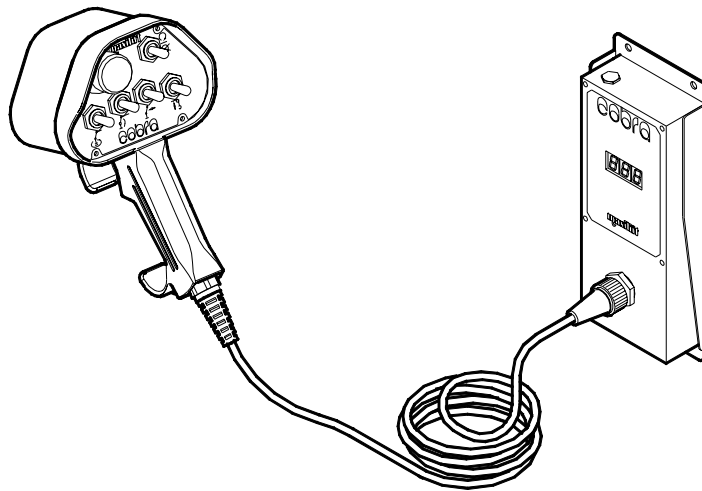
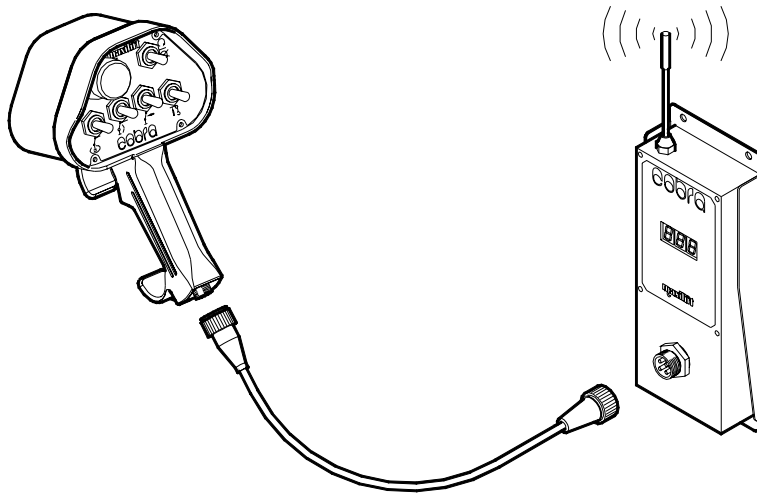


maxilift



SERVICE CRANE

Integrazione comandi a distanza con microprocessore

Integration for microprocessor - remote control system

Code MD.0.105
Rev 0
Edition 03/04

USE AND MAINTENANCE MANUAL

MICROPROCESSOR REMOTE CONTROL SYSTEM

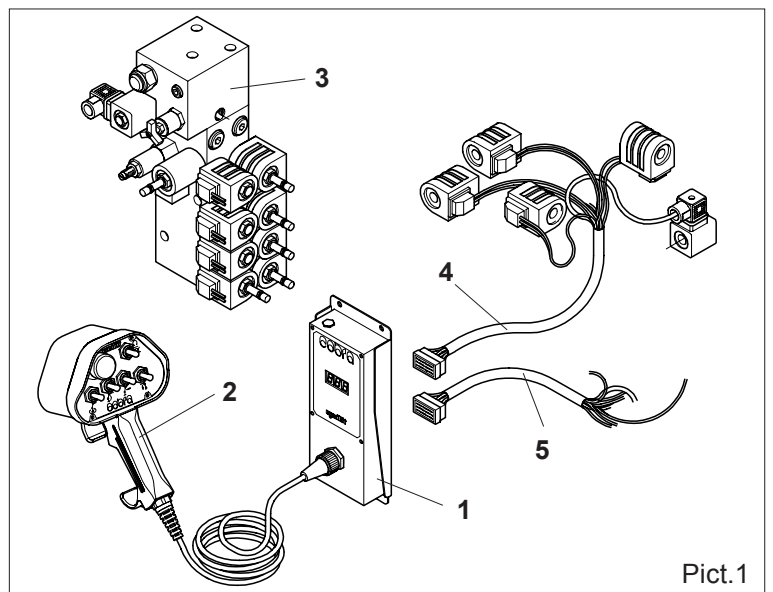
The **COBRA** cranes are equipped with an advanced control and safety devices managing system, with microprocessor logic, allowing a correct crane functioning and safety devices managing, but also supplying to the operator, when necessary, some indications helping him for a quick diagnosis of a working problem, or an adjustment to carry out.

