

Valid for models:

**PM 100024 SP**

**PM 100026 SP**

**PM 100028 SP**

**PM 100029 SP**

## **SERIE 100 SP**

**- G116 -**

### **INSTRUCTION AND WARNINGS**

Valid with the serial number

**G.116.0001**

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**Original instructions in English**



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## 1.1 - Purpose of the manual

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The instructions manual contains information which is essential for the correct use of the crane (1) (hereinafter also referred to as the machine).

Its purpose is to inform the operator (2) of the instructions to follow and the fundamental criteria to apply in all machine use or maintenance operations.

Before starting up the machine for the first time, the operator must have read and understood the instructions contained in this manual, in particular those highlighted with the various symbols.

The manual is an integral part of the machine and must be kept, for future reference, until the machine is scrapped.

If the machine is resold, the seller is bound to provide the new owner with the manual.

The information contained herein is arranged in chapters, in a sequential order according to subject matter.

The indexes, both alphabetic or analytic, allow the user to refer to the different subjects quickly and easily.

The original instructions are supplied by the manufacturer in english language.

To fulfil legal or commercial requirements, the original instructions may be supplied by the manufacturer in other languages.

It is strictly forbidden to use the manual for anything other than the machine's use and maintenance.

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## 1.2 - Manufacturer's details and machine identification data

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### - Manufacturer's details

**PM Group S.p.A.**

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41018 San Cesario sul Panaro - Modena (Italy)

tel. +39 059 936811

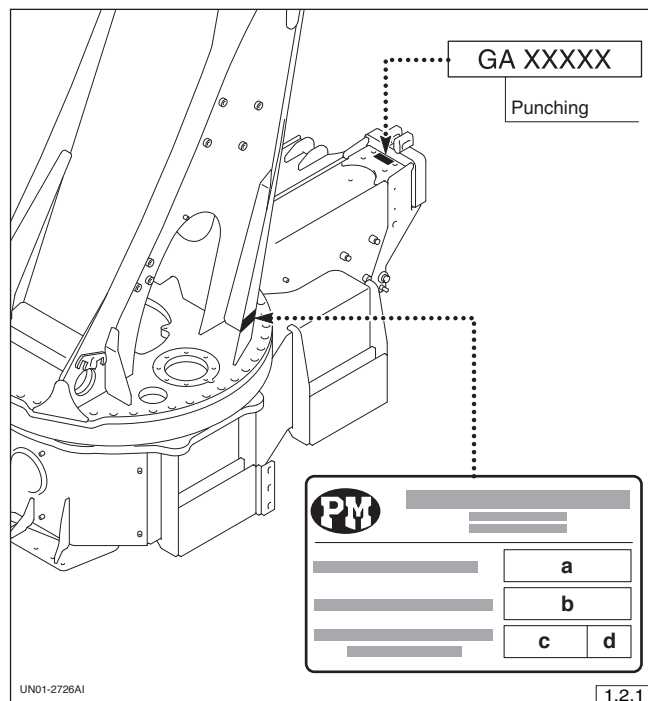
fax. + 39 059 936800

e-mail: info@pm-group.eu

(1) The term "crane" refers to the trade name given to the machine (from the crane series) stated on the title page.

(2) The term "operator(s)" refers to the person(s) possessing the necessary expertise to use, inspect and carry out routine maintenance on the machine.

## - Machine identification data



### Plate details

- a** = Crane model
- b** = Serial number
- c** = Year of manufacture
- d** = Conformity "CE" stamp

## 1.3 - Symbology

The symbols used in this manual are intended to highlight potentially hazardous operations.

To guarantee safe working conditions, the instructions highlighted by these symbols must always be followed.



**HAZARD !**

This indicates information or procedures which, if not complied with exactly, cause death or serious injuries.



**WARNING !**

This indicates information or procedures which, if not complied with exactly, could cause death or serious injuries.



**CAUTION !**

This indicates information or procedures which, if not complied with exactly, could cause slight injuries or damage to the machine.



**Information**

This indicates useful and important information or procedures.



#### WARNING !

***For the sake of clarity when outlining procedures to carry out, some illustrations show the machine with the guards, casings or panels removed.***

***Never use the machine without all the casings and guards in place.***

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## 1.4 - Technical service

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Technical service requests must be addressed to the manufacturer's Technical Assistance Service (T.A.S.) or to the nearest Authorised Workshop.

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## 1.5 - Enclosed documentation

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- "EC" conformity declaration
- Warranty booklet
- Machine certificate of origin (only for markets requiring it).

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## 1.6 - Disclaimer

---

The manufacturer cannot be held responsible for any occurrence arising from the following:

- total or partial failure to comply with instructions herein;
- misuse of the machine;
- unauthorised alterations or work carried out on the machine;
- failure to comply with the highway code and regulations concerning transportation when moving the machine from one site to another;
- lack of maintenance;
- use of non-original spare parts or those which are not designed specifically for the model;
- exceptional weather conditions.





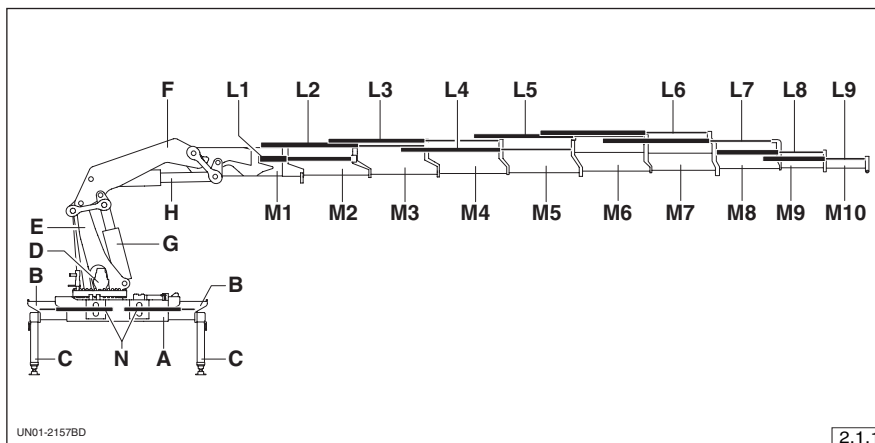
## 2.1 - Description of the crane

The crane is composed of a base inside which there is a rotating column with a system of articulated arms at its end.

The crane is driven by hydraulic energy generated by a motor and a pump.

This crane series is available in various models, which differ mostly in the number of extendable arms.

### 2.1.1 - Basic crane main parts



## Key to the main parts

| Ref.      | Part                        | 100024 SP | 100026 SP | 100028 SP | 100029 SP |
|-----------|-----------------------------|-----------|-----------|-----------|-----------|
| <b>A</b>  | Base                        | •         | •         | •         | •         |
| <b>B</b>  | Stabiliser arm              | •         | •         | •         | •         |
| <b>C</b>  | Stabiliser jack             | •         | •         | •         | •         |
| <b>D</b>  | Rotation reduction gear     | •         | •         | •         | •         |
| <b>E</b>  | Column                      | •         | •         | •         | •         |
| <b>F</b>  | Main arm                    | •         | •         | •         | •         |
| <b>G</b>  | Main jack                   | •         | •         | •         | •         |
| <b>H</b>  | Secondary jack              | •         | •         | •         | •         |
| <b>L1</b> | 1st arm extension jack      | •         | •         | •         | •         |
| <b>L2</b> | 2nd arm extension jack      | •         | •         | •         | •         |
| <b>L3</b> | 3rd arm extension jack      | •         | •         | •         | •         |
| <b>L4</b> | 4th arm extension jack      | •         | •         | •         | •         |
| <b>L5</b> | 5th arm extension jack      |           | •         | •         | •         |
| <b>L6</b> | 6th arm extension jack      |           | •         | •         | •         |
| <b>L7</b> | 7th arm extension jack      |           |           | •         | •         |
| <b>L8</b> | 8th arm extension jack      |           |           | •         | •         |
| <b>L9</b> | 9th arm extension jack      |           |           |           | •         |
| <b>M1</b> | Secondary arm               | •         | •         | •         | •         |
| <b>M2</b> | 1st hydraulic extension arm | •         | •         | •         | •         |
| <b>M3</b> | 2nd hydraulic extension arm | •         | •         | •         | •         |
| <b>M4</b> | 3rd hydraulic extension arm | •         | •         | •         | •         |
| <b>M5</b> | 4th hydraulic extension arm | •         | •         | •         | •         |
| <b>M6</b> | 5th hydraulic extension arm |           | •         | •         | •         |

| Ref. | Part                             | 100024 SP | 100026 SP | 100028 SP | 100029 SP |
|------|----------------------------------|-----------|-----------|-----------|-----------|
| M7   | 6th hydraulic extension arm      |           | •         | •         | •         |
| M8   | 7th hydraulic extension arm      |           |           | •         | •         |
| M9   | 8th hydraulic extension arm      |           |           | •         | •         |
| M10  | 9th hydraulic extension arm      |           |           |           | •         |
| N    | Stabiliser arm<br>extension jack | •         | •         | •         | •         |

---

## 2.2 - Conditions of use

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### 2.2.1 - Designated use

The crane is designed for the vertical lifting, handling and positioning of free loads (3), in compliance with the values given in the capacities diagram and handling speeds not exceeding the maximum prescribed limits (see specifications).

The cranes are designed in compliance with harmonised standard EN 12999, class H1-B3, which provides for non-continuous use, with a hook, for a maximum of 400 lifting cycles per week and a load equalling 3/4 of the load indicated in the relative diagram.

To use the machine with loads other than those for which it is designed, it is the user's responsibility to first contact an authorised workshop to check whether a downgrade is necessary.

(3) The term "free load" means loads whose movement is not limited.

## 2.4

### 2.2.2 - Inadmissible uses

**It is forbidden** to use the machine in areas where there is a risk of fires or explosions.

**It is forbidden** to use the crane to pull out poles, uproot trees and lift fixed loads.

**It is forbidden** to use the machine to lift people, with the exception of cases in which the crane is fitted with a specially designed operator's platform approved by the manufacturer.

**It is forbidden** to use the crane with fixed load-lifting accessories such as hooks, bucket, grabs etc unless the accessories are authorised by the manufacturer.

**It is forbidden** to use the machine as a recovery means for towing broken-down vehicles.

**It is forbidden** to drag or push loads.

Before performing a rotation manoeuvre, the load must be lifted off the ground.

**It is forbidden** to lift the base truck with the stabilisers to change the tyres.

**It is forbidden** to lift the base truck with the stabilisers in order to move the vehicle if stuck in areas of loose ground.

**It is forbidden** to fit removable clamping accessories such as jibs, manual extensions etc if they are not approved by the manufacturer or they are not designed specifically for the model in question.

## 2.3 - Control and limiting devices



### HAZARD !

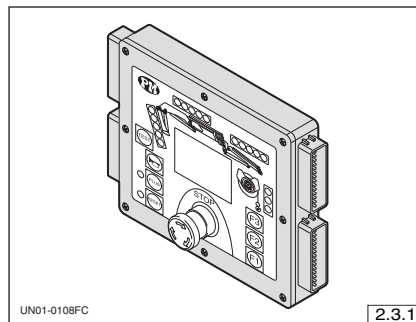
***On no account must you tamper with the control and limiting devices.***



### Information

*The control and limiting devices for the accessories are outlined in the section describing each accessory.*

### 2.3.1 - Functional control unit



The functional control unit features:

- the crane momentum limiting device;
- the jib momentum limiting device;
- the rotation limiting device.

The functional control unit:

- checks the delivery pressure in the primary and secondary jack;
- checks that the control and limiting devices work properly;
- indicates the machine's operating status and any malfunctions;

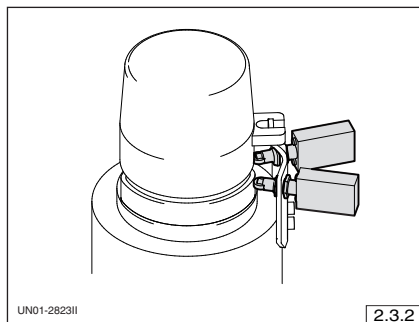
- allows the truck engine to be switched on (Test+F1) and off (Test+F2) as an alternative to the radio control.



### Information

*The momentum limiter does not relieve the operator of liability if the maximum loads allowed are intentionally exceeded.*

### 2.3.2 - Rotation locking and limiting device



#### - Rotation limiting device

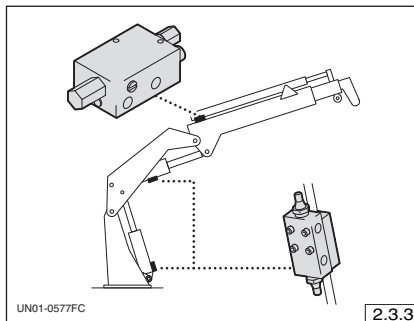
The rotation limiting device stops the crane rotating when it reaches the area in which the stability, with that particular load, is at risk.

Work may only be carried out in that area if the load is reduced (in relation to the nominal capacity) (see "Work sectors").

#### - Rotation lock device

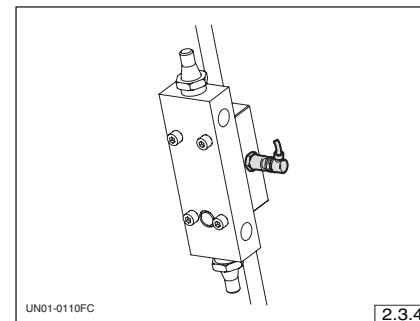
The device prevents the crane being operated in the area where the stability of the outfitting is at risk (see "Work sectors").

### 2.3.3 - Load support valves



The valves prevent the loads dropping unexpectedly to the ground as a result of a broken line or a sudden pump failure.

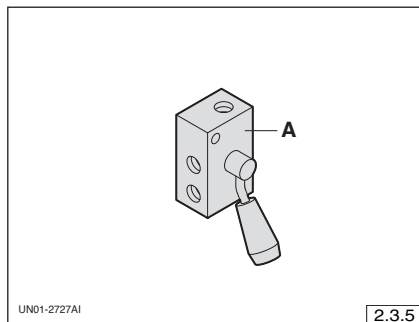
### 2.3.4 - Pressure sensors



The sensors are located on the load support valves on the secondary jack and the main jack.

These signal the pressure of the jacks to the functional control unit to prevent the handling of loads greater than the limit foreseen.

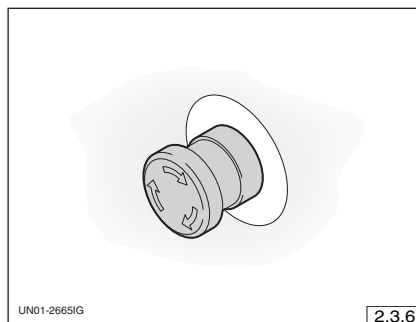
### 2.3.5 - Stabiliser valve



#### **A** - Lock-out valve with cock

The valve locks the stabiliser jack (in the position it is in at that precise moment) in the event of a broken line or that the oil delivered to the jack is suddenly cut off.

### 2.3.6 - Emergency stop device



Use the device to stop all the crane's movements in the event of an emergency.

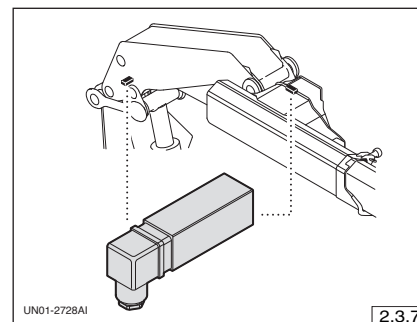
Rotate the button to activate the crane.



**WARNING !**

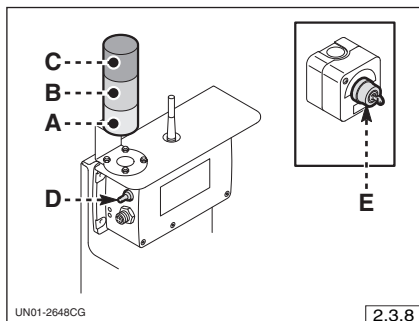
***Ensure the hazardous conditions cannot persist before releasing the button.***

### 2.3.7 - Tilt sensor



The sensor informs the functional control unit of the angle of the main arm and of the secondary arm in relation to the horizontal axis so that the controls used to move the crane safely can be enabled.

## 2.3.8 - Signal lights



### A) Green light (if featured).

This signals that the receiver unit has been activated (see “Radio control”):

- with selector “D” in “REMOTE” position for radio controls “SCAN-RECO”;
- with switch “E” in “Radio” position for radio control “HETRONIC”.

### B) Orange light.

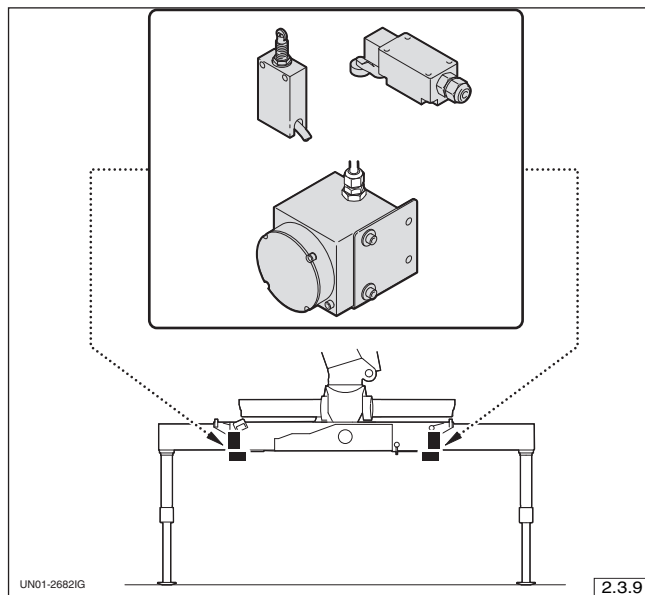
This signals that 90% of the load that can be lifted is reached.

### C) Red light.

This signals that 100% of the load that can be lifted is reached.



### 2.3.9 - Stabilisation controller



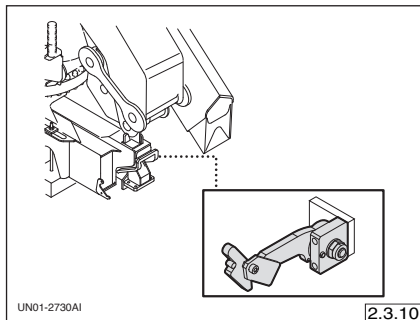
The device consists of microswitches and sensors that signal the position of the jacks and the outrigger arms to the functional control unit in order to ensure safe operation.

- These detect when the outrigger jacks are resting properly on the ground.
- These detect the extension of the outriggers; if they are not completely extended the crane may operate with reduced lifting capacity.



*If featured, the device is also installed on the supplementary crossmember.*

### 2.3.10- Locking devices for transit on the roads



Mechanical device to prevent accidental extension of the stabiliser arms.

The devices keep the crane within the vehicle's profile when travelling on public roads.

### 2.3.11- Control devices for transit on roads

The devices check that the crane is within the outer profile of the vehicle in order to be allowed to transit on roads.

The following devices activate the signal lights and/or acoustic signals in the driver's cab:

- outriggers arms closure control device;
- crane height control device.

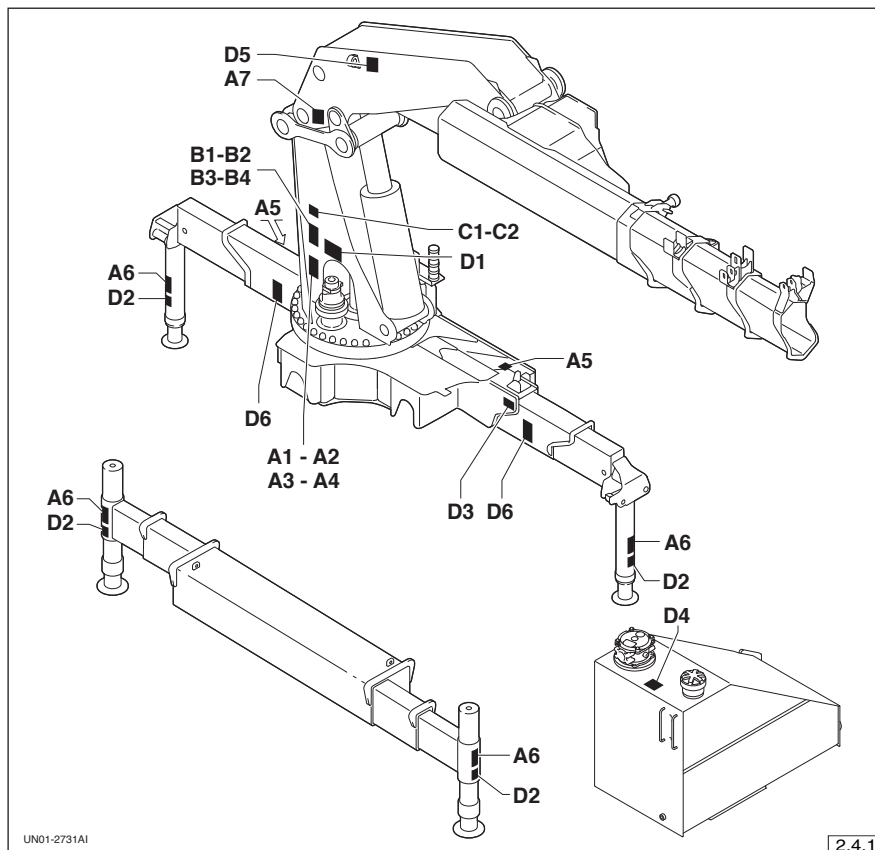
## 2.4 - Safety recommendations and information



### WARNING !

**Always comply with the safety recommendations on the plates.**

**Check that the plates are always present and legible; if not replace them with new ones in the same position.**



UN01-2731AI

2.4.1

2.11

## - Hazards signs



**A1 = Risk of electric shocks (\*)**.  
Always keep a safe distance from electricity lines.



**A2 = Risk from overhanging loads (\*)**.  
Take care not to walk or stand under overhanging loads.



**A3 = Dangerous manoeuvre signal (\*)**.  
Operate the crane so that it opens and closes on the opposite side to the trajectory travelled by the main arm.



**A4 = Obstacle risk signal (\*)**.  
Watch out for max. admitted heights when travelling on public roads.

(\*) Signals grouped together on one plate.



**A5 = Risk of falls.**  
Slippery surface, take care.



**A6 = Risk of crushing.**  
Lower limbs could be crushed by stabiliser jacks when in use, take care.



**A7 = Risk of lacerations signal.**  
This indicates a risk of lacerations to the hands caused by moving parts.

## - Prohibition signs



**B1 = No entry (\*\*).**  
It is forbidden to both move around and stop in the crane's operating range.



**B2 = Prohibited use (\*\*).**  
It is forbidden for unauthorised persons to use the machine.



**B3 = No water jets (\*\*).**  
It is forbidden to use pressurised water on the electrical components.



**B4 = Prohibited use (\*\*).**  
Use of the machine is prohibited if the stabilisers have not been positioned correctly.

(\*\*) Signals grouped together on one plate.

## - Obligation sign

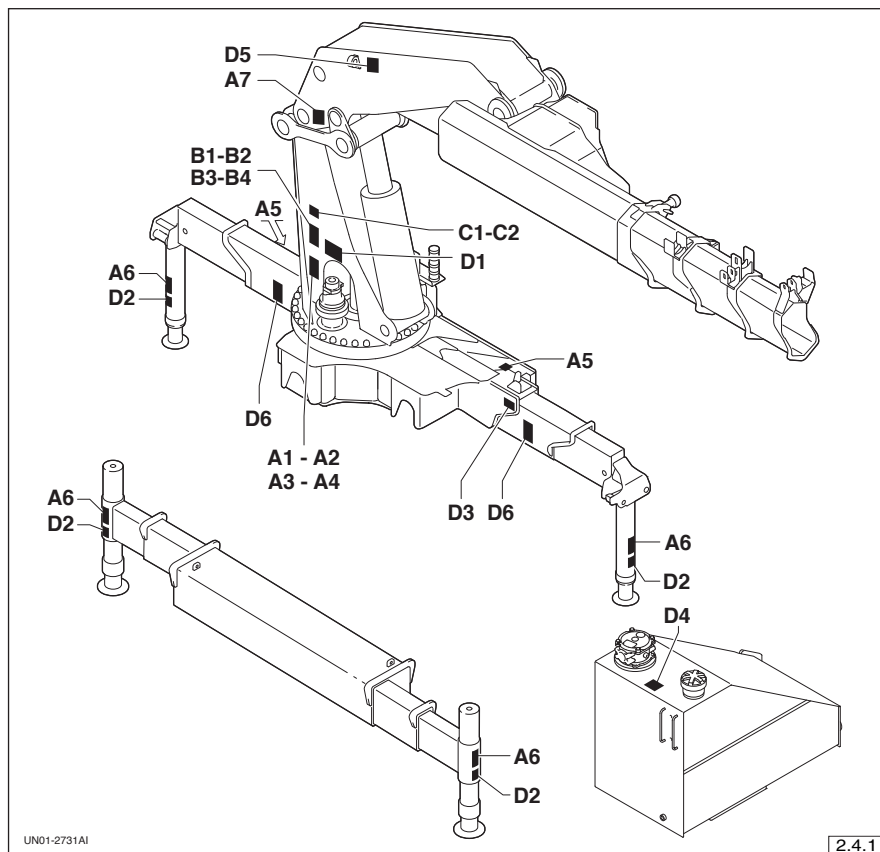


**C1 = Instruction Manual plate (\*\*\*)**.  
This indicates that the operator must read the instruction manual carefully before using the machine.

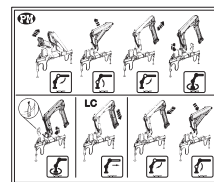


**C2 = Individual safety gear plate (\*\*\*)**.  
This indicates that the user is under obligation to wear the safety helmet when operating the machine.

(\*\*\*) Signals grouped together on one plate.



## - Information signs



### D1 = Crane opening/closing plate.

Indicates the order of the actions to set the crane in the working or resting positions.



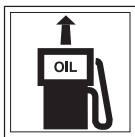
### D2 = Max. stabiliser pressure signal.

Shows the maximum force that the crane exerts on the ground



### D3 = Power takeoff plate.

Reminds the operator to switch off the power takeoff during transfers.



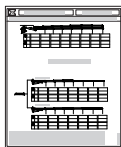
**D4 = Oil tank plate.**

Indicates the hydraulic oil tank.



**D5 = Hoisting points plate.**

Indicates the hoisting hooks attachment points.



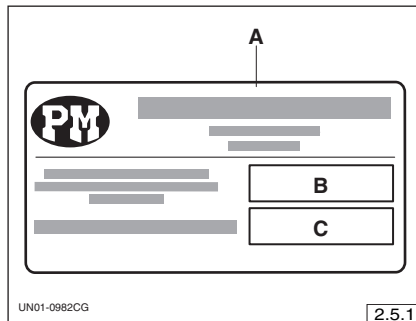
**D6 = Capacities diagram plate.**

Indicates the performance limits of the machine and any accessories fitted.

## 2.5 - Accessories

### 2.5.1 - Additional crossmember

#### - Identification detail



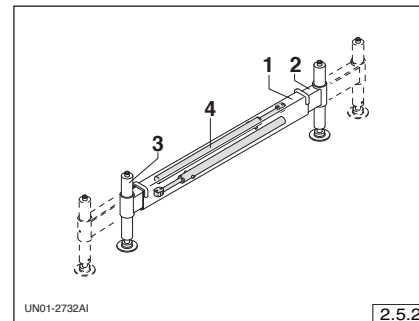
**A)** Manufacturer code

**B)** Supplementary crossbeam model

**C)** Serial number

#### - General description

The additional crossmember is only fitted when the crane's stabiliser jacks alone cannot guarantee the crane/truck unit's stability.



#### - Main parts

**1** - Crossbeam

**2** - Extendable stabiliser arm

**3** - Stabiliser jack

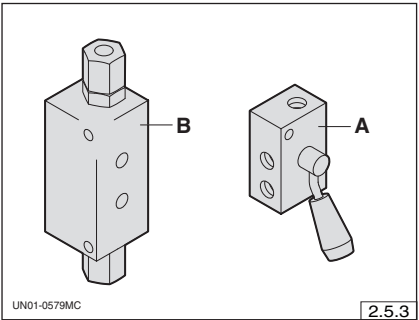
**4** - Stabiliser arms extension jack

#### - Installable crossbeam

Crossbeam with hydraulically extended outriggers arms.

- Locking devices

Stabiliser valve

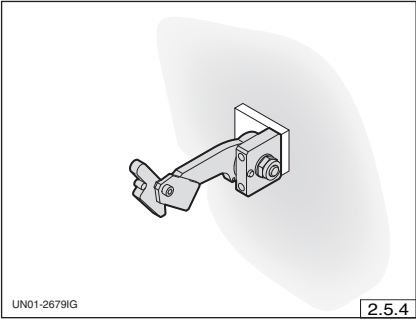


Alternatively, two types of valve can be fitted on the outriggers.

- A) Lock-out valve with cock
- B) Lock-out valve

The valve locks the stabiliser jack (in the position it is in at that precise moment) in the event of a broken line or that the oil delivered to the jack is suddenly cut off.

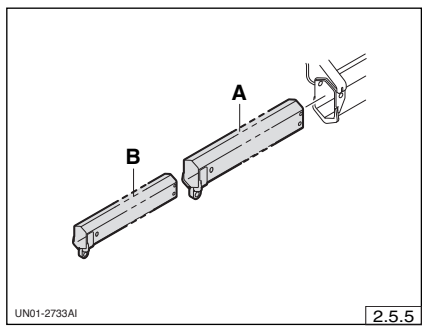
Locking devices for transit on roads



These prevent the supplementary arms extending accidentally when the vehicle is in transit. The devices must be manually disconnected before extending the outrigger arms; closure is automatic once the arms are retracted.

2.5.2 - Manual extensions

Manual extensions on jib

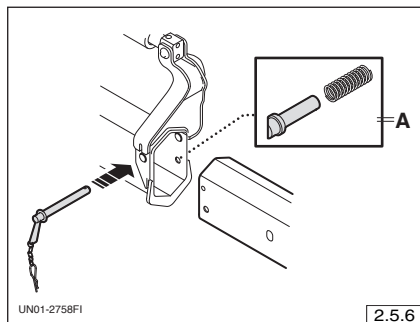


| Pos. | Model of the jib |           |
|------|------------------|-----------|
|      | J 1616.25        | J 2416.25 |
| A    | •                | •         |
| B    | •                | •         |

| Pos. | Weight kg - (lbs) |           |
|------|-------------------|-----------|
|      | J 1616.25         | J 2416.25 |
| A    | 40 (90)           | 50 (115)  |
| B    | 35 (80)           | 45 (100)  |

## - Locking and limiting devices

### Safety pin



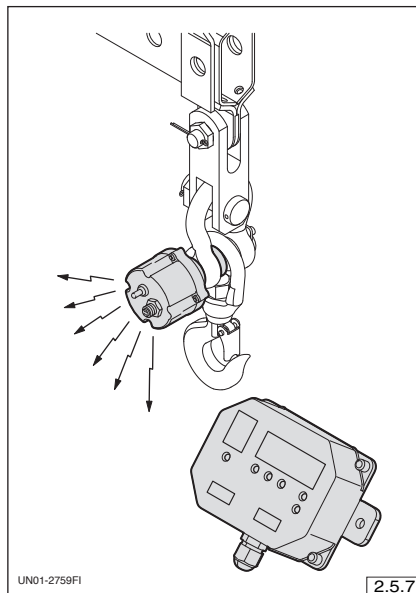
Device “A” prevents the extension dropping to the ground accidentally during its extension.



**WARNING !**

***The device is not scaled to withstand hoisting loads, therefore each extension must be locked in position (extended or retracted) with the relative safety pin.***

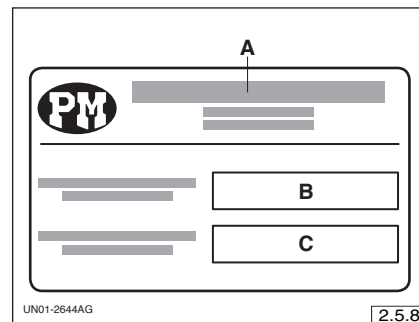
### Manual extension load limiting device



This prevents manual extension overloading (see para. “Use of the manual extension load limiter”).

## 2.5.3 - Jibs

### - Identification details



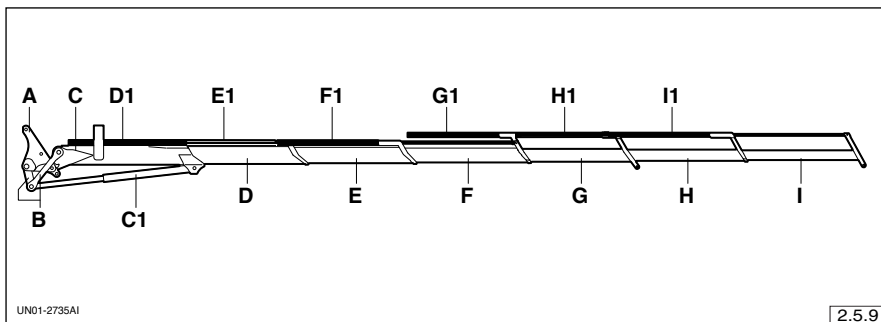
- A)** Manufacturer's details
- B)** Jib model
- C)** Serial number

### - General description

The jib is fitted on the crane's last hydraulic extension arm for the purposes of placing loads whose positioning requires both depth and height.



## - Main parts



### Key to main parts

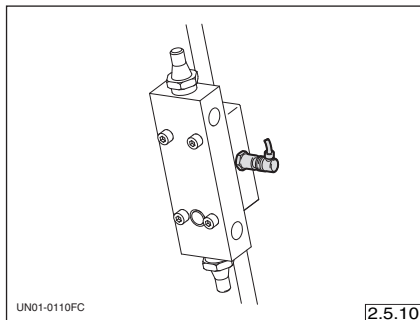
| Pos. | Part                               | J 1614.25 | J 1616.25 | J 2414.25 | J 2416.25 |
|------|------------------------------------|-----------|-----------|-----------|-----------|
| A    | Tooth                              | •         | •         | •         | •         |
| B    | Connecting rods                    | •         | •         | •         | •         |
| C    | Articulated arm                    | •         | •         | •         | •         |
| C1   | Articulation jack                  | •         | •         | •         | •         |
| D    | First arm hydraulic extension      | •         | •         | •         | •         |
| D1   | First arm extension jack           | •         | •         | •         | •         |
| E    | Second arm hydraulic extension     | •         | •         | •         | •         |
| E1   | Second arm extension jack          | •         | •         | •         | •         |
| F    | Third arm hydraulic extension      | •         | •         | •         | •         |
| F1   | Third arm extension jack           | •         | •         | •         | •         |
| G    | Fourth arm hydraulic extension     | •         | •         | •         | •         |
| G1   | Fourth arm extension jack          | •         | •         | •         | •         |
| H    | Fifth arm with hydraulic extension |           | •         |           | •         |
| H1   | Fifth arm extension jack           |           | •         |           | •         |
| I    | Sixth arm with hydraulic extension |           | •         |           | •         |
| I1   | Sixth arm extension jack           |           | •         |           | •         |

## - Jibs that can be fitted

| Jib model | Machine model |           | Weight kg (lbs) |
|-----------|---------------|-----------|-----------------|
|           | 100026 SP     | 100028 SP |                 |
| J 1614.25 |               | •         | 980 (2160)      |
| J 1616.25 |               | •         | 1200 (2645)     |
| J 2414.25 | •             |           | 1385 (3053)     |
| J 2416.25 | •             |           | 1645 (3626)     |

## - Locking and limiting devices

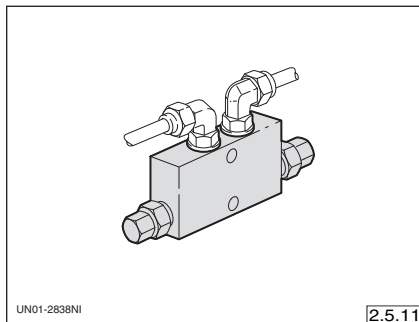
### Pressure sensor



The sensors are located on the load support valves on the secondary jack and the main jack.

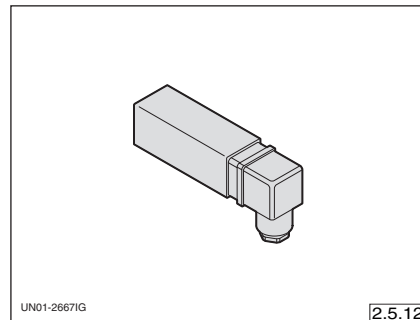
These signal the pressure of the jacks to the functional control unit to prevent the handling of loads greater than the limit foreseen.

### Load support valves



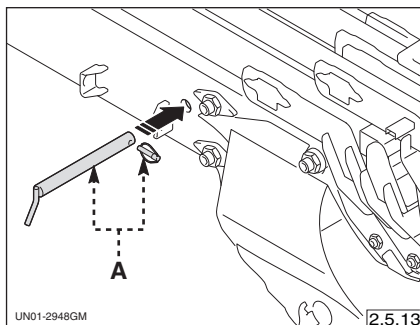
The valves prevent the loads dropping to the ground unexpectedly as a result of a broken line or a sudden pump failure.

### Tilt sensor



The sensor informs the functional control unit of the angle of the jib in relation to the horizontal axis so that the controls used to move the crane safely can be enabled.

