maximum value	•Verify that the cable or the connector wiring is not open If the alarm persists, please, contact Technical Assistance : • Verify the angle sensor integrity.
12 Page 25	Pressure reading of the main cylinder (bottom side) lower than the minimum.	• Verify that the cable or the connectors wiring are not in short circuit If the alarm persists, please, contact Technical Assistance : • Verify the pressure transducer integrity
22 Page 26	Pressure reading of the main cylinder (bottom side) higher than the maximum.	• Verify that the cable or the connector wiring are not open If the alarm persists, please, contact Technical Assistance : •Verify the pressure transducer integrity

Alarm code	Description	What to do
13 Page 27	Pressure reading of the main cylinder (rod side) lower than the minimum.	•Verify that the wiring and the connectors are not in short circuit If the alarm persists, please, contact Technical Assistance : •Verify the pressure transducer integrity
23 Page 28	Pressure reading pressure of the main cylinder (rod side) higher than the maximum.	• Verify that the cable or the connector wiring are not open If the alarm persists, please, contact Technical Assistance : •Verify the pressure transducer integrity
11 Page 29, 30, 31	Boom length sensor total reading lower than the minimum value	• Verify that the wiring and the connectors are not in short circuit If the alarm persists, please, contact Technical Assistance: Verify the length transducer integrity
21 Page 29, 30, 31	Boom length sensor total reading higher than the maximum value	• Verify that the cable or the connector wiring is not open If the alarm persists, please, contact Technical Assistance : • Verify the length transducer integrity
E01 RADIUS MIN	The boom's angle has overtaken the maximum value	• Lower the boom
E02 RADIUS MAX	This message appears when the boom is positioned in a way that, referring to the load charts, there isn't any load charts table applicable	•Lift or close the crane boom until a load chart table can be applied.

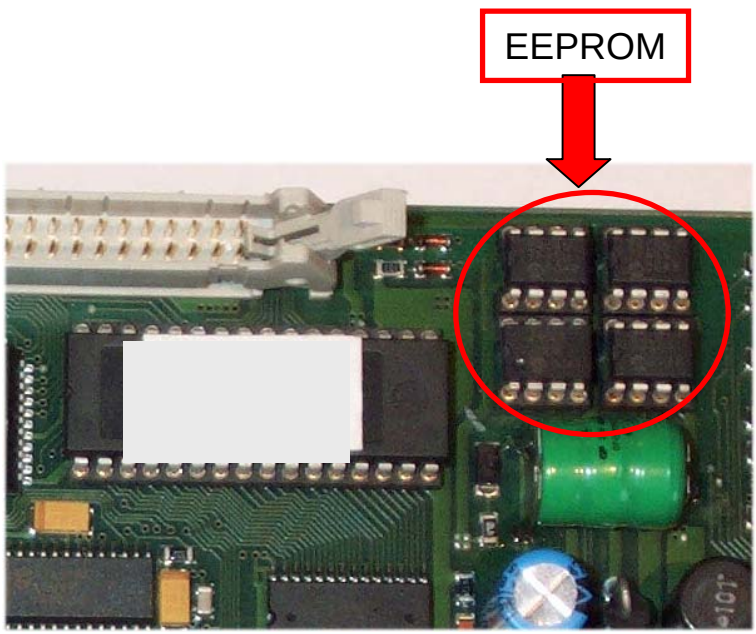
Alarm code	Description	What to do
18	Table charts not available.. The operating condition selection is missing	•Please, select the operating mode in use and confirm it.
20	Group Alarm.Configuration errore	•Please, select the operating mode in use and confirm it.
6 Page 22, 23, 24, 32	Boom length sensor 1 reading lower than the minimum value	• Verify that the wiring and the connectors are not in short circuit If the alarm persists, please, contact Technical Assistance: Verify the length transducer integrity
7 Page 22, 23, 24, 32	Boom length sensor 1 reading higher than the maximum value	• Verify that the cable or the connector wiring is not open If the alarm persists, please, contact Technical Assistance : • Verify the length transducer integrity

NOTE: The code of the alarms can change in case of particular functions or client needs

ALARM CODE 56 : MEMORY DATA NOT RELIABLE

CAUSE:

All the calibration data are stored in four EEPROM 24C65.
Through the “Check-sum” equation, software checks continuously the result to the original memorised value. When detecting a difference, the display will show the following message : ALARM 1 = memory data not reliable.



ACTION TO TAKE:

1) Switch the system off and on.
2) Verify that the EEPROM chip is fitted properly in its socket.
3) Re-enter data and save again, switch off and on again.
4) If the problem persists, replace the PC board making sure that software/parameters installed are corresponding to the machine characteristics.

ALARM CODE 15 :
ANGLE TRANSDUCER READING
LOWER THAN THE MINIMUM VALUE(*)

CAUSE:

The signal from the angle transducer to the main PC board is lower than the minimum programmed value.
This can be produced by a short-circuit in the electrical wiring, between the Main Unit and Sensor or the sensor itself is in interdiction.

ACTION TO TAKE:

- Verify the wiring
- Verify cable reel PC board proper power supply
  (refer to “CABLE REEL POWER SUPPLY VERIFYING” section – page 20).
- Verify angle potentiometer
  (refer to “ANGLE POTENTIOMETER VERIFYING” section – page 21).

ALARM CODE 25:
ANGLE TRANSDUCER READING
HIGHER THAN THE MAXIMUM VALUE (*)

CAUSE:

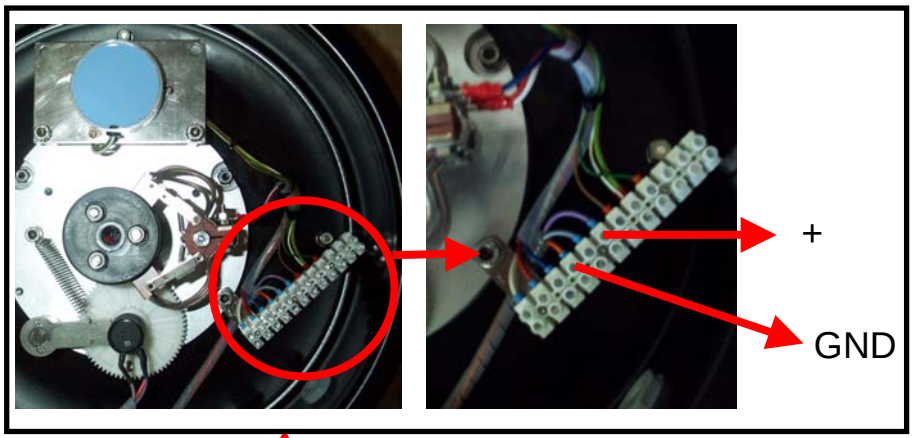
The signal from the angle transducer to the main PC board is higher than the maximum programmed value.
This can be produced by a break in the electrical wiring, between the Main Unit and Sensor or the sensor itself is in saturation.

ACTION TO TAKE:

- Verify the wiring
- Verify cable reel PC board proper power supply
  (refer to “CABLE REEL POWER SUPPLY VERIFYING” section – page 20).
- Verify angle potentiometer
  (refer to “ANGLE POTENTIOMETER VERIFYING” section – page 21).