AVAILABLE CONTROL VERSIONS

- Proportional mono-function cable control
- Proportional dual-mode cable control
- Proportional mono-function radio control
- Proportional dual-mode radio control

The system is consisting of the following main components (Pict. 1):

- 1) Control and safety devices managing control unit
- 2) Remote control button strip
- 3) Directional and flow regulating hydraulic unit
- 4) Solenoid valves wiring
- 5) Wiring for stop end and pressure switch connection and power supply.



Pict.1

1) ELECTRONIC POWER UNIT (Pict.2)

The electronic control unit, placed beside column casing, consists of a tight stainless steel box holding the circuit board with microprocessor logic for the management of the remote control and the safety systems required for crane functioning.

On the control unit front side there is a three-digits red display (1) to be used as an interface to the operator for checking or adjusting operations.

The connector (2) for the remote control button strip is placed on the control unit.

The connector is equipped with a protection cover, to be applied when the crane is not operating.

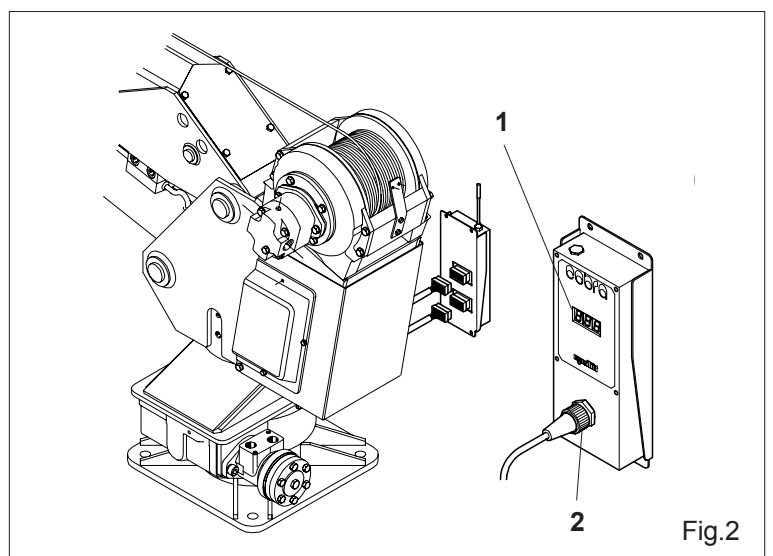


Fig.2

1a) THE RADIO RECEIVING UNIT (Pict.4)

In case of radio remote control, the control unit **(3)** holds the radio module, and accomplishes the function of receiver, besides managing the complete machine logic, and it is equipped with an antenna on its upper part.

In this case, the connector is used to supply the batteries of radio remote control button strip **(4)** through the cable on issue **(1)**. This cable can be also used to work with the transmitter cutting out the radio link, as required by the law in some working environments (airports, hospitals, etc.).

Moreover, the use of the serial cable allows normal working in case of noise.

The antenna, even if not essential, improves the reception in the intermediate/long-range.

2) THE PENDANT BUTTON STRIP (Pict.3)

The pendant for single-hand use was designed to give the operator an ergonomic, practical remote control device, and to optimize the several crane functions.

It is essentially consisting of a plastic container with protected control panel completely connected to an ergonomic handgrip.

On the panel are located the crane operating selectors **(S)** in radial arrangement.

Above the selectors there is the emergency button **(P)** with safety stop function.