## Anti-extension device for jib arms



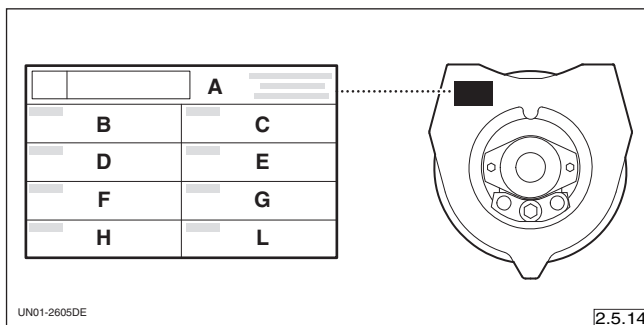
This prevents the jib arms extending accidentally when the vehicle is in transit.

## 2.5.4 - Winch

The winch is composed of a drum, driven by a hydraulic motor, around which the load lifting cable is wound.

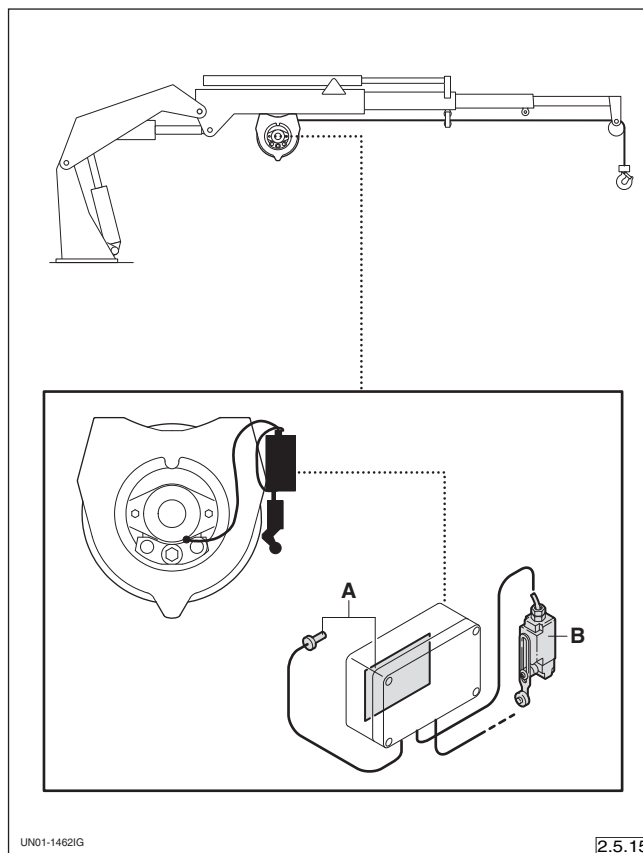
At the end of the last extendable arm there is a lifting tackle fitted.

### - Identification details



- A) Manufacturer details
- B) Winch model
- C) Identification code
- D) Serial number
- E) Year of manufacture
- F) Maximum capacity
- G) Maximum speed
- H) Maximum pull
- L) Maximum pressure (bar)

- Locking and limiting devices

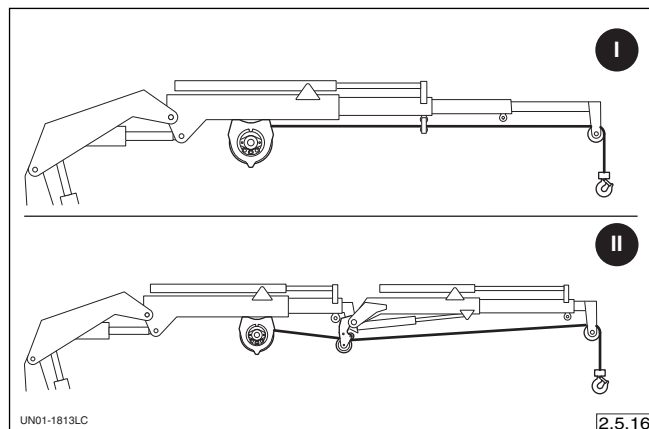


**A) Load limiter**

This is comprised of a loading cell and a circuit board.  
It stops the machine when:  
the lifted load exceeds the maximum;  
the lower block reaches the upper stroke limit switch.

**B) Down stroke limit switch**

The limit switch stops the load travelling downwards to prevent the cable on the drum unwinding fully.

**- Assembly type****Winches installable on the standard machine and on the standard machine with the jib**

| Crane model | Winch model (I) |        |
|-------------|-----------------|--------|
|             | TC 5            | S 19 L |
| PM 100 SP   | •               | •      |

| Jib model | Winch model (II) |
|-----------|------------------|
|           | S 19 L           |
| J 1614.25 | •                |
| J 1616.25 | •                |
| J 2414.25 | •                |
| J 2416.25 | •                |

**- Specifications****Winch model ..... TC5**

Cable diameter = .....ø mm 14 .....in. 0.55"  
Minimum cable breaking load = .....kN 150 .....lbs 33721  
Maximum cable length = .....m 87 .....ft 285  
Maximum cable pull  
load (last layer) = .....kN 32 .....lbs 7193  
Maximum cable speed = .....m/min 56 .....ft/min. 183  
Weight = .....kg 191 .....lbs 421  
Mass with cable = .....kg 270 .....lbs 595  
Mechanism class according to UNI ISO 4301/1 ....M3

**Winch model ..... S 19 L**

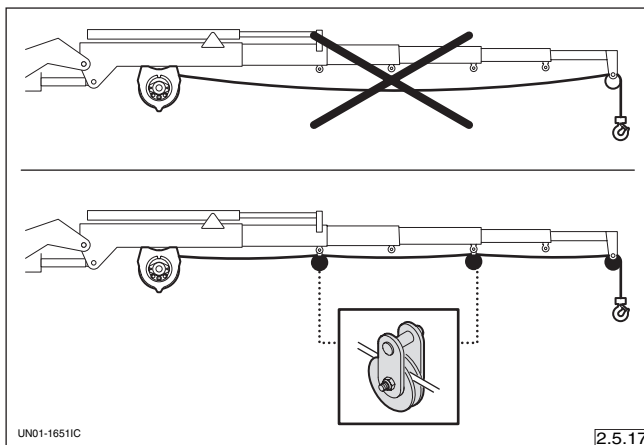
Cable diameter = .....ø mm 11 .....in. 0.43"  
Minimum cable breaking load = .....kN 110 .....lbs 24955  
Maximum cable length = .....m 89 .....ft 292'  
Maximum cable pull  
load (last layer) = .....kN 19 .....lbs 4270  
Maximum cable speed = .....m/min 59 .....ft/min. 193  
Weight = .....kg 112 .....lbs 247  
Mass with cable = .....kg 175 .....lbs 385  
Mechanism class according to UNI ISO 4301/1 ....M3

## - Use of the winch



**CAUTION !**

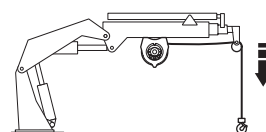
**The section of cable between the winch and the block must remain in contact with the arms. If this is not the case, fit the driving pulley (see "Tackle installation").**



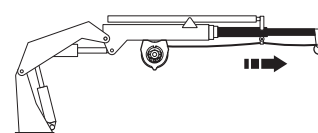
**HAZARD !**

**It is forbidden to lift objects at an angle.**

**I**



**II**



UN01-14321C

2.5.18

To prevent further damage to the cable, the hook must be lowered before the arm is extended.



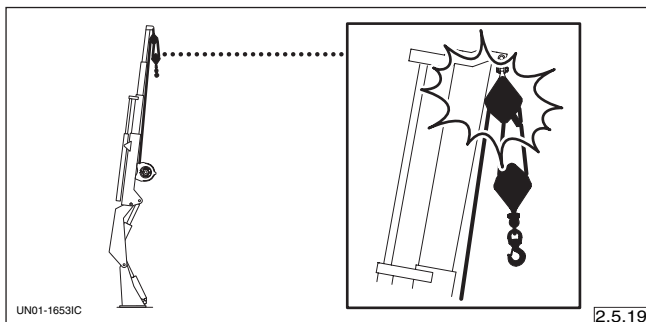
**CAUTION !**

**Do not use the winch when the crane arms are fully closed. To wind the cable around the winch drum properly, extend at least two arms.**



**CAUTION !**

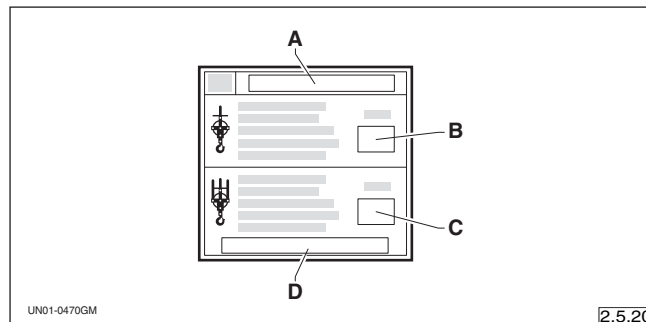
**During the winding/unwinding operations check that the cable is always taut, so that it positions itself correctly on the winch drum.**



In order not to damage the machine, avoid contact between upper block and the arms when the latter are vertically tilted.

## 2.5.5 - Lifting tackle

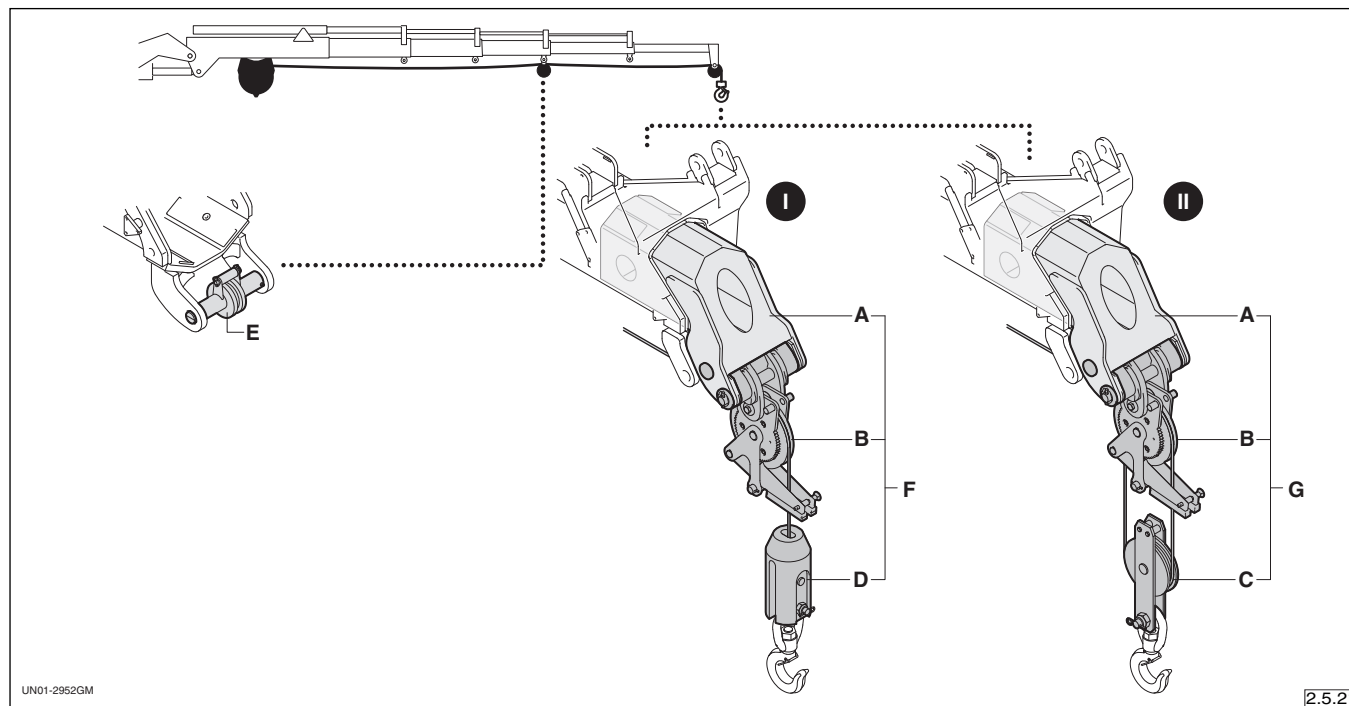
### - Identification details



The tackle is composed of a system of pulleys located at the end of the last arm.

- A) Manufacturer details
- B) Tackle capacity with direct pull (kg/lb)
- C) Tackle capacity with double pull (kg/lb)
- D) Cable diameter

- Tackle types for each crane  
**TC5 winch (PM 100024 SP - 100026 SP)**



- I) Tackle with direct pull for crane  
 II) Tackle with double pull for crane

**A** - Arm  
**B** - Upper block  
**C** - Lower block for double pull line on crane

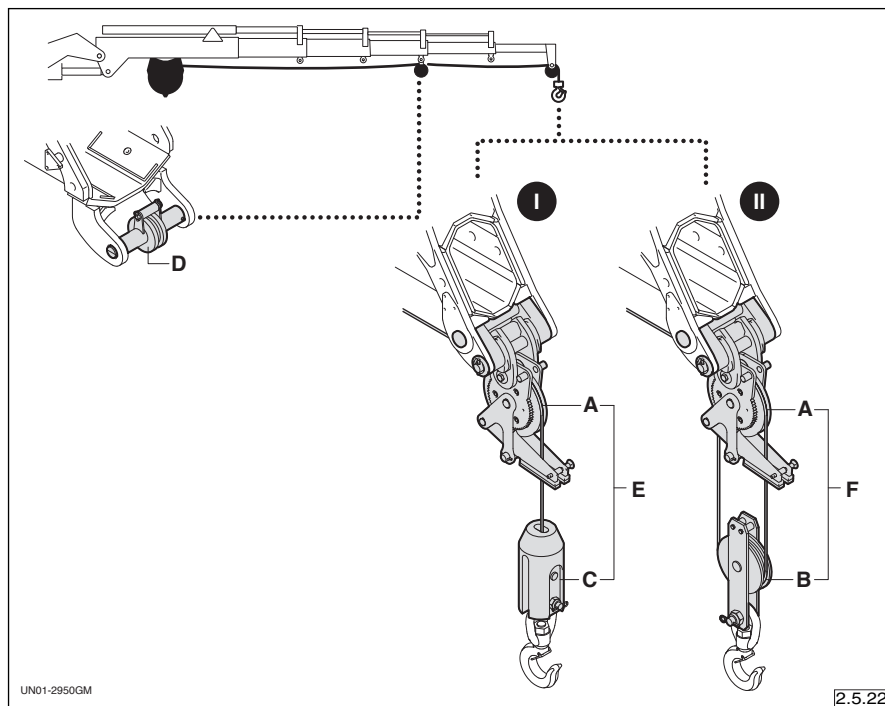
**D** - Lower block for single pull on crane  
**E** - Driving pulley (100026 SP)  
**F** - Full tackle for single pull line on crane  
**G** - Full tackle for double pull on crane

**Crane tackle weights**

| Crane model | Part (kg - lbs) |             |            |            |           |              |
|-------------|-----------------|-------------|------------|------------|-----------|--------------|
|             | A               | B           | C          | D          | E         | G            |
| 100 SP      | 55<br>(125)     | 55<br>(125) | 35<br>(80) | 35<br>(80) | 8<br>(20) | 145<br>(319) |



## TC5 winch (PM 100028 SP - 100029 SP)



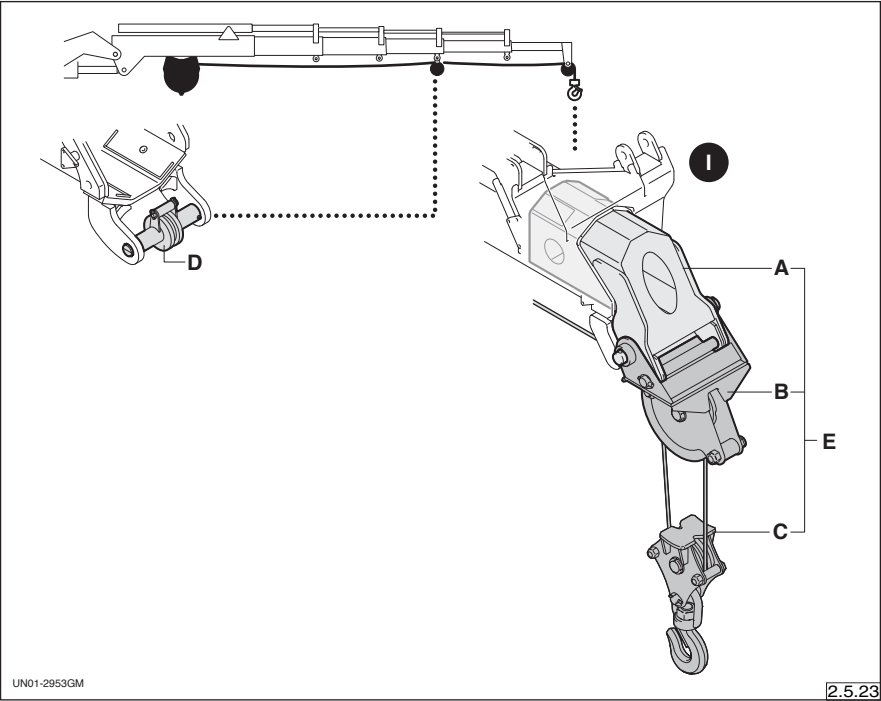
- A - Upper block
- B - Lower block for double pull line on crane
- C - Lower block for single pull on crane
- D - Driving pulley
- E - Full tackle for single pull line on crane
- F - Full tackle for double pull on crane

### Crane tackle weights

| Crane model | Part (kg - lbs) |            |            |           |             |             |
|-------------|-----------------|------------|------------|-----------|-------------|-------------|
|             | A               | B          | C          | D         | E           | F           |
| 100 SP      | 55<br>(125)     | 35<br>(80) | 35<br>(80) | 8<br>(20) | 90<br>(200) | 90<br>(200) |

- I) Tackle with direct pull for crane
- II) Tackle with double pull for crane

S 19 L winch (PM 100024 SP - 100026 SP)



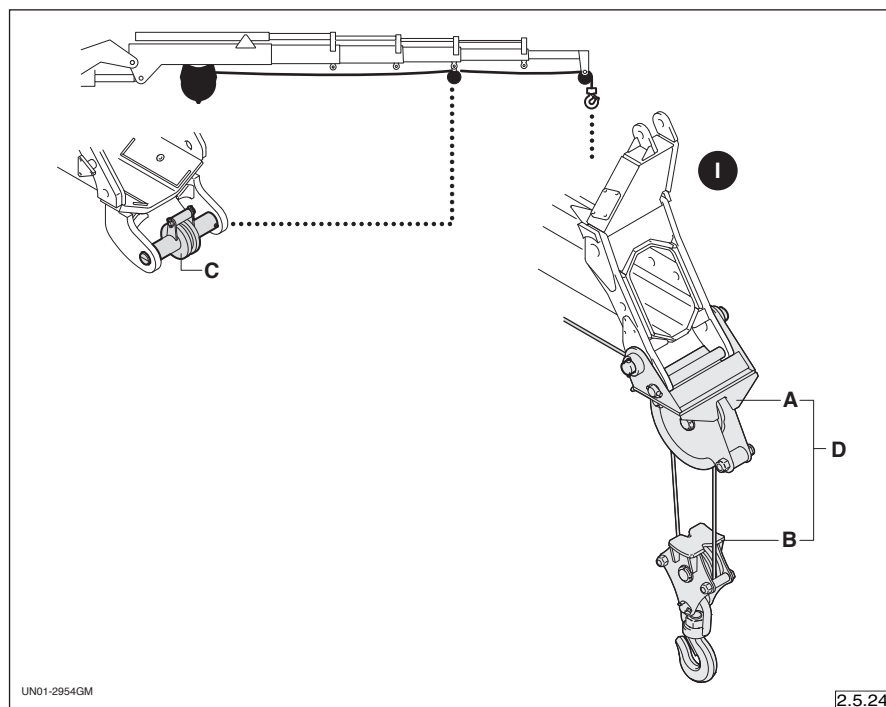
I) Tackle with double pull for crane

- A - Arm
- B - Upper block
- C - Lower block
- D - Driving pulley (100026 SP)
- E - Complete tackle for double pull

Crane tackle weights

| Crane model | Part kg - (lbs) |             |            |           |              |
|-------------|-----------------|-------------|------------|-----------|--------------|
|             | A               | B           | C          | D         | E            |
| 100 SP      | 55<br>(125)     | 75<br>(170) | 35<br>(80) | 8<br>(20) | 165<br>(365) |

## S 19 L winch (PM 100028 SP - 100029 SP)



### I) Tackle with double pull for crane

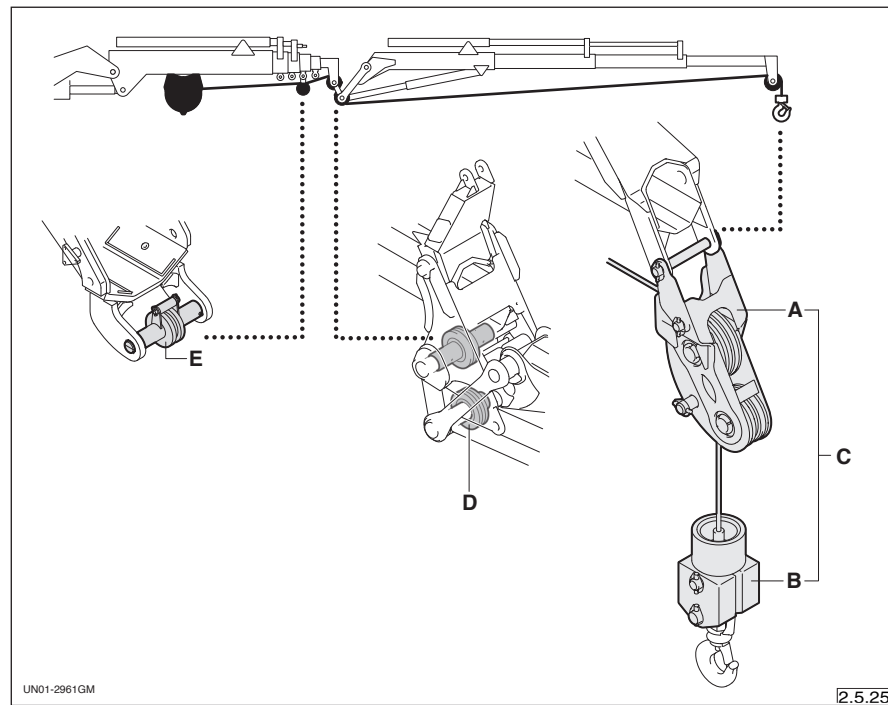
- A** - Upper block
- B** - Lower block
- C** - Driving pulley
- D** - Full tackle for double pull

## Crane tackle weights

| Crane model | Part kg - (lbs) |            |           |              |
|-------------|-----------------|------------|-----------|--------------|
|             | A               | B          | C         | D            |
| 100 SP      | 75<br>(170)     | 35<br>(80) | 8<br>(20) | 110<br>(245) |

## - Tackle types on jib

*Winch fitted on standard machine*



## Crane tackle weights

| Crane model | Part kg- (lbs) |            |             |            |           |
|-------------|----------------|------------|-------------|------------|-----------|
|             | A              | B          | C           | D          | E         |
| 100 SP      | 40<br>(90)     | 35<br>(80) | 75<br>(170) | 35<br>(80) | 8<br>(20) |

**A** - Upper block

**B** - Lower block

**C** - Complete tackle for direct pull

**D** - Joint driving pulley

**E** - Driving pulley

---

## 2.6 - Noise level

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Tests carried out have measured a sound pressure level below 70 Db(A).

The tests have been carried out without considering the power source (vehicle's engine) as it is not part of the supply.

The installer should ask the truck's manufacturer for information about the noise level and transfer the said information to the operator.

---

## 2.7 - Vibrations

---

Vibration effects on the operator are considered not significant as the machine is used for short periods of time.

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## 2.8 - Gas emissions

---

- Gases produced by the combustion of the fuel used by the truck endothermic engine.
- Fuel vapours emitted during refuelling.

---

## 2.9 - Electromagnetic compatibility

---

All the machine's components subject to the European directives 95/54/CEE (and subsequent modifications) and 2004/108/CE on electromagnetic compatibility conform to the aforesaid directives.

---

### 2.10- Residual dangers

---

#### ***Dangers of a mechanical nature.***

Contact with the articulated parts of the machine could result in limbs being crushed or lacerated.

#### ***Dangers of thermal nature.***

Contact with the machine's hot parts could result in burns.

#### ***Fire hazard.***

Fuel leaking from the tank, during use or when refilling, can create a fire hazard.

#### ***Risk of fluid ejection at high pressure.***

The breakage of a pipe or blow-by under oil pressure could create risk of lesions and skin infections.

#### ***Risk of slipping and falling.***

Oil, grease, snow and ice on the entrance steps of the maneuvering stations and on the work platform floor can cause the operator to slip and fall.



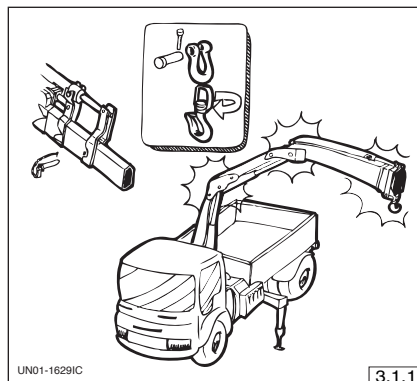
# 3 Safety

## 3.1 - Safety regulations



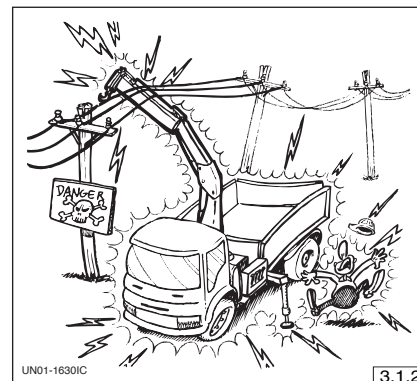
### WARNING !

*Read the instructions contained in this manual carefully, in particular those concerning safety and the signs affixed to the machine.*



### Before operating the crane

- ◆ Check the degree of wear of the accessories' lock pins;
- ◆ make sure the hook is fitted with a nut and that it rotates freely without excess play;
- ◆ make sure the hook is fitted with the safety device to prevent cables being released accidentally and that the said safety device is intact;
- ◆ carefully check the load harnesses and the chains, cables and straps are in good condition and that they are suitable for the load to be lifted;
- ◆ make sure the hoses are in good condition and that no oil leaks are present.



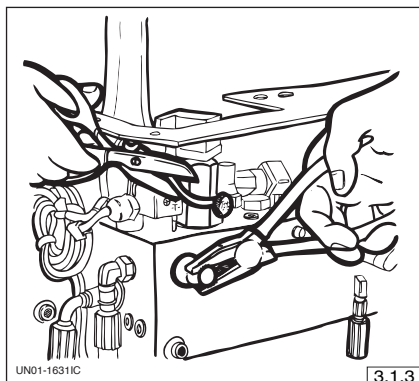
### HAZARD !

***Do not operate the machine in the vicinity of power lines.***

To operate the crane in the vicinity of power lines, always refer to your superiors or the competent authority for special instructions.

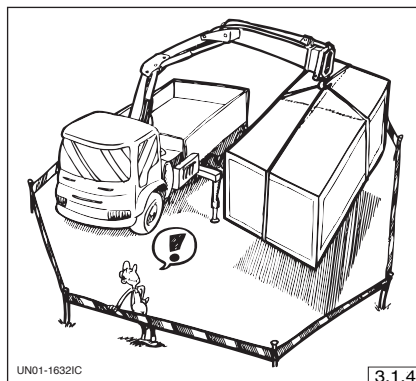
Obtain clear instructions regarding the way in which the work must be carried out. Said procedures must be studied for each particular situation and complied with exactly.

When carrying out maintenance work on power lines, you are advised to connect the metal parts on the vehicle to the earth, observing the relative regulations in force.



**WARNING !**

***Do not remove the lead seals on the valves.***



Cordon off the work area to prevent access by unauthorised persons. The operator must ensure no-one stops or moves around in the work area.



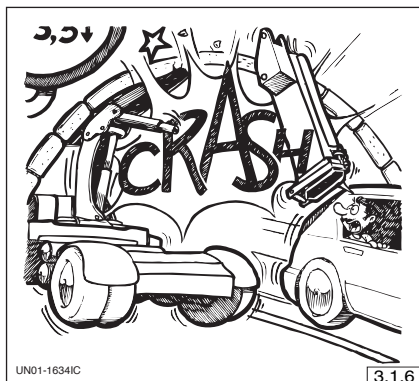
**HAZARD !**

***It is strictly forbidden to move the load over the vehicle's manoeuvring area.***

When this is unavoidable, operate the machine using the controls on the opposite side, assisted by other personnel on the ground to perform the necessary manoeuvres, or use suitable accessories provided for this purpose, such as:

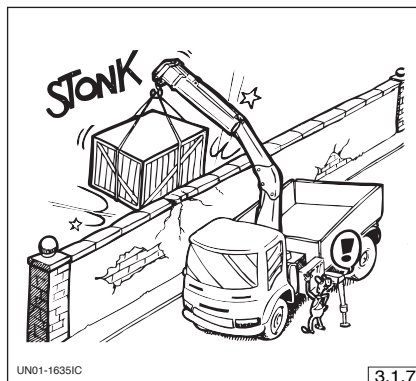
- remote controls
- raised seat
- raised control station.



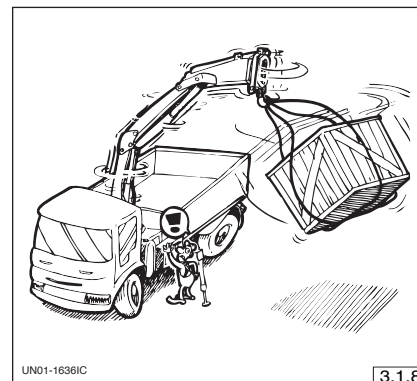


# **WARNING !**

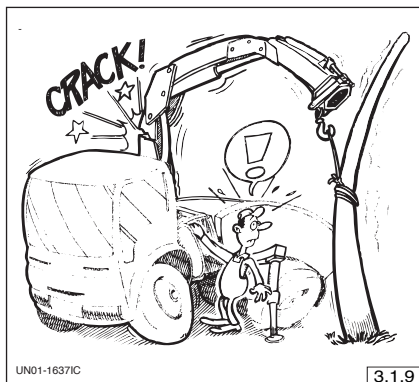
***Always follow the Highway Code, in particular with regards to height limit signs.***



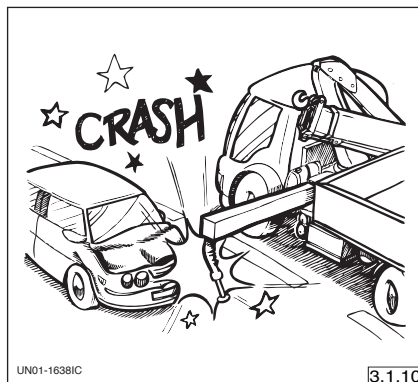
Do not operate the crane in poor visibility conditions. The operator must always have a perfect view of the work area.



Use short harnesses and operate the levers smoothly and gently to prevent the load swinging dangerously.

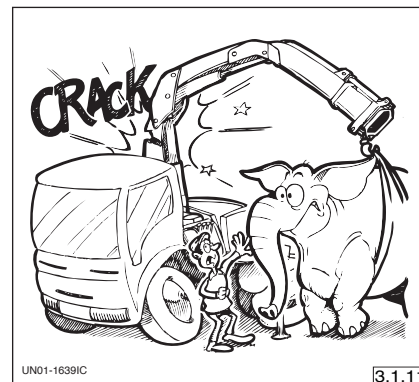


Do not use the crane to remove poles, uproot trees or lift fixed loads.



**WARNING !**

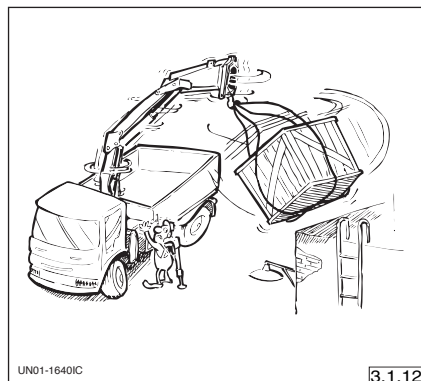
***Before driving the vehicle, ensure all the lock devices are engaged.***



**WARNING !**

***Never lift loads exceeding the limits stipulated in the loads diagrams.***

Make sure the loads are less than those indicated on the diagrams in relation to the outreach.



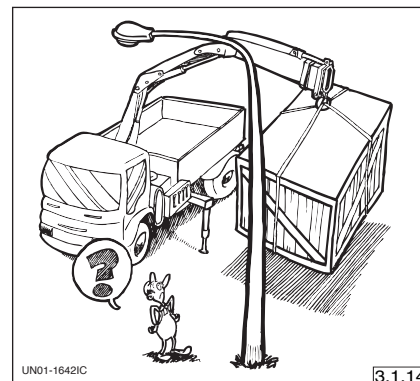
**HAZARD !**

***Never swing the load to place it beyond the permitted outreach indicated in the load diagram.***



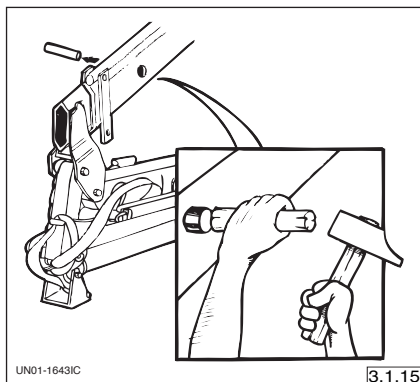
**WARNING !**

***Never drag loads, lift them upwards.***



**WARNING !**

***In the presence of objects obstructing the crane's range of action, take precautions to prevent collisions.***



**WARNING !**

*When fitting and removing the accessories' lock pins, use equipment made of soft materials to prevent the risk of being hit by flying splinters caused by the striking of the tool.*



**WARNING !**

*Never use the crane during a storm.*



**HAZARD !**

*It is forbidden to operate the crane when the wind reaches a speed of 10.8 m/s (grade 6 on the Beaufort scale).*

To calculate the wind speed, please refer to the table below.

## - Beaufort scale -

| Wind force          |                                                                                                 | Wind speed       |                               | Effect of the wind on land                                                     |                                                                                    |
|---------------------|-------------------------------------------------------------------------------------------------|------------------|-------------------------------|--------------------------------------------------------------------------------|------------------------------------------------------------------------------------|
| Beaufort number     | Description of the wind                                                                         | m/s              | Km/h (Mp/h)                   |                                                                                |                                                                                    |
| 0                   | Calm                                                                                            | from 0 to 0,2    | 1 (0)                         | Calm, smoke rises straight up                                                  |                                                                                    |
| 1                   | Light air                                                                                       | from 0,3 to 1,5  | from 1 to 5 (from 1 to 3)     | Wind direction indicated by the movement of smoke only, not by the weathervane |                                                                                    |
| 2                   | Light breeze                                                                                    | from 1,6 to 3,3  | from 6 to 11 (from 4 to 7)    | Wind can be felt on the face, leaves rustle, weathervane moves                 |                                                                                    |
| 3                   | Gentle breeze                                                                                   | from 3,4 to 5,4  | from 12 to 19 (from 8 to 12)  | Leaves and small branches move, pennants unfold                                |                                                                                    |
| 4                   | Moderate breeze                                                                                 | from 5,5 to 7,9  | from 20 to 28 (from 13 to 18) | Wind lifts dust and loose paper, moves branches and thin poles                 |                                                                                    |
| 5                   | Fresh breeze                                                                                    | from 8,0 to 10,7 | from 29 to 38 (from 19 to 25) | Small broadleaves begin to wave, slight foam appears on lakes                  |                                                                                    |
| <div>HAZARD !</div> | 6                                                                                               | Strong breeze    | from 10,8 to 13,8             | from 39 to 49 (from 25 to 31)                                                  | Poles move greatly, whistling along telephone lines, use of umbrellas is difficult |
|                     | 7                                                                                               | Near gale        | from 13,9 to 17,1             | from 50 to 61 (from 32 to 38)                                                  | All the trees move, it is very difficult to move against the wind                  |
|                     | 8                                                                                               | Gale             | from 17,2 to 20,7             | from 62 to 74 (from 39 to 46)                                                  | Tree branches are broken, walking in the open air is particularly difficult        |
|                     | 9                                                                                               | Strong gale      | from 20,8 to 24,4             | from 75 to 88 (from 47 to 55)                                                  | Slight damage to houses (chimney pots and roof tiles are blown off)                |
|                     | <div></div> 10 | Storm            | from 24,5 to 28,4             | from 89 to 102 (from 56 to 64)                                                 | Trees are uprooted, considerable damage to houses                                  |

---

## 3.2 - Operator's qualifications and behaviour

---

The use of the crane is restricted solely to personnel meeting the following minimum requirements:

- ◆ specifically employed personnel;
- ◆ apprentices under direct supervision of the specifically employed personnel;
- ◆ staff members employed for the machine's maintenance and testing (when their skills are required);
- ◆ crane inspectors.

Only the persons listed above may access the crane's work area, and only for the purpose of fulfilling their functions. In any case, they must always advise the operator or person in charge of their presence.