(*) : NOTE: Main Unit Processor identifies below and over the signal range a minimum zone and a maximum zone in order to check the sensor

CABLE REEL POWER SUPPLY VERIFYING



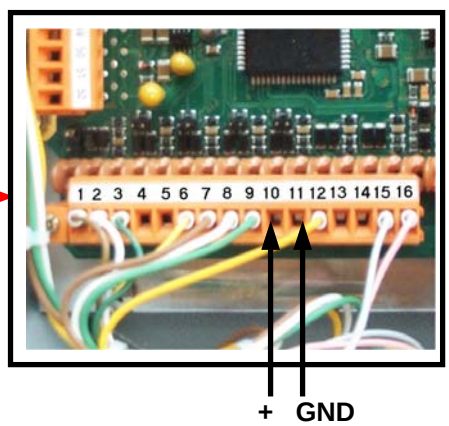
Verify 5Volts between + and GND on cable reel board

TRUE

Verify the Potentiometers (**)

FALSE

Verify on the Main PC board 5Volts between 10(+) and 11(GND)



TRUE

Cable brake down. Check the cable-reel cable

FALSE

Disconnect wires 10 and 11 from the Main pc board and Check for 5Vdc

TRUE

Probably the cable is in short circuit. Check cable

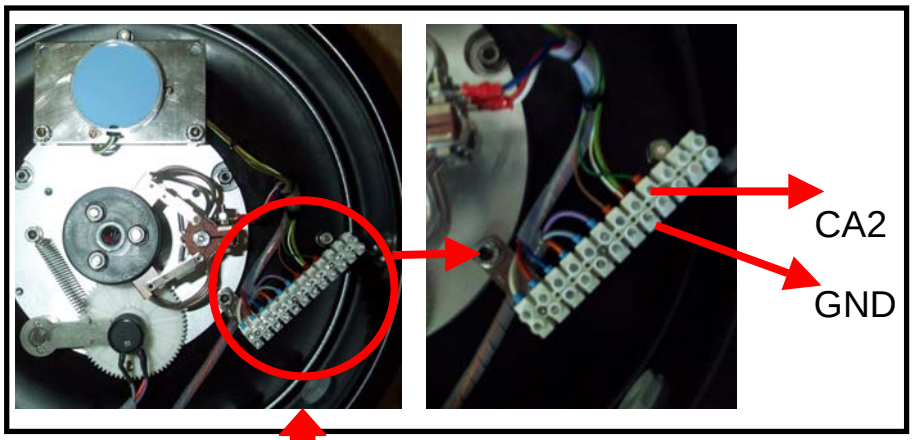
FALSE

Main pc board Is faulty. Replace it with a new one (*)

(*) REFER ALSO TO EPROM and EEPROM MEMORIES REPLACEMENT - page 32
(**) REFER TO page 21

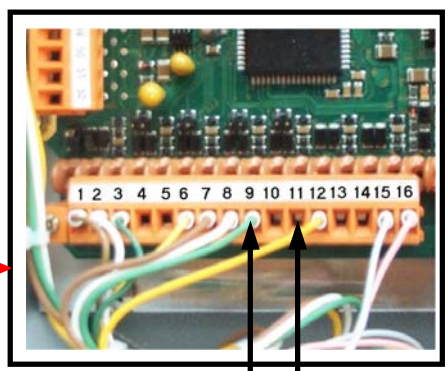
ANGLE POTENTIOMETER VERIFYING

Put the machine boom at 0° (horizontal).



Verify between CA2 e GND +2,5Vdc +/- 5%

- FALSE → Angle potentiometer broken (**)
- TRUE → Raise the boom slowly.
  - Verify with a voltmeter that the signal increases in a linear and continuous way.
    - Losses of Signal → Angle potentiometer broken (**)
    - The variation is continuous and linear → Verify on the Main pc board the potentiometer signal on 9(CA2) e 11(GND)
      - The signal is not correct → Problems on the Connection Cable. Probably short circuited. Check the cable
      - The signal is correct → The Main pc board is faulty. Proceed with the replacement (*)



(*) REFER ALSO TO EPROM and EEPROM MEMORIES REPLACEMENT - page 32
(**) REFER ALSO TO POTENTIOMETERS ALIGNMENT - page 33

ALARM CODE 6 :
BOOM LENGTH TRANSDUCER READING LOWER THAN THE MINIMUM VALUE(*)

CAUSE:

The signal from the boom length transducer to the main PC board is lower than the minimum programmed value.
This can be produced by a short-circuit in the electrical wiring, between the Main Unit and Sensor or the sensor itself is in interdiction.

ACTION TO TAKE:

- Verify the cabling.
  Verify cable reel PC board proper power supply
  (refer to “CABLE REEL POWER SUPPLY VERIFYING” section – page 23).
- Verify length potentiometer
  (refer to “EXTENSION POTENTIOMETER VERIFYING” section - page 24).

ALARM CODE 7 :
BOOM LENGTH TRANSDUCER READING HIGHER THAN THE MAXIMUM VALUE (*)

CAUSE:

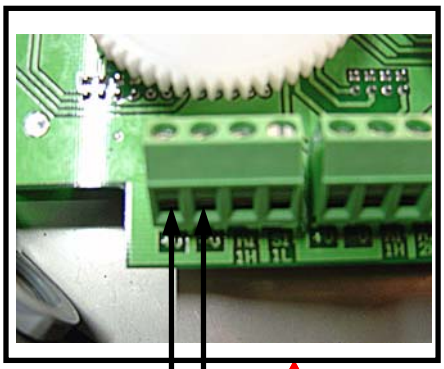
The signal from the boom length transducer to the main PC board is higher than the maximum programmed value.
This can be produced by a short-circuit in the electrical wiring, between the Main Unit and Sensor or the sensor itself is in saturation.
.

ACTION TO TAKE:

- Verify the cabling.
- Verify cable reel PC board proper power supply
  (refer to “CABLE REEL POWER SUPPLY VERIFYING” section – page 23).
- Verify length potentiometer
  (refer to “EXTENSION POTENTIOMETER VERIFYING” section - page 24).

(*) NOTE: Main Unit Processor identifies below and over the signal range a minimum zone and a maximum zone in order to check the sensor.