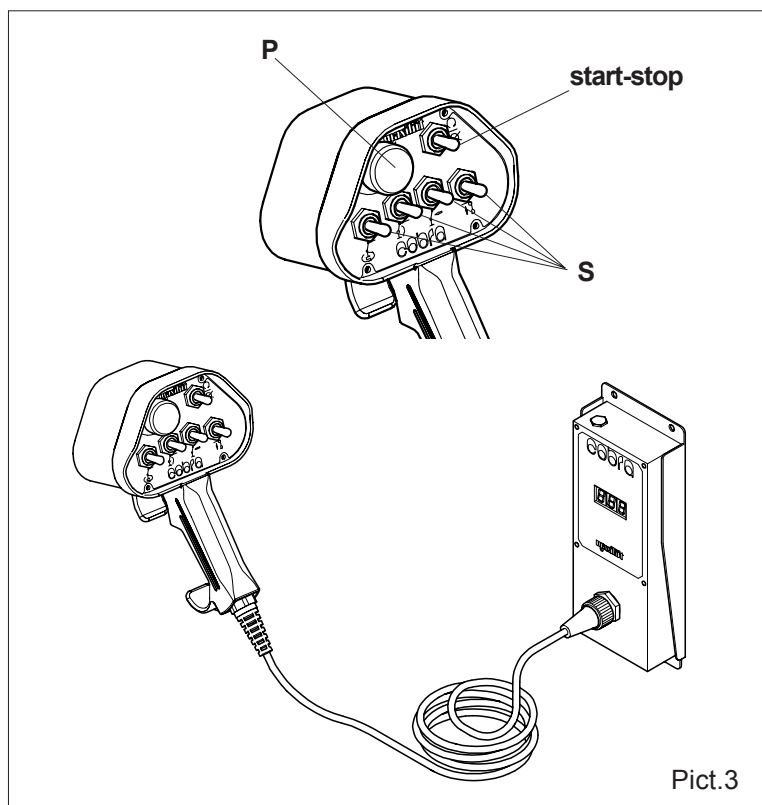
The emergency button (P) must be used also to switch on and off the remote control pendant.

Beside the emergency button there is the engine start-stop selector, when these two functions are activated. The system provides the possibility of supplying and controlling these two functions, which are external to the crane.

The pendant panel is fitted with an essential symbology for the different functions on a green background, which is very agreeable and intuitive for the operator.

In the lower and protected part of the handgrip is located the trigger button. By acting in a gradual way on this button it is possible to meter the movement speed, which is to be pre-selected by the manoeuvre selectors placed on the upper panel.

On the cable end, which can keep its flexibility and handling even under extreme conditions, is applied the connector to the control unit.



2a) THE RADIO TRANSMITTING BUTTON STRIP (Pict.4)

It is identical to the above described cable one as far as the operator interface is concerned.

The main difference is the absence of the integral cable, which is replaced by a connector fixed to the handle base suitable for connection of the batteries power supply cable (1).

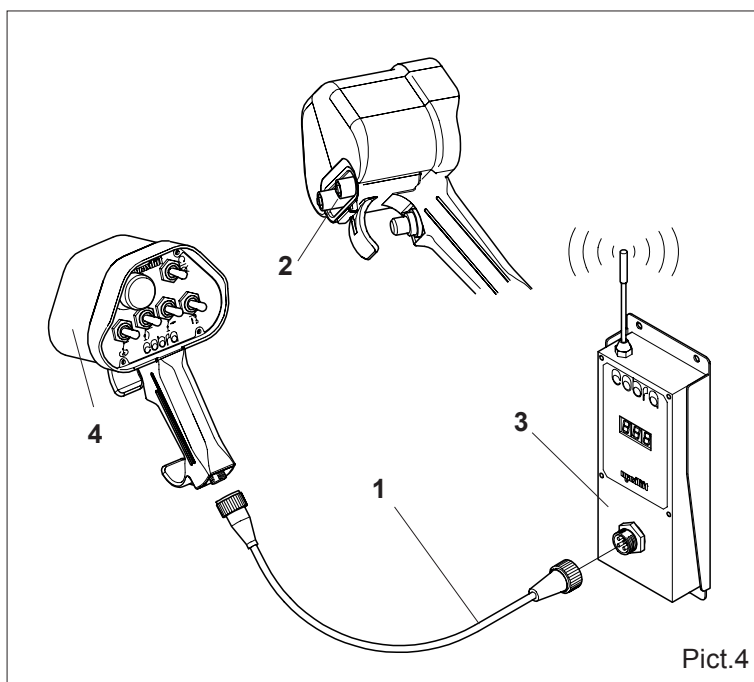
This cable of 1.5 mt. length is supplied on issue. It allows to charge the button strip batteries and, while connected, can be used to activate the crane by cable.