### - Operator's qualifications

To operate the crane, the following requirements must be met:

- ◆ possession of the necessary psychophysical qualities to ensure the operator is neither a risk to himself or to others;
- ◆ ability to understand the descriptions and illustrations in the instructions manual (including the figures and diagrams contained therein) and the symbols and instructions on the plates affixed to the machine;
- ◆ familiarity with and ability to implement the emergency procedures;
- ◆ ability to operate the machine as a whole, together with any accessories applied;
- ◆ experience of the applicable safety regulations.

### - Operator's behaviour

The operator must not:

- ◆ engage in any other activity which may distract him while operating the crane;
- ◆ operate the machine in a state of drunkenness or when under the influence of drugs which may reduce either physical or mental abilities;
- ◆ leave the crane unattended with the load hanging;
- ◆ use the machine in the event of malfunctions.

## 4.1 - Handling and lifting

**WARNING !**

*Always use lifting means which are suitable for the load to be lifted and handled.*

*Chains and cables must always be in good condition, never worn or frayed as this would seriously prejudice the operators' safety.*

*Always keep the load as low as possible when moving to guarantee better stability and visibility.*

*Always work with great care and carry out very slow manoeuvres for the safety of the operators present and to safeguard the good working condition of the crane.*

**ATTENZIONE !**

*If the crane is used without the locking devices (e.g. wooden beams, threaded bars, tie rods, screws, pins, etc.) the machine may overturn.*

They type of packing must be chosen according to the means of transport and the destination of the goods.

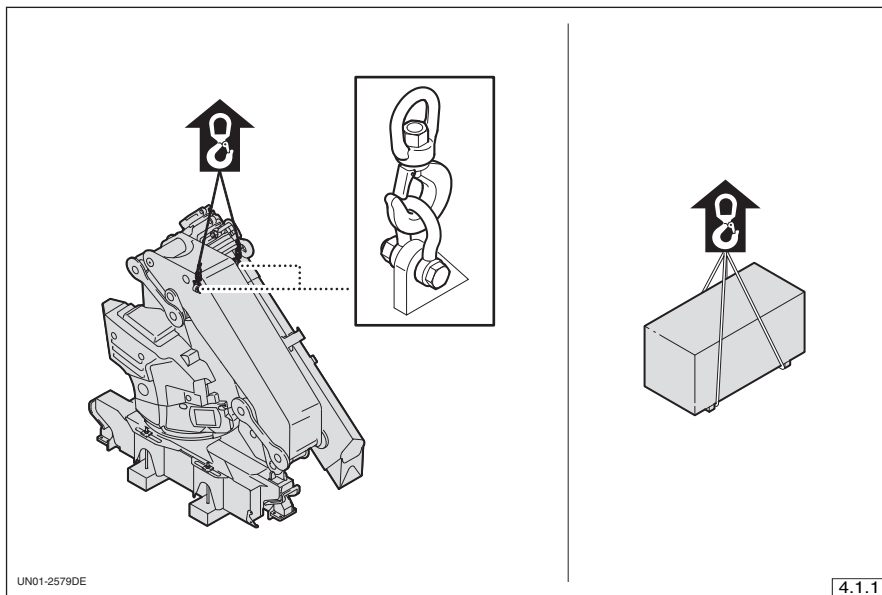
The crane is normally dispatched placed on two wooden beams with the stabilisers facing upwards or disassembled and placed in a box with the equipment used to fit the crane on the base truck.

The wooden beams must be removed during the installation of the crane on a truck.

For packaging which differs from that shown in the manual, follow the instructions and the symbols applied to the packing itself.

Before lifting the crane always check the weight on the technical information sheets.

#### 4.1.1 - Lifting the crane with a hook



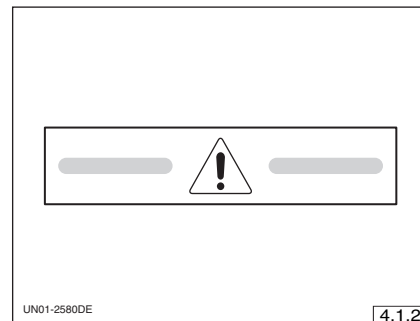
Lift the crane using the special lifting points positioned on the main arm of the crane.

If the crane is fitted with accessories such as antenna, winch, manual extensions, etc., the barycentre of the machine will be different each time.

When lifting from above pay attention to the crane swinging movement as the lifting point is never perfectly barycentric.

#### 4.1.2 - Safety devices

PM cranes are fitted with locking devices to avoid hazardous situations during handling of the machine (e.g.: arm pack or swinging support lock) highlighted with the following sticker (fig. 4.1.2).





---

## 4.2 - Storage

---

Normally, the crane accessories and other equipment supplied are dispatched wrapped in a protective sheet which must be removed before they are fitted.

However, in the event of long periods during which the unit will be not be used, provide a suitable cover and store it indoors to protect it from the weather.

The storage area must not be excessively damp or dusty. The room temperature must be between -20 °C (-4 °F) and +70 °C (+158 °F) with a maximum humidity level of 90%, with no condensation.

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## 4.3 - Fitting

---

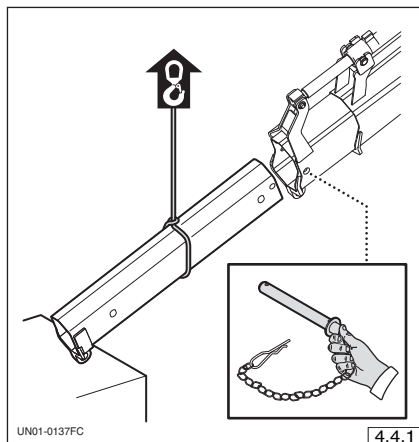
The installation of the crane on the vehicle and the inspections following installation required by the local regulations in force in each country must be carried out carefully following the information contained in the "Instruction and warnings manual for the installation of the crane on a truck" written by the company PM Group S.p.A.

All necessary information, including the "Instruction and warnings manual for the installation of the crane on a truck" is supplied to the crane owner only upon request sent by email to:

**info@pm-group.eu**

The fitting and any alterations to the vehicle required must comply with the regulations issued by the vehicle's manufacturer.

## 4.4 - Fitting the manual extension



### WARNING !

***The manual extensions must be fitted and removed one at a time in a sequential order.***

***After fitting, ensure the safety devices prevent the extension sliding out uncontrolled.***

Proceed as outlined below.

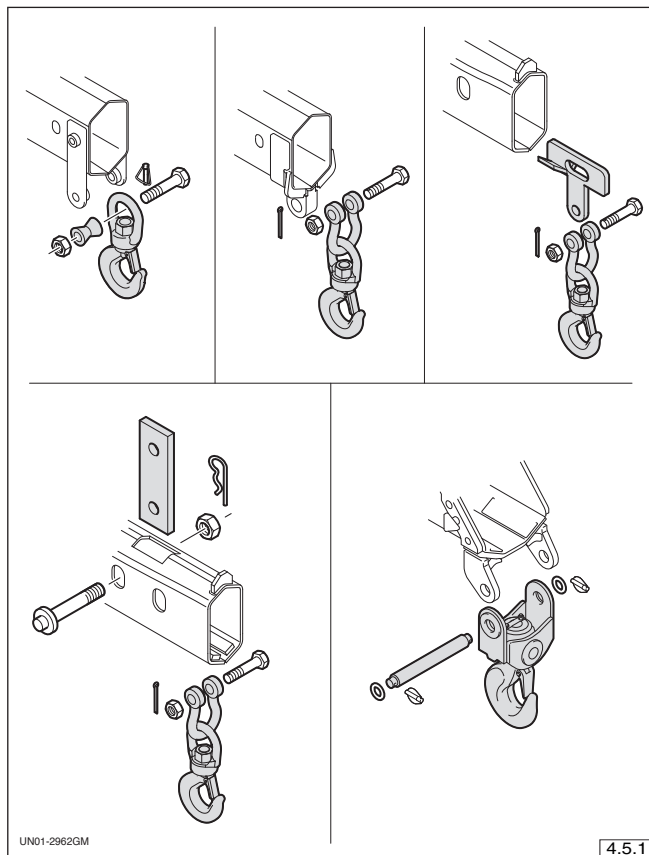
- 1 - According to its weight, harness the extension with suitable lifting means and rest it on a stable surface.
- 2 - Slide out the arms and insert the extension and so the pin holes are aligned.
- 3 - Lock the extension into position (open or closed) using the special pin and safety lock pin.

To disassemble the extension, proceed as described for the assembly but in the reverse order.

Whenever possible, keep the arm pack angled towards the ground.

## 4.5 - Fitting the hook

### Assembly type



**WARNING !**

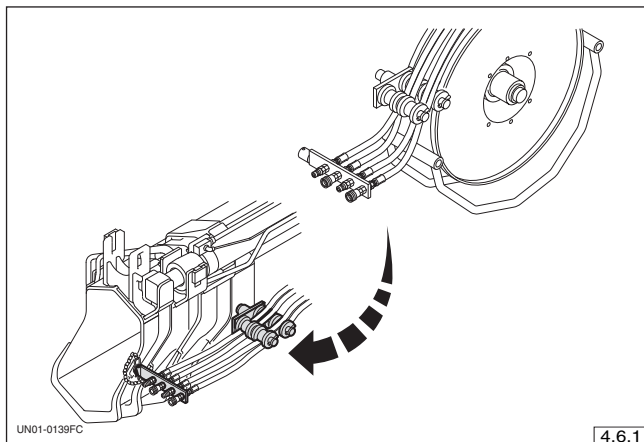
*The hook can only be fitted onto the last arm or the manual extension when extended.*

## 4.6 - Fitting the jib

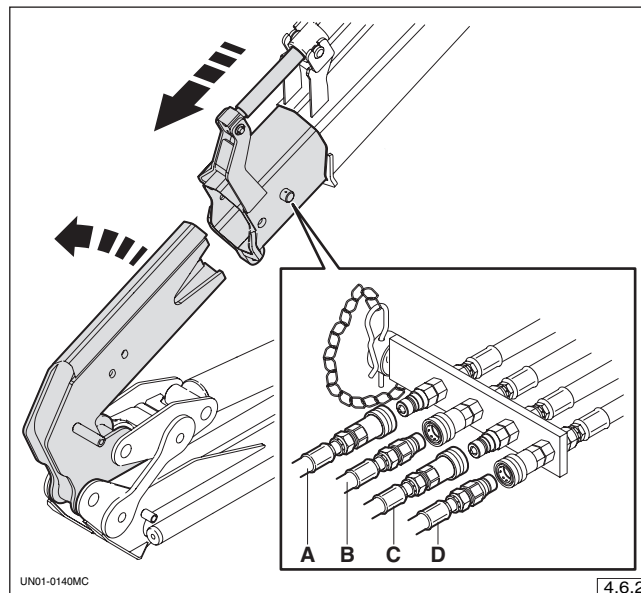


### WARNING !

*To prevent the risk of the unit overturning, ensure the extension is always stable, resting on the ground or on suitable supports.*



For the cranes equipped with a hose reel, fit the quick coupling mount at the end of the last arm and the pipe track on the main arm.



Proceed as outlined below.

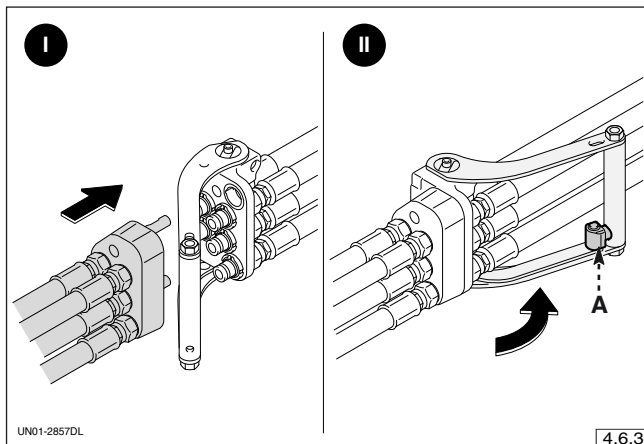
- 1 - Place the jib on the ground; if the crane is equipped with a winch, place it safely on suitable supports.
- 2 - Extend the arms until they are near the tooth.
- 3 - Connect the hoses to the unions in the following order:
  - A - articulated arm opening
  - B - articulated arm closing
  - C - arms jack extension
  - D - arms jack retraction

- 4 - Open the articulated joint jack to align the tooth with the crane.
- 5 - Extend the crane arms to introduce the tooth and lock it with the special pin and safety lock pin.

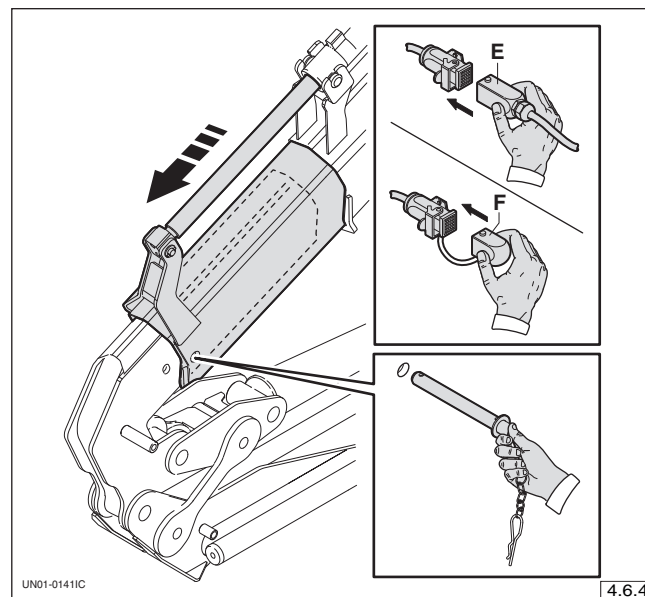
### **i** Information

*In the crane with the pipe track, connect the hoses from the jib in the same order as the crane with the hose reel.*

### - Quick coupling device



- 1) Connect the two parts of the device;
- 2) press the button "A" and turn the lever until the locking position is reached.



If the extension is fitted with a momentum limiting device, connect the electrical pin "E".

### - Jib removal

For the disassembly, proceed as for the assembly but in the reverse order.  
Connect the pin to terminal "F" to be able to use the crane without the jib.

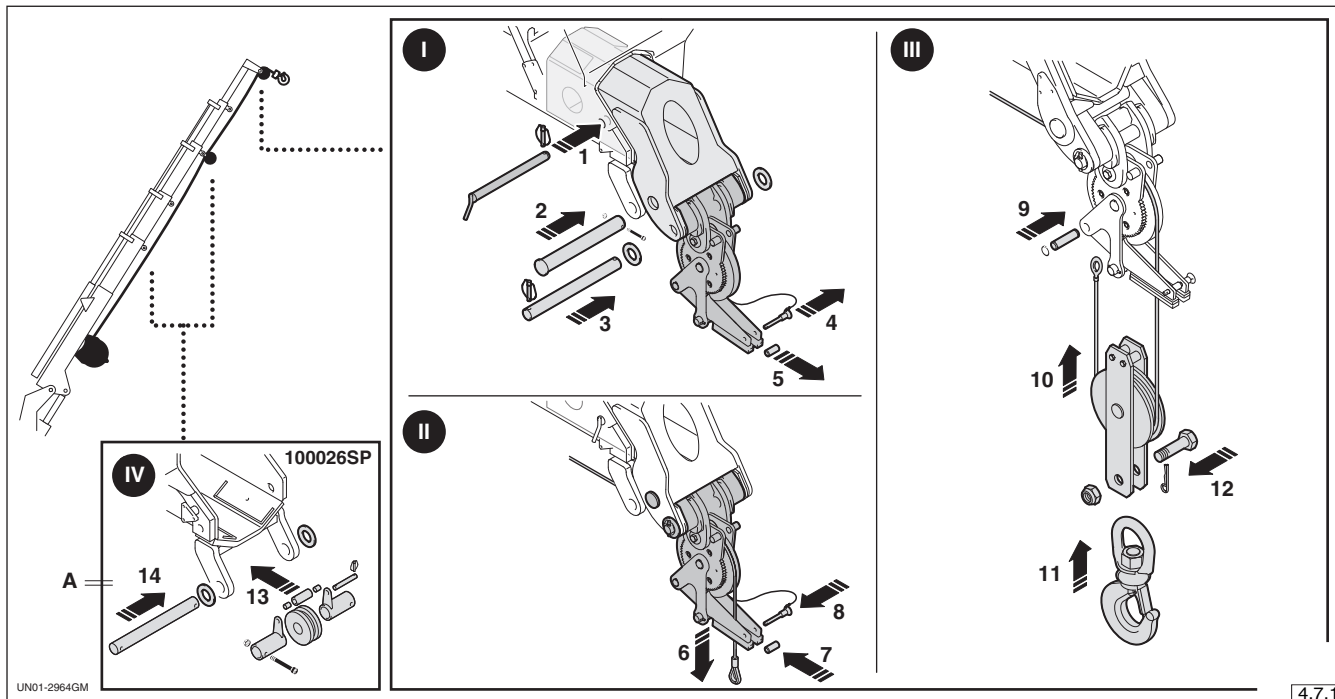
## 4.7 - Tackle installation

### 4.7.1 - Fitting the tackle on the crane

Fit the pulley “A” to support the cable if there are long sections between the winch and the block.

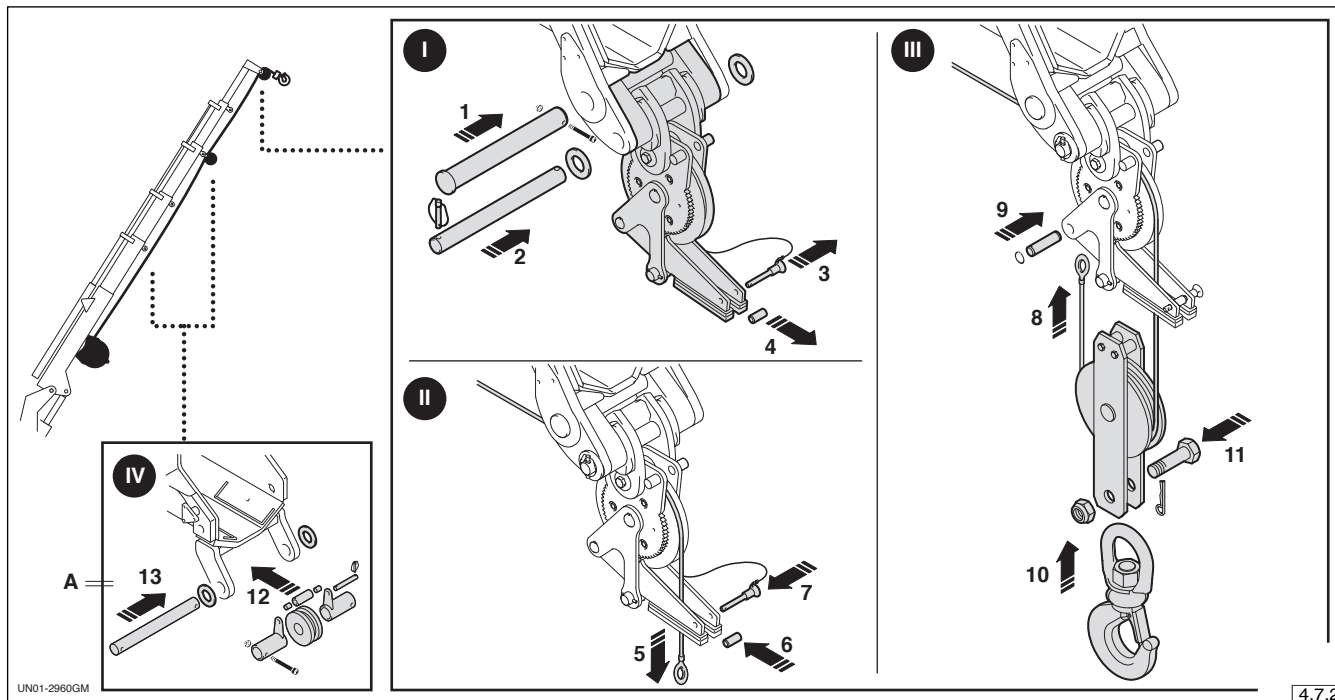
#### - Assembly sequence for tackle with double pull

*TC5 winch (PM 100024 SP - 100026 SP)*



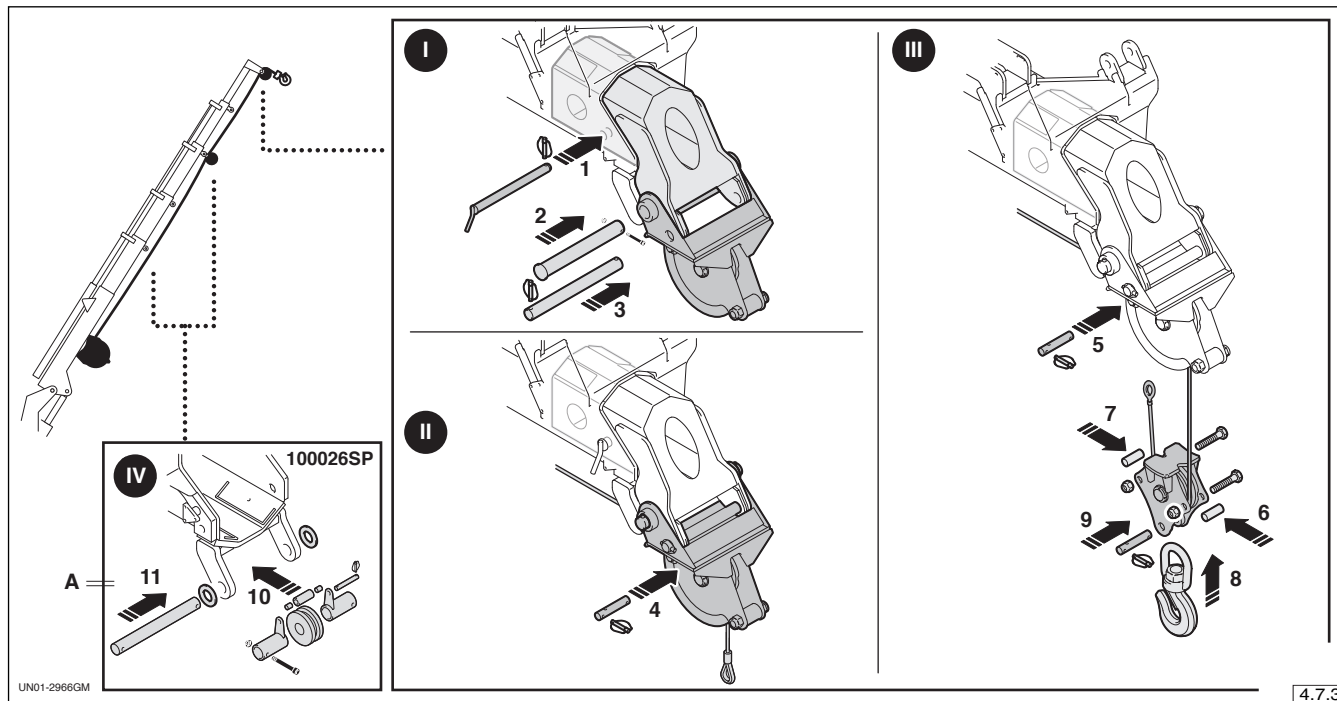
A = driving pulley

- Assembly sequence for tackle with double pull  
 TC5 winch (PM 100028 SP - 100029 SP)



A = driving pulley

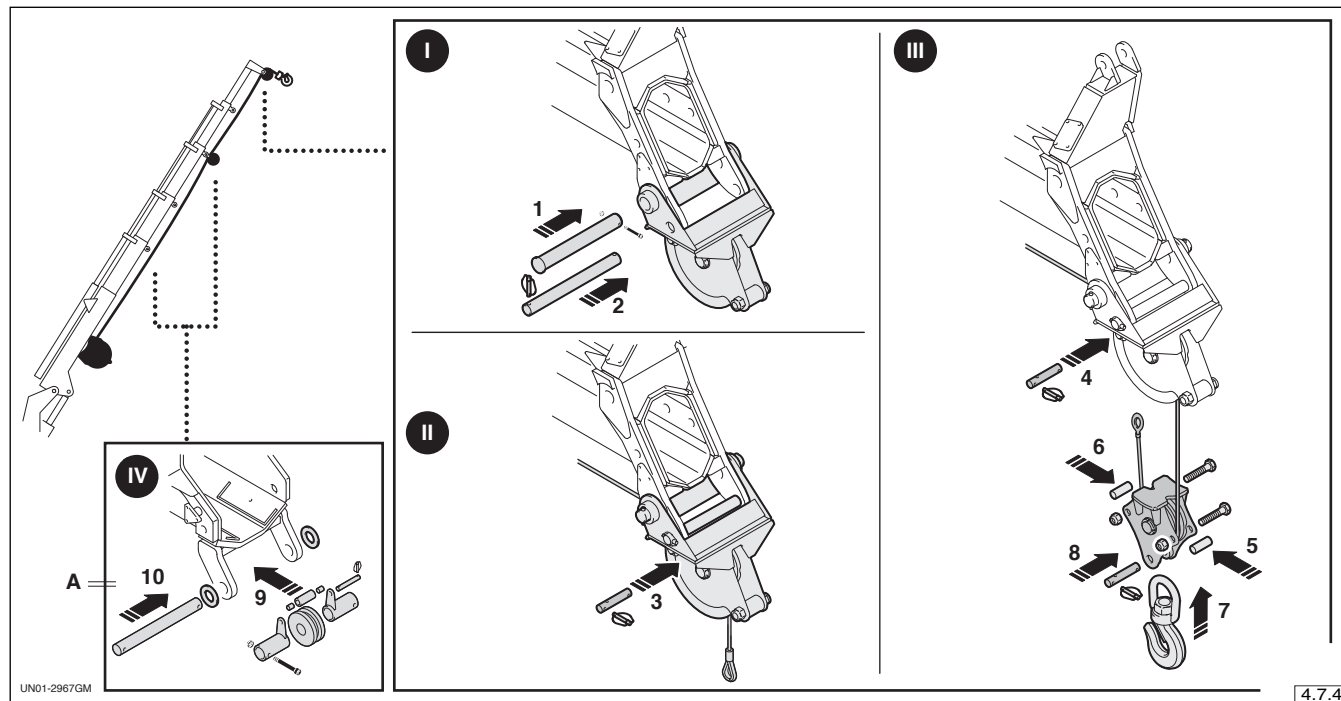
- Assembly sequence for tackle with double pull  
*S 19 L winch (PM 100024 SP - 100026 SP)*



A = driving pulley

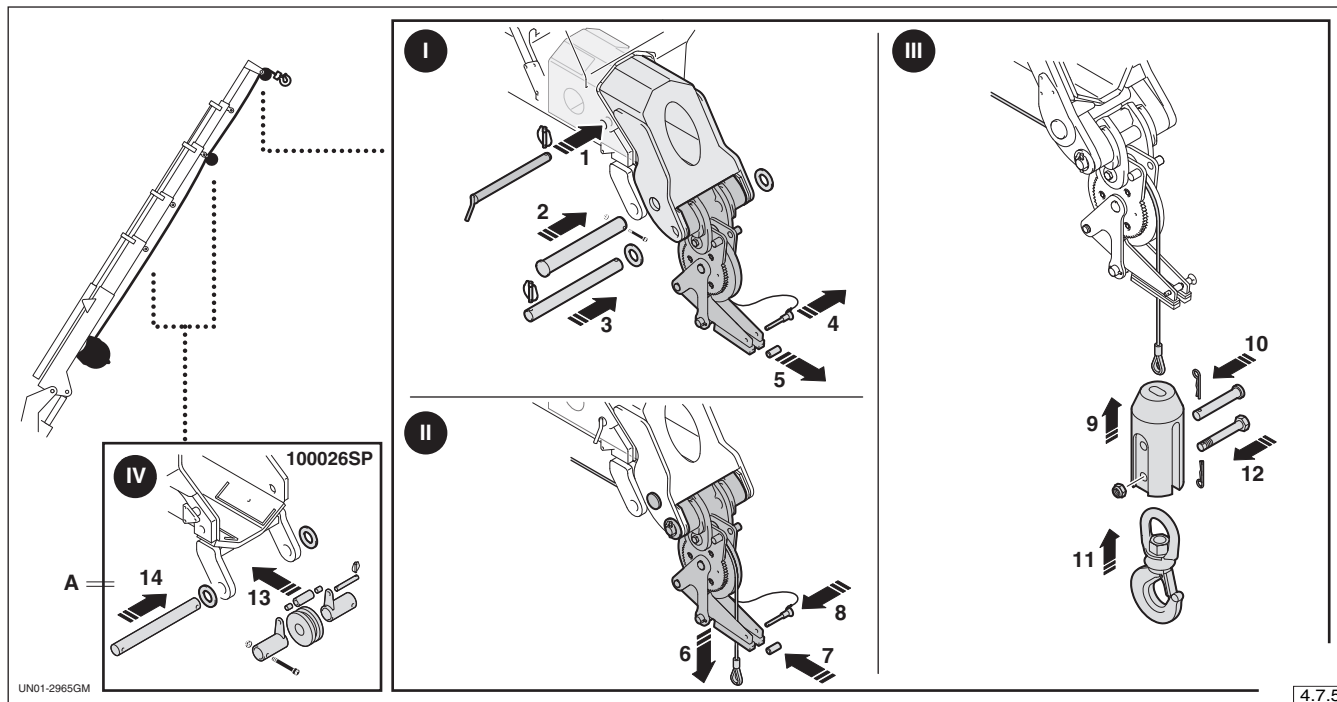


- Assembly sequence for tackle with double pull  
S 19 L winch (PM 100028 SP - 100029 SP)



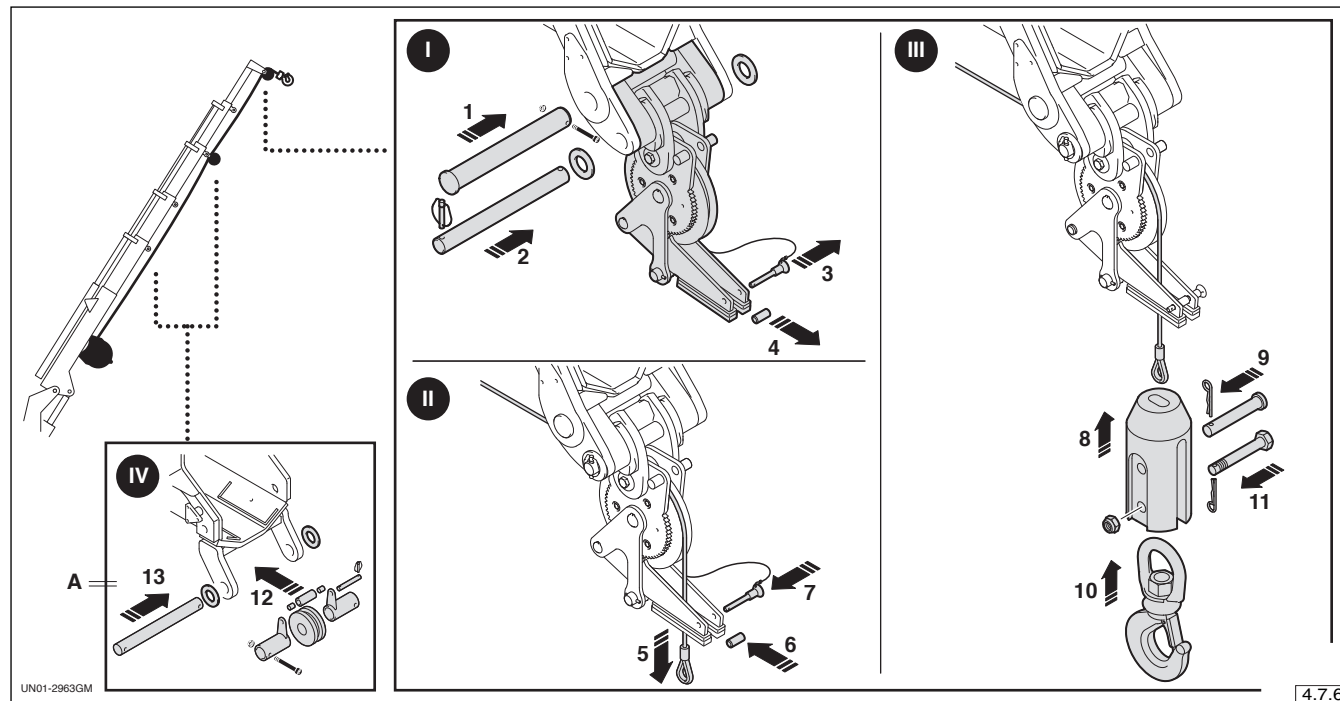
A = driving pulley

- Assembly sequence for tackle with direct pull  
*TC5 winch (PM 100024 SP - 100026 SP)*



A = driving pulley

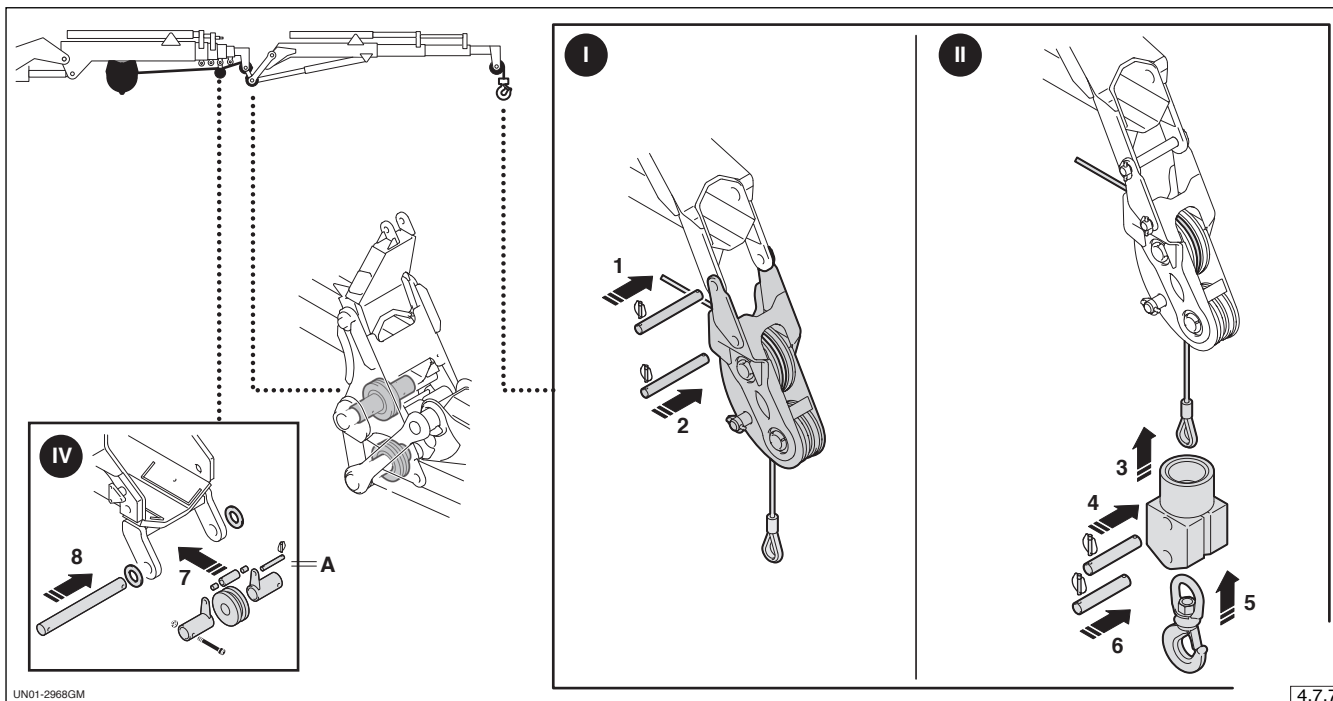
- Assembly sequence for tackle with direct pull  
TC5 winch (PM 100028 SP - 100029 SP)



A = driving pulley

## 4.7.2 - Fitting the tackle on the jib

- Assembly sequence for tackle with direct pull (winch on standard crane)



A = driving pulley

## **5** Information about adjustments

All adjustments must be performed by an authorised workshop.



# 6 Usage instructions

## 6.1 - Controls

### 6.1.1 - Symbols

|                   |                                                                                   |                            |
|-------------------|-----------------------------------------------------------------------------------|----------------------------|
| Crane stabilisers |  | Stabiliser activation      |
|                   |  | Crane activation           |
| Stabilisers       |  | Stabiliser jack extension  |
|                   |  | Stabiliser jack retraction |
| Column            |  | Clockwise rotation         |
|                   |  | Anti-clockwise rotation    |

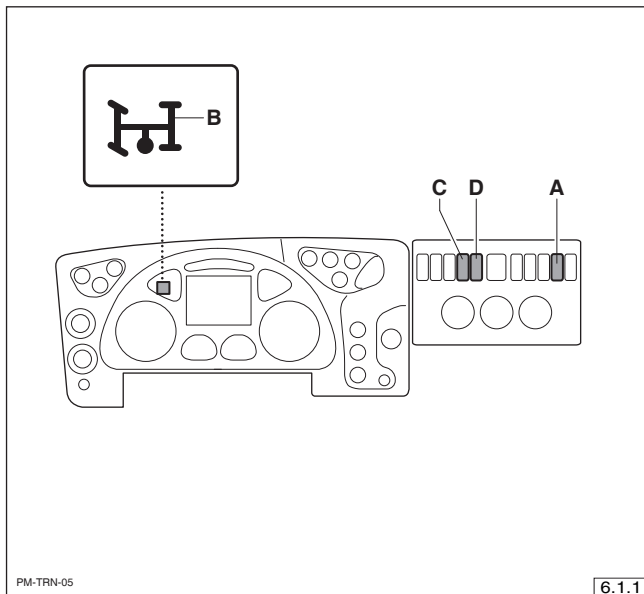
|               |                                                                                     |            |
|---------------|-------------------------------------------------------------------------------------|------------|
| Main arm      |  | Lowering   |
|               |  | Lifting    |
| Secondary arm |  | Lowering   |
|               |  | Lifting    |
| Arms          |  | Extension  |
|               |  | Retraction |

|                                                               |                                                                                    |                                                                                           |
|---------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------|
| <b>Jib</b>                                                    |    | Lowering                                                                                  |
|                                                               |   | Lifting                                                                                   |
|                                                               |   | Extension                                                                                 |
|                                                               |   | Retraction                                                                                |
| <b>Rotator</b>                                                |   | Clockwise rotation                                                                        |
|                                                               |   | Anti-clockwise rotation                                                                   |
| <b>Grab</b>                                                   |   | Grab opening                                                                              |
|                                                               |   | Grab closing                                                                              |
| <b>Winch</b>                                                  |   | Lower winch cable                                                                         |
|                                                               |   | Lift winch cable                                                                          |
| <b>Jib arms/winch<br/>(with multiple<br/>activate device)</b> |   | <ul style="list-style-type: none"> <li>- Jib lifting</li> <li>- Winch lowering</li> </ul> |
|                                                               |  | <ul style="list-style-type: none"> <li>- Jib lowering</li> <li>- Winch lifting</li> </ul> |



### 6.1.2 - Controls and signals/gauges located in the truck cab

Controls, signal lights and warning buzzers that may be installed in the truck cab are listed below; the figure and position of the controls and signals/gauges are indicative.