CABLE REEL POWER SUPPLY VERIFYING



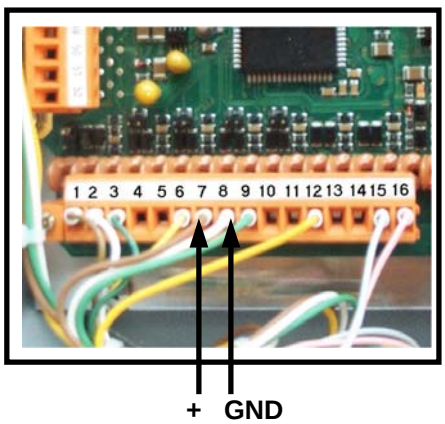
Verify 5Volts between +V and –V (MS1) on cable reel board

TRUE

Verify the Potentiometers (**)

FALSE

Verify on the Main PC board 5Volts between 7(+) and 8(GND)



TRUE

Cable brake down. Check the cable-reel cable

FALSE

Disconnect wires 7 and 8 from the Main pc board and Check for 5Vdc

TRUE

Probably the cable is in short circuit. Check cable

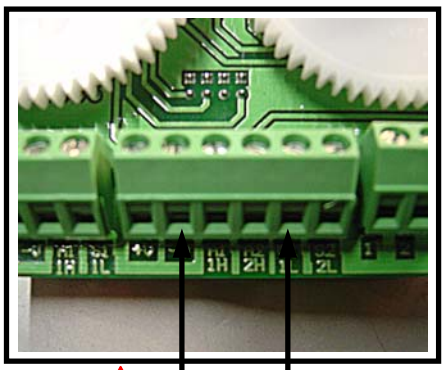
FALSE

Main pc board Is faulty. Replace it with a new one (*)

(*) REFER ALSO TO EPROM and EEPROM MEMORIES REPLACEMENT - page 32
(**) REFER TO pages 24

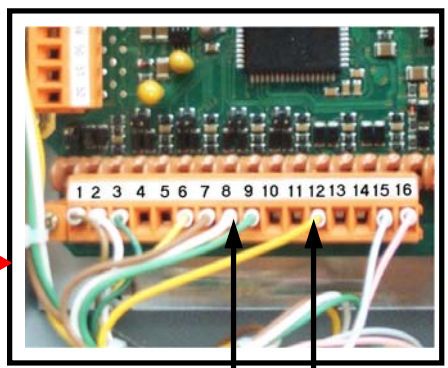
BOOM LENGTH POTENTIOMETER VERIFYING

The machine boom must be completely retracted.



Verify between -V and S1 (MS2) a voltage of roughly +250mV

- FALSE → Boom Length Potentiometer broken (**)
- TRUE → Perform a Boom extension. → Verify with a voltmeter that the signal increases in a linear and continous way.
  - Losses of Signal → Boom Length potentiometer broken (**)
  - The variation is continous and linear → Verify on the Main pc board the potentiometer signal on 8(GND) e 12(CA3)

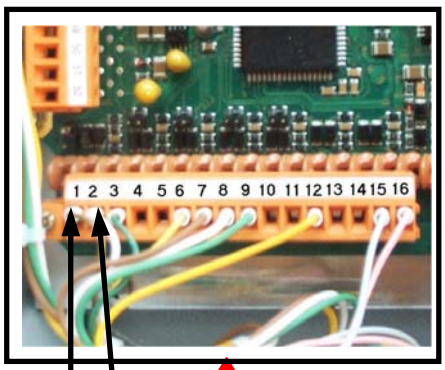


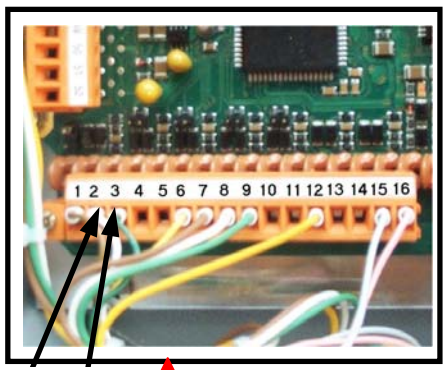
  - The signal is not correct → Problems on the Connection Cable.Probably short circuited. Check the cable
  - The signal is correct → The Main pc board is faulty. Proceed with the replacement (*)
- Voltage higher or at 5V → Boom Length potentiometer broken (**)

(*) REFER ALSO TO EPROM and EEPROM MEMORIES REPLACEMENT - page 32
(**) REFER ALSO TO POTENTIOMETERS ALIGNMENT - page 33

ALARM CODE 12 :
MAIN CYLINDER (BOTTOM SIDE) READING LOWER THAN THE MINIMUM VALUE

NOTE:
Main Unit Processor identifies below and over the signal range a minimum zone and a maximum zone in order to check the sensor.





Verify on the Main pc board that between 1(+) e 2(GND) there is a voltage of +15Vdc

TRUE

Measure on the Main PC board the voltage on 2(GND) e 3(CA0)

Value <0,5Vdc

Problems on the Connection Cable. Probably short circuited. Check the cable

Broken Pressure Transducer. Proceed With the Replacement

Value >0,5Vdc

The Main pc board is faulty. Proceed with the replacement(*)

FALSE

Disconnect wires on 1(+) e 2(GND) and Verify a voltage of +15Vdc

FALSE

The Main pc board is faulty. Proceed with the replacement(*)

TRUE

Problems on the Connection Cable. Probably short circuited. Check the cable

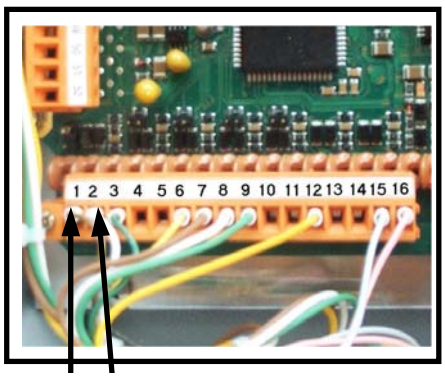
FALSE

Broken Pressure Transducer. Proceed With the Replacement

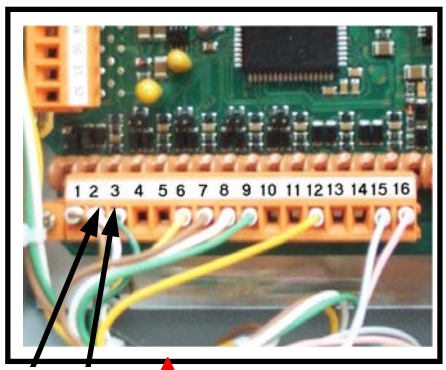
(*) REFER ALSO TO EPROM and EEPROM MEMORIES REPLACEMENT - page 32

ALARM CODE 22 :
MAIN CYLINDER (BOTTOM SIDE) READING HIGHER THAN THE MAXIMUM VALUE

NOTE:
Main Unit Processor identifies below and over the signal range a minimum zone and a maximum zone in order to check the sensor.