The rechargeable batteries are located in a proper protected space (2) inside the button strip, and can be easily removed by unplugging a small quick connector.

Batteries recharging when they are completely discharged can require up to three hours.

Inside the button strip there is the radio transmitting module.

A green led lights up permanently by activating whichever function to show that the transmitter is activated. The approaching to low battery condition is indicated by the led flashing while keeping a function activated. The remote control box must be opened only to carry out some repairs, or when checking for possible anomalies.



Before operating the radio remote control, check the perfect functioning of the emergency button.

During the pauses, the radio remote control must be absolutely switched off by pushing the emergency button.

In order to check the emergency button functioning proceed as follows:

- Operate one function (ex.: boom lifting), checking that it is carried out by the crane
- Then push the emergency button, and check that the function previously carried out immediately stops. If this does not happen, stop immediately the crane.

N.B. Never let the crane work with disabled emergency button.



The pendant must be unplugged from the control unit connector on which the protection cover will be screwed.

After the use, push the emergency button of both cable and radio remote controls push button panels, before recovering them in a safe and protected place.

The radio button strip has a battery endurance between 12 and 24 hours according to the type of use. We recommend to discharge as much as possible the batteries before recharging them.

3) PROPORTIONAL MONO-FUNCTION REGULATION HYDRAULIC UNIT (Pict.5)

The unit is consisting of two separate aluminium blocks.

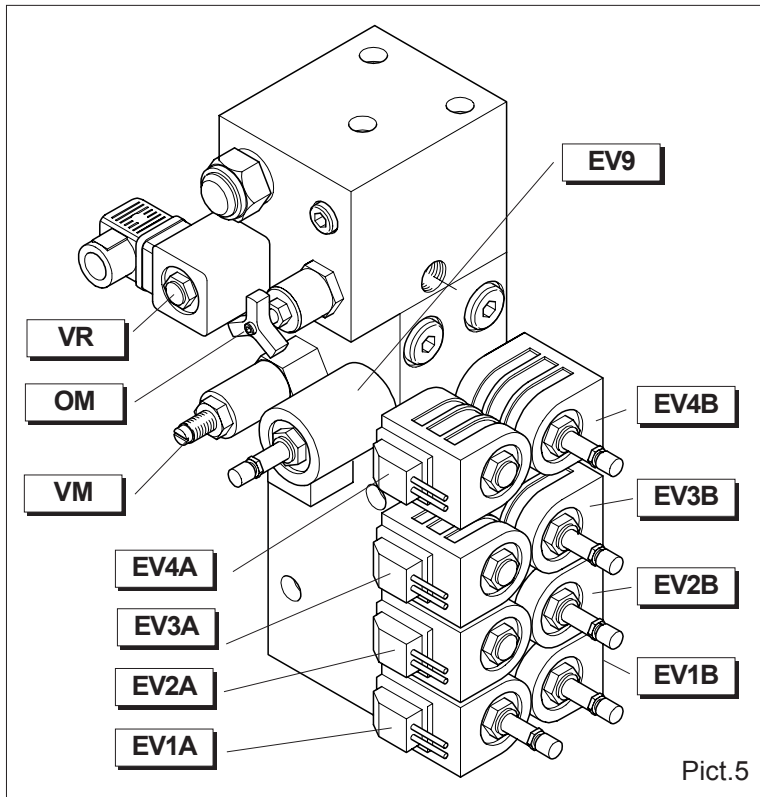
The upper section includes the proportional adjusting valve (**VR**) and the manual bypass control valve (**OM**) of the proportional regulator.

The lower section includes the main relief valve (**VM**), the dump valve (**EV9**) and the control solenoid valves (**EV...A – EV...B**), two for each movement.

The solenoid valves: **EV9 – EV3B – EV2B – EV1B – EV1A** are equipped with a manual override, to be used only for emergency (failure of the electronic control unit or the button strip, lack of power supply).