#### A - PTO switch

This engages and disengages the PTO.

#### B - Signal light

When lit, this shows the power take-off (PTO) is engaged.

#### C - Signal light

When lit, this shows that the outriggers are not in the correct resting position. The buzzer will sound when the signal lights light up.

#### D - Signal light

When lit, this shows that the crane is not in the correct resting position. The buzzer will sound when the signal lights light up.



#### Information

*For all other vehicle controls and signals/gauges, please refer to the instructions provided by the vehicle's manufacturer.*

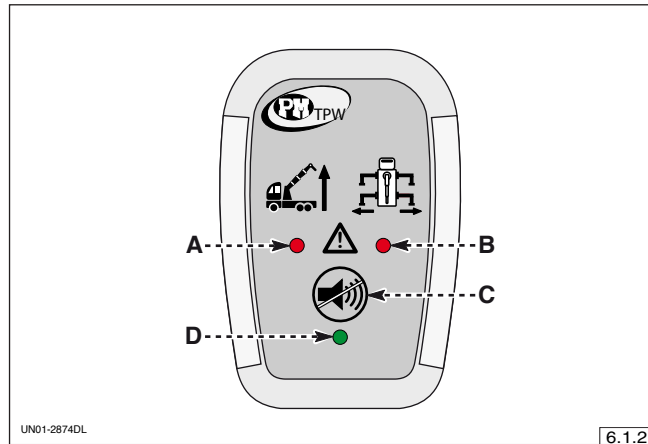


#### Information

*In some cases a control to temporarily disable the warning buzzer can be installed.*

### 6.1.3 - PM panel for per driver's cab

PM supplies a panel to be installed in the cab, which is designed for the following indicators.



#### **A - Red signal light**

When lit, this shows that the crane is not in the correct resting position. The buzzer will sound when the signal lights light up.

#### **B - Red signal light**

When lit, this shows that the outriggers are not in the correct resting position. The buzzer will sound when the signal lights light up.

#### **C - Button to temporarily disable the warning buzzer**

#### **D - Green signal light**

This signals that the system is running.

## 6.2 - Radio control

The radio control is composed of a portable transmitter unit for the operator and a receiver unit installed on-board the machine.

### - Safety precautions

- Do not operate the radio control if it is damaged or malfunctioning.
- Before using the radio control, check that the batteries are charged.
- Do not leave the remote control unattended; otherwise the crane may be used by unauthorised persons.
- Keep under constant control:
  - work area;
  - load trajectory;
  - indicator light on-board the machine or the incremental bar on the radio control, which show the lifting of 90% or 100% of the load.
- Do not clean the remote control with a pressurised water jet or immerse it in water or any other type of liquid.
- Do not position the load manually.

### 6.2.1 - SCANRECO radio control

#### - Technical data

- Power voltage: 7,2 Volts
- Battery: rechargeable "Scanreco".
- Working range including obstacles: 100 m (ft 328).
- Protection grade: IP65.

### Battery

The effective duration of a battery is approx. 8 hours. The intermittent switching on three times of a buzzer and the intermittent switching on of the indicator light "M", indicate that the battery is nearly flat.



#### Information

*Only replace the battery when the flashing "M" indicator light switches off.*

### Battery charger

Charge voltage of the battery charger supplied: 11 Vcc - 30 Vcc.

The recharging time of a completely flat battery varies from 12 to 14 hours.

### Battery charger indicator lights

- The red indicator light signals the presence of electricity supply to the charger.
- When the green indicator light is on, the battery is being recharged.

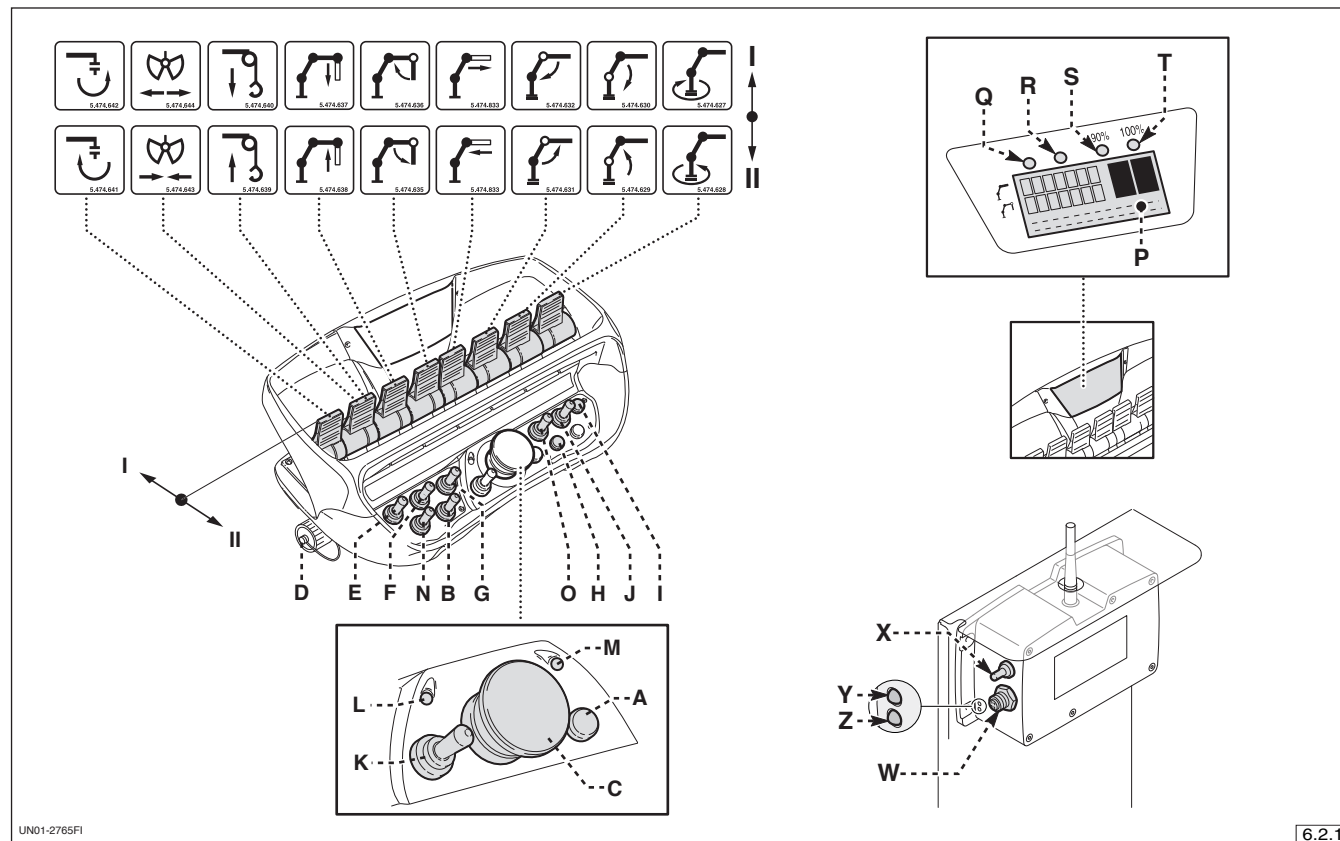


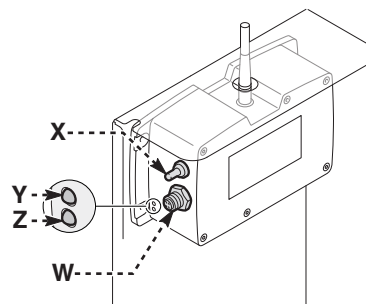
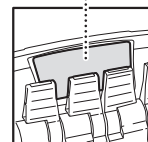
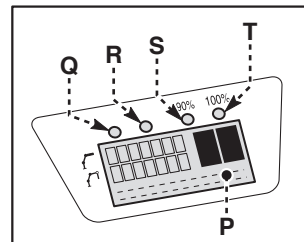
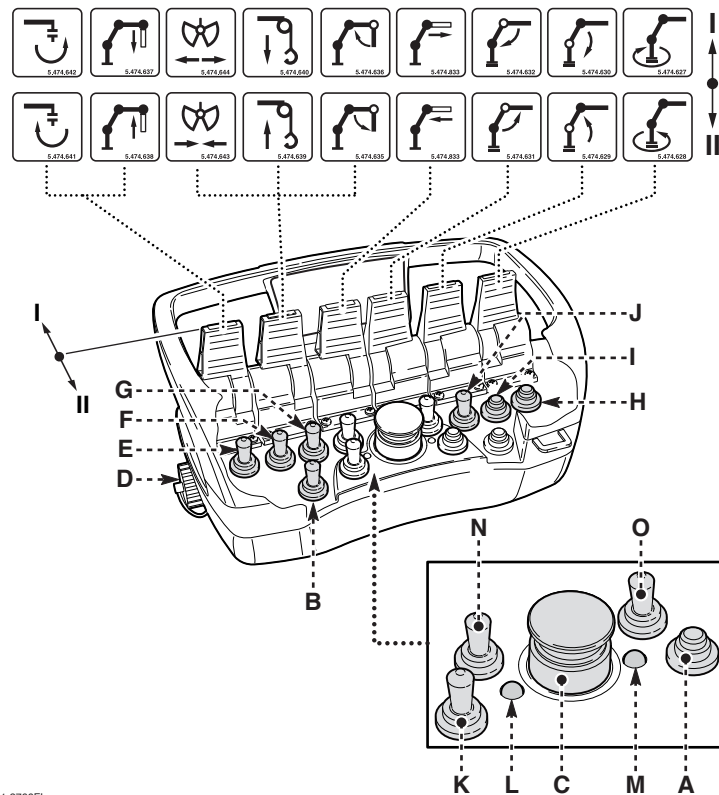
#### Information

*The fig. 6.2.1 and 6.2.2 symbology illustrated controls order can be on request inverted.*

## - Controls

### Scanreco Maxi radio control





UN01-2766FI

6.2.2

### **A - Switching on the transmitter unit**

The button has two functions:

- I) radio control ON;
- II) buzzer.

### **B - Control commutation switch**

This enables the stabilisation controls or those used for load handling.

### **C - Emergency stop button**

See "Control and limiting devices".

### **D - Cable connector**

Connection for use of the transmitter as a cable control.

### **E - "RPM" activation**

Flick the switch to place the engine rpm in automatic or manual mode.

### **F - Start-up/stop**

Flick the switch to start up or stop the vehicle engine.

### **G - Accelerator**

Flick the switch to vary the engine rpm of the vehicle. It only works with switch "E" in manual.

### **H - "Plus" reset button**

The "PLUS" device automatically reduces the working speed and increases the lifting capacity when, due to the effect of the load in relation to the arm, the pressure reaches the calibration value of the device.

Push briefly to deactivate the "PLUS" device and put the crane back into the normal functioning mode.

It is only possible to carry out the operation when indicator "R" and indicator of the functioning control unit are illuminated with a fixed light.

### **I - "Reset" button**

The button, used in combination with each single load lowering control command, moves the crane from a blocked situation in which all the controls are inhibited (see function reset with "3-30").

### **J - "F3/T" function switch**

- Move to the left to enable or disable the optional "F3" command;
- move to the right "T" to scroll the display pages (1).

### **K - Speed switch**

The switch activates and deactivates the functioning speed of the crane.

Press repeatedly.

Each time it is pressed corresponds to

a different crane speed.

Up to five different speeds are possible.

The speed chosen is indicated by the number of flashes of the indicator light "L".

Flick the switch once only (in the OFF direction) to reset the normal functioning speed.

### **L - Indicator light**

Green.

When on, it indicates the different functioning speeds of the crane (see speed switch).

### **M- Indicator light**

Red.

When on, it indicates that the transmitter unit is switched on.

### **N - "F+" function switch**

This allows the alternate functioning of the activations:

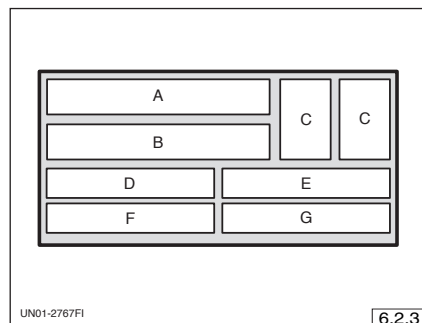
- from the jib joint to the winch and vice versa;
- from jib arms extension with possible further accessories.

### **O - "F1" and "F2" functions switch**

Activate to enable or disable the optional "F1" or "F2" functions.

## P - Display

On the display, the following information pages are shown in succession.



### Key

|   |                                                                                |
|---|--------------------------------------------------------------------------------|
| A | Incremental bar of the load percentage bearing on the main and secondary jacks |
| B | Incremental bar of the load percentage bearing on the jib joint jack           |
| C | Information and alarm icons                                                    |

### Key to page 1 (1)

|   |                         |
|---|-------------------------|
| D | Main jack pressure      |
| E | Secondary jack pressure |
| F | Main arm angle          |
| G | Secondary arm angle     |

### Key to page 2 (1)

|   |                                                              |
|---|--------------------------------------------------------------|
| D | Jib joint jack pressure                                      |
| E | Oil temperature                                              |
| F | Jib angle                                                    |
| G | DV from radio (0 = no 1 = yes)<br>EV active (0 = no 1 = yes) |

### Key to page 3 (1)

|   |                                                                            |
|---|----------------------------------------------------------------------------|
| D | Extension percentage of the crane's right hand outrigger arm               |
| E | Extension percentage of the crane's left hand outrigger arm                |
| F | Crane right hand outrigger jack<br>OK - stabilised<br>NOK - not stabilised |
| G | Crane left hand outrigger jack<br>OK - stabilised<br>NOK - not stabilised  |

### Key to page 4 (1)

|   |                                                                                                       |
|---|-------------------------------------------------------------------------------------------------------|
| D | Extension percentage of the right hand outrigger arm of the supplementary crossmember                 |
| E | Extension percentage of the left hand outrigger arm of the supplementary crossmember                  |
| F | Right hand outrigger jack of the supplementary crossmember<br>OK - stabilised<br>NOK - not stabilised |
| G | Left hand outrigger jack of the supplementary crossmember<br>OK - stabilised<br>NOK - not stabilised  |

### Key to page 5 (1)

|   |                                           |
|---|-------------------------------------------|
| D |                                           |
| E | Last alarm codes (see the alarm messages) |
| F |                                           |
| G |                                           |

## Q - Indicator light

Yellow.

When on, it indicates that the "3-30" system is functioning to lower the load to the ground.

## R - Indicator light

Yellow.

When on:

- with an intermittent light, it indicates that the crane functioning is in the "PLUS" mode;
- with a fixed light, it indicates that the crane functioning is in the "PLUS" mode, but with the possibility of deactivating it and returning to the normal mode.

## S - Indicator light

Yellow.

When on, it indicates that 90% of the load that can be lifted with the winch has been reached.

## T - Indicator light

Red.

When on, it indicates that 100% of the load that can be lifted with the winch has been reached.

## W - Cable connector

Connection for use of the transmitter as a cable control.

- (1) Only available on the more recent versions of the radio control panels.

### **X - Three stable position switch**

This switches on and off the receiver unit.

REMOTE position: the receiver unit is on.

OFF position: the receiver unit is off.

MANUAL position: the receiver unit is on and the transmitter unit is by-passed.

### **Y - (DV) signal light**

This indicates the state of operation of the wireless control.

### **Z - (Status) signal light**

This indicates the state of operation of the wireless control.

### **- Signal light signals ("Y" and "Z")**

#### *System on and transmitter unit off*

| Position selector "X" | Signal lights on     |
|-----------------------|----------------------|
| REMOTE                | "Status" (red light) |
| MANUAL                | "DV" (red light)     |

#### *System on and transmitter unit on*

| Position selector "X"                             | Signal lights on                           |
|---------------------------------------------------|--------------------------------------------|
| REMOTE (no button is pressed on transmitter unit) | "Status" (green light)                     |
| REMOTE (a button is pressed on transmitter unit)  | "Status" (green light)<br>"DV" (red light) |

### **- Switching on the radio control**

- Press button "A", fig. 6.2.2.

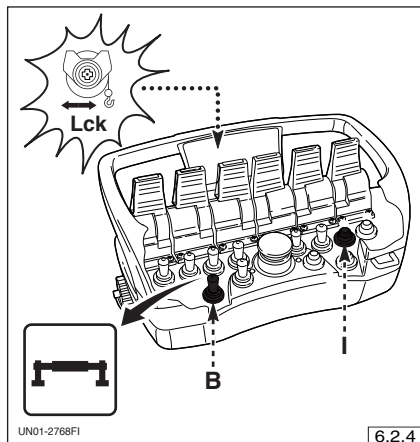
### **- Switching off the radio control**

- Press button "C", fig. 6.2.2.



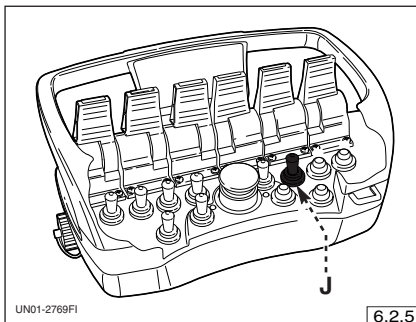
## - Supplementary transmitter unit functions

### Winch shut-off



- 1 - Move the switch "B" to "stabilisation" position;
- 2 - press and hold the button "I" (Reset) until the "Winch lock" icon appears on the display to disable the use of the winch.  
Press and hold the button "I" until the icon disappears to enable the use of the winch.
- 3 - Move the switch "B" to "crane" position.

### Work light



Move the switch "J" to position "F3" to switch the work light (when featured) on or off.

## 6.2.2 - HETRONIC radio control

### - Technical data

- Power voltage: 3 (V)
- Batteries:
  - Rechargeable with Ni-Mh or Ni-Cd accumulators, 3,9 Volts;
  - Stylus/miniature type alkaline 2x1,5 Volts or 3x1,5 Volts.
- Working range including obstacles: 100 m (ft 328).
- Protection grade: IP65.

The radio control features two devices that are automatically activated in the following cases:

- if the work area is disturbed by a signal which effects the radio control's frequency range;
- the radio control is out of the transmitting unit's range.

In this case, the radio control switches to emergency mode and stops the crane operating.

### Battery



#### Information

*Use alkaline batteries only.*

*The power supplied by zinc-carbon batteries is insufficient.*

### Battery charger

Charge voltage of the battery charger supplied: 12 (Vcc) / 24 (Vcc).

### Battery charger indicator lights

- When the signal light is switched on, this means the battery charger is live.
- When charging, the signal light should always remain on.
- As soon as the battery charging is complete, the signal light will flash.

## - Controls



### Information

The fig. 6.2.6 symbology illustrated controls order can be on request inverted.

#### A - Indicator light

Yellow.

When on, it indicates that 90% of the load that can be lifted with the winch has been reached.

#### B - Indicator light

Red.

When on, it indicates that 100% of the load that can be lifted with the winch has been reached.

#### C - Control commutation switch

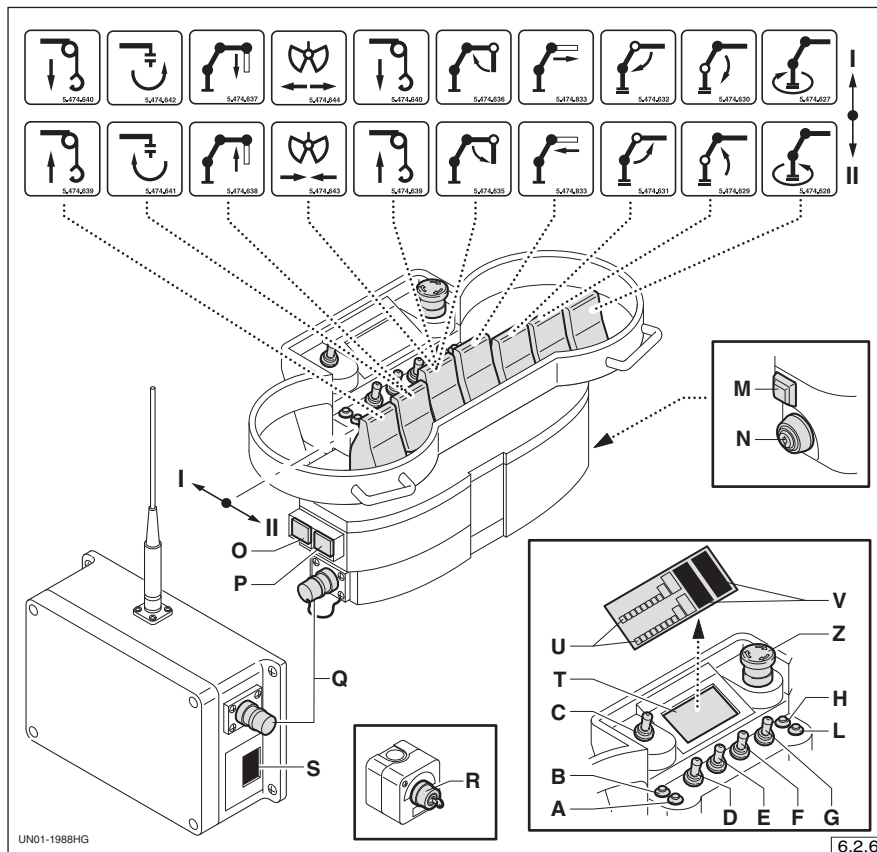
This enables the stabilisation controls or those used for load handling.

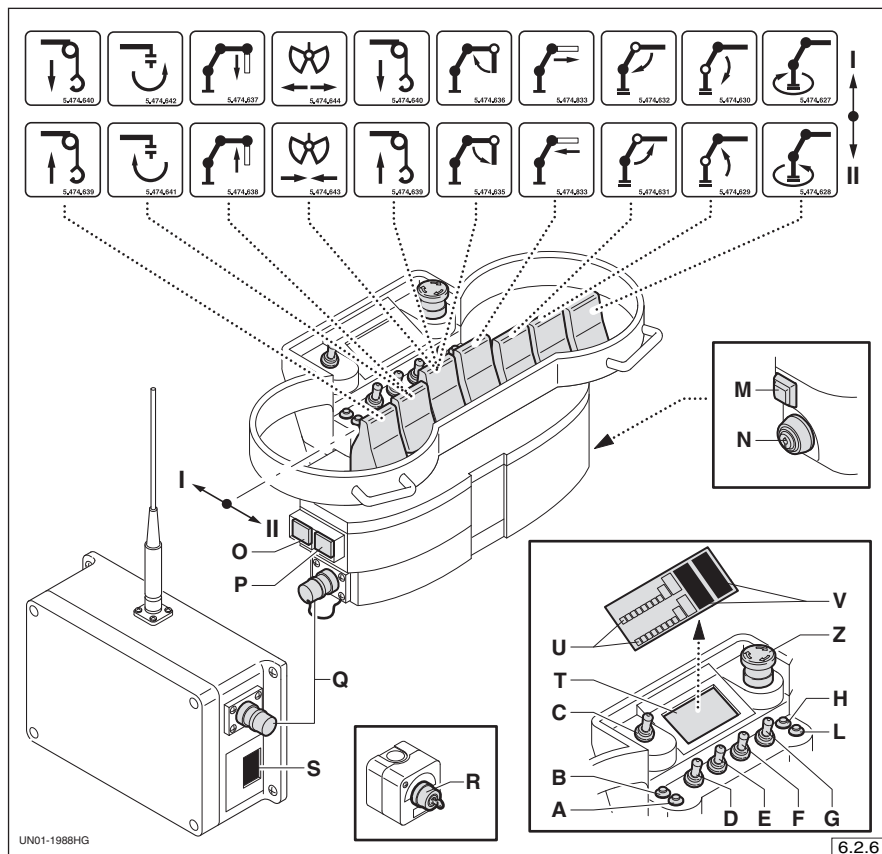
#### D - Switch ("RPM + / RPM -")

Flick the switch to vary the engine rpm of the vehicle.

#### E - Speed / "F3" function key switch

Activate to enable or disable the crane operating speed or the optional "F3" function key.





## F - Start / stop switch

Flick the switch to start up or stop the vehicle engine.

## G - "F1" and "F2" functions switch

Activate to enable or disable the optional "F1" or "F2" functions.

## H - Indicator light

Yellow.

When on:

- with an intermittent light, it indicates that the crane functioning is in the "PLUS" mode;
- with a fixed light, it indicates that the crane functioning is in the "PLUS" mode, but with the possibility of deactivating it and returning to the normal mode.

## L - Indicator light

When on:

- with a green light, this shows the radio-control is operating normally;
- with a red light, this shows the transmitter unit batteries are flat.

## M - Remote control enable

The button has two functions:

- 1) enables the radio control operation;
- 2) sounds to alert the operator that the radio control is switched on.

**N - On switch**

- O = Transmitter unit is switched off
- I = Transmitter unit is live
- P = Programming accessible by specialised technical staff only.

**O - Multi-function button**

The button has two functions:

- short press: enables / disables the "PLUS" device;
- long press: enables/disables the "Regenerative" device (increases speed with no load applied) when fitted.

**P - "Reset" button**

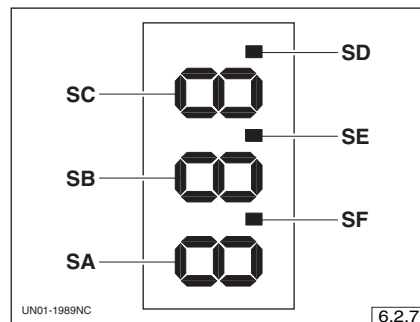
The button, used in combination with each single load lowering control command, moves the crane from a blocked situation in which all the controls are inhibited (see function reset with "3-30").

**Q - Cable connector**

Connection for use of the transmitter as a cable control.

**R - Receiver unit ON switch**

Hand/Manual position = manual control function activated;  
Radio position = radio-control function activated.

**S - Display**

The display shows all the radio-control operation information.

- Alphanumeric fields

**SA:** shows which lever on the transmitter unit has been operated;

**SB:** only active during system programming carried out by specialised personnel;

**SC:** displays the radio-control operating status (see radio control operation status chart).

**T - Display****U - Incremental bars**

Incremental bars for the load percentage on the main or secondary jack and jib joint.

**V - Information and alarm message display****Z - Emergency stop button**

See "Control and limiting devices".

## - Radio control operation status chart

| Pos. | Code | Description                                                                                                                                             |
|------|------|---------------------------------------------------------------------------------------------------------------------------------------------------------|
| SA   | E    | Transmitter unit lever operating error.<br>Switch the transmitter unit off then on again; if the code is still displayed, operation is inhibited        |
|      | 1    | Joystick 1 operation                                                                                                                                    |
|      | 2    | Joystick 2 operation                                                                                                                                    |
|      | 3    | Joystick 3 operation                                                                                                                                    |
|      | 4    | Joystick 4 operation                                                                                                                                    |
|      | 5    | Joystick 5 operation                                                                                                                                    |
|      | 6    | Joystick 6 operation                                                                                                                                    |
|      | 7    | Joystick 7 operation                                                                                                                                    |
|      | 8    | Joystick 8 operation                                                                                                                                    |
|      |      | Joysticks = control levers, labelled in ascending order from left to right (see fig. 6.2.6).<br>For example:<br>Joystick 3 = third lever from the left  |
| SB   |      | System codes: these are only displayed during system programming.<br>For use by specialised personnel only                                              |
| SC   | 0    | Radio-control activated: all manoeuvres are enabled.                                                                                                    |
|      | 1    | Receiver unit powered correctly.<br>Radio signal present but radio-control not yet active.                                                              |
|      | 2    | Emergency stop button pressed on transmitter unit.                                                                                                      |
|      | 3    | Warning message: insufficient radio signal reception.                                                                                                   |
|      | 4    | Receiver unit powered correctly but no radio signal:<br>- transmitter unit switched off;<br>- programming error (wrong radio channel or serial number). |

- Points:

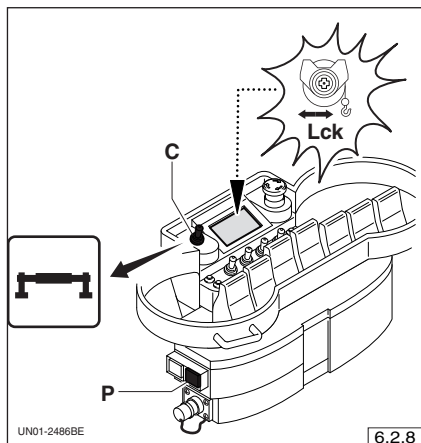
**SD:** flashing: correct radio signal reception.

**SE:** not active.

**SF:** flashing in conjunction with "SD":  
during programming stage only.

## - Supplementary transmitter unit functions

### Winch shut-off

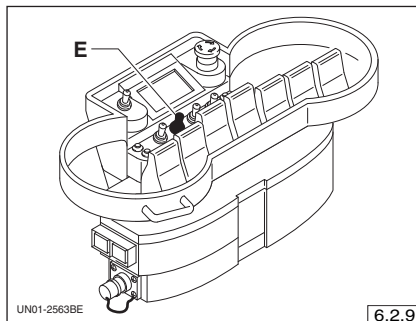


To disable winch operation:

- 1 - press switch "C" to the "stabilisation" position;
- 2 - press the button "P" (Reset) until the "Winch lock" icon appears on the display.

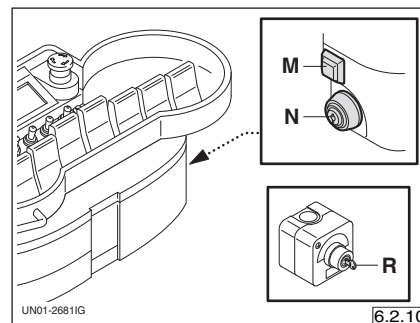
Quick-press button "P" quickly to reactivate the winch (the icon disappears).

### Work light



Press switch "E" in position "F3" to switch the work light (where featured) on or off.

## - Switching on the radio control



- Turn the key on the receiver unit ON switch "R" to the "RADIO" position.
- Turn the key on the transmitter unit ON switch "N" to the "I" position.
- Press button "M" to activate the transmitter / receiver unit functions.

## - Switching off the radio control

- Turn the key on the ON switch "N" on the transmitting unit to "0" position.
- Turn the key on the ON switch "R" on the receiver unit to "HAND / MANUAL" position.

### **6.2.3 - Radio control operation check**

Before starting to work:

- check the batteries are charged;
- check the radio control is in good condition;
- check the rubber guards around the levers are in good condition;
- check the receiving unit connections are in good condition;
- check the connection pins on the receiving unit are tightened properly.
- Checking emergency stop device operation.

Press emergency stop button, move the levers on the radio control in both directions and check that no crane manoeuvres are possible. Rotate the button to restore normal crane operation.

### **6.2.4 - Radio control stop due to power failure**

In the event that the "crane locks" due to a flat battery, proceed as follows:

- I) switch off the transmitting unit
- II) replace the battery
- III) carry out the receiving unit start-up procedure.

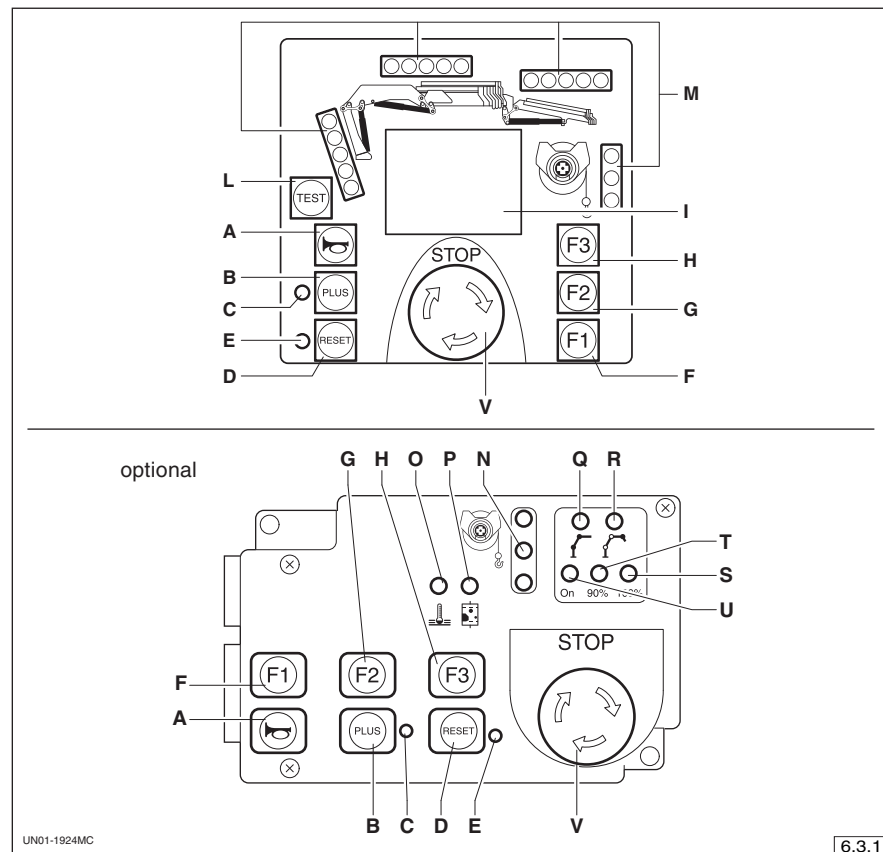
### **6.2.5 - Radio control maintenance**

For radio control maintenance, please refer to the instructions contained in the instruction manual provided by the radio control's manufacturer.



## 6.3 - Functioning control unit

### 6.3.1 - Functioning control unit controls and indicators (Power Tronic)



#### A - Buzzer

#### B - "PLUS" button

This performs the same function as the "PLUS" button on the transmitter unit.

#### C - Indicator light

Yellow.

When on:

- with an intermittent light, it indicates that the crane functioning is in the "PLUS" mode;
- with a fixed light, it indicates that the crane functioning is in the "PLUS" mode, but with the possibility of deactivating it and returning to the normal mode.

#### D - Reset button

This has the same function as the reset button on the transmitter unit.

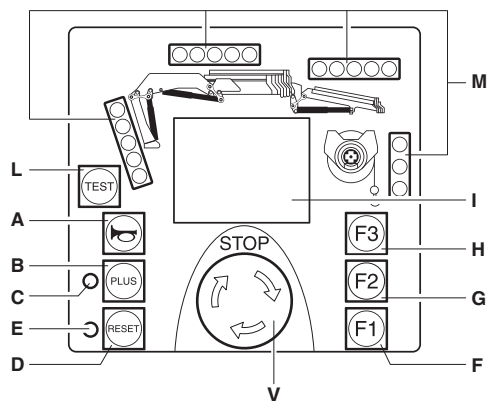
#### E - Indicator light

When on, it indicates that the movement of the load in the "3-30" mode is in progress (see function reset with "3-30").

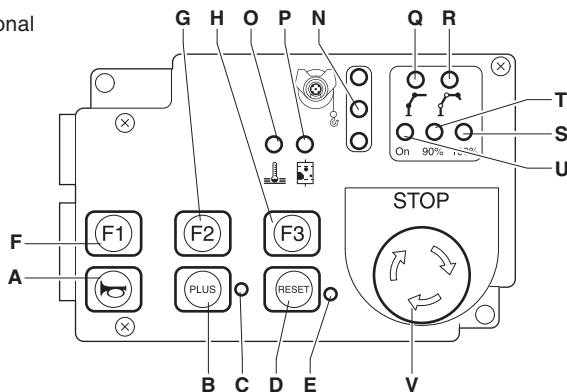
#### F - "F1" function button

This enables or disables optional control "F1".

Upon switching on the machine, select the "crane with hook" work mode.



optional



UN01-1924MC

6.3.1

### G - “F2” function button

This enables or disables optional control “F2”.

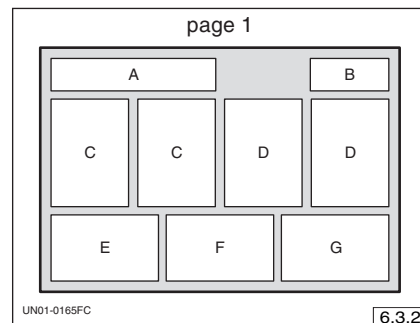
Upon switching on the machine, select the “crane with hydraulic tool” work mode.