+ GND



GND CA0

Verify on the Main PC board that between 1(+) e 2(GND) there is a voltage of +15Vdc

TRUE

Measure on the Main PC board the voltage on 2(GND) e 3(CA0)

Value >5Vdc

Broken Pressure Transducer.Proceed With the Replacement

Value <5Vdc

The Main pc board is faulty.Proceed with the replacement (*)

FALSE

Disconnect wires on 1(+) e 2(GND) and Verify a voltage of +15Vdc

FALSE

The Main pc board is faulty.Proceed with the replacement (*)

TRUE

Problems on the Connection Cable.Probably short circuited. Check the cable

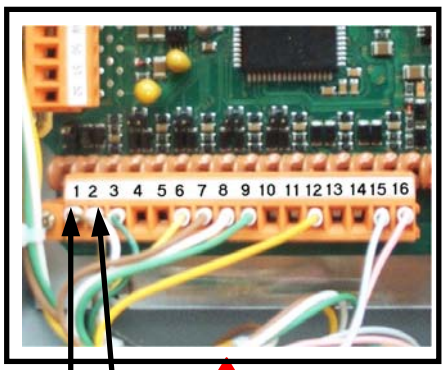
TRUE

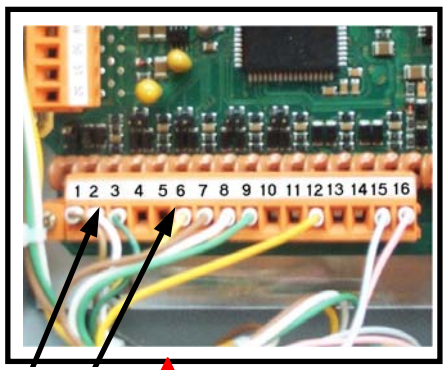
Broken Pressure Transducer.Proceed With the Replacement

(*) REFER ALSO TO EPROM and EEPROM MEMORIES REPLACEMENT - page 32

ALARM CODE 13:
MAIN CYLINDER (ROD SIDE) READING LOWER THAN THE MINIMUM VALUE

NOTE:
Main Unit Processor identifies below and over the signal range a minimum zone and a maximum zone in order to check the sensor.





Verify on the Main pc board that between 1(+) e 2(GND) there is a voltage of +15Vdc

TRUE

Measure on the Main PC board the voltage on 2(GND) e 6(CA1)

Value <0,5Vdc

Problems on the Connection Cable. Probably short circuited. Check the cable

Broken Pressure Transducer. Proceed With the Replacement

Value >0,5Vdc

The Main pc board is faulty. Proceed with the replacement(*)

FALSE

Disconnect wires on 1(+) e 2(GND) and Verify a voltage of +15Vdc

FALSE

The Main pc board is faulty. Proceed with the replacement(*)

TRUE

Problems on the Connection Cable. Probably short circuited. Check the cable

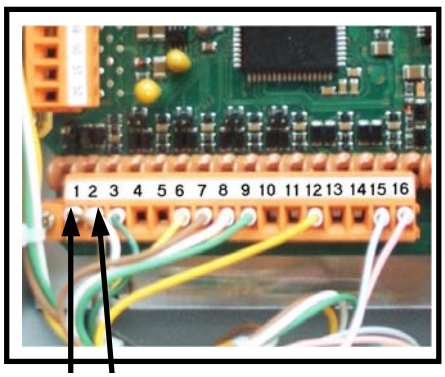
FALSE

Broken Pressure Transducer. Proceed With the Replacement

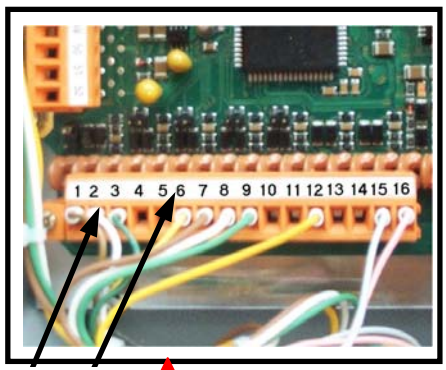
(*) REFER ALSO TO EPROM and EEPROM MEMORIES REPLACEMENT - page 32

ALARM CODE 23 :
MAIN CYLINDER (ROD SIDE) READING HIGHER THAN THE MAXIMUM VALUE

NOTE:
Main Unit Processor identifies below and over the signal range a minimum zone and a maximum zone in order to check the sensor.



+ GND



GND CA1

Verify on the Main PC board that between 1(+) e 2(GND) there is a voltage of +15Vdc

TRUE

Measure on the Main PC board the voltage on 2(GND) e 6(CA1)

Value >5Vdc

Broken Pressure Transducer.Proceed With the Replacement

Value <5Vdc

The Main pc board is faulty.Proceed with the replacement (*)

FALSE

Disconnect wires on 1(+) e 2(GND) and Verify a voltage of +15Vdc

FALSE

The Main pc board is faulty.Proceed with the replacement (*)

TRUE

Problems on the Connection Cable.Probably short circuited. Check the cable

TRUE

Broken Pressure Transducer.Proceed With the Replacement

(*) REFER ALSO TO EPROM and EEPROM MEMORIES REPLACEMENT - page 32

ALARM CODE 11 :
BOOM LENGTH TRANSDUCER READING LOWER THAN THE MINIMUM VALUE(*)

CAUSE:

The signal from the boom length transducer to the main PC board is lower than the minimum programmed value.
This can be produced by a short-circuit in the electrical wiring, between the Main Unit and Sensor or the sensor itself is in interdiction.

ACTION TO TAKE:

- Verify the cabling.
  Verify cable reel PC board proper power supply
  (refer to “CABLE REEL POWER SUPPLY VERIFYING” section – page 30).
- Verify length potentiometer
  (refer to “EXTENSION POTENTIOMETER VERIFYING” section - page 31).

ALARM CODE 21 :
BOOM LENGTH TRANSDUCER READING HIGHER THAN THE MAXIMUM VALUE (*)

CAUSE:

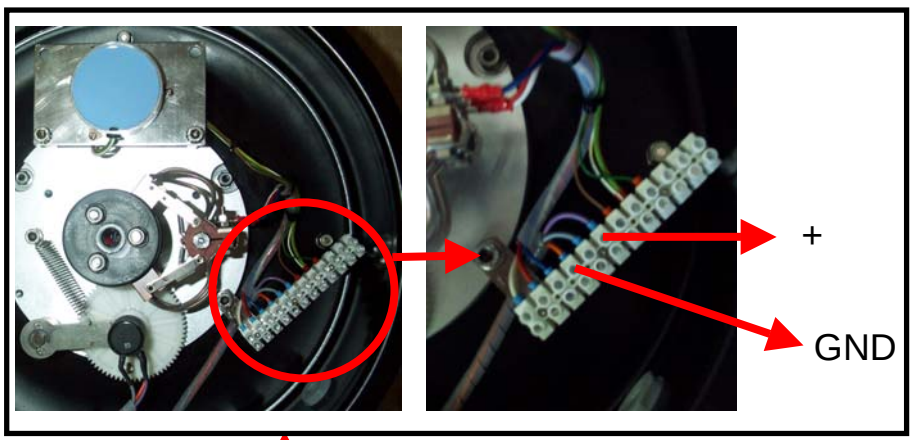
The signal from the boom length transducer to the main PC board is higher than the maximum programmed value.
This can be produced by a short-circuit in the electrical wiring, between the Main Unit and Sensor or the sensor itself is in saturation.
.

ACTION TO TAKE:

- Verify the cabling.
- Verify cable reel PC board proper power supply
  (refer to “CABLE REEL POWER SUPPLY VERIFYING” section – page 30).
- Verify length potentiometer
  (refer to “EXTENSION POTENTIOMETER VERIFYING” section - page 31).