In such cases it is necessary to proceed as follows:

- a) fully turn counter-clockwise the valve handwheel (**OM**) in order to bypass the proportional valve (**VR**)
- b) fully turn counter clock-wise the manual override of the valve, coupled to the desired movement (extension re-entry, boom lowering, etc.).
- c) finally, fully turn counter clock-wise the manual override of the valve (**EV9**), in order to activate the desired movement
- d) once the standard working conditions of the crane are restored, always remember to close completely the manual overrides, by turning them clockwise.
- e) finally close completely the bypass valve (**OM**) by turning the handwheel clockwise.



Pict.5

3a) PROPORTIONAL DUAL-MODE REGULATION HYDRAULIC UNIT (Pict.6)

The unit is consisting of two separate aluminium blocks.

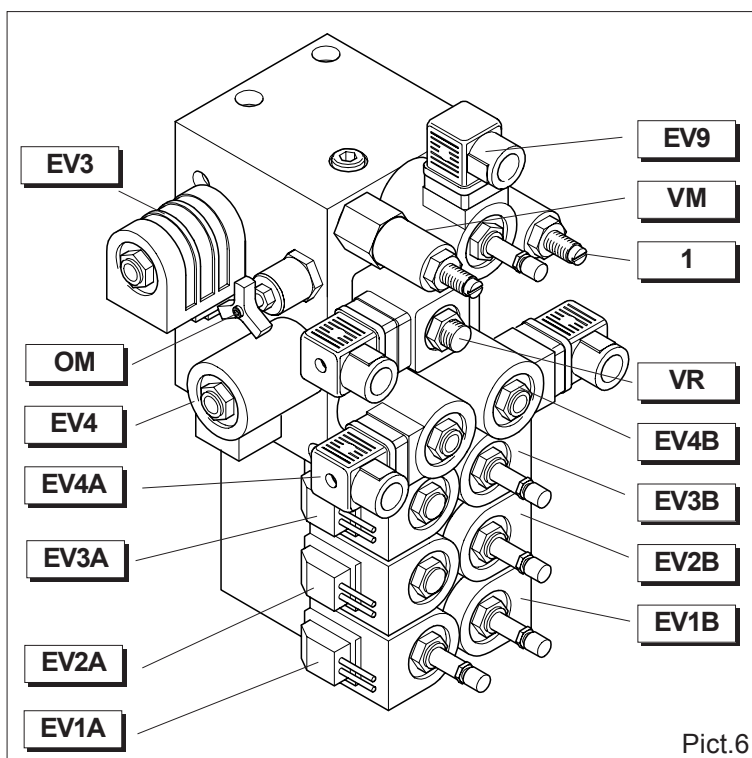
The upper section includes the proportional adjusting valve (**VR**), the manual bypass control valve (**OM**) of the proportional regulator, the main relief valve (**VM**), the winch operating solenoid valves (**EV4A – EV4B**), the dump valve (**EV9**) and the solenoid valves (**EV3 – EV4**) required to operate the winch and another function at the same time.

The lower section includes the control solenoid valves (**EV...A – EV...B**), two for each movement.

The solenoid valves: **EV9 – EV3B – EV2B – EV1B – EV1A** are equipped with a manual override, to be used only for emergency (failure of the electronic control unit or the button strip, lack of power supply).

In such cases it is necessary to proceed as follows:

- fully turn counter-clockwise the valve handwheel (**OM**) in order to bypass the proportional valve (**VR**)
- fully turn counter clock-wise the manual override of the valve, coupled to the desired movement (extension re-entry, boom lowering, etc.).
- finally, fully turn counter clock-wise the manual override of the valve (**EV9**), in order to activate the desired movement
- once the standard working conditions of the crane are restored, always remember to close completely the manual overrides, by turning them clockwise.
- finally close completely the bypass valve (**OM**) by turning the handwheel clockwise.