### H - “F3” function button

Short-press to switch the work light (if featured) on or off.

### I - Display

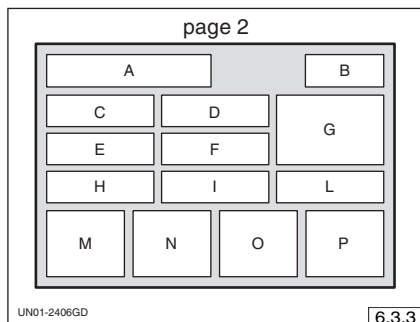
On the display, the following information pages are shown in succession.



6.3.2

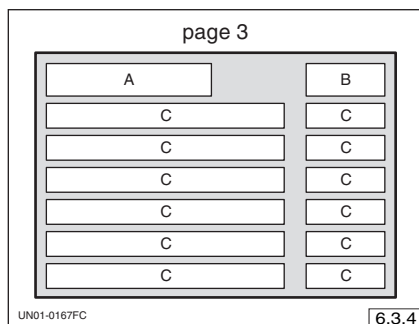
### Key to page 1

|   |                                              |
|---|----------------------------------------------|
| A | Crane model                                  |
| B | Effective time-counter                       |
| C | Alarm icon with code<br>(see alarm messages) |
| D | Signal icon<br>(see information messages)    |
| E | Main jack pressure                           |
| F | Secondary jack pressure                      |
| G | Jib joint jack pressure                      |



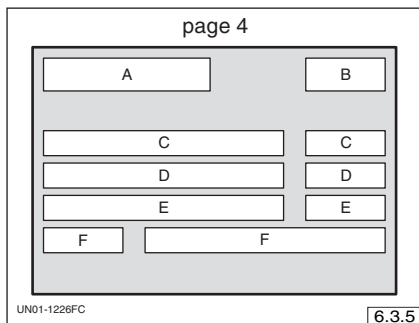
#### Key to page 2

|   |                                        |
|---|----------------------------------------|
| A | Crane model                            |
| B | Effective time-counter                 |
| C | Transversal tilt                       |
| D | Longitudinal tilt                      |
| E | Main arm angle                         |
| F | Arms pack angle                        |
| G | Oil temperature                        |
| H | Necessary maintenance (0 = no 1 = yes) |
| I | DV from radio (0 = no 1 = yes)         |
| L | Active solenoid valve (0 = no 1 = yes) |
| M | Speed reduction percentage             |
| N | Antenna angle (when present)           |
| O | Winch load percentage                  |
| P | Winch use time-counter                 |



#### Key to page 3

|   |                                    |
|---|------------------------------------|
| A | Crane model                        |
| B | Effective time-counter             |
| C | Last 6 alarms (see alarm messages) |



#### Key to page 4

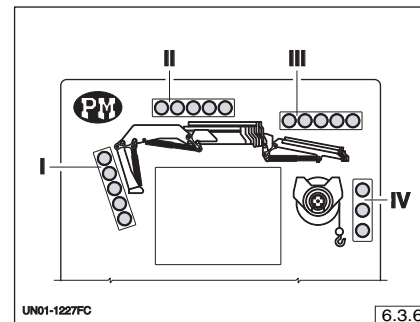
|   |                        |
|---|------------------------|
| A | Crane model            |
| B | Effective time-counter |
| C | Hardware version       |
| D | Loader version         |
| E | Software version       |
| F | Series number          |

#### L - "Test" button

Press the button repeatedly to display the information pages in succession.

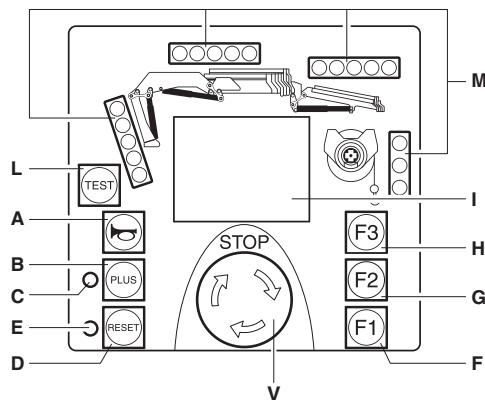
#### M - Indicators light

These indicate the lifting capacity in use.

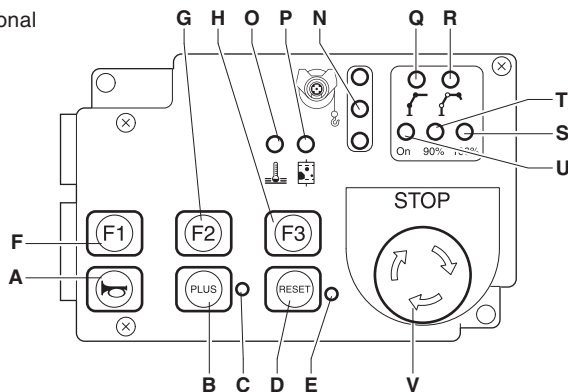


- I - Main jack indicator
- II - Secondary jack indicator
- III - Jib junction jack indicator
- IV - Winch indicator

- Green LEDs on:  
normal working values.
- Orange LEDs on:  
limiter working with 90% of the load that can be lifted.
- Red LEDs on:  
blocked condition.



optional



UN01-1924MC

6.3.1

### O - Indicator light

Red.

When lit up, this signals: low hydraulic oil temperature.

### P - Indicator light

Red.

When lit up, this signals: filter clogged.

### Q - Indicator light

When lit up, this shows the unit is locked due to an overload at the:

- main jack;
- secondary jack.

### R - Indicator light

When lit up, this shows the unit is locked due to an overload at the jib joint jack.

### S - Indicator light

Red.

When on, it indicates that 100% of the load that can be lifted with the winch has been reached.

### T - Indicator light

Yellow.

When on, it indicates that 90% of the load that can be lifted with the winch has been reached.

### U - Indicator light

Yellow.

This shows the power is on.

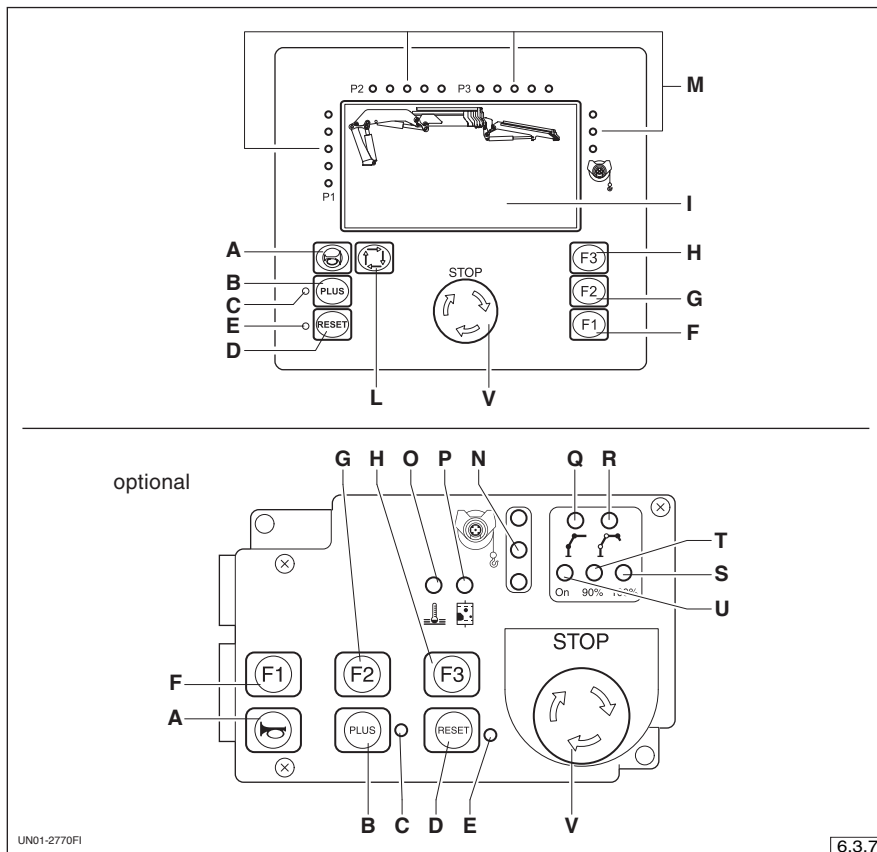
### V - Emergency stop device

See "Control and limiting devices".

### N - Indicators light

These show the lifting capacity (for the winch) when the unit is in operation. See point M "Signal lights - IV - Winch signal light", fig. 6.3.6.

## 6.3.2 - Functioning control unit controls and indicators (Power Tronic Advance)



### A - Buzzer

### B - "PLUS" button

This performs the same function as the "PLUS" button on the transmitter unit.

### C - Indicator light

Yellow.

When on:

- with an intermittent light, it indicates that the crane functioning is in the "PLUS" mode;
- with a fixed light, it indicates that the crane functioning is in the "PLUS" mode, but with the possibility of deactivating it and returning to the normal mode.

### D - Reset button

This has the same function as the reset button on the transmitter unit.

### E - Indicator light

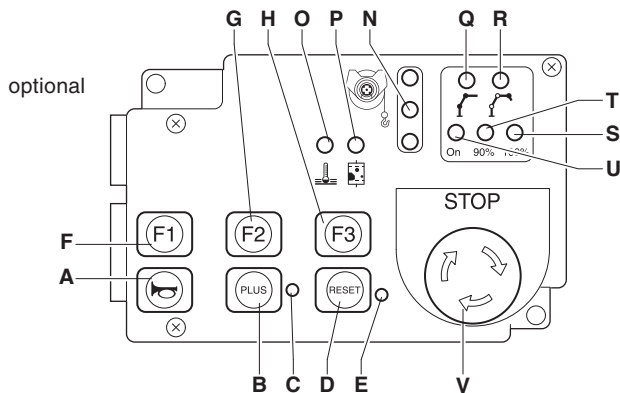
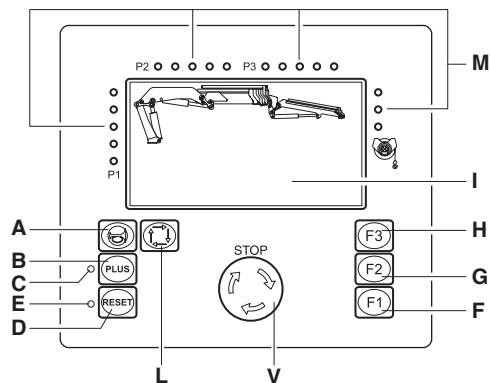
When on, it indicates that the movement of the load in the "3-30" mode is in progress (see function reset with "3-30").

### F - "F1" function button

This enables or disables optional control "F1". Upon switching on the machine, select the "crane with hook" work mode.

### G - "F2" function button

This enables or disables optional control "F2". Upon switching on the machine, select the "crane with hydraulic tool" work mode.



## H - "F3" function button

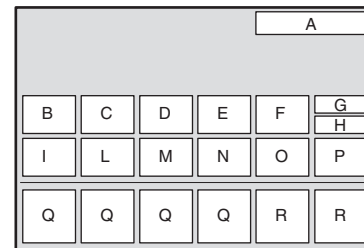
Short-press to switch the work light (if featured) on or off.

## I - Display

On the display, the following information pages are shown in succession.

6.24

page 1

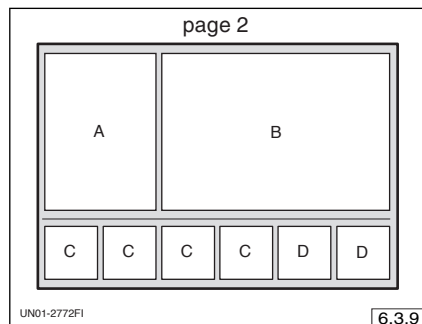


UN01-2771FI

6.3.8

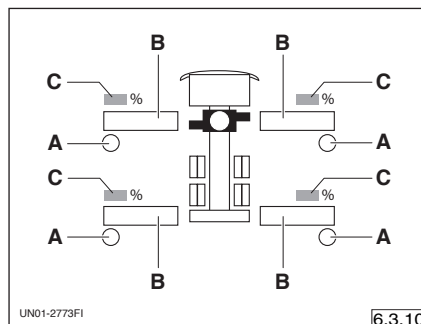
## Legenda pag. 1

|   |                                                         |
|---|---------------------------------------------------------|
| A | Crane model                                             |
| B | Main jack pressure                                      |
| C | Secondary jack pressure                                 |
| D | Jib joint jack pressure                                 |
| E | Oil temperature                                         |
| F | Speed reduction percentage                              |
| G | DV from radio (0 = no 1 = yes)                          |
| H | Active solenoid valve (0 = no 1 = yes)                  |
| I | Main arm angle                                          |
| L | Arms pack angle                                         |
| M | Jib angle (when featured)                               |
| N | Column rotation angle (zero is always on the truck cab) |
| O | Winch load percentage                                   |
| P | Effective time-counter                                  |
| Q | Alarm icon with code (see alarm messages)               |
| R | Signal icon (see information messages)                  |

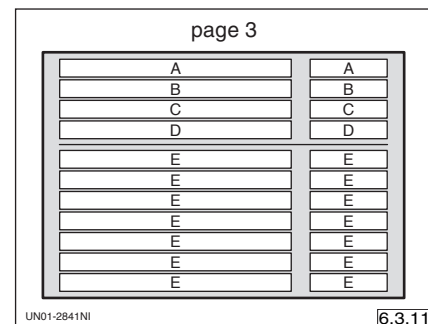


#### Key to page 2

|   |                                                                                         |
|---|-----------------------------------------------------------------------------------------|
| A | Graphical representation of the column rotation angle (zero is always on the truck cab) |
| B | Graphical representation of the stabilisation status (fig. 6.3.10)                      |
| C | Alarm icon with code (see alarm messages)                                               |
| D | Signal icon (see information messages)                                                  |

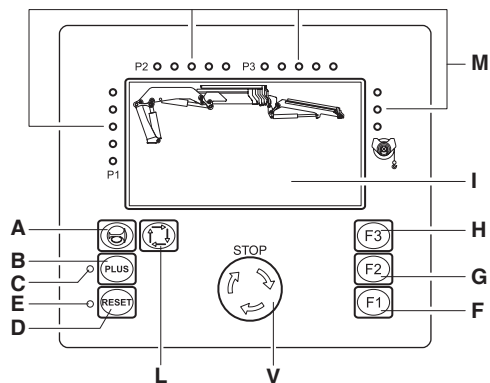


- A** - Outrigger jack signal:
- the outrigger is resting on the ground
  - the outrigger is not resting on the ground.
- B** - Incremental bars: they indicate the extension of the outriggers arms (crane and supplementary cross-member)
- C** - Percentage value: it indicates the extension of the outriggers arms (crane and supplementary cross-member)

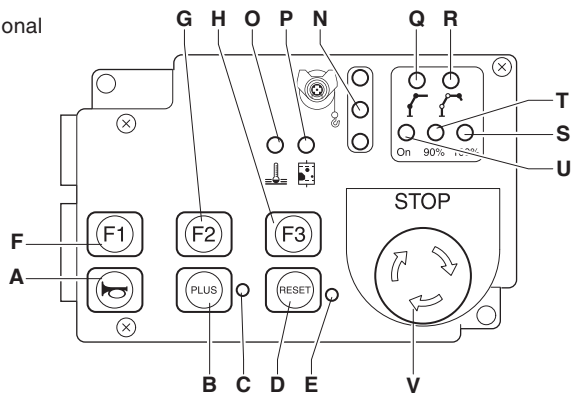


#### Key to page 3

|   |                                    |
|---|------------------------------------|
| A | Effective time-counter             |
| B | Loader version                     |
| C | Firmware version                   |
| D | Software version                   |
| E | Last 6 alarms (see alarm messages) |



optional



UN01-2770FI

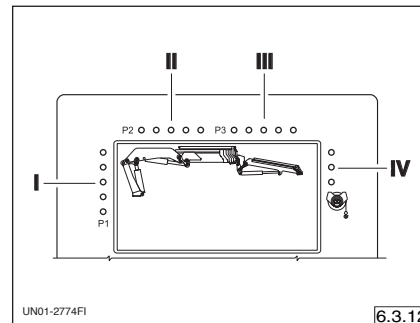
6.3.7

### L - Page selection button

Press the button repeatedly to display the information pages in succession.

### M - Indicators light

These indicate the lifting capacity in use.



I - Main jack indicator

II - Secondary jack indicator

III - Jib junction jack indicator

IV - Winch indicator

- Green LEDs on:  
normal working values.
- Orange LEDs on:  
limiter working with 90% of the load  
that can be lifted.
- Red LEDs on:  
blocked condition.



**N - Indicators light**

These show the lifting capacity (for the winch) when the unit is in operation.

See point M "Signal lights - IV - Winch signal light", fig. 6.3.6.

**O - Indicator light**

Red.

When lit up, this signals: low hydraulic oil temperature.

**P - Indicator light**

Red.

When lit up, this signals: filter clogged.

**Q - Indicator light**

When lit up, this shows the unit is locked due to an overload at the:

- main jack;
- secondary jack.

**R - Indicator light**

When lit up, this shows the unit is locked due to an overload at the jib joint jack.

**S - Indicator light**

Red.

When on, it indicates that 100% of the load that can be lifted with the winch has been reached.

**T - Indicator light**

Yellow.

When on, it indicates that 90% of the load that can be lifted with the winch has been reached.

**U - Indicator light**

Yellow.

This shows the power is on.

**V - Emergency stop device**

See "Control and limiting devices".

## 6.3.3 - Information and alarm messages

### - Information messages

| Icon                                                                              | Description                                |
|-----------------------------------------------------------------------------------|--------------------------------------------|
|  | Multiple activation functioning            |
|  | Use of the grab                            |
|  | Rotation block                             |
|  | Emergency button pressed                   |
|  | Active limited area                        |
|  | Jib not connected to the electrical system |
|  | Carry out maintenance                      |
|  | Heat exchanger fan in use                  |
|  | Reset: operates for 3 seconds              |
|  | Reset: does not operate for 30 seconds     |
|  | Set for the use of the crane               |
|  | Facility for use with outriggers           |
|  | Active "regenerative" function             |
|  | Activated PLE speed                        |

| Icon                                                                              | Description                                                                                                 |
|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------|
|  | Stabilized crane                                                                                            |
|  | Crane thrust control                                                                                        |
|  | Crane maximum lifting                                                                                       |
|  | Jib thrust control                                                                                          |
|  | Jib maximum lifting                                                                                         |
|  | MOD: translation mode<br>OK: winch in work position<br>NOK: winch not in work position<br>Lck: winch locked |
|  | Block lower limit                                                                                           |
|  | Block upper limit                                                                                           |

#### (\*) Icon

- Icon not associated with numerical code; perform maintenance available to operator
- Icon associated with numerical code; have machine serviced at authorised centre
- Numerical codes:
  - 60 - carry out maintenance every 500 hours
  - 61 - carry out maintenance every 1000 hours

(\*\*) Not featured on the Power Tronic Advance

## - Alarm messages

| <i>Icon (1)</i>                                                                   | <i>Code</i> | <i>Description</i>                      |
|-----------------------------------------------------------------------------------|-------------|-----------------------------------------|
|  | 01          | Filter blocked                          |
|  | 34          | Interlock limit switch                  |
|  | 33          | Winch lowering end stroke               |
|  | 22          | Manual extension overload               |
|  | 02          | Hydraulic oil high temperature          |
|  | 03          | Hydraulic oil low temperature           |
|  | 21          | Interlock crane not stabilised          |
|  | 45          | Control unit malfunction                |
|  | 46          | Central remote control unit malfunction |
|  | 47          | LG / IO card failure                    |
|  | 48          | Satellite unit malfunction              |
|  | 49          | MCS card failure (MASTER)               |
|  | 49B         | MCS card failure (SLAVE)                |
|  | 51          | Encoder 1 failure                       |
|  | 52          | Encoder 2 failure                       |

| <i>Icon (1)</i>                                                                   | <i>Code</i> | <i>Description</i>          |
|-----------------------------------------------------------------------------------|-------------|-----------------------------|
|  | 53          | Encoder 3 failure           |
|  | 54          | Encoder 4 failure           |
|  | 55          | CP tilt sensor failure      |
|  | 56          | Extension encoder failure 1 |
|  | 57          | Extension encoder failure 2 |
|  | 58          | Extension encoder failure 3 |
|  | 59          | Extension encoder failure 4 |
|  | 66B         | Rotation encoder failure    |
|  | 67B         | Rotation 2 encoder failure  |
|  | 68          | Incorrect encoder data      |
|  | 105         | Front encoder 8 failure     |
|  | 106         | Front encoder 9 failure     |

(1) The icon appears together with the active control lever code.

| <b>Icon (1)</b>                                                                   | <b>Code</b> | <b>Description</b>                                                                                        |
|-----------------------------------------------------------------------------------|-------------|-----------------------------------------------------------------------------------------------------------|
|  | 23A<br>23B  | Main jack angular sensor<br><i>23A - sensor disconnected</i><br><i>23B - sensor short circuited</i>       |
|  | 24A<br>24B  | Secondary jack angular sensor<br><i>24A - sensor disconnected</i><br><i>24B - sensor short circuited</i>  |
|  | 25A<br>25B  | Jib angular sensor<br><i>25A - sensor disconnected</i><br><i>25B - sensor short circuited</i>             |
|  | 26          | Temperature sensor<br><i>sensor failure</i>                                                               |
|  | 27A<br>27B  | Main jack pressure sensor<br><i>27A - sensor disconnected</i><br><i>27B - sensor short circuited</i>      |
|  | 28A<br>28B  | Secondary jack pressure sensor<br><i>28A - sensor disconnected</i><br><i>28B - sensor short circuited</i> |
|  | 29A<br>29B  | Jib joint jack pressure sensor<br><i>29A - sensor disconnected</i><br><i>29B - sensor short circuited</i> |
|  | 30A<br>30B  | Emergency solenoid valve<br><i>30A - emergency disconnected</i><br><i>30B - emergency short circuited</i> |

| <b>Icon</b>                                                                       | <b>Code</b> | <b>Description</b>                                                                                                            |
|-----------------------------------------------------------------------------------|-------------|-------------------------------------------------------------------------------------------------------------------------------|
|  | 31A<br>31B  | Regenerative solenoid valve<br><i>31A - solenoid valve disconnected</i><br><i>31B - solenoid valve short circuited</i>        |
|  | 32A<br>32B  | Multiple activation solenoid valve<br><i>32A - solenoid valve disconnected</i><br><i>32B - solenoid valve short circuited</i> |
|  | 37A<br>37B  | Rotation solenoid valve<br><i>37A - Solenoid valve disconnected</i><br><i>37B - Solenoid valve short circuited</i>            |
|  | 38A<br>38B  | Capacity reduction solenoid valve<br><i>38A - solenoid valve disconnected</i><br><i>38B - solenoid valve short circuited</i>  |
|  | 39A<br>39B  | Spare solenoid valve 1<br><i>39A - solenoid valve disconnected</i><br><i>39B - solenoid valve short circuited</i>             |
|  | 41A<br>41B  | Spare solenoid valve 2<br><i>41A - solenoid valve disconnected</i><br><i>41B - solenoid valve short circuited</i>             |
|  | 42A<br>42B  | Analogue winch sensor<br><i>42A - sensor disconnected</i><br><i>42B - sensor short circuited</i>                              |
|  | 44A<br>44B  | Spare solenoid valve 3<br><i>44A - solenoid valve disconnected</i><br><i>44B - sensor short circuited</i>                     |
|  | 64A<br>64B  | <i>64A - satellite not found</i><br><i>64B - satellite detected but not configured</i>                                        |

(1) The icon appears together with the active control lever code.

| Icon                                                                               | Code       | Description                                                                                                   |
|------------------------------------------------------------------------------------|------------|---------------------------------------------------------------------------------------------------------------|
|   | 66A        | Micro rotation failure                                                                                        |
|   | 77         | Starting the engine of the short circuited vehicle                                                            |
|   | 78         | Stopping the engine of the short circuited vehicle                                                            |
|   | 79         | Winch right shifting short circuit                                                                            |
|   | 80         | Winch left shifting short circuit                                                                             |
|   | 81         | Horn short circuit                                                                                            |
|   | 82         | Auto-RPM short circuit                                                                                        |
|   | 83A<br>83B | RH outrigger jack sensor<br><i>83A - disconnected base sensor</i><br><i>83B - short circuited base sensor</i> |
|   | 84A<br>84B | RH outrigger jack sensor<br><i>84A - disconnected rod sensor</i><br><i>84B - short circuited rod sensor</i>   |
|   | 85A<br>85B | LH outrigger jack sensor<br><i>85A - disconnected base sensor</i><br><i>85B - short circuited base sensor</i> |
|   | 86A<br>86B | LH outrigger jack sensor<br><i>86A - disconnected rod sensor</i><br><i>86B - short circuited rod sensor</i>   |
|   | 87A<br>87B | Distributor pressure sensor (PLE)<br><i>87A - disconnected sensor</i><br><i>87B - short circuited sensor</i>  |
|  | 95         | Platform tilt (PLE)                                                                                           |

| Icon (1)                                                                          | Code         | Description                               |            |
|-----------------------------------------------------------------------------------|--------------|-------------------------------------------|------------|
|  | from 7 to 13 | Distributor electrical module malfunction |            |
|                                                                                   | 7            | Rotation control                          | 1st module |
|                                                                                   | 8            | Main jack control                         | 2nd module |
|                                                                                   | 9            | Secondary jack control                    | 3rd module |
|                                                                                   | 10           | Arm jack control                          | 4th module |
|                                                                                   | 11           | Accessory control                         | 5th module |
|                                                                                   | 12           | Accessory control                         | 6th module |
|                                                                                   | 13           | Accessory control                         | 7th module |

(1) The icon appears together with the active control lever code.

| <i>Icon (1)</i>                                                                   | <i>Code</i>     | <i>Description</i>                      |               |
|-----------------------------------------------------------------------------------|-----------------|-----------------------------------------|---------------|
|  | from 14A to 20B | Distributor lever active position       |               |
|                                                                                   | 14 A            | Rotation control lever (clockwise)      | 1st component |
|                                                                                   | 14 B            | Rotation control lever (anti-clockwise) |               |
|                                                                                   | 15 A            | Main jack control lever (lowering)      | 2nd component |
|                                                                                   | 15 B            | Main jack control lever (lifting)       |               |
|                                                                                   | 16 A            | Secondary jack control lever (lowering) | 3rd component |
|                                                                                   | 16 B            | Secondary jack control lever (lifting)  |               |
|                                                                                   | 17 A            | Arm jack control lever (extension)      | 4th component |
|                                                                                   | 17 B            | Arm jack control lever (retraction)     |               |
|                                                                                   | 18 A<br>18 B    | Accessory control lever (2)             | 5th component |
|                                                                                   | 19 A<br>19 B    | Accessory control lever (2)             | 6th component |
|                                                                                   | 20 A<br>20 B    | Accessory control lever (2)             | 7th component |

## - Accessory connection table

| <i>Accessory</i> | <i>Code</i> | <i>Lever function</i>             |
|------------------|-------------|-----------------------------------|
| Jib              | ..A         | Junction jack control (lowering)  |
|                  | ..B         | Junction jack control (lifting)   |
|                  | ..A         | Arm jack control (extension)      |
|                  | ..B         | Arm jack control (retraction)     |
| Winch            | ..A         | Winch control (lowering)          |
|                  | ..B         | Winch control (lifting)           |
| Rotator          | ..A         | Rotation control (clockwise)      |
|                  | ..B         | Rotation control (anti-clockwise) |
| Grab             | ..A         | Grab control (closing)            |
|                  | ..B         | Grab control (opening)            |

(1) The icon appears together with the active control lever code.

(2) The code is associated with the distributor component and as a result the function of the lever varies in relation to the accessory assembled on that component (see accessory connection table).

## 6.4 - Work sectors

Different devices to check the work sectors can be installed to guarantee the stability of the equipment.



### Information

*Machines fitted with the Power Tronic Advance control panel can perform small manoeuvres near the column axis, for example opening and closing the crane even when the outrigger jacks are not resting on the ground.*

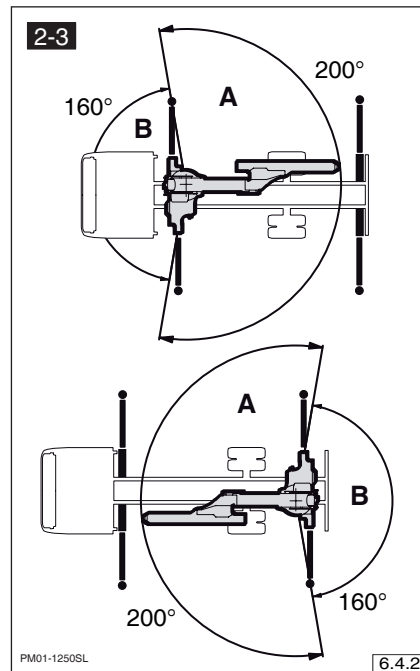
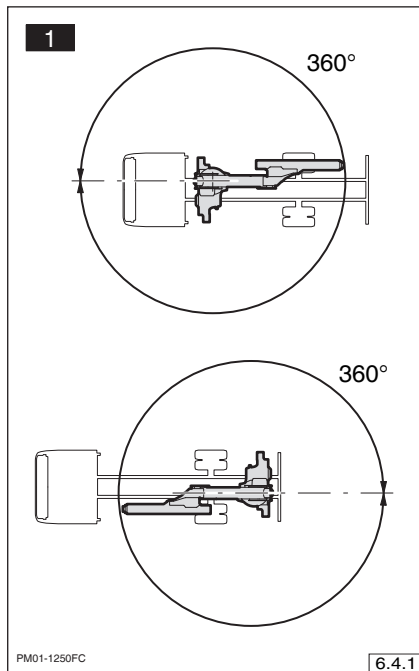


### Information

*The values of the angles that determine the work sectors and the outrigger extension percentages are indicative; they may vary according to the crane and type of equipment.*

## 6.4.1 - Electrical and mechanical rotation control devices

- 1) At 360° with a nominal capacity (\*) (fig. 6.4.1).
- 2) With a nominal capacity (\*) in sector "A" (200°) but without the possibility of rotation in sector "B" (160°) (fig. 6.4.2).
- 3) With a nominal capacity (\*) in sector "A" (200°) and a reduction in capacity in sector "B" (\*\*) (160°) (fig. 6.4.2).



(\*) nominal capacity = max. load permitted in relation to a certain configuration (see "Capacity diagram").

(\*\*) with a crane behind the truck bed, in some cases, the same load capacity of the sector "A" can be applied to sector "B".



### 6.4.2 - Stabilisation control device (TYPE 1)

This device makes it possible to work with two sectors (A - B).

- **Sector A** (rated load capacity) (\*)  
outriggers arms fully extended and outrigger jacks resting correctly on the ground.
- **Sector B** (reduced load capacity) (\*\*)  
outrigger jacks resting correctly on the ground.

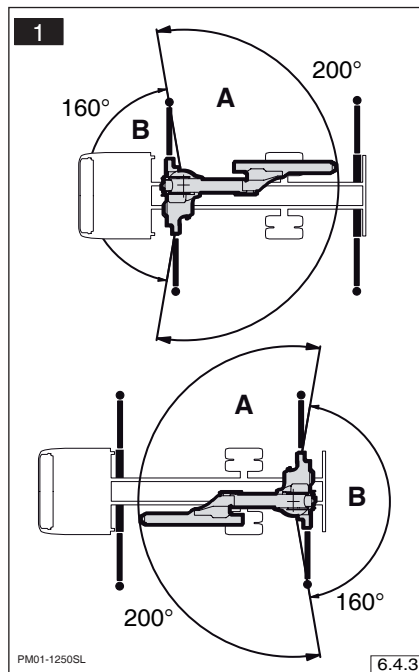


Fig. 1: outriggers arms fully extended.

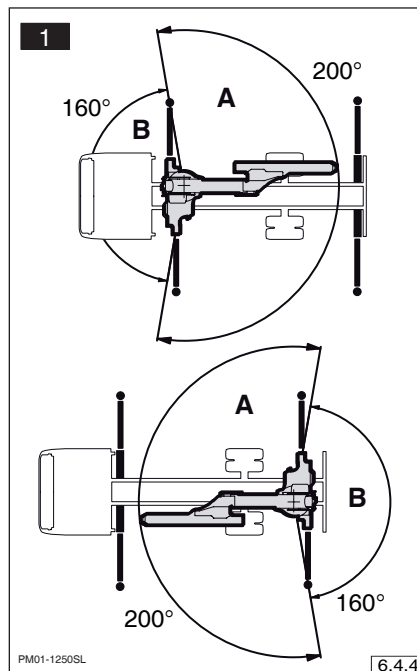
(\*) Nominal capacity = max. load permitted in relation to a certain configuration (see "Capacity diagram").

(\*\*) The sector "B" can be disabled according to the type of equipment. With a crane behind the truck bed, in some cases, the same load capacity of the sector "A" can be applied to sector "B".

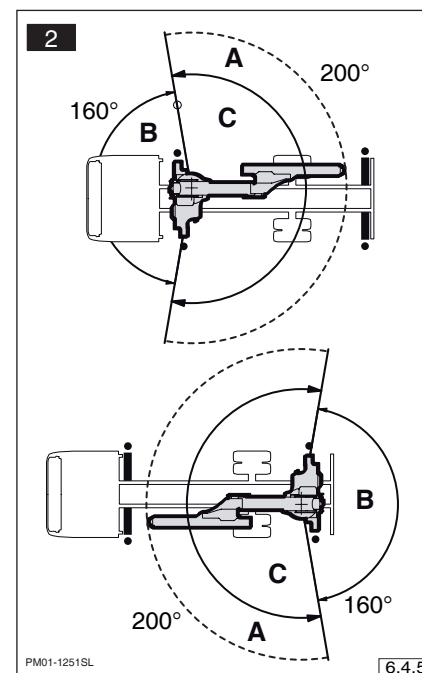
### 6.4.3 - Stabilisation control device (TYPE 2)

This device makes it possible to work with 3 sectors (A - B - C).

- **Sector A** (rated load capacity) (\*) outriggers arms fully extended and outrigger jacks resting correctly on the ground.
- **Sector B** (reduced load capacity) (\*\*) outrigger jacks resting correctly on the ground.
- **Sector C** (reduced load capacity) outriggers arms not fully extended and stabiliser jacks resting correctly on the ground.



**Fig. 1:** outriggers arms fully extended.



**Fig. 2:** outriggers arms not fully extended.

(\*) Nominal capacity = max. load permitted in relation to a certain configuration (see "Capacity diagram").

(\*\*) The sector "B" can be disabled according to the type of equipment. With a crane behind the truck bed, in some cases, the same load capacity of the sector "A" can be applied to sector "B".

### 6.4.4 - Stabilisation control device (TYPE 3)

This device makes it possible to work with 3 sectors (A - B - C) differentiating the right side and the left side.

- **Sector A** (rated load capacity) (\*) outriggers arms fully extended and outrigger jacks resting correctly on the ground.



#### Information

*With this type of device there is a sector "A", rated load capacity, where only the outrigger jacks are resting correctly on the ground (fig. 4).*

- **Sector B** (reduced load capacity) (\*\*) outrigger jacks resting correctly on the ground.
- **Sector C** (reduced load capacity) outriggers arms not fully extended and stabiliser jacks resting correctly on the ground.

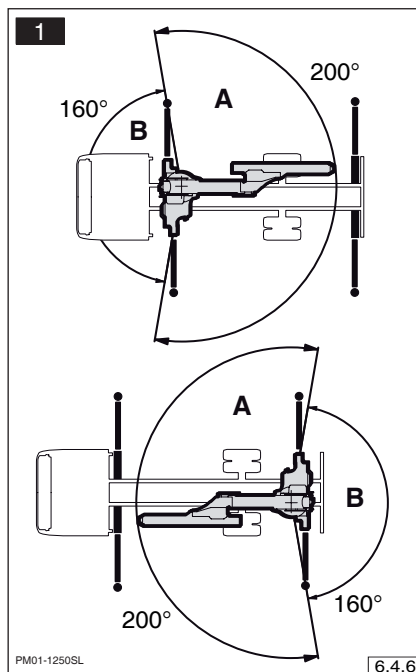


Fig. 1: outriggers arms fully extended.