(*) NOTE: Main Unit Processor identifies below and over the signal range a minimum zone and a maximum zone in order to check the sensor.

CABLE REEL POWER SUPPLY VERIFYING



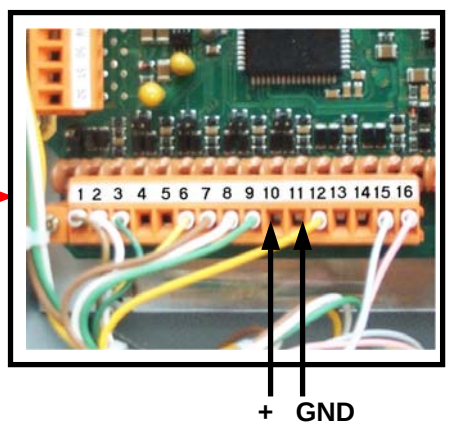
Verify 5Volts between + and GND on cable reel board

TRUE

Verify the Potentiometers (**)

FALSE

Verify on the Main PC board 5Volts between 10(+) and 11(GND)



TRUE

Cable brake down. Check the cable-reel cable

FALSE

Disconnect wires 10 and 11 from the Main pc board and Check for 5Vdc

TRUE

Probably the cable is in short circuit. Check cable

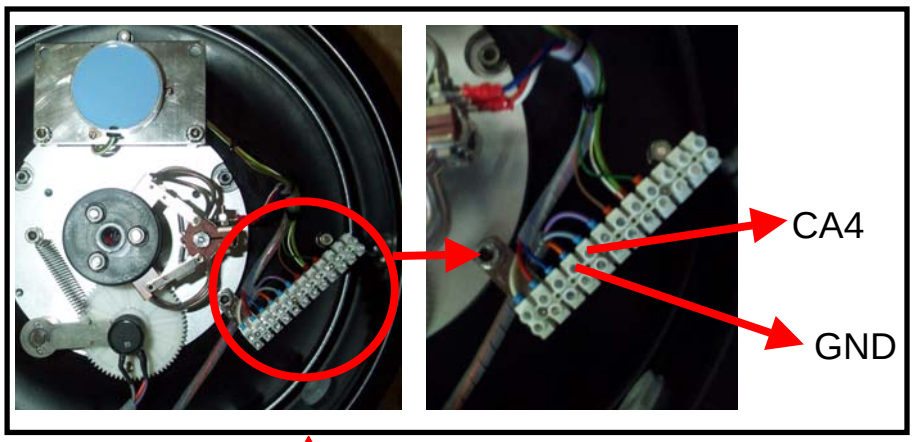
FALSE

Main pc board Is faulty. Replace it with a new one (*)

(*) REFER ALSO TO EPROM and EEPROM MEMORIES REPLACEMENT - page 32
(**) REFER TO page 31

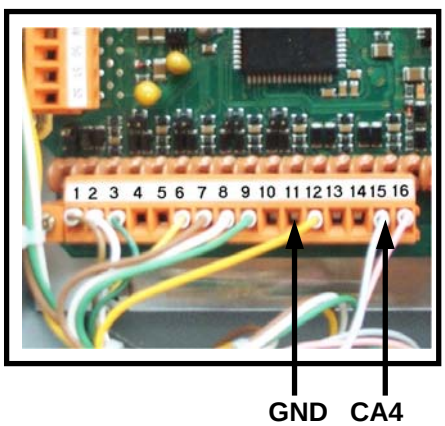
BOOM LENGTH POTENTIOMETER VERIFYING

The machine boom must be completely retracted.



Verify between GND e CA4 a voltage of roughly +250mV

- FALSE → Boom Length Potentiometer broken (**)
- TRUE → Perform a Boom extension. → Verify with a voltmeter that the signal increases in a linear and continous way.
  - Losses of Signal → Boom Length potentiometer broken (**)
  - The variation is continous and linear → Verify on the Main PC board the potentiometer signal on 11(GND) e 15(CA4)
    - The signal is not correct → Problems on the Connection Cable. Probably short circuited. Check the cable
    - The signal is correct → The Main pc board is faulty. Proceed with the replacement (*)
- Voltage higher or at 5V → Boom Length potentiometer broken (**)

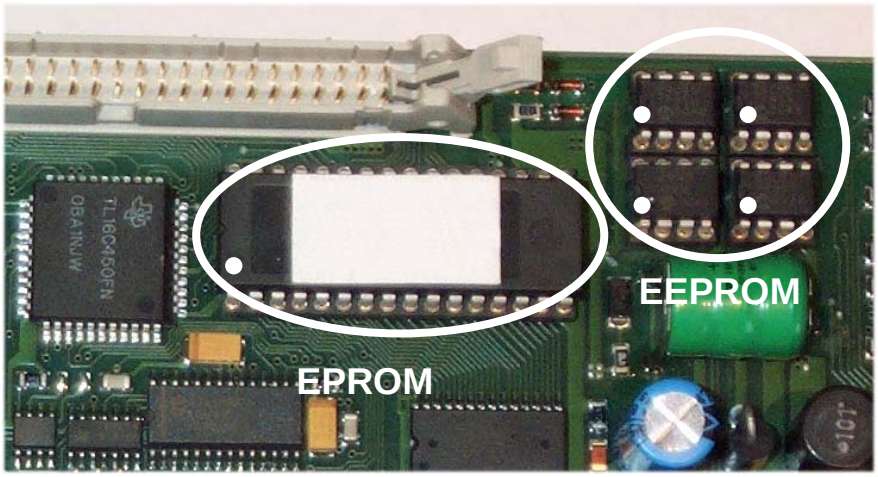


(*) REFER ALSO TO EPROM and EEPROM MEMORIES REPLACEMENT - page 32

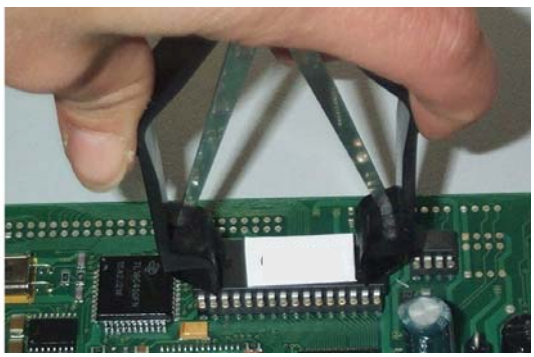
(**) REFER ALSO TO POTENTIOMETERS ALIGNMENT - page 33

EPROM and EEPROM REPLACEMENT(*)

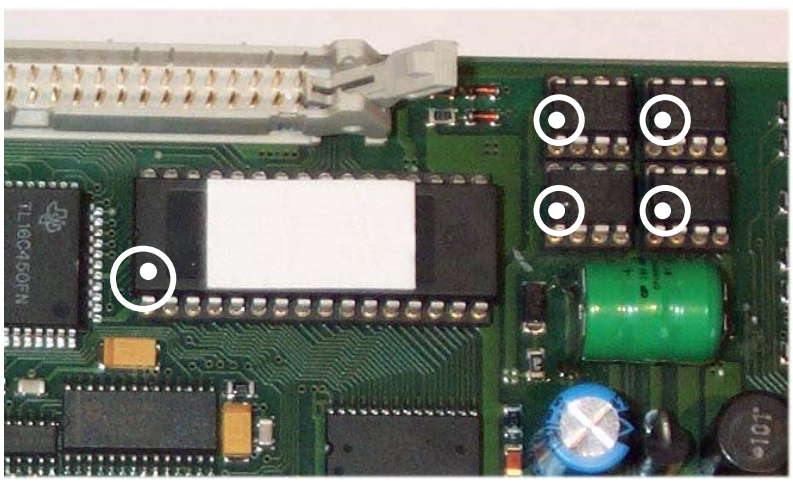
The picture shows the EPROM storing main program data and Load Tables, and EEPROM storing calibration data, that have to be removed from the old PC board to the new one.