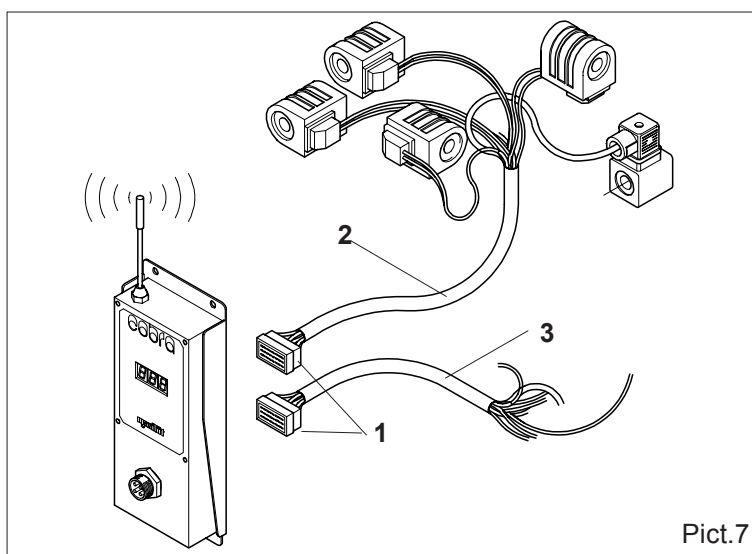


Pict.6

4) WIRING (pict.7)

The system is consisting of two fully independent wiring systems, which are connected to the electronic control unit through tight multipolar connectors (**1**) fitted with a quick coupling system.

The first wiring (**2**) includes the solenoids for the connection of the operation valves, which are located on the hydraulic unit, to the electronic control unit. The second wiring (**3**) connects the control unit to the safety stop ends (**FA – FB – FV**), to the pressure switch (**PM**), to the engine start/stop and to the power supply.



Pict.7

REMOTE CONTROL USE

After the preliminary operations concerning:

- PTO engaging
 - extension and lowering of stabilizer legs and their levelling
 - control system supply by switching on the proper switch inside the cabin
 - power supply by turning the battery-disconnecting lever in case of electro-hydraulic crane
- you can go on working with the remote control.

USE OF THE MONO-FUNCTION PROPORTIONAL REMOTE CONTROL

It is necessary to select the desired movement by pushing the selector (**S**) upwards or downwards (check carefully the symbols on the panel; the opposite movements are carried out by inverting the movement).

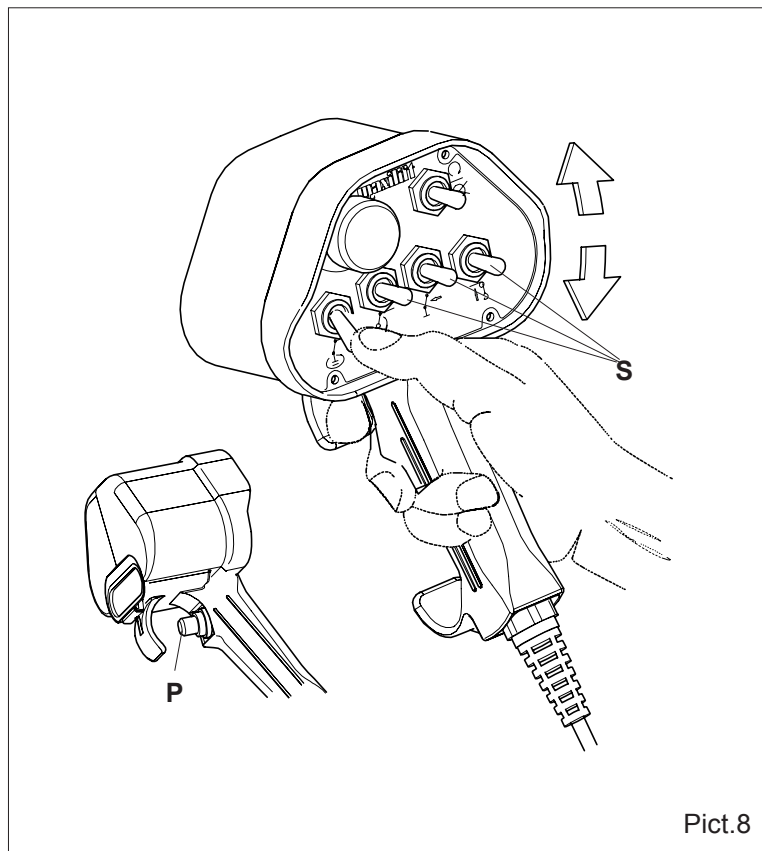
While keeping the selector pushed act gradually with your forefinger on the proportional button (**P**), in order to get a gradual speed increase. Proportionally to the stroke of the button, you will get a movement of the selected function which will be quicker and quicker until you achieve the maximum speed.