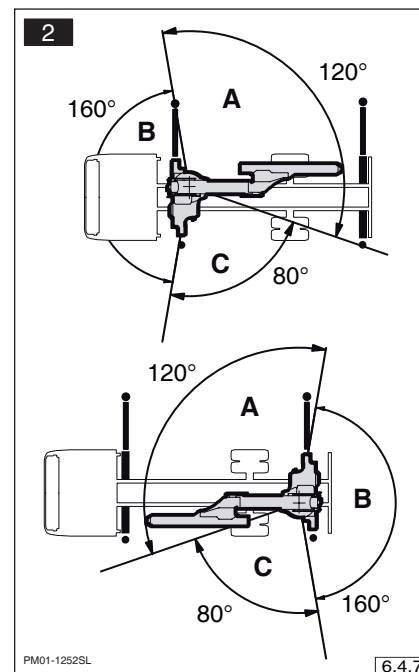
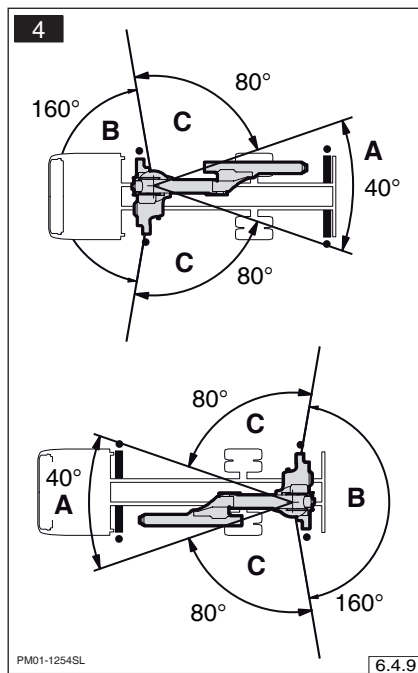
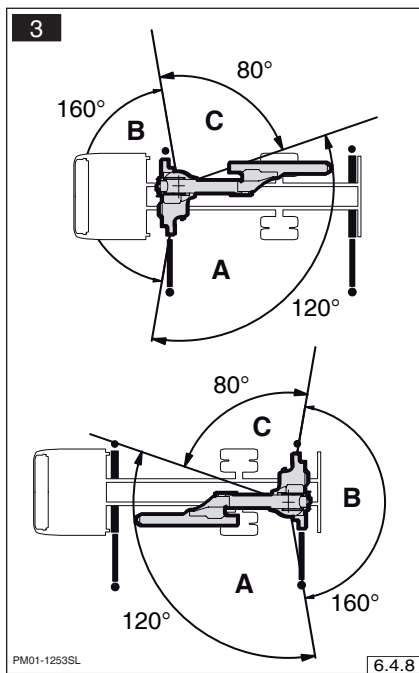


Fig. 2: outriggers arms not fully extended.

(\*) Nominal capacity = max. load permitted in relation to a certain configuration (see "Capacity diagram").

(\*\*) The sector "B" can be disabled according to the type of equipment. With a crane behind the truck bed, in some cases, the same load capacity of the sector "A" can be applied to sector "B".



**Fig. 3 - 4:** outriggers arms not fully extended.

### 6.4.5 - Stabilisation control device (TYPE 4)

This device makes it possible to work with 4 sectors (A - B - C - D) differentiating the right side and the left side, and also differentiating the position of the outriggers arms in two intervals.

- **Sector A** (rated load capacity) (\*) outriggers arms fully extended and outrigger jacks resting correctly on the ground.

#### i

#### Information

With this type of device there is a sector "A", rated load capacity, where only the outrigger jacks are resting correctly on the ground (fig. 4).

- **Sector B** (reduced load capacity) (\*\*) outrigger jacks resting correctly on the ground.
- **Sector C** (reduced load capacity) outrigger jacks resting correctly on the ground and at least one outrigger arm with an extension of about less than 50% compared to the maximum extension.

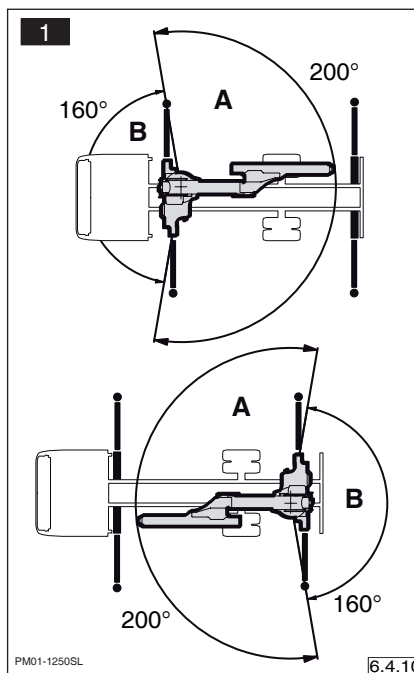


Fig. 1: outriggers arms fully extended.

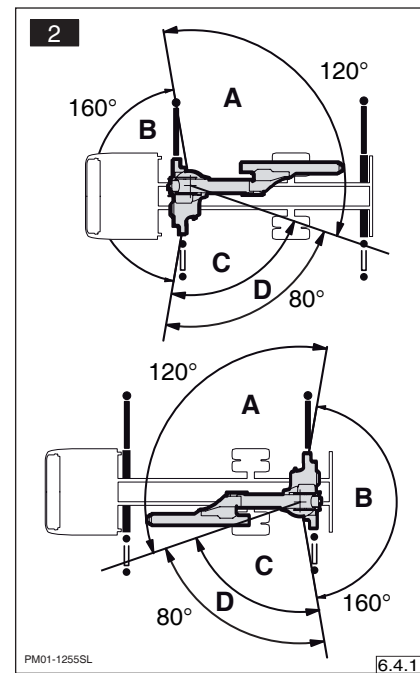
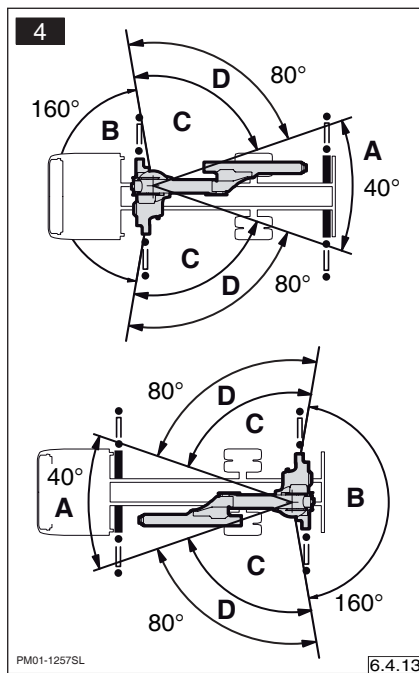
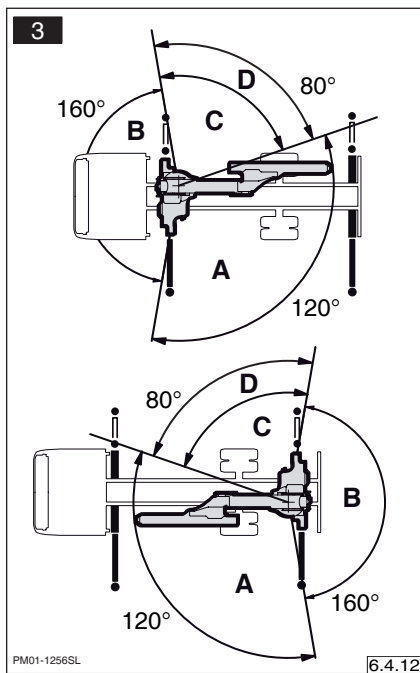


Fig. 2: outriggers arms not fully extended.

(\*) Nominal capacity = max. load permitted in relation to a certain configuration (see "Capacity diagram").

(\*\*) The sector "B" can be disabled according to the type of equipment. With a crane behind the truck bed, in some cases, the same load capacity of the sector "A" can be applied to sector "B".



- **Sector D** (reduced load capacity)  
outrigger jacks resting correctly on the ground and both outriggers arms with an extension of about more than 50% compared to the maximum extension, but not fully extended.

## 6.4.6 - Stabilisation control device (TYPE 5)

This device makes it possible to work with 6 sectors (A - B - C1 - C2 - C3 - C4) differentiating the right side and the left side, and also differentiating the position of the outriggers arms in 4 intervals for the crane and 3 intervals for the supplementary crossmember.

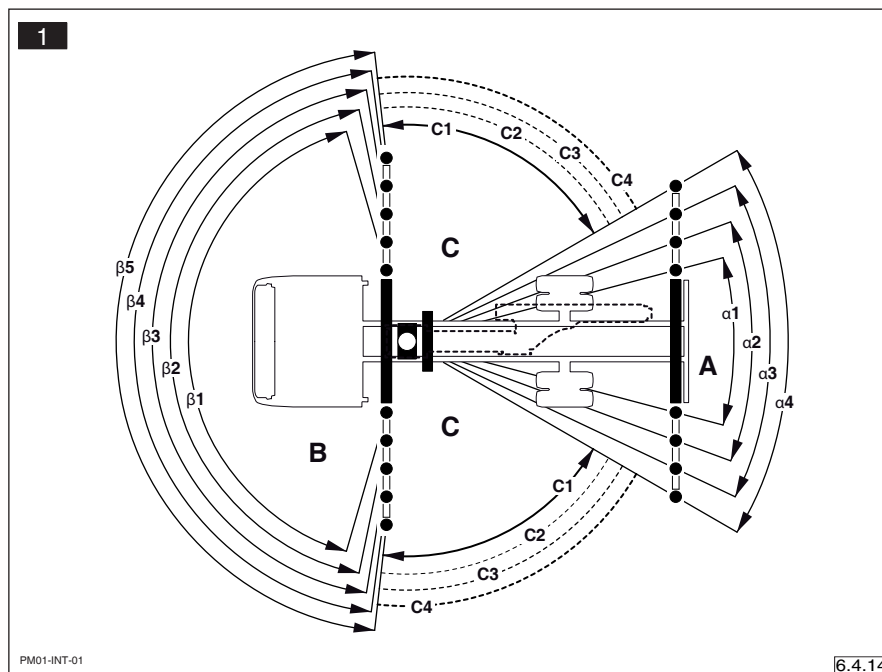
- **Sector A** (rated load capacity) (\*)  
outriggers arms fully extended and outrigger jacks resting correctly on the ground.



### Information

With this type of device there is a sector "A", rated load capacity, where only the outrigger jacks are resting correctly on the ground (fig. 1).

- **Sector B** (reduced load capacity) (\*\*)  
outrigger jacks resting correctly on the ground.
- **Sectors C1, C2, C3, C4** (reduced load capacity)  
outrigger jacks resting correctly on the ground and outriggers arms extended as shown in the table.



(\*) Nominal capacity = max. load permitted in relation to a certain configuration (see "Capacity diagram").

(\*\*) The sector "B" can be disabled according to the type of equipment. With a crane behind the truck bed, in some cases, the same load capacity of the sector "A" can be applied to sector "B".

- Stabilisation combinations between the crane and the supplementary crossmember

|  |           | <b><math>\alpha 1</math></b> | <b><math>\alpha 2</math></b> | <b><math>\alpha 3</math></b> | <b><math>\alpha 4</math></b> |
|-----------------------------------------------------------------------------------|-----------|------------------------------|------------------------------|------------------------------|------------------------------|
|                                                                                   |           | 0% - 32%                     | 33% - 65%                    | 66% - 99%                    | 100%                         |
| <b><math>\beta 1</math></b>                                                       | 0% - 24 % | C1                           | C1                           | C1                           | C1                           |
| <b><math>\beta 2</math></b>                                                       | 25% - 49% | C2                           | C2                           | C2                           | C2                           |
| <b><math>\beta 3</math></b>                                                       | 50% - 74% | C2                           | C3                           | C3                           | C3                           |
| <b><math>\beta 4</math></b>                                                       | 75% - 99% | C2                           | C3                           | C4                           | C4                           |
| <b><math>\beta 5</math></b>                                                       | 100%      | C2                           | C3                           | C4                           | A                            |

( $\alpha$ ) sector width given by the extension of the supplementary crossmember outriggers arms.

( $\beta$ ) sector width given by the extension of the crane outriggers arms.



## 6.5 - Crane stabilisation

### 6.5.1 - Stabilisation procedure



**HAZARD !**

*The operator must know the maximum load that the stabiliser will apply to the ground (see "Enclosures") and must ensure that the ground consistency can guarantee the stability of the vehicle.*

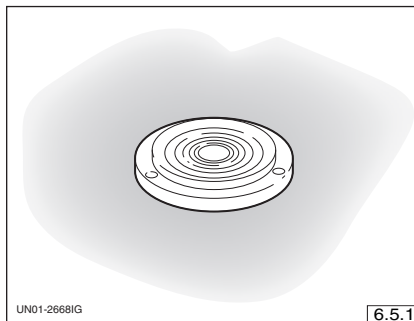
*On ground that is not very solid, place the raised support plates or a hard wooden board of a suitable size between the stabiliser and the ground. Stabilise the machine by unloading the weight of the vehicle from the suspension without lifting the wheels off the ground, as this would cancel out the elastic effect of the suspension, causing it to tip over.*

*Check the correct levelling using the spirit level (fig. 6.5.1), which must be flat (0°) with a maximum tolerance of  $\pm 1^\circ$ .*



**CAUTION !**

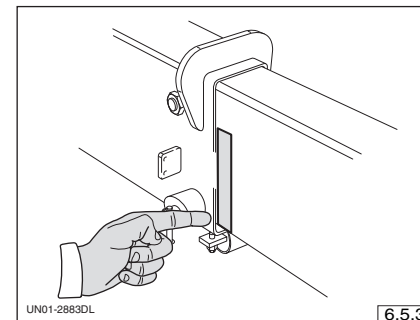
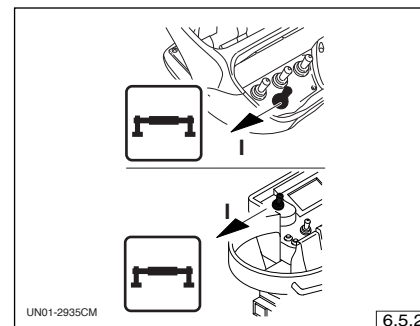
*Before using the controls for the stabilisation, deactivate all the locking devices.*



- 1 - Block the vehicle with the parking brake and place the chocks behind the wheels.
- 2 - Start the motor at minimum rpm and engage the power takeoff.
- 3 - Select the machine operation mode:
  - operation with load hoisting hook attached "F1";
  - operation with hydraulic tool control "F2" (grab, claw, etc.) attached.
- 4 - Ensure the outrigger control on the radio control or on the functional control unit is in the "enable outriggers" position, fig. 6.5.2.
- 5 - Extend the stabiliser arms to the

maximum open position signalled by the yellow indicator light (fig. 6.5.3).

- 6 - Extend the outrigger jacks and position them correctly on the ground.





## Information

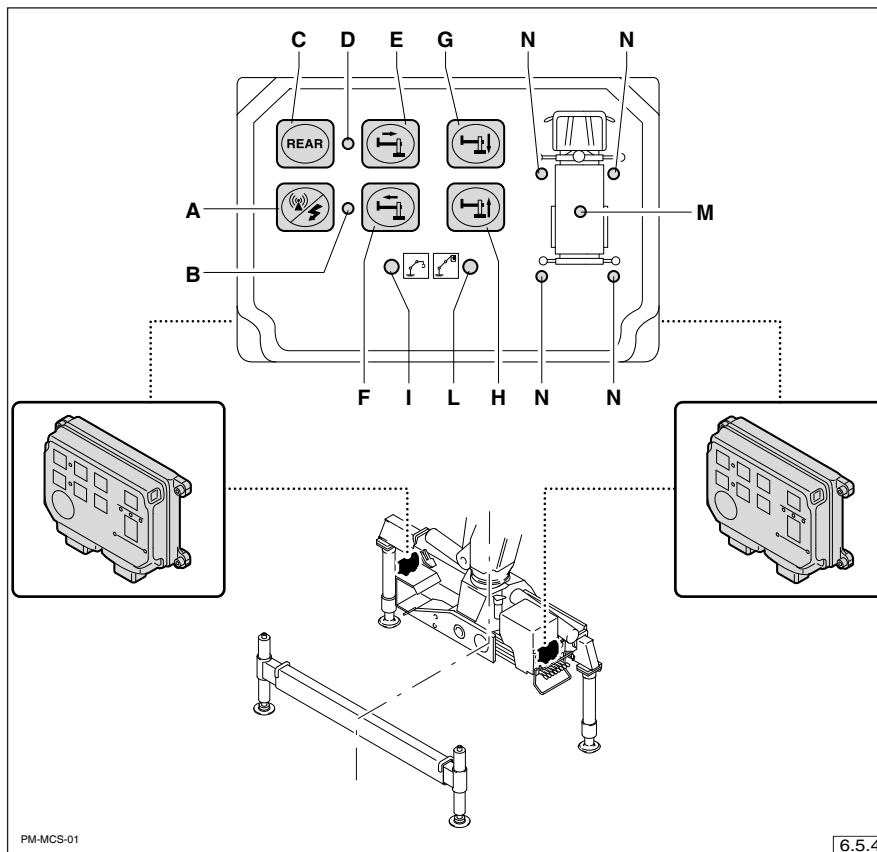
*The crane cannot be used until the operation mode is selected.*

*It is only possible to use the crane when the oil temperature is higher than the preset minimum.*

*In cold climates, allow the pump to run for a few minutes before manoeuvring the crane to ensure the hydraulic oil reaches the operating temperature.*

*Check the oil temperature in the functional control unit.*

## 6.5.2 - Stabilisation controls with “MCS” keyboard



Each keyboard only controls the outriggers arms and outrigger jacks (crane and supplementary crossmember) on the same side as the keyboard.

#### **A - Activation button for transmitter unit controls**

The stabilisation must be performed using the transmitter unit within three seconds, otherwise the keyboard controls are re-enabled.

#### **B - Red signal light**

ON = transmitter unit controls active; OFF = keyboard controls active.

#### **C - Supplementary crossbeam/crane outriggers selection button**

#### **D - Red signal light**

When lit, it signals that the outriggers of the supplementary crossbeam have been selected; when switched off those of the crane have been selected.

#### **E - Outrigger arm extension**

#### **F - Outrigger arm retraction**

#### **G - Outrigger jack extension**

#### **H - Outrigger jack retraction**

#### **I - Green signal light**

- **When lit permanently** it signals that the system is in crane mode.
- **When lit with flashing light** it signals a system failure.
- **Off** it signals that the system is not powered.

#### **L - Green signal light**

When lit permanently, it signals that the system is in "PLE" mode (function not active).

#### **M - Green signal light**

It signals the following machine stabilisation situations:

- **light off:** this means the machine is not stabilised;
- **flashing light:** this means the machine is operating in a work sector with reduced load capacity (see work sectors B - C - D);
- **light on constantly:** this means the machine is operating in a work sector with rated load capacity (see work sector A).

#### **N - Green signal light.**

This signals the status of the arms and outrigger jacks. The LEDs light up and switch off according to a specific logic depending on the stabilisation control installed on the crane.

### Stabilisation control device (TYPE 1, 2 and 3)

|                     |                                                                                                                           |
|---------------------|---------------------------------------------------------------------------------------------------------------------------|
| light off           | this means the outrigger arm is closed or partially extended and the outrigger jack is not resting properly on the ground |
| slow flash          | this means the outrigger arm is closed or partially extended and the outrigger jack is resting properly on the ground     |
| quick flash         | this means the outrigger arm is fully extended and the outrigger jack is not resting properly on the ground               |
| light on constantly | this means the outrigger arm is fully extended and the outrigger jack is resting properly on the ground                   |

### Stabilisation control device (TYPE 4)

The lighting up sequence of the LEDs follows the status of the outrigger jack, then after about 4 seconds the flashing light cycle shows the status of the outrigger arms extension.

#### - Outrigger jack status

|                     |                                                                 |
|---------------------|-----------------------------------------------------------------|
| light off           | this mean the outrigger jack closed                             |
| light on constantly | this means the outrigger jack is resting properly on the ground |

#### - Outrigger arm extension status

|                     |                                                                                                         |
|---------------------|---------------------------------------------------------------------------------------------------------|
| light off           | this means the outrigger arm is closed                                                                  |
| 1 flash             | this means the outrigger arm extension is between 0% and 49% of the maximum extension                   |
| 2 flashes           | this means the outrigger arm extension is between 50% and 99% of the maximum extension                  |
| 3 flashes           | this means the outrigger arm extension is 100% of the maximum extension                                 |
| light on constantly | this means the outrigger arm is fully extended and the outrigger jack is resting properly on the ground |

## Stabilisation control device (TYPE 5)

The lighting up sequence of the LEDs follows the status of the outrigger jack, then after about 4 seconds the flashing light cycle shows the status of the outrigger arms extension.

The flashing light cycle is different for the crane and the supplementary crossmember.

### - Outrigger jack status

|                     |                                                                 |
|---------------------|-----------------------------------------------------------------|
| light off           | this mean the outrigger jack closed                             |
| light on constantly | this means the outrigger jack is resting properly on the ground |

### - Crane outrigger arm extension status

|                     |                                                                                                         |
|---------------------|---------------------------------------------------------------------------------------------------------|
| light off           | this means the outrigger arm is closed                                                                  |
| 1 flash             | this means the outrigger arm extension is between 0% and 24% of the maximum extension                   |
| 2 flashes           | this means the outrigger arm extension is between 25% and 49% of the maximum extension                  |
| 3 flashes           | this means the outrigger arm extension is between 50% and 74% of the maximum extension                  |
| 4 flashes           | this means the outrigger arm extension is between 75% and 99% of the maximum extension                  |
| 5 flashes           | this means the outrigger arm extension is 100% of the maximum extension                                 |
| light on constantly | this means the outrigger arm is fully extended and the outrigger jack is resting properly on the ground |

### - Supplementary crossmember outrigger arm extension status

|                     |                                                                                                         |
|---------------------|---------------------------------------------------------------------------------------------------------|
| light off           | this means the outrigger arm is closed                                                                  |
| 1 flash             | this means the outrigger arm extension is between 0% and 32% of the maximum extension                   |
| 2 flashes           | this means the outrigger arm extension is between 33% and 65% of the maximum extension                  |
| 3 flashes           | this means the outrigger arm extension is between 66% and 99% of the maximum extension                  |
| 4 flashes           | this means the outrigger arm extension is 100% of the maximum extension                                 |
| light on constantly | this means the outrigger arm is fully extended and the outrigger jack is resting properly on the ground |



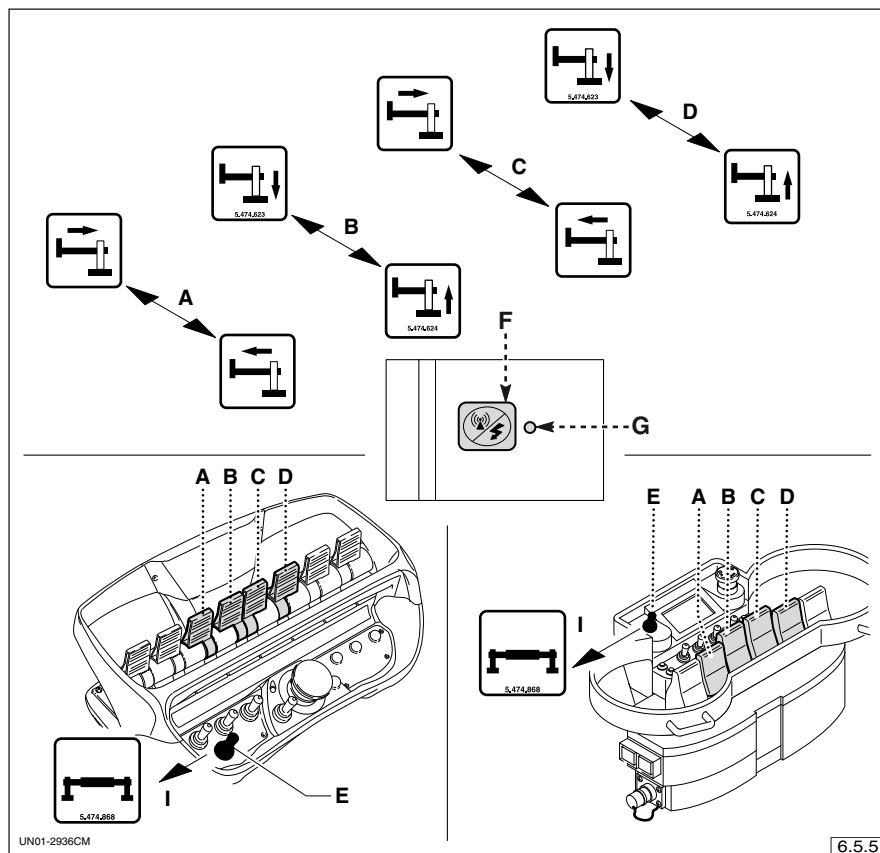
#### Information

*When the signal lights "B" and "D" start flashing at the same time during a stabilisation command (in "MCS" or "Radio" mode), it means that the functional control unit is inhibiting the stabilisation/destabilisation of the crane for safety reasons. Check that the control parameters "P1" (1) and "A1" (2) are below the safety values (usually "P1" < 100 bar and "A1" < 0°, i.e. crane without load or open below the correct horizontal position).*

(1) P1 = main jack pressure

(2) A1 = main arm angle

### 6.5.3 - Stabilisation controls with transmitter unit



Enable outriggers control on transmitter unit with switch "E" (pos. I). Press button "F" on the MCS keyboard, signal light "G" comes on. Use the levers on the control panel to stabilise the machine.

- A - extension/retraction - crane outriggers arms
- B - extension/retraction - crane outriggers jacks
- C - extension/retraction - supplementary crossbeam outriggers arms
- D - extension/retraction - supplementary crossbeam outriggers jacks
- E - control commutation switch  
This enables the stabilisation controls (pos. I).

### 6.5.4 - Revolving stabilisers



**CAUTION !**

*Extend the stabiliser arms until allowing the free rotation of the stabiliser jack into the vertical position.*

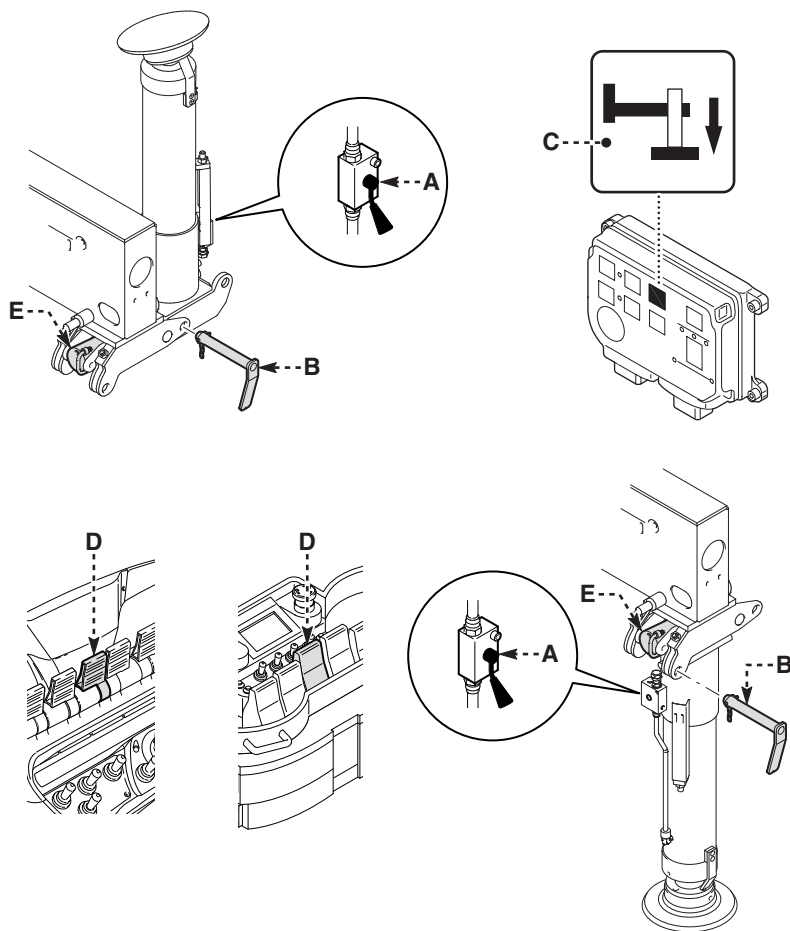


**HAZARD !**

*Be very careful as to the trajectory of the outrigger jack during rotation, to avoid collisions and damage to people and objects.*

- 1 - Close cock "A".
- 2 - Pull out pin "B" and its safety pin.
- 3 - Use the "C" key on the MCS keyboard or lever "D" on the transmitter to move rotation jack "E" to its stroke limit.
- 4 - Insert pin "B" and its safety pin.
- 5 - Open cock "A".

To place the stabiliser in the resting position, carry out the start-up operations in reverse order.



UN01-2743AI

6.5.6

6.49

## 6.6 - Working position of the crane

Before moving the crane, carefully read the section on “Safety” and the stabilisation instructions.

Check that the battery is charged and the radio control functions properly.



### CAUTION !

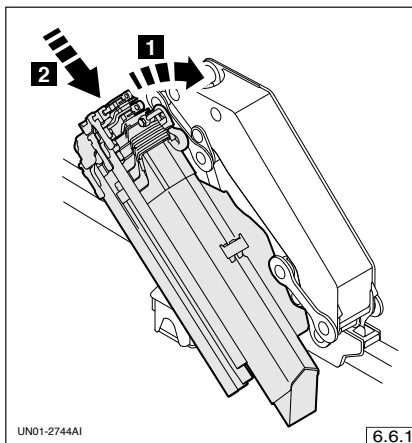
***Before starting any manoeuvres remove the mechanical locking devices:***

- ***that hold the crane in position during road transit;***
- ***that stop the crane rotating and the arm pack extending during road transit.***



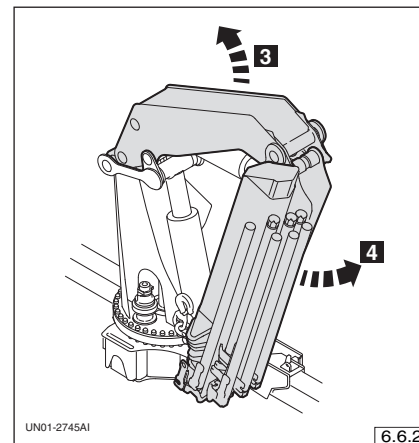
### WARNING !

***All crane opening and closing manoeuvres must be performed very slowly, taking into account the spaces occupied by moving parts.***



To place the crane into the working position, carry out the following manoeuvres:

- 1 - close the secondary jack to the end stroke;
- 2 - close the arm extension jack or jacks when they reach the limit of the stroke;
- 3 - open the main jack;
- 4 - open the secondary jack.



The main and secondary jacks must be open enough to allow the free rotation of the crane.



### 6.6.1 - Working position of the jib

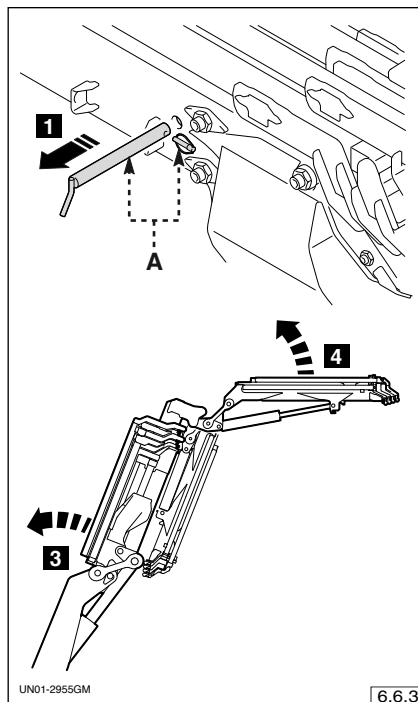
To place the jib into the working position, carry out the following manoeuvres.

- 1 - Remove the arms anti-extension device "A".
- 2 - Carry out the crane opening manoeuvre described in para. "Working position of the crane".
- 3 - Open the secondary jack to allow the rotation of the jib.
- 4 - Open the articulation jack.



**WARNING !**

*When the blocks are installed take care not to knock other parts of the machine.*



### 6.7 - Checking the efficiency of the control and limiting devices

On start-up, the function control device carries out a self-diagnosis (of the existing crane configuration) to check for any malfunctions.

The anomalies are shown on the control unit (see "Information and alarm messages") and on the radio control unit display if present.

#### 6.7.1 - Checking the emergency stop button



**WARNING !**

*Check all the emergency stop buttons individually.*

Conduct a test with the crane open and unloaded.

- 1) Press the emergency button.
- 2) Move the control levers in both directions and check that no crane manoeuvres are possible.
- 3) Turn the button to reset the crane functioning.

### 6.7.2 - Checking the rotation limiter (fig. 6.7.1)

Carry out the check with a load that is higher than what is permitted for that certain sector.

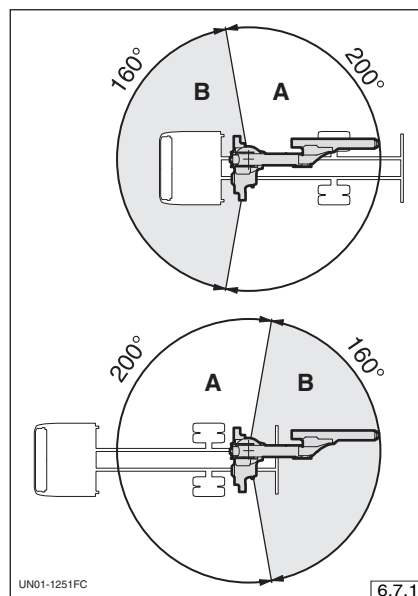
The permitted load value is provided by the authorised service centre that performed the installation and checked the stability of the assembly.

- 1) Turn the crane clockwise and anti-clockwise to check that the device prevents the rotation of the crane into sector "B".

### 6.7.3 - Checking the rotation block (fig. 6.7.1)

Carry out the check with the crane open and without a load.

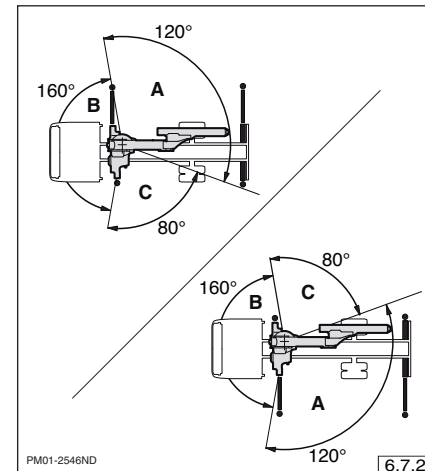
- 1) Turn the crane clockwise and anti-clockwise to check that the device prevents the rotation of the crane into sector "B".



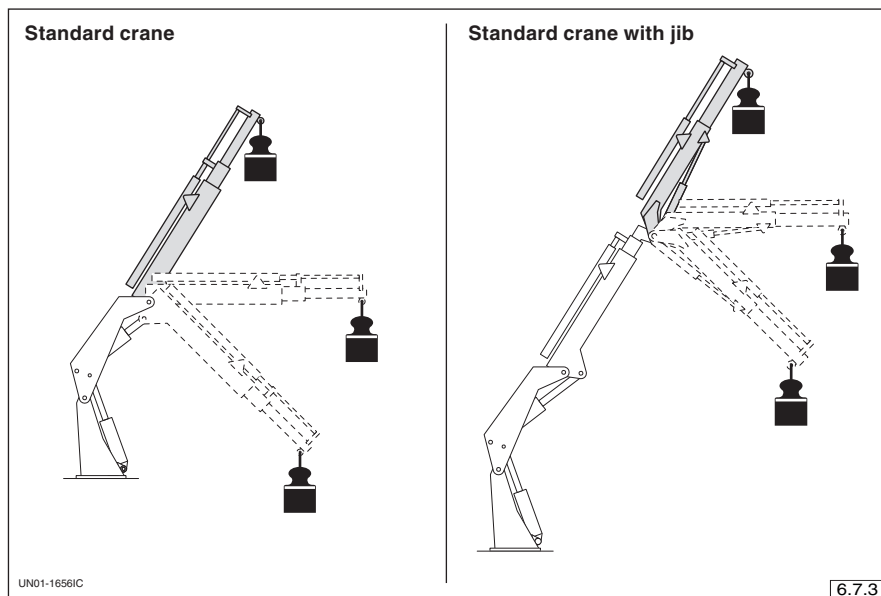
### 6.7.4 - Checking the rotation limiter with stabilisation control device

Carry out the test, starting from sector "A" on the right, with a load exceeding the permissible load for work sectors "B" and "C" at a certain distance (see capacities diagram).

- 1) Stabilise the machine.
  - 2) Turn the crane clockwise and anti-clockwise to make sure the devices prevent crane rotation in the sectors that are off-limits, i.e. "B" and "C", fig. 6.7.2).
- Repeat the test, starting from sector "A" on the left.



## 6.7.5 - Checking the load maintenance valve

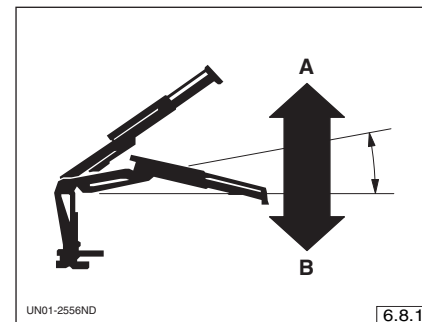


Carry out the check with a medium load.

- 1) Position the crane as shown in fig. 6.7.3.
- 2) Deactivate the power takeoff.
- 3) Remove the pressure from the system by moving the distributor lever a few times.
- 4) Wait for a short time to check that the load does not lower.

## 6.8 - Lifting and moving the load

### - Lifting the load



To lift large loads that require the full power of the crane, work as follows.

#### Zone "A":

- move mainly the main jack.

#### Zone "B":

- use mainly the secondary jack and the arm extension jacks.

Maximum lifting capacity is achieved with the main arm at an angle of 20° above the horizontal, as shown in the capacities diagrams.

The value of this angle can be seen on the display of the Power Tronic functional control unit.

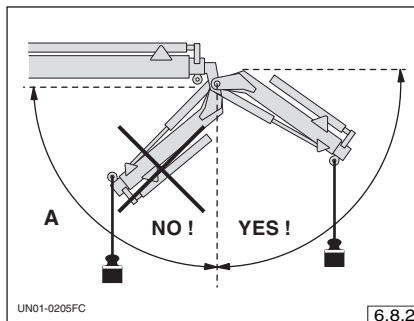
To speed up the loading/unloading operations, it is preferable to use the main and secondary jack, rather than the arm extension jacks.