Remove the EPROM and EEPROM carefully out of their sockets by means of electronic components tweezers or adeguate tools.



Insert the EPROM and EEPROM in their sockets on the new PC Board in the correct way, taking care not to damage their pins, and looking to their reference mark.



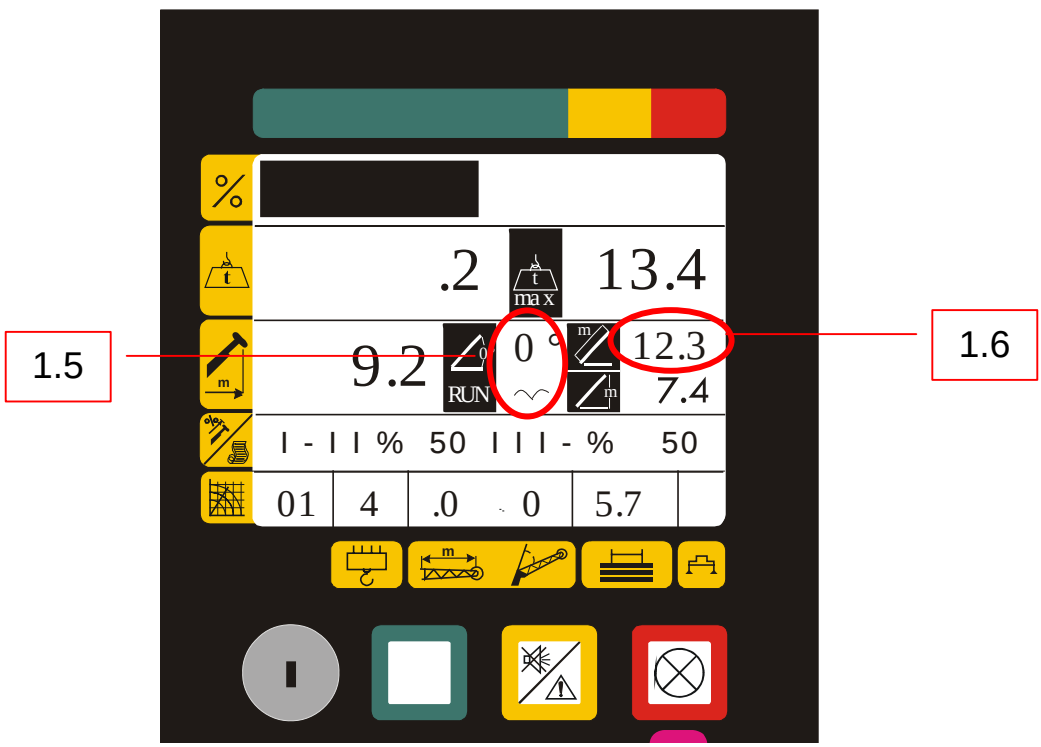
(*) REMARK: Replacement of memories is required in case of failure of Main Control Unit that must be replaced, avoiding any re-programming and re-calibration of the system .

POTENTIOMETERS ALIGNMENT

Mechanical alignment of angle and extension sensors

Following the replacement of a potentiometer, even if this has been done carefully, it is suggested to check its alignment.
The following procedure, if properly done, allows the total restoring of the machine behaviour without any calibration operation.

Switch on the machine without load and wait for a few seconds for the main working data page to be shown.
Select the operating mode used as described into the User Manual.



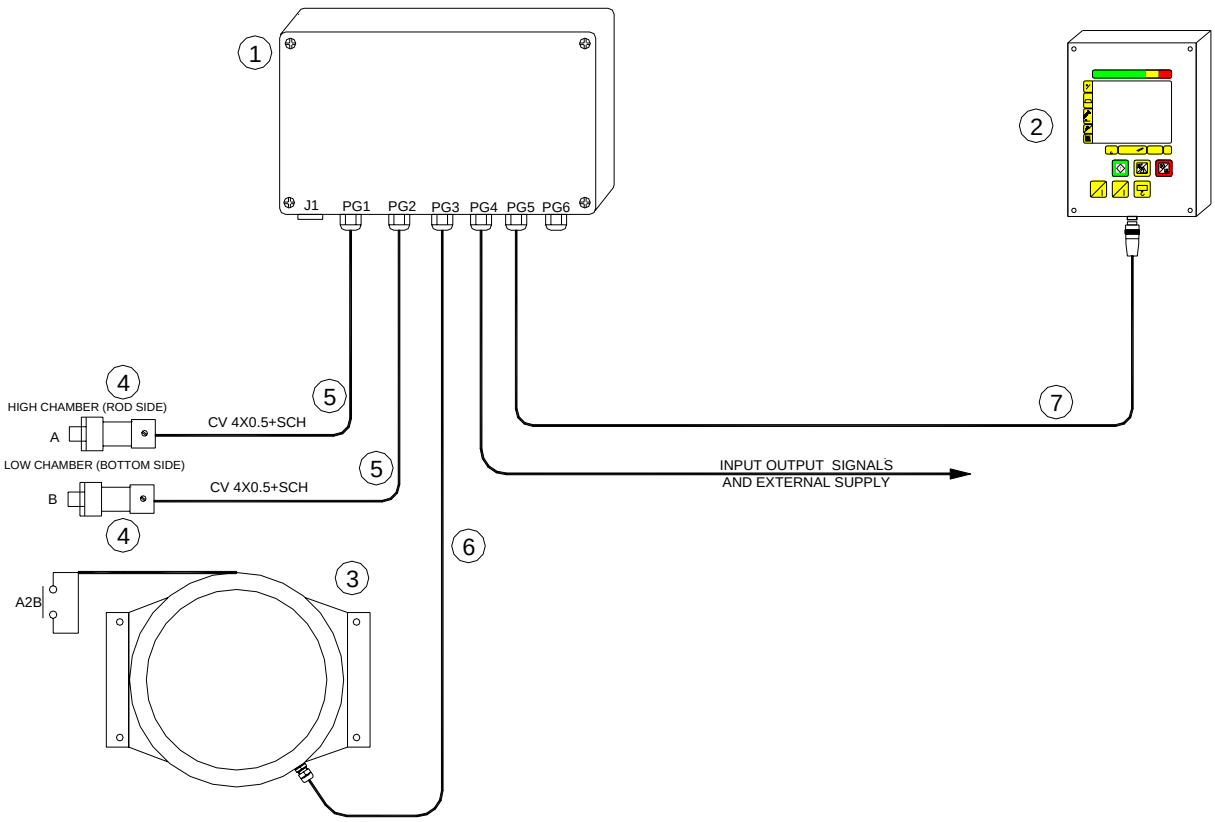
Referring to the angle, simply check that, with the boom in horizontal position (0°) the angle's reading on the display (zone 1.5) is "0" acting on the potentiometer's body.. Before fit the potentiometer, make sure that, the value will increase by lifting the boom.
After the length potentiomer has been replaced, it's necessary proceed with its alignment.
With the machine's boom completely retracted,rotate the potentiometer's body until the length indication on the display (zone 1.6) will be the same at the minimum length value (please,refer to the load charts tables).
In case of cable reel wire replacement, put it around 1 mt. pre-tension, fixing the other side to the boom end.