ATTENTION

Do not operate the proportional button before selecting the movement: it will not work.

Do not pull immediately the proportional button to its maximum limit: you will not get the right gradualness and the movements will be jerking and dangerous.

Always release first the proportional button, and then the selector of the movement chosen.



Pict.8

USE OF THE DUAL-MODE PROPORTIONAL REMOTE CONTROL

The dual-mode remote control can be normally used as a mono-function remote control when following the instructions of previous paragraph.

The remote control in object allows the combination of two movements at the same time by coupling the winch function (raising or lowering) to one of the remaining movements.

You always have to select first the two functions chosen, and then to operate the proportional button metering the speed, in order to achieve the desired speed, even allowing at the same time the winch rope raising or lowering.

By releasing one of the movements the speed of the other one does not increase until the function is stopped. By this way of operating the two speeds are nearly halved in comparison to the use of a single function.

DISPLAY MESSAGES

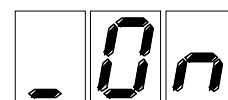
As previously explained, the electronic control unit is fitted with a 3 digits display showing messages which help the operator understanding if everything is working properly, the operating state and the functioning of its electrical components.

The operator, when led by an expert or following basic operations, can actually read on such display different messages helping him locating possible electrical anomalies on the system. This is a great help for searching and identifying possible faults, preventing useless and unsuitable interventions by the after-sales service.

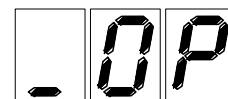
Against possible displays of error messages, the operator is requested to contact the Technical After-Sales Service.

NORMAL DISPLAY MENU

When switching on, after a sequence of messages on the display this must show:



When carrying out whichever movement by selecting the function it must appear:



When the crane goes gets locked by the LLD (**overload**) the display shows:



In this case you have to carry out the manoeuvres allowing the overload reduction, i.e.: extension re-entry or winch lowering.

Moreover, the system can show the following error messages, which can be displayed when operating or trying unsuccessfully to operate.



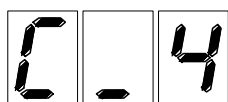
The messages and relevant meanings are the following:
“O”xx followed by the solenoid valve abbreviation.
 It means open circuit detected on the solenoid valve in object.



“C”xx followed by the solenoid valve abbreviation.
 It means “short circuit” detected on the solenoid valve in object.



Examples:
 Open circuit alarm on solenoid valve **EV3B**.



Short circuit alarm on solenoid valve **EV4**.

The following table shows all the displayed alarm codes.

<i>Display</i>	<i>Alarm Type</i>	<i>Valve on which the alarm is detected</i>
O1A	open circuit	EV on/off 1A (CLOCKWISE ROTATION)
O1b	open circuit	EV on/off 1b (COUNTER-CLOCKWISE ROTATION)
O2A	open circuit	EV on/off 2A (BOOM UP)
O2b	open circuit	EV on/off 2b (BOOM DOWN)
O3A	open circuit	EV on/off 3A (TELESCOPIC BOOM OUT)
O3b	open circuit	EV on/off 3b (TELESCOPIC BOOM IN)
O4A	open circuit	EV on/off 4A (WINCH DOWN)
O4b	open circuit	EV on/off 4b (WINCH UP)
O_3	open circuit	E3
O_4	open circuit	E4
O_9	open circuit	E9 (venting)
O_r	open circuit	VR (proportional valve)
C1A	short circuit	EV on/off 1A (CLOCKWISE ROTATION)
C1b	short circuit	EV on/off 1b (COUNTER-CLOCKWISE ROTATION)
C2A	short circuit	EV on/off 2A (BOOM UP)
C2b	short circuit	EV on/off 2b (BOOM DOWN)
C3A	short circuit	EV on/off 3A (TELESCOPIC BOOM OUT)
C3b	short circuit	EV on/off 3b (TELESCOPIC BOOM IN)
C4A	short circuit	EV on/off 4A (WINCH DOWN)
C4b	short circuit	EV on/off 4b (WINCH UP)
C_3	short circuit	E3
C_4	short circuit	E4
C_9	short circuit	E9 (venting)
C_r	short circuit	VR (proportional valve)