## - Moving the load with the jib



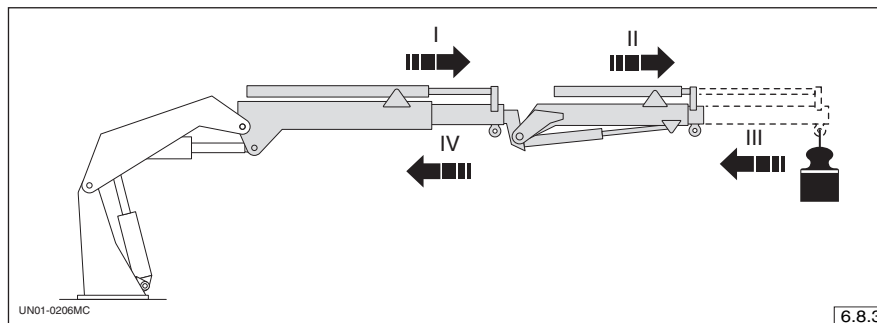
**WARNING !**

*It is prohibited to move loads in the negative sector "A" (see fig. 6.8.2).*



The appropriate manoeuvres to transfer the load (crane and jib arms horizontally), fig. 6.8.3, are:

- 1 - first extend the crane arms and then the jib arms;
- 2 - retract the jib arms and then the crane arms.

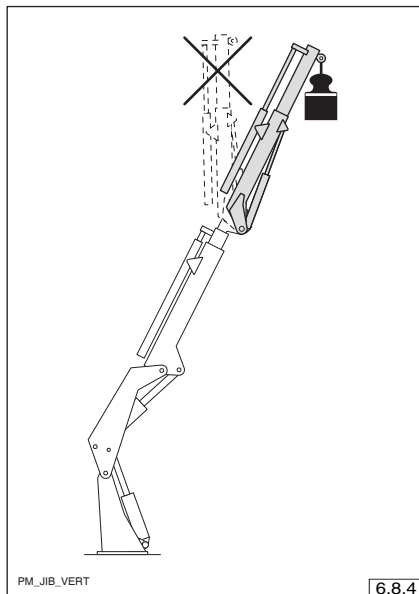




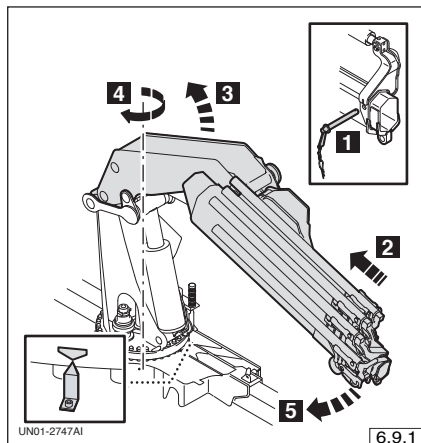
# **WARNING !**

*The crane must not be positioned vertically when the joint jack of the jib is completely open.*

*Align the jib with the crane's arm pack before starting.*



## 6.9 - Crane resting position

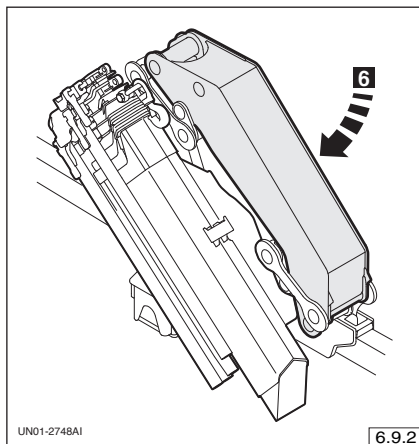


**HAZARD !**

***To avoid the risk of accidents, manoeuvre the crane from the opposite side to the main arm closing.***

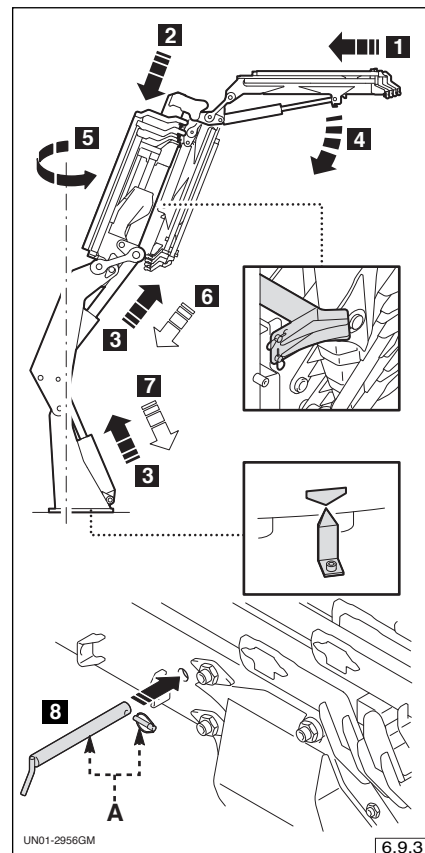
To place the crane in the resting position, carry out the following manoeuvres (fig. 6.9.1 and 6.9.2).

- 1 - Retract the manual extensions and lock them with the pin and safety plug in the minimum outreach position.



- 2 - Retract the crane arms.
- 3 - Open the main jack.
- 4 - Turn the crane until it fits the reference points located on the column and base.
- 5 - Close the secondary jack.
- 6 - Close the main jack making sure that the main arm of the crane fits into the special anti-rotation supports.

### 6.9.1 - Crane resting position with jib



To place the crane in the resting position, carry out the following manoeuvres:

- 1 - retract the jib arms;
- 2 - retract the crane arms;
- 3 - open the main and secondary jacks, in order to be able to work without obstacles;
- 4 - close up the jib joint jack and set the jib down on the support located on the secondary arm;
- 5 - turn the crane until it fits into the reference points located on the column and base;
- 6 - close the secondary jack;
- 7 - close the main jack, making sure that the main crane arm fits into the special anti-rotation supports;
- 8 - engage the locking device "A".



#### WARNING !

**When the blocks are installed take care not to knock other parts of the machine.**

## 6.10- Crane destabilisation and circulation on the roads

### 6.10.1- Crane destabilisation



#### Information

*The signal lights "B" and "D" start flashing simultaneously (fig. 6.5.4), indicating that the crane is not in the resting position and the stabilisation controls are locked.*

- 1 - Close up the machine into the resting position.
- 2 - Retract all the stabiliser jacks completely;
- 3 - retract all the stabiliser arms completely.
- 4 - Switch on locking devices for road transit.
- 5 - Deactivate the power takeoff;
- 6 - check that the crane is within the maximum outreach limits foreseen by the Highway Code.

### 6.10.2- Circulation on the roads



#### WARNING !

**Before setting off, make sure the power takeoff is switched off to prevent serious damage to the vehicle.**

Driving the vehicle and crane outfitting requires particular skill and training, in addition to a extreme awareness of the responsibility it entails, which is why only suitably trained and authorised persons may drive the machine. Circulation on the road network is only permitted to approved machines and drivers meeting the requirements of the current highway code.

In any case, before setting off, ensure:

- the locking pins for circulation on the roads are fitted properly;
- any mobile parts which could move suddenly and unexpectedly are locked securely;
- all protruding parts are clearly marked with the relative warning plates.

---

## 6.11 - Lock situations and manoeuvres permitted

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It is impossible to explain every lock situation that can be verified during the use of the machine.

As a general rule, manoeuvres that are permitted are those which bring the load towards the column, thereby reducing the pressure inside main jacks "P1" and secondary jack "P2".

Even if there are no loads being lifted, manoeuvres performed at the limits of the primary and secondary jack strokes can cause lock conditions, which require use of the "3-30" system.

The crane lock condition is shown by a red flashing signal light on the functional control unit.

The following illustrations show a series of lock situations and permitted manoeuvres.



### Information

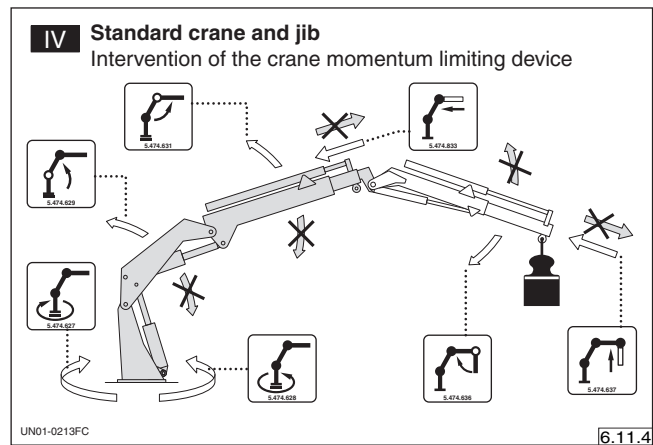
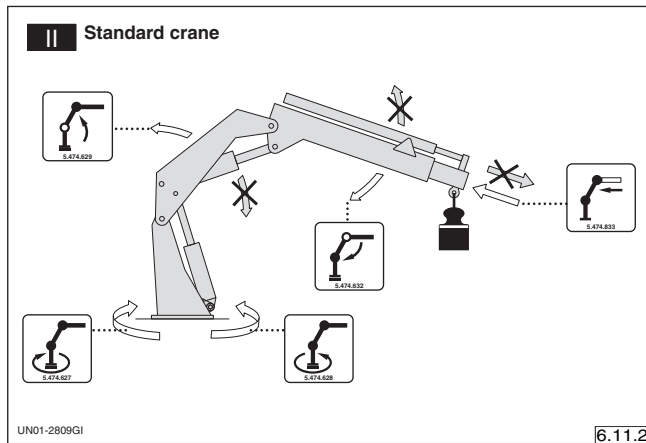
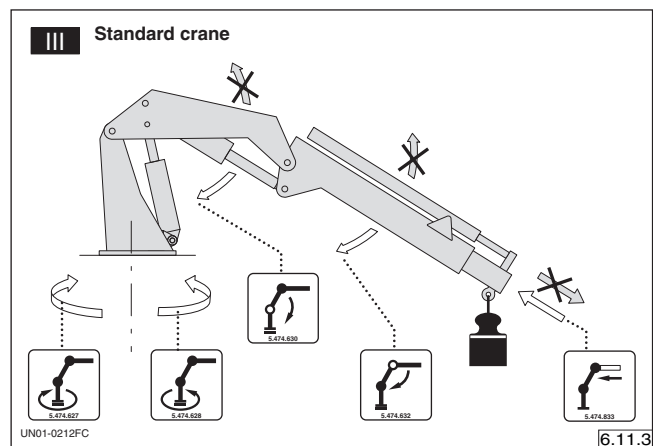
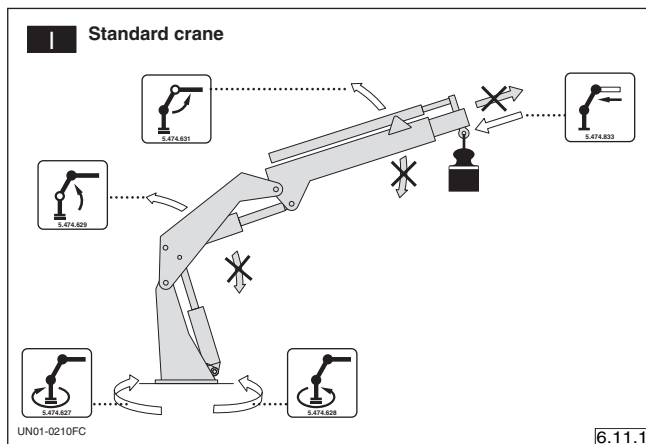
*In lock conditions, arm retraction is always permitted, except in particular situations where the movement overloads the main jack.*

*In these cases, arm retraction locks and the load can be handled with the remaining permitted manoeuvres.*

*In the front limited area, sector "B", the same manoeuvres are allowed, under lock conditions, as in sector "A" (or "C") - see "Work sectors", with the exception of the rotation manoeuvre, which is always prevented.*

*If all the controls are disabled, perform the system release manoeuvres (3-30).*

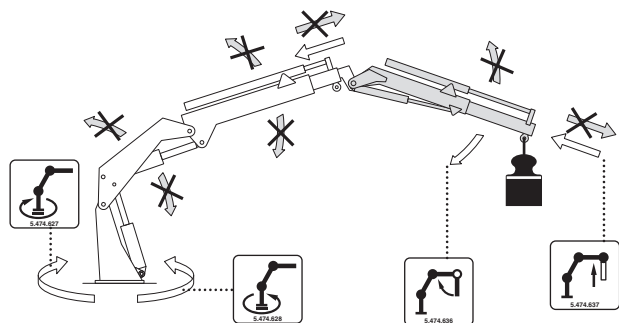




V

## Standard crane and jib

Intervention of the jib momentum limiting device



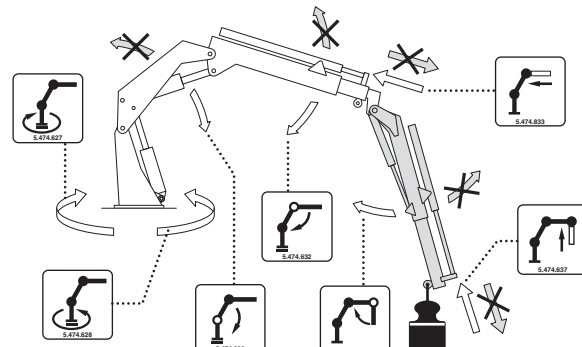
UN01-0214FC

6.11.5

VII

## Standard crane and jib

Intervention of the jib momentum limiting device



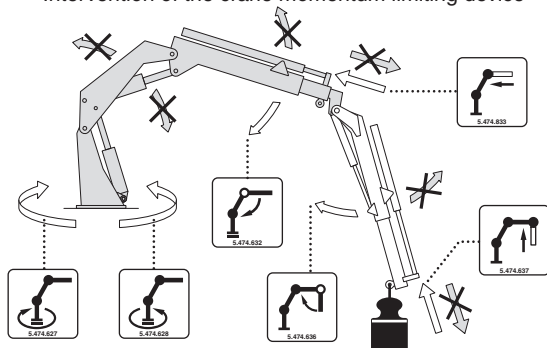
UN01-0216FC

6.11.7

VI

## Standard crane and jib

Intervention of the crane momentum limiting device



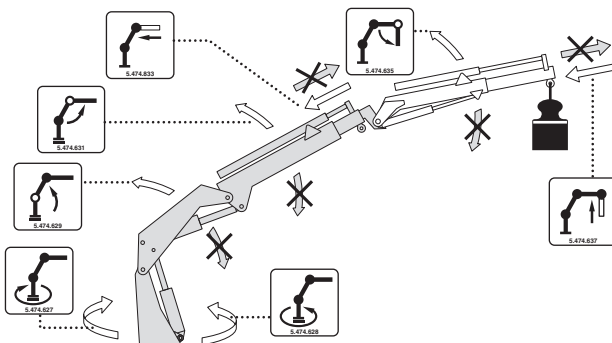
UN01-0215FC

6.11.6

VIII

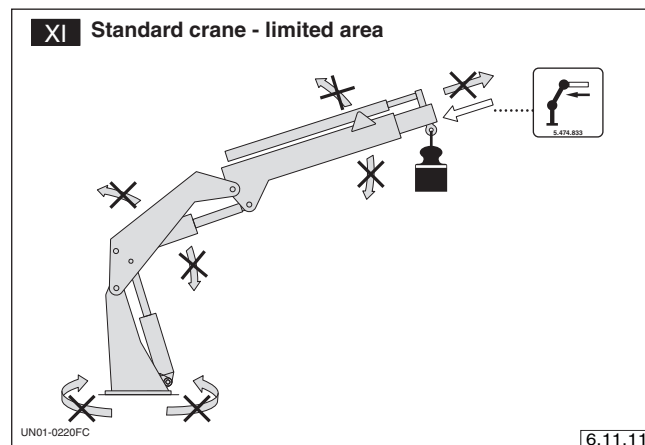
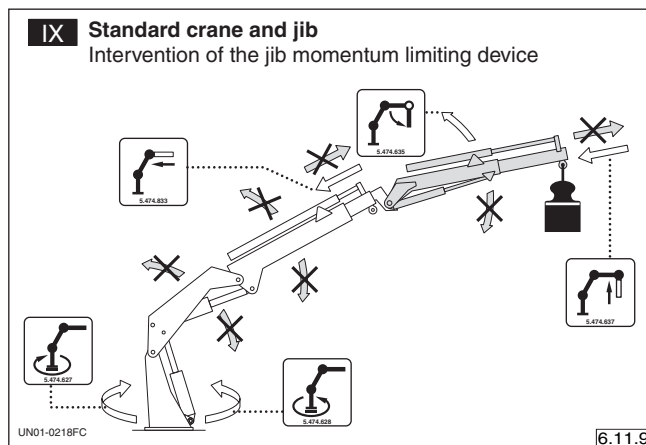
## Standard crane and jib

Intervention of the crane momentum limiting device

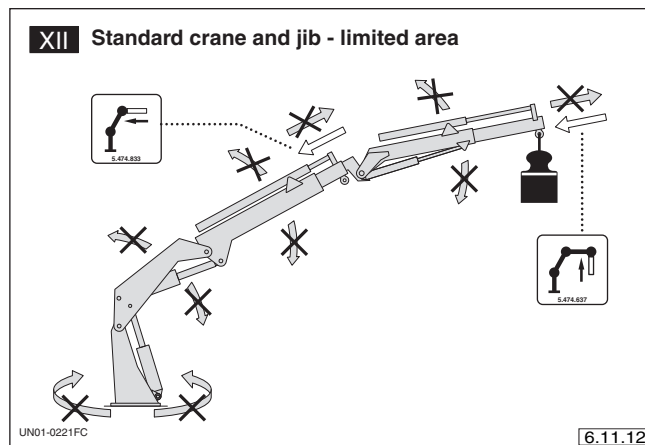
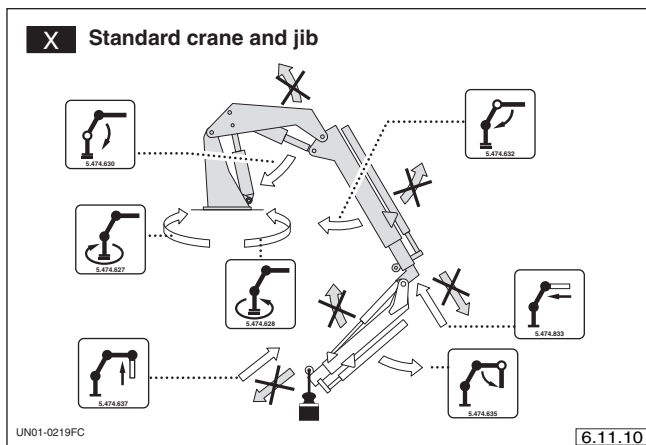


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6.11.8

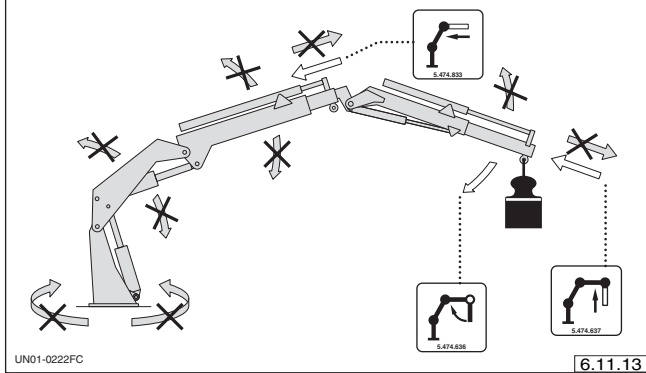


Only with a Power Tronic functional control unit



Only with a Power Tronic functional control unit

### **XIII** Standard crane and jib - limited area



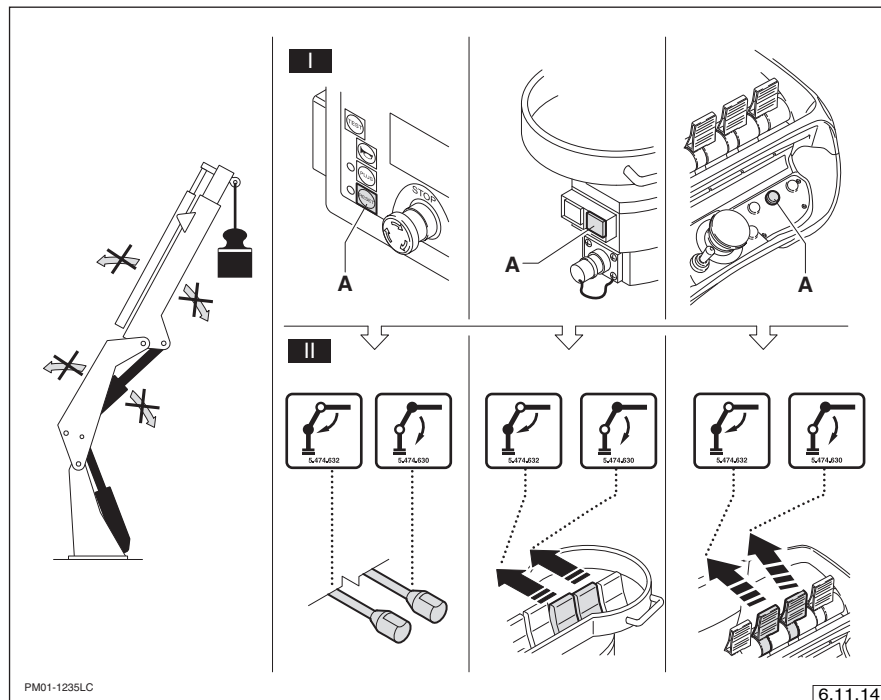
Only with a Power Tronic functional control unit

### 6.11.1- Resetting the functioning using the “3-30” system



## Information

*It is only possible to carry out the lowering of the load with the arms completely retracted.*



Use the system when the manoeuvres necessary to get out of the emergency situation are inhibited.

"3-30" means the system requires 3 seconds of manoeuvres and 30 seconds of machine stoppage (if the previous manoeuvres were not sufficient to get out of the lock condition).

Proceed as outlined below.

- Press reset button “A” (fig 6.11.14):  
when the open padlock icon appears  
on the display, use the controls for the  
locked jack to lower the load.

At the end of the activation time, if the lock condition has been removed, the crane will resume normal operation.

If the lock condition continues, all manoeuvres are inhibited for 30 seconds; a flashing signal light will show how long you have to wait, accompanied by the closed padlock icon on the display.

When the "Reset" button is used, the condition is stored as an event in the "Black Box" internal memory.

### 6.11.2- Winch lock

Lifting a load that exceeds the maximum allowed by the winch causes the current manoeuvre to lock. Lower the load to get out of the lock situation and return the equipment to the starting position. If the reverse manoeuvre is not enough to get out of the lock situation (e.g. because the crane also locked at the same time), activate the crane controls to move the load near the column. The winch lock condition is shown by a red signal light appearing on the functional control unit and on the handheld radio control unit.

### 6.11.3- Crane rotation lock

The rotation limiters (fig. 2.3.2) allow the crane to be safely operated as regards the stability of the equipment in the reduced load capacity work sectors (see the work sectors). When manoeuvring with the rotation control, if you reach a sector with a load capacity lower than the load lifted, the crane will lock and the reverse manoeuvre will be allowed to return to the original sector.

---

## 6.12- Failure situations

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### 6.12.1- Quick Reset / Restart

This feature allows you to reset any temporary alarms detected by the functional control unit and indicated by the appearance of error codes/icons on the display (see "Information and alarm messages").

#### - Quick Reset

Activate the "Quick Reset" function by pressing the "Reset" key on the functional control unit or on the transmitter unit.

If the error icon / code clears, normal crane operation can be resumed.



*For older models of the Power Tronic the "Quick Reset" function is obtained by pressing at the same time for a few seconds the keys "F1" + "Reset".*

#### - Restart

If the alarm signal continues, turn off and restart the system (i.e. by switching the power take-off off and on again or by cutting off the power via the truck battery cut-out switch).

### 6.12.2- Radio control transmission failure / error

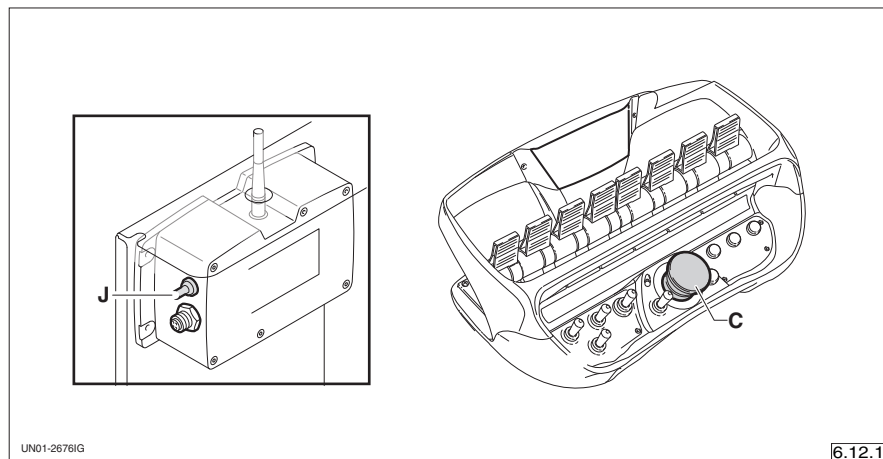
#### - Radio signal interference

Switch the transmitter unit off then on again.

If the problem persists, use the cable connecting the handheld transmitter unit and the receiver unit to cut off radio communications.

## - Radio control error

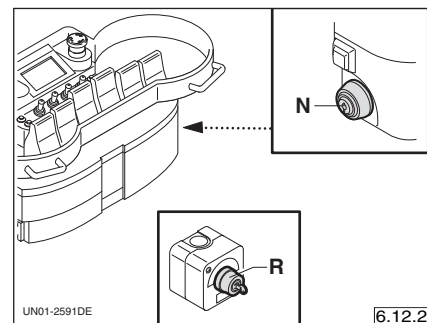
### Scanreco radio control



If the transmitter failure remains even after performing the operations concerning radio signal interference, proceed as follows.

- 1 - Set the selector "J" to "MANUAL".
- 2 - Turn off the transmitter unit with button "C".
- 3 - Use the emergency lever on the hydraulic distributor to perform the emergency manoeuvres.

### Hetronic radio control



If the transmitter failure remains even after performing the operations concerning radio signal interference, proceed as outlined below.

- 1 - Turn switch "R" to the "HAND" position.
- 2 - Turn switch "N" to position "0".
- 3 - Use the emergency lever on the hydraulic distributor to perform the emergency manoeuvres.

## 6.13 - Radio control/CAN-BUS network failure and electrical-electronic failure

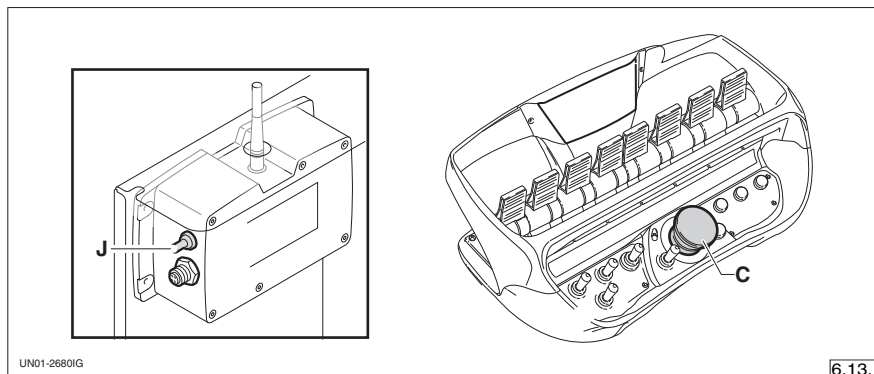
These types of failure are signalled by the appearance of one or more alarm icons and the relevant error codes (see the "Information and alarm messages" table) on the display of the transmitter unit and of the functional control unit.

### 6.13.1- Closing the crane in case of mains failure

In the event of a failure in the communication network between the functional control unit and the radio control, proceed as outlined below.

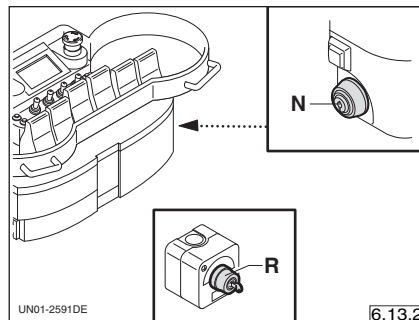
*Scanreco radio control*

- 1 - Set the selector "J" to "MANUAL".
- 2 - Turn off the transmitter unit with button "C".
- 3 - Use the emergency lever on the hydraulic distributor to perform the machine resting position manoeuvres.



*Hetronic radio control*

- 1 - Turn switch "R" to the "HAND" position.
- 2 - Turn switch "N" to position "0".
- 3 - Use the emergency lever on the hydraulic distributor to perform the machine resting position manoeuvres.





### 6.13.2- Closing the crane in case of electrical-electronic failure

In case of electrical-electronic failure, the crane must be manoeuvred from the control post on board the machine.



#### HAZARD !

***The exclusion of the function control unit makes it possible to tip the machine over, therefore operate with maximum care.***

***Only carry out the manoeuvres that move the load towards the column, in order to place the load on the ground.***



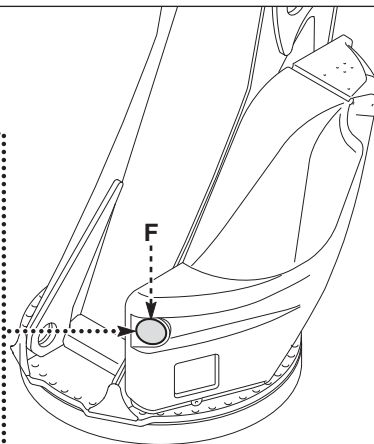
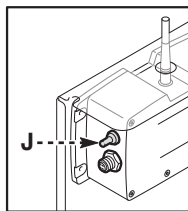
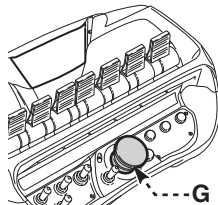
#### Information

*Distributor manoeuvres are only permitted in an emergency.*

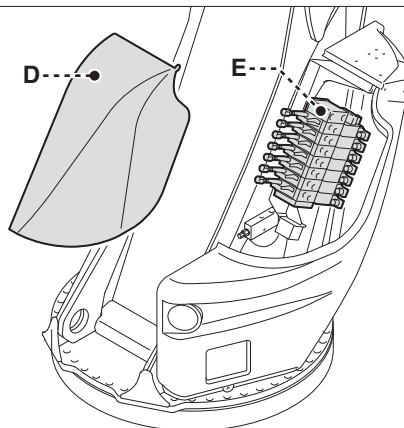
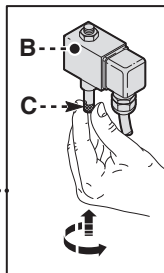
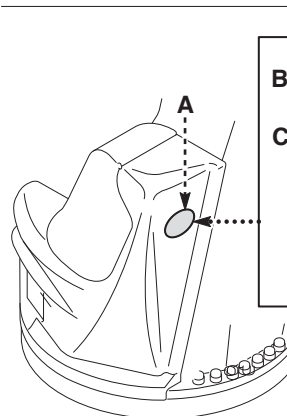
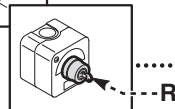
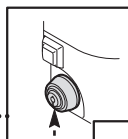
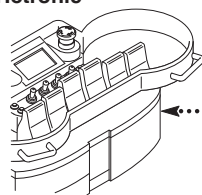
*Moving the crane from the distributor with the functioning radio control causes the crane to lock.*

*To restart the machine restart the vehicle engine and reengage the power takeoff.*

### Scanreco



### Hetronic



### Scanreco radio control

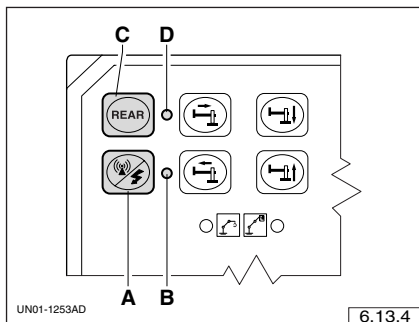
- 1 - Turn off the transmitter unit with button "G".
- 2 - Open cover "F".
- 3 - Set the selector "J" to "MANUAL".
- 4 - Remove the cover "A".
- 5 - Remove the seals from the shut-off device "B".
- 6 - Press and turn the pawl "C" fully.
- 7 - Open cover "D".
- 8 - Manoeuvre the crane from the distributor "E" in order to place the load on the ground and close the crane in the resting position.

### Hetronic radio control

- 1 - Turn switch "N" to the "0" position.
- 2 - Open cover "F".
- 3 - Ruotare il commutatore "R" in posizione "HAND/MANUAL".
- 4 - Remove the cover "A".
- 5 - Remove the seals from the shut-off device "B".
- 6 - Press and turn the pawl "C" fully.
- 7 - Open cover "D".
- 8 - Manoeuvre the crane from the distributor "E" in order to place the load on the ground and close the crane in the resting position.

## 6.13.3- Destabilisation

### I - Network failure situation

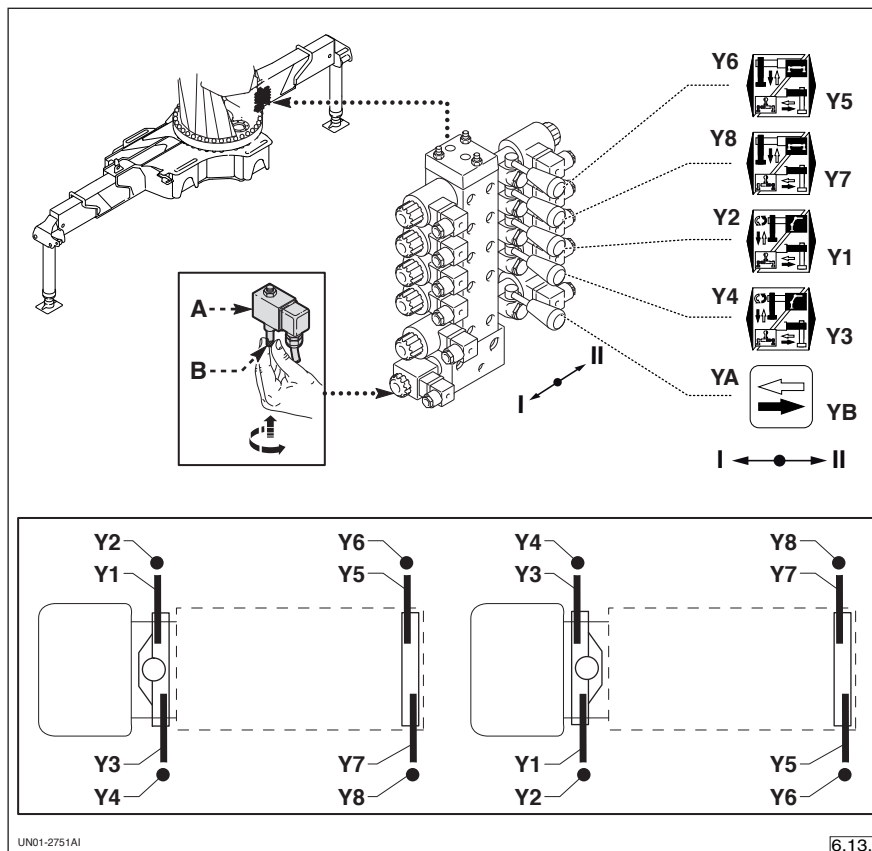


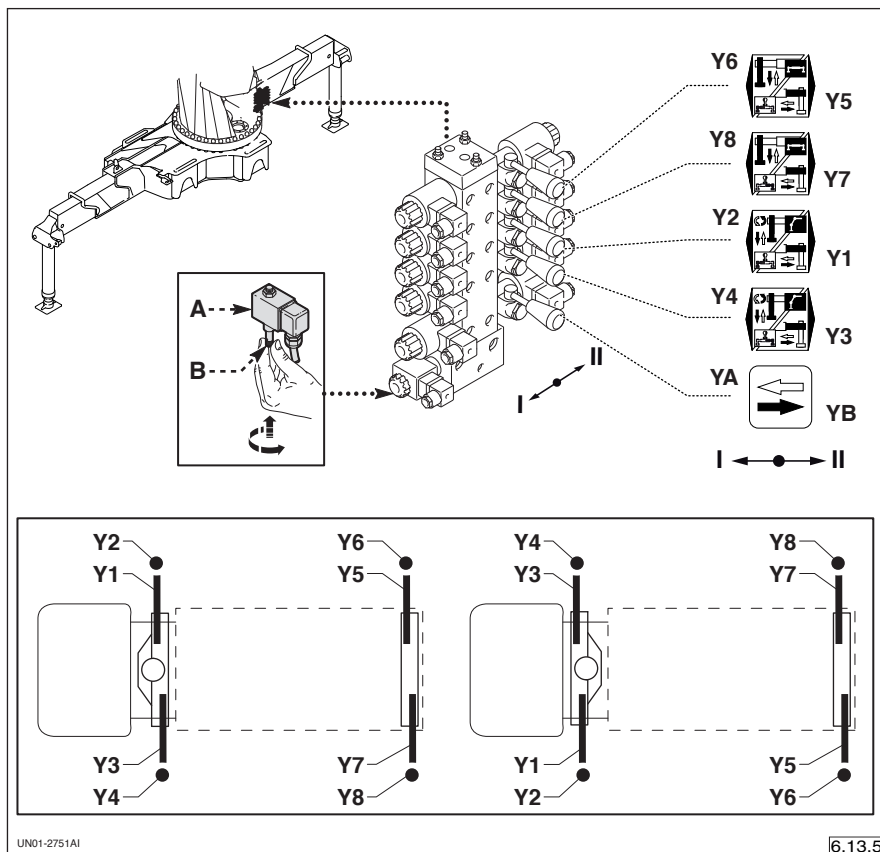
In the event of a failure involving the communication network between the control unit and the stabilisation controls, destabilise the machine as outlined below:

- 1 - push button "A" and keep it pushed throughout the operations (signal light "B" = ON).
- 2 - Use the "MCS" keyboard controls to retract first the outrigger jacks and then the crane outriggers.
- 3 - Push button "C" (signal light "D" = ON).
- 4 - Use the controls to retract first the outrigger jacks and then the outriggers on the supplementary cross-beam.