After the replacement of the potentiometer, it is advisable to verify the correspondence between the values shown on the display to a couple of known boom position.

I.E: Boom completely closed / Boom extended and 0° / maximum angle

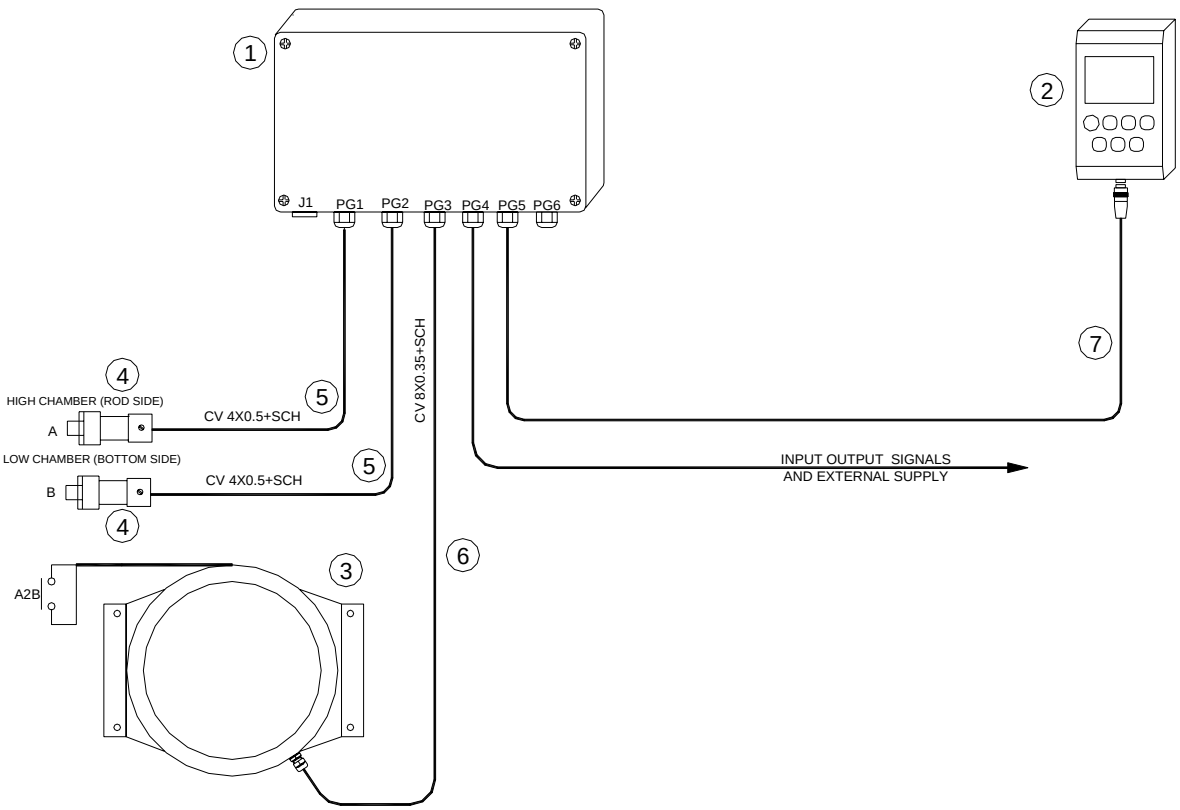
These displayed values must correspond to the values given by the Manufacturer for this specific machine model.

SYSTEM LAY-OUT MEGAMAC.106 AND CONNECTIONS



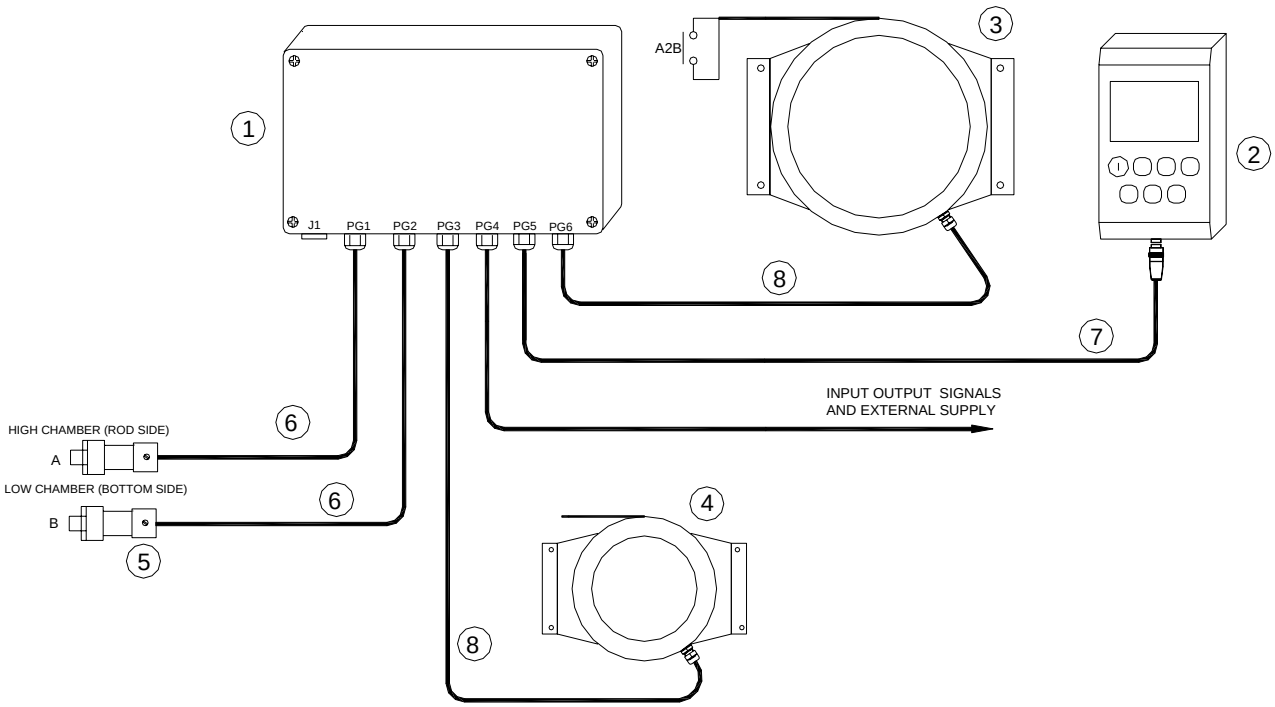
Ref.	Description	Code
1	Main unit	U2MIC-X/XX
2	Control panel	CMC1-XXX/XX
3	Cable reel	AC MCP214A/3P
4	Pressure transducer	Y11 4745-350
5	Cable	CV 4x0.5+SCH
6	Cable	CV 8x0.35+SCH
7	Cable	CV ATG12/XX