The system, through simple operations, allows to enter other menus, which can be helpful for the operator or a technician from the After-Sales Service. These menus are:

- MICRO-SWITCHES AND PRESSURE SWITCH DISPLAY MENU
- CURRENT DISPLAY MENU (for proportional valve adjustment)
- REMOTE CONTROL BUTTON STRIP DISPLAY MENU

There are other menus for adjustments and settings, needing test devices normally not available for operators, rather for the After-Sales Service.

- CALIBRATION MENU
- PROPORTIONAL BUTTON ACQUISITION MENU

MICRO-SWITCHES AND PRESSURE SWITCH DISPLAY MENU

This menu is accessed from the Normal Display Menu through the following procedure:

push the proportional button to its maximum level, then operate the 1A and 3B movements simultaneously for at least 5 seconds.

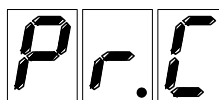
In this menu the state of FA, FB, FV, PM micro-switches are displayed cyclically, with a 2.5 seconds interval; each micro-switch can be in one of the following conditions:

- O** open
- C** closed

Example: display of the state “**FB micro-switch open**”



Example: display of the state “**PM micro-switch closed**”



The following table shows all displayed codes:

Fa.O	Fa.C	micro-switch FA
Fb.O	Fb.C	micro-switch FB
Fu.O	Fu.C	micro-switch FV
Pr.O	Pr.C	micro-switch PM

When no operation is activated the electronic control unit automatically switches to the Normal Display Menu after 60 seconds; otherwise a new power-on is required in order to get out of this menu.

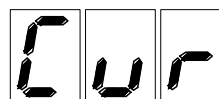
CURRENT DISPLAY MENU

This menu is accessed from the Normal Display Menu through the following procedure:

push the proportional button to its maximum level, then operate the 1A and 4B movements simultaneously for at least 5 seconds.

In this menu, when no operation is active, the indication “Cur” is displayed. When a movement is active the value of the current (in mA) that is driving the proportional solenoid valve is displayed.

Example: indication without any active movement



Example: indication with an active movement and with the proportional valve driven at 523 mA



When no operation is activated the electronic control unit automatically switches to the Normal Display Menu after 60 seconds; otherwise a new power-on is required in order to get out of this menu.

REMOTE CONTROL BUTTON STRIP DISPLAY MENU

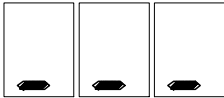
This menu is accessed from the Normal Display Menu through the following procedure:

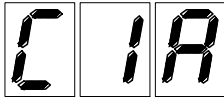
push the proportional button to its maximum level, then operate the 1A and 2B movements simultaneously for at least 5 seconds.

In this menu, when no operation is active, the indication “_ _ _” is displayed. When a movement is active the state of the contact that activates the movement in the remote control pendant is displayed. For each of the contacts the following state is displayed:

C closed

In case of multiple command (two or more movements activated simultaneously) only the state of the first received command is displayed.

Example: indication without any active movement 

Example: indication when the contact 1A is closed on the remote control uni 

The following table shows all displayed codes:

<i>Display</i>	<i>Indication</i>
C1A	contact 1A closed (CLOCKWISE ROTATION)
C1b	contact 1B closed (COUNTER-CLOCKWISE ROTATION)
C2A	contact 2A closed (BOOM UP)
C2b	contact 2B closed (BOOM DOWN)
C3A	contact 3A closed (TELESCOPIC BOOM OUT)
C3b	contact 3B closed (TELESCOPIC BOOM IN)
C4A	contact 4A closed (WINCH DOWN)
C4b	contact 4B closed (WINCH UP)
C5A	contact 5A closed (START)
C5b	contact 5B closed (STOP)

When no operation is activated the electronic control unit automatically switches to the Normal Display Menu after 60 seconds; otherwise a new power-on is required in order to get out of this menu.