SYSTEM LAY-OUT MEGAMAC.HC118 AND CONNECTIONS



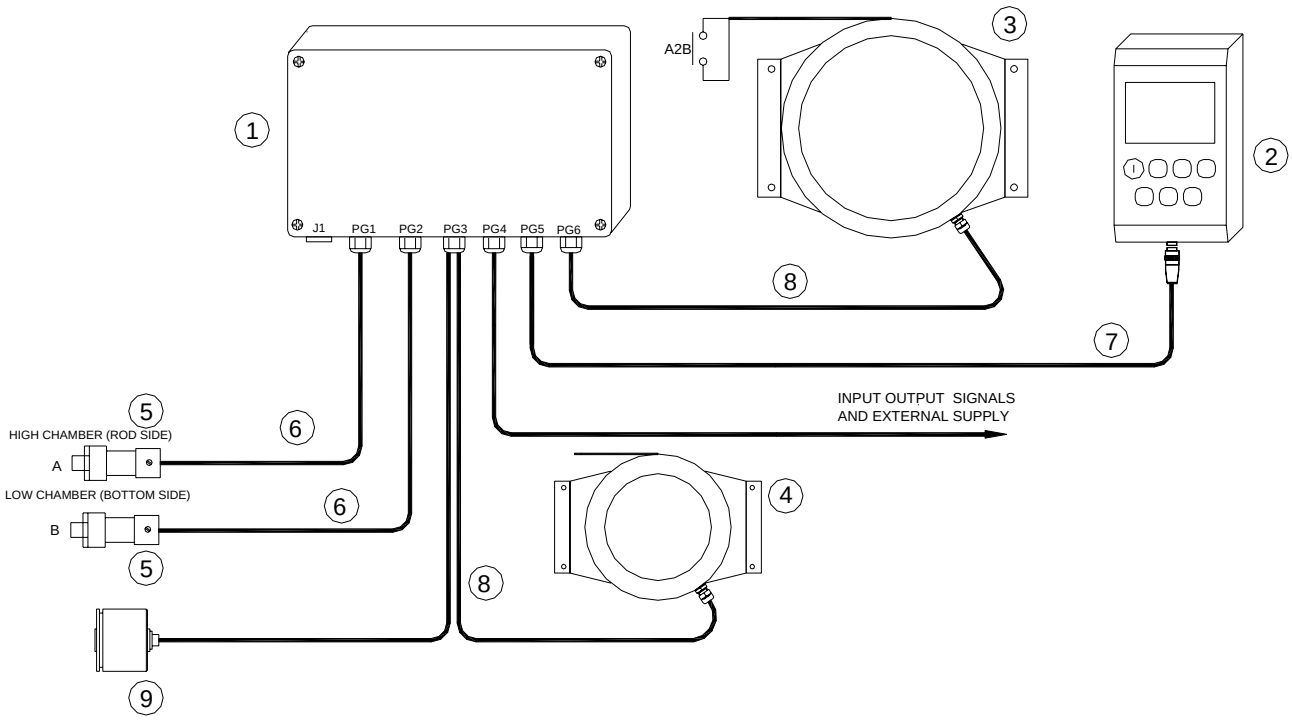
Ref.	Description	Code
1	Main unit	U2MIC-X/XX
2	Control panel	CMC100-XX/XX
3	Cable reel	AC MCP214A/3P
4	Pressure transducer	Y11 4745-350
5	Cable	CV 4x0.5+SCH
6	Cable	CV 8x0.35+SCH
7	Cable	CV ATG12/XX

SYSTEM LAY-OUT MEGAMAC.HC212 AND CONNECTIONS



Ref.	Description	Code
1	Main unit	U2MIC-X/XX
2	Control panel	CMC100-XX/XX
3	Cable reel	ACT11AS100/XX
4	Cable reel	AC MCP214A/3P
5	Pressure transducer	Y11 4745-350
6	Cable	CV 4x0.5+SCH
7	Cable	CV ATG12/XX
8	Cable	CV 8x0.35+SCH

SYSTEM LAY-OUT MEGAMAC.HC220 AND CONNECTIONS



Ref.	Description	Code
1	Main unit	U2MIC-X/XX
2	Control panel	CMC100-XX/XX
3	Cable reel	AC MCP214A/3P
4	Cable reel	ACT10AE100/XX
5	Pressure transducer	Y11 4745-350
6	Cable	CV 4x0.5+SCH
7	Cable	CV ATG12/XX
8	Cable	CV 8x0.35+SCH
9	Encoder CANBUS	Y11 BMMH42S1N

RECOMMENDED SPARE PARTS LIST

MAIN COMPONENTS

DESCRIPTION	CODE
MAIN UNIT	U2MIC-2/XX
CONTROL PANEL	CMC100-XX/XX
CONTROL PANEL	CMC1-XXX/XX
LENGTH/ANGLE SENSOR	AC MCP214A/3P
LENGTH SENSOR	ACT11AS100/XX
LENGTH SENSOR	ACT10AE100/XX
PRESSURE TRANSDUCERS	Y1 4745-350
CONNECTING CABLE MAIN UNIT/CONTROL PANEL	CV ATG12/21
CONNECTING CABLE	CV 8x0,35+SCH
CONNECTING CABLE	CV 4x0,5+SCH

INTERNAL PARTS

DESCRIPTION	CODE
MAIN BOARD WITH BLACK BOX	S U2MIC-6/42
KEY BOARD PC BOARD	S DT-CMC1/20
DISPLAY PC BOARD	S DM-CMC1/30
ELECTRONIC BOARD FOR BOOM LENGTH/ANGLE SENSOR (ACT11AS100/XX)	S ACT-1/13
ELECTRONIC BOARD FOR BOOM LENGTH/ANGLE SENSOR (ACT1AE100/XX)	S ACT-3/12
ANGLE POTENTIOMETER	Y11 PL310/1K
LENGTH POTENTIOMETER	PT 534-2K
DRUM CABLE (17mt)	CV 510.726
CABLE REEL MECHANICS WITHOUT INTERNAL BOARD AND SENSORS (ACT11AS100/XX)	GR M-ACT1S/10
CABLE REEL MECHANICS WITHOUT INTERNAL BOARD AND SENSORS (ACT10AE100/XX)	GR M-ACT1E/11
ANGLE POTENTIOMETER PC BOARD	GR TIHP300/10
CABLE REEL WIRE 32 + 5 mt	
CABLE REEL WIRING KIT	