### II° - Electrical-electronic failure condition

In case of electrical-electronic failure, use the control distributor on board the machine.





specific control unit to perform the outrigger closure manoeuvres.

Proceed as outlined below.

- 1 - Remove the seals from the shut-off device "A".
- 2 - Press and turn pawl "B" fully.
- 3 - Using the distributor, perform outrigger closure manoeuvres:

**YA:** activation of the jack and/or arm retraction control

**YB:** activation of the jack and/or arm extension control

**Y1:** crane outrigger arm

**Y2:** crane outrigger jack

**Y3:** crane outrigger arm

**Y4:** crane outrigger jack

**Y5:** supplementary crossbeam outrigger arm

**Y6:** supplementary crossbeam outrigger jack

**Y7:** supplementary crossbeam outrigger arm

**Y8:** supplementary crossbeam outrigger jack

How the controls are associated with the stabilisation jacks depends on the installation type:

- crane outriggers arms - facing cabin;
- crane outriggers arms - facing body.

When a failure occurs in the communication network between the control unit and the outrigger control distributor (the situation cannot be solved with the Quick Reset / Restart procedure or from the "MCS" panel), it becomes necessary to shut off the



**WARNING !**

***Retract first the outrigger jacks and then the outrigger arms.***

***Do not operate several jacks at once.***



**HAZARD !**

***Crane use with device shut off is prohibited.***

***The seal on the shut off device must be replaced by the authorised service centre.***

## **6.14- Sensor exclusion during malfunction**

If a malfunction occurs in one or more sensors, (with the exception of the pressure sensors), it is possible to exclude them and operate temporarily to complete the operation in progress and re-close the crane.

The exclusion of the sensors causes an automatic reduction of the lifting capacity by 10%.

Proceed as outlined below.

- 1) Press and keep pressed the "Reset" button on the transmitter unit of the remote control or on the control panel of the function control unit.  
The intermittent buzzer informs the operator that the reset function is active.
- 2) Move the crane.  
If a lock condition occurs, re-press the "Reset" button.  
It is possible to use the reset function three times, then only movements that bring the load closer to the column are permitted.  
If a block is caused, it is necessary to carry out the procedures described in para "Lock situations and manoeuvres permitted" to activate the crane.

## 6.15 - Use of the manual extension load limiter



### WARNING !

**Before moving the load with the extensions, check that the transmitter pin is working and that it is mounted onto the extension that you wish to use.**

**Always select the number relating to the extension in use.**

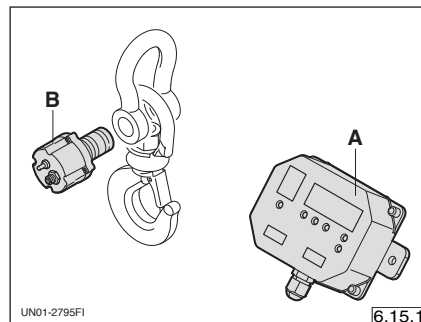
**During movement of the load, do not for any reason change the number of the extension in use. It is prohibited to lift loads larger than those indicated on the capacity diagrams (whatever the geometric configuration of the crane is).**

### - General description

The limiting device informs the operator of the weight lifted by the extension in use.

On reaching the preset value (depending on the extension in use), all the load lifting manoeuvres stop immediately and so the overloading of the extension is avoided.

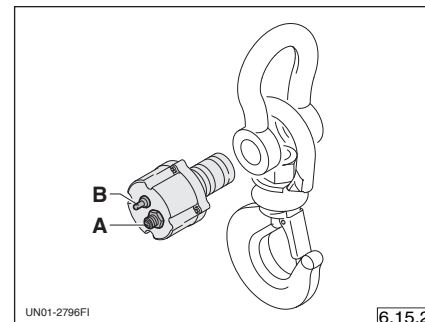
### - Main parts



**A - Receiver unit**

**B - Transmitter pin**

### - Controls and indicators

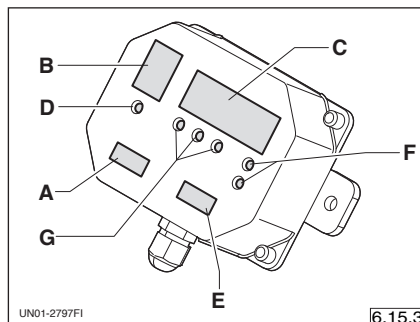


**A - Battery charger connector.**

**B - Switch to switch the transmitter unit on/off.**

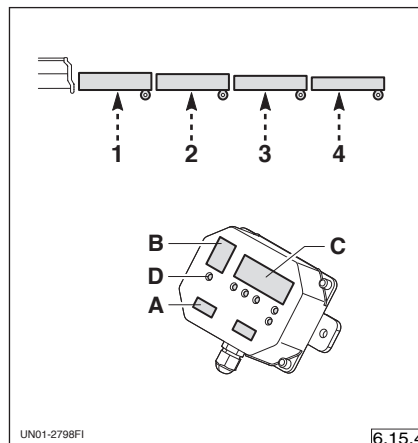
### - Technical data

|                             |                   |
|-----------------------------|-------------------|
| Power voltage               | from 9 to 24 V dc |
| Absorption                  | 250 mA max.       |
| Protection                  | IP 65             |
| Emission frequency          | FM 2,4 Ghz (ISM)  |
| Battery                     | Ni-Mh 3,6V 2,4 Ah |
| Indicative battery duration | 120 hours         |



- A** - Selection key for the extension in use.
- B** - Display for the extension selected.
- C** - Display for the weight lifted by the extension in use.
- D** - Light signal: when it is lit it means the load preset for the extension in use has been exceeded.
- E** - Measurement unit selection button.
- F** - Signal lights: they signal which measurement unit is shown on the display (kg or lbs).
- G** - Signal lights: they show the charge of the battery of the transmitter unit (green, yellow and red).  
When the battery is completely flat the message "-." and "- - - ." appears on the displays "B" and "C".

## - Functioning



Proceed as outlined below.

- 1 - Using button "A", select the manual extension that you wish to use, in accordance with the diagram in fig. 6.15.4. The number of the extension appears on the display "B".
- 2 - Fit the transmitter/pin on the selected extension and switch it on.
- 3 - Lift the load.

When the maximum load liftable by the extension in use is reached, the signal light lamp "D" will light up. The corresponding icon will appear on the radio control and/or transmitter unit display and on the control unit.

All the lifting manoeuvres by the crane are blocked and only lowering movements to place the load on the ground are permitted.

With the load on the ground, the alarm stops and it is possible to start work again.



### WARNING !

*If all the commands are inhibited press button "A" until a flashing dash appears on the display "B", indicating that the load limiter has been deactivated.*

*The operator has to manoeuvre with maximum care and place the load on the ground in order to avoid any accidents.*

## - Displaying the maximum preset values (fig. 6.15.4)

When an extension is selected using the button "A", the corresponding preset load is shown on the display "C".



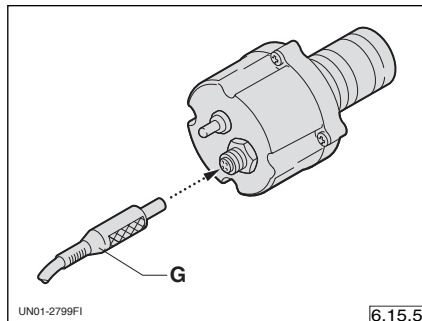
#### WARNING !

**The values for the maximum loads of the manual extensions were originally preset by PM Group or at an authorised service centre.**

**Any re-calibrations may only be carried out at an authorised service centre.**

**The maximum preset values are slightly higher than those indicated in the load diagrams, due to the tolerance of the device.**

#### - Charging the battery



Connect the cable “G” of the battery charger to the transmitter unit and to the 12 - 24 V dc socket of the vehicle (charging time: about 4 hours).

6.74

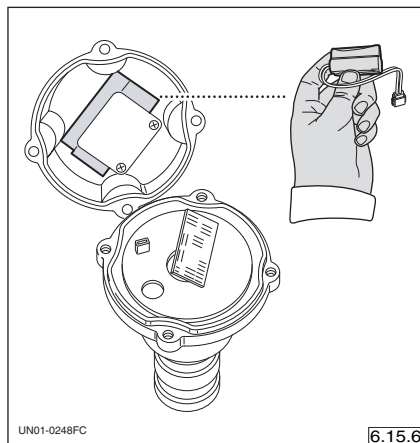


#### Information

Switch off the transmitter when not in use.

After a long period out of use it is recommended to charge the transmitter before use.

#### - Replacing the battery



Proceed as outlined below.

- 1 - Unscrew the four screws and open the case.
- 2 - Turn the casing upside down and unscrew the four fixing screws of the circuit board.

- 3 - Remove the connector that connects the board and replace the battery pack.



#### Information

Do not use lithium batteries, as they are not suitable.

Only use batteries of the type specified by the manufacturer, the same as those already fitted in the transmitter.



# 7 Maintenance

## 7.1 - Regular checks

All the maintenance operations that are not provided for in this chapter must be carried out at an authorised PM service centre.



**CAUTION !**

***Before carrying out any maintenance operation check that the oil has completely cooled down.***

| Regular checks                           |                 |                |                 |                            |                           |       |
|------------------------------------------|-----------------|----------------|-----------------|----------------------------|---------------------------|-------|
| Checks to be carried out by the operator |                 |                |                 |                            |                           |       |
| Component                                | Operation       | Every 10 hours | Every 100 hours | Every 500 hours (6 months) | Every 1000 hours (1 year) | Para. |
| Pipes and hoses                          | Check           | •              |                 |                            |                           | 7.2   |
| Hosing guard                             | Check integrity | •              |                 |                            |                           | 7.3   |
| Connections                              | Check for leaks | •              |                 |                            |                           | 7.4   |
| Plates                                   | Check integrity | •              |                 |                            |                           | 2.4   |
| Hook                                     | Check           | •              |                 |                            |                           | 3.1   |
| Hydraulic oil                            | Check           | •              |                 |                            |                           | 7.6   |
| Control and limiting devices             | Check           | •              |                 |                            |                           | 2.3   |
| Structure                                | Inspection      | •              |                 |                            |                           | 7.7   |
| Winch cable                              | Check           | •              |                 |                            |                           | 7.9   |
|                                          | Lubrication     |                | •               |                            |                           | 7.10  |
| Pulleys                                  | Check integrity | •              |                 |                            |                           | 7.8   |
|                                          | Running check   | •              |                 |                            |                           | 7.8   |
|                                          | Lubrication     |                | •               |                            |                           | 7.21  |
| Crane stay rod                           | Check           |                | •               |                            |                           | 7.11  |
| Supplementary crossmembers               | Check           |                |                 |                            |                           | 7.13  |
| Crane                                    | Cleaning        |                | •               |                            |                           | 7.16  |
| Pins                                     | Lubrication     |                | •               |                            |                           | 7.21  |
| Arms                                     | Lubrication     |                | •               |                            |                           | 7.15  |
| Sliding blocks                           | Lubrication     |                | •               |                            |                           | 7.21  |
| Control levers                           | Lubrication     |                | •               |                            |                           | 7.21  |
| Jack sliding blocks                      | Check           |                | •               |                            |                           | 7.14  |
| Fifth wheel                              | Lubrication     |                | •               |                            |                           | 7.21  |
| Reduction gears oil                      | Check           |                | •               |                            |                           | 7.5   |

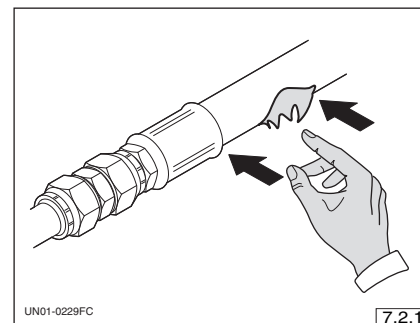
| Regular checks<br>Checks to be carried out by the operator |             |                |                 |                            |                           |       |
|------------------------------------------------------------|-------------|----------------|-----------------|----------------------------|---------------------------|-------|
| Component                                                  | Operation   | Every 10 hours | Every 100 hours | Every 500 hours (6 months) | Every 1000 hours (1 year) | Para. |
| Filters                                                    | Check       | •              |                 |                            |                           | 7.14  |
|                                                            | Replacement |                |                 | •                          |                           | 7.14  |
| Radio control batteries                                    | Replacement |                |                 |                            | •                         | 6.2   |
| Manual extension limiter batteries                         | Replacement |                |                 |                            | •                         | 6.15  |

| Regular checks<br>Checks that must be carried out at an authorised service centre |                             |                 |                            |                           |                            |                            |
|-----------------------------------------------------------------------------------|-----------------------------|-----------------|----------------------------|---------------------------|----------------------------|----------------------------|
| Component                                                                         | Operation                   | Every 200 hours | Every 500 hours (6 months) | Every 1000 hours (1 year) | Every 2000 hours (2 years) | Every 4000 hours (4 years) |
| Hydraulic oil                                                                     | Check, replacement          |                 |                            | •                         |                            |                            |
|                                                                                   | Check contamination         |                 | •                          |                           |                            |                            |
| Control and limiting devices                                                      | Check                       |                 |                            | •                         |                            |                            |
| Supplementary crossmembers                                                        | Nut and bolt tightness test |                 | •                          |                           |                            |                            |
| Structure                                                                         | Inspection                  |                 | •                          |                           |                            |                            |
| Sliding blocks                                                                    | Replacement                 |                 |                            |                           |                            | •                          |
| Valves                                                                            | Calibration                 |                 | •                          |                           |                            |                            |
| Manual extensions                                                                 | Adjustment                  |                 | •                          |                           |                            |                            |
| Base oil                                                                          | Check                       |                 | •                          |                           |                            |                            |
| Winch                                                                             | Lubrication check           | •               |                            |                           |                            |                            |
|                                                                                   | Lubrication replacement (*) |                 | •                          |                           |                            |                            |
|                                                                                   | Check brake                 |                 |                            | •                         |                            |                            |
| Hydraulic system                                                                  | Washing                     |                 |                            |                           |                            | •                          |
| Reduction gears oil                                                               | Replacement                 |                 |                            |                           | •                          |                            |

(\*) For oil bath lubricated winches

## 7.2

### 7.2 - Checking the condition of the hoses

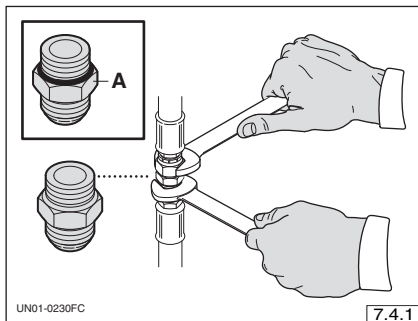


Check the fastening of the pipe connection and the condition of the hose. If the pipe shows any signs of ageing, breakage, bulging, abrasion, etc., it must be replaced.

### 7.3 - Checking the hosing guards

These guards protect the operator from oil spurts in the event of a breakage in the hosing. If they are worn or broken, they must be replaced.

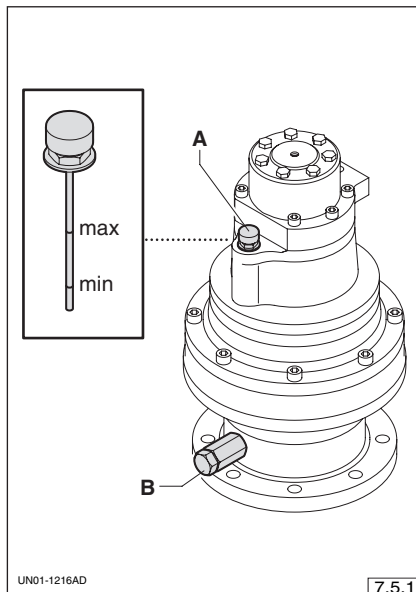
## 7.4 - Checking for oil leaks from the hydraulic system



Oil leaks from the connections can normally be eliminated by tightening the connections correctly.

Oil leaks from connection "A", which is supplied with an airtight washer, can only be eliminated by replacing the connection.

## 7.5 - Checking the oil level in the rotation reduction gears



**A** - Air vent stopper

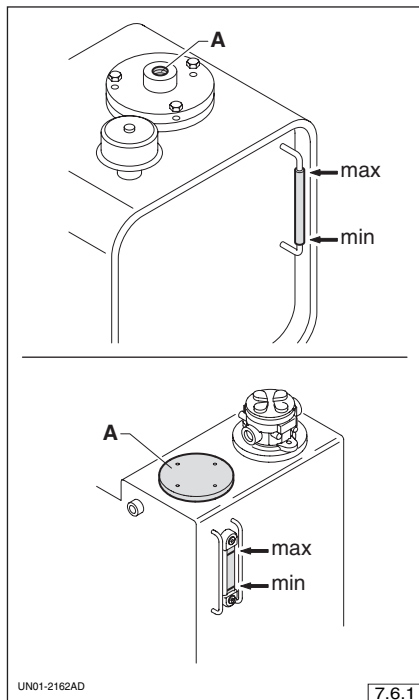
**B** - Exhaust stopper

To check the level, clean and insert the dipstick.

Top up until the level is between the minimum and maximum marks on the dipstick.

For the oil characteristics see para "Oils and lubricants".

## 7.6 - Checking the hydraulic oil level



Check the oil level daily, which must be between the minimum and maximum marks.

If necessary, top up from mouth "A".

For the oil characteristics see para "Oils and lubricants".



### Information

*Carry out the check with the crane in the resting position, with all the jacks retracted and the vehicle on a flat surface.*

## 7.7 - Structure inspection

Wash the crane carefully before carrying out the checks.

Visually inspect the integrity of the structure in general and in particular the welding.

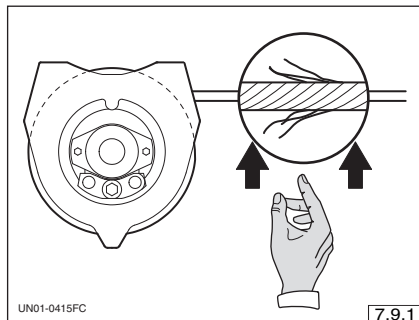
If any weakening or small cracks are noticed, immediately contact an authorised PM service centre.

As stated in the regular check schedule (para. "Regular checks") have the structure checks carried out at an authorised PM service centre.

## 7.8 - Pulley check

- Check that the pulley races and flaps are in good condition; if they are worn or broken, they must be replaced.
- Check that they run smoothly when rotating and if they do not, contact an authorised PM workshop.

## 7.9 - Cable check



According to the law, the cables must be checked every three months by expert personnel unless otherwise specified by the manufacturer. The results of these checks must be recorded in the special check register in the appendix of this manual. The cable must be carefully examined for any wear which could alter its technical features. The cable must be replaced when:

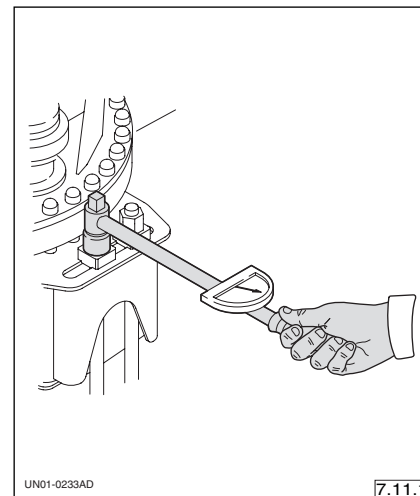
- the quantity of the broken wires (in a section whose length is equal to four times the screw pitch of the elementary wire in the strand) is over 10% of the total wires making up the cable;
- the wire wear is extremely visible (10% reduction in the diameter of the elementary wire);
- the cable is permanently warped with

- slackening of the trefoils;
- the cable has considerable dents or permanent twisting, has been crushed, its core is coming out or has any other significant signs of wear;
- the sealing on the cable ends is damaged.

## 7.10- Cable lubrication

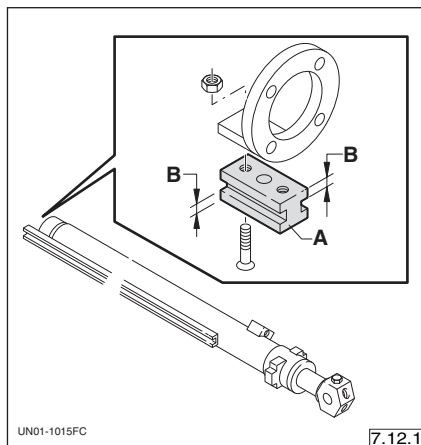
The lubrication must be carried out with particular care to protect the cable from corrosive external elements and to reduce the friction with the pulleys. For lubricant specifications, see para. "Oils and lubricants".

## 7.11 - Checking the anchorage stay rods



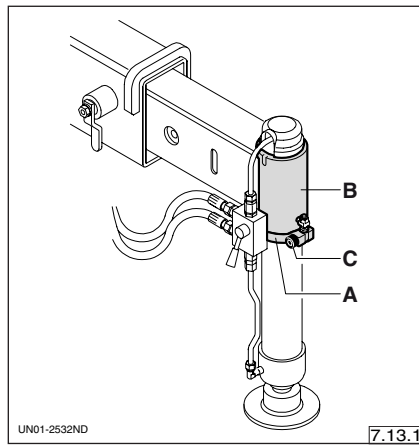
Check that the anchorage stay rods are tightened; if not, tighten the nuts to the tightening torque of 70 daNm (1180 lbf - ft).

## 7.12 - Checking the jack sliding blocks



Check the wear of sliding blocks "A".  
At an authorised service centre, have the sliding blocks replaced when the wings "B" are less than 4 mm (0.157").

## 7.13 - Checking the supplementary crossmember



Check visually that the outrigger jacks have not moved upwards and that, with the jacks at rest, there is no play between locking collar "A" and sleeve "B". If this is not the case, contact an authorised service centre.  
Periodically check fastening screws "C" on the outrigger jacks.  
If loose, tighten the screws with a torque of 20 daNm (147 lbf - ft).

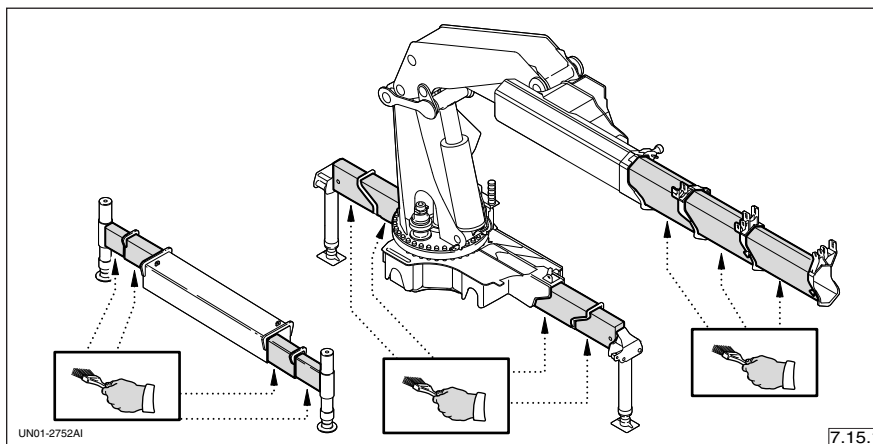
## 7.14- Filters



### Information

Carry out the clogging check and replace filter cartridges at the intervals specified in the maintenance schedule and in general after any maintenance on the hydraulic system (see “Filter replacement”).

## 7.15- Lubrication of the crane arms and stabilisers



For the lubricant characteristics see para. “Oils and lubricants”.

After having carried out the lubrication, carry out some arm extension manoeuvres without a load, in order to distribute the lubricant.

### - Lubricating the crane arms

Extend the outrigger arms fully and grease all the upper, lower and side surfaces.

### - Lubricating the outrigger arms

Extend the outrigger arms fully and grease all the side surfaces.

---

## 7.16- Cleaning the machine

---

Clean the jack shafts to avoid dirt building up.

Clean the machine with a jet of pressurised water, using detergents that are authorised by the standards in force.

Do not orient a jet of pressurised water to electrical equipment to avoid damaging it.

---

## 7.17- Long periods of machine inactivity

---

If the crane has to remain inactive for a long period of time, it is necessary to:

- 1) wash it and fold it back into the resting position with all the jacks closed.  
If this is not possible, clean and lubricate the part of the jackshafts that remains exposed to the atmospheric agents.
- 2) Park the machine in a sheltered area, which can only be accessed by authorised personnel;
- 3) check and replace the damaged and worn components;
- 4) check and remove any fluid leaks;
- 5) check and top up all the fluid levels if necessary.

---

## 7.18- Starting the machine up again

---

Before starting the machine up again after a long period of inactivity, carry out the following checks and operations:

- 1) wash the machine completely;
- 2) grease all the components that are subject to lubrication;
- 3) check and top up all the fluid levels if necessary;
- 4) check and remove any fluid leaks;
- 5) check the integrity of the pipes and hoses;
- 6) check and replace any damaged components;
- 7) check the correct functioning of the controls and visual indicators;
- 8) check the correct functioning of all the safety devices;
- 9) carry out the maintenance operations in accordance with the planned maintenance schedule (see para. "Regular checks").

---

## 7.19- Scrapping and disposal

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The demolition of the machine must be carried out by specifically qualified personnel with the necessary hydraulic and mechanical skills.

The components removed must be sorted according to the type of materials they contain and in compliance with the laws in force concerning waste collection, sorting and disposal.

With reference to European directives 2002/95 EC, 2002/96 EC, and 2003/108 EC (Waste from Electrical and Electronic Equipment), the electric and electronic parts, marked with the relative symbol, must be disposed of via a specific collection centre or returned to the dealer, still fitted, when purchasing a new machine.

Waste from electrical and electronic equipment can contain substances which may be environmentally hazardous and pose health risks, therefore you are advised to dispose of it correctly.

Illegal disposal of electric and electronic components is punishable by law with sanctions applicable according to the law in force where the parts are dumped.



## 7.20 - Oils and lubricants

Never mix oils of different types together, in order to avoid machine malfunctions.

For top ups, only use preventively filtered oils (maximum filtration grade, class 9, in accordance with Nas 1638-18/14 ISO 4406).



### Information

*Do not dispose of the oil in the environment, as it causes pollution.*

### Oil working temperature -30 ÷ +140 °C (-22 °F ÷ 284 °F)

| Lubricant     | AGIP <sup>(1)</sup> | MOBIL      | SHELL         | TOTAL        | ESSO      |
|---------------|---------------------|------------|---------------|--------------|-----------|
| Hydraulic oil | OSO 32              | DTE OIL 24 | TELLUS OIL 32 | AZOLLA ZS 32 | NUTO H 32 |
| Grease        | GREASE PV 2         | -          | RETINAX HD 2  | -            | -         |

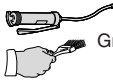
(1) Lubricant used by the manufacturer the first time the system is filled.

### Intensive use (saline environment)

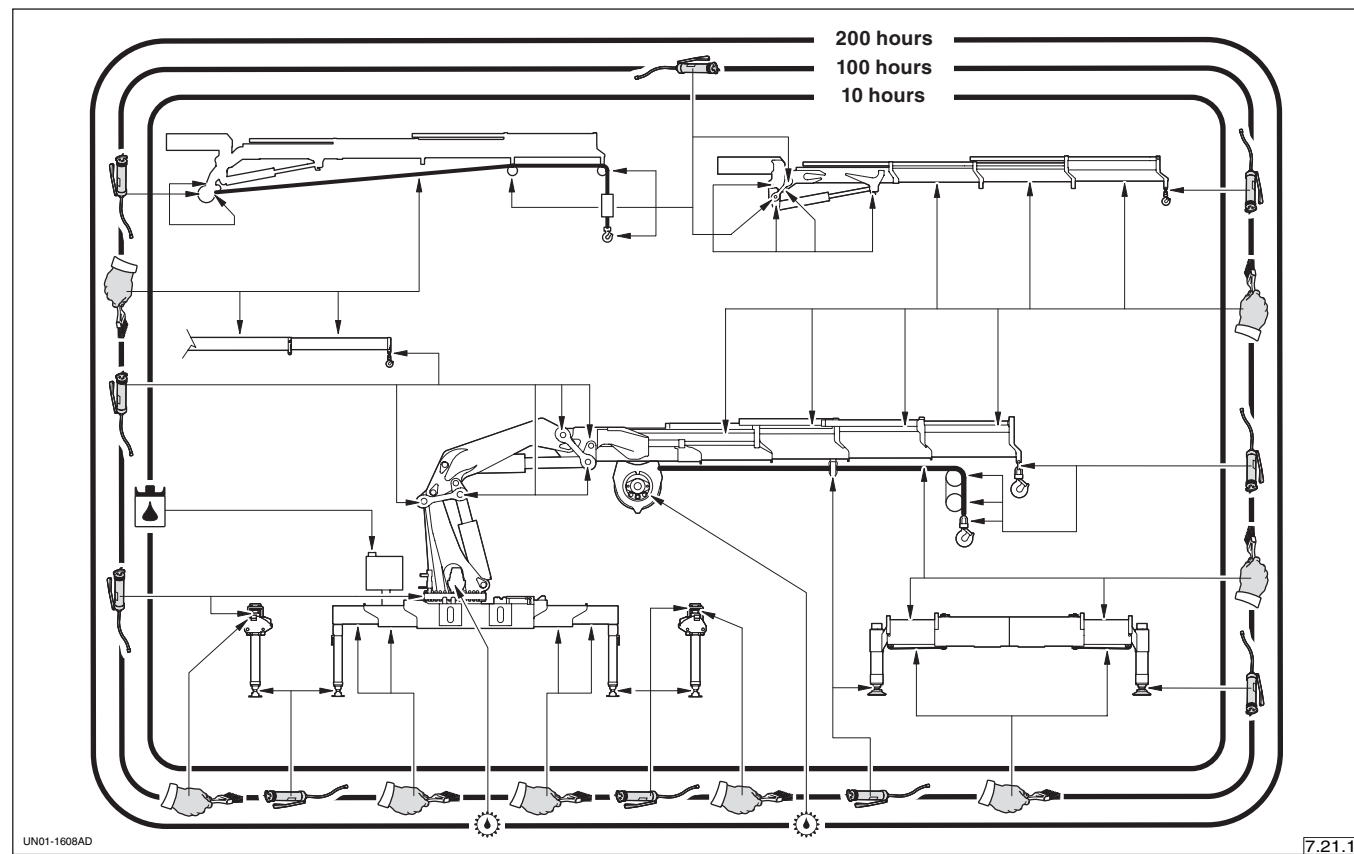
### oil working temperatures -30 ÷ +140 °C (-22 °F ÷ 284 °F)

| Lubricant     | AGIP                 | MOBIL      | SHELL         | TOTAL        | ESSO      |
|---------------|----------------------|------------|---------------|--------------|-----------|
| Hydraulic oil | OSO 32               | DTE OIL 22 | TELLUS OIL 22 | AZOLLA ZS 22 | NUTO H 22 |
| Grease        | RACOL SHAPPIRE AQUA2 | -          | -             | -            | -         |

### 7.20.1- Lubricant comparison table

| Lubricant                                                                                |                        | Oil working temperatures |           |           |
|------------------------------------------------------------------------------------------|------------------------|--------------------------|-----------|-----------|
|                                                                                          |                        | -30 ÷ +140 °C            |           |           |
| Hydraulic oil                                                                            | ISO 3348               | ISO VG 32                | ISO VG 46 | ISO VG 22 |
|  Grease | NLGI 2 calcium/lithium |                          |           |           |

## 7.21 - Greasing and lubrication diagrams



Symbols =

7.10



Hydraulic oil



Grease



Grease

| Fault                           | Cause possible                                                    | Remedy                                                                       |
|---------------------------------|-------------------------------------------------------------------|------------------------------------------------------------------------------|
| The crane is completely stopped | Emergency buttons pressed                                         | Release the emergency stop buttons                                           |
|                                 | The moment control device has come into operation                 | See "Block situation and manoeuvres allowed"                                 |
|                                 | The P.T.O is not engaged correctly                                | Engage the P.T.O                                                             |
|                                 | P.T.O. engagement malfunctioning                                  | Repair the P.T.O. engagement                                                 |
|                                 | Electrical system malfunctioning                                  | Check signals on push-button panel or electronic control unit displays       |
|                                 | Low temperature of hydraulic oil                                  | Let the oil flow through the system until the working temperature is reached |
|                                 | There may be a lever switch for a dump body located on the latter | Position the switch on crane                                                 |
|                                 | Radio control malfunctioning                                      | Check radio control devices                                                  |

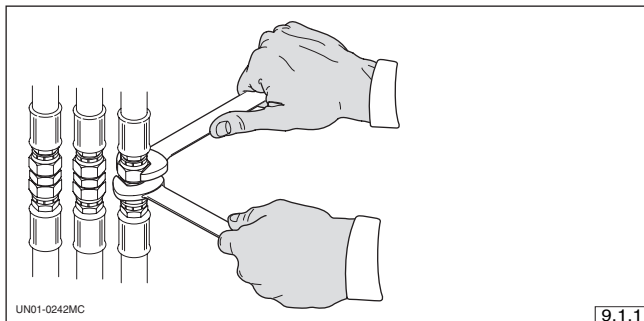
| Fault                                                           | Cause possible                                                                                                                       | Remedy                                                                                                                                                                                                                                                                               |
|-----------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| The crane boom cannot hold the load and creep down considerably | <p>The pilot operated check valve fitted on the lift cylinder in question leaks</p> <p>Oil leakage inside the cylinder concerned</p> | <p>Have the valve checked and/or replaced by an authorized repair workshop</p> <p>Have the seals inside the cylinder replaced by an authorised repair workshop</p>                                                                                                                   |
| Permanent vibrations while operating on all the movements       | <p>Insufficient hydraulic oil</p> <p>Clogging of hydraulic oil filter</p> <p>Suction hose obstructed</p> <p>Inefficient pump</p>     | <p>Add hydraulic oil to the tank (see para. "Checking the hydraulic oil level")</p> <p>Replace the filter cartridge (see para. "Filters replacement")</p> <p>Locate the cause of the obstruction and remove it</p> <p>Check the pump flow; if it is not regular replace the pump</p> |
| Considerable reduction in the speed of the movements            | <p>Low speed of the engine</p> <p>Radio and/or distributor system malfunctioning</p> <p>Inefficient pump</p>                         | <p>Check the exact speed of the vehicle's engine on the basis of the hydraulic boom extension time</p> <p>Check signals on push-button panel or electronic control unit displays</p> <p>Check the pump flow; if it has decreased, replace the pump</p>                               |

| Fault                                              | Cause possible                                                                                                                         | Remedy                                                                                                                                                     |
|----------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|
| It is hard to engage the P.T.O.                    | <p>If pneumatic: the air into the appropriate vehicle system is insufficient</p> <p>If mechanical: the control cable is obstructed</p> | <p>Check the pressure of the air in the vehicle's pneumatic system; stop any leaks</p> <p>Free the control cable</p>                                       |
| Vibrations in the arm unit during load translation | <p>Sliding pads insufficiently lubricated</p> <p>Sliding pads too worn</p> <p>Insufficient hydraulic oil</p>                           | <p>Lubricate the sliding pads according to the relative instructions</p> <p>Consult an authorised workshop</p> <p>Check the level of the hydraulic oil</p> |
| Lack of tension on the whole crane                 | <p>Interrupted fuses</p> <p>P.T.O. relay malfunctioning</p>                                                                            | <p>Replace the fuses</p> <p>Replace the relay</p>                                                                                                          |
| Electronic control unit off and crane not working  | Control unit malfunctioning                                                                                                            | Consult an authorised workshop                                                                                                                             |

| Fault                            | Cause possible                                   | Remedy                                                               |
|----------------------------------|--------------------------------------------------|----------------------------------------------------------------------|
| Radio control off or not working | Interrupted radio fuse                           | Replace the fuse (see para."Fuse replacement")                       |
|                                  | Radio unit malfunctioning                        | Consult an authorised workshop                                       |
|                                  | Push-button panel battery exhausted              | Recharge the battery                                                 |
|                                  | Interferenced radio transmission                 | Connect via cable the push-button panel to the receiver on the crane |
|                                  | Receiver antenna malfunctioning                  | Consult an authorised workshop                                       |
|                                  | Emergency stop push-button pressed               | Release the emergency stop push-button                               |
| Heat exchanger not working       | Exchanger activation device malfunctioning       | Have the device replaced by an authorized repair workshop            |
|                                  | Exchanger electrical connections cut-off         | Check all electrical contacts                                        |
|                                  | Fan motor not working                            | Have the device replaced by an authorized repair workshop            |
|                                  | Satellite electronic control unit malfunctioning | Have the device replaced by an authorized repair workshop            |

## 9 Spare part replacement

### 9.1 - Hose replacement



***The hosing must be replaced with the hydraulic system depressurised and when the oil has completely cooled down.***

To depressurise the system, disconnect the power take off, stop the truck engine and move the control levers back and forwards. Unscrew the joints and collect oil into a suitable tank.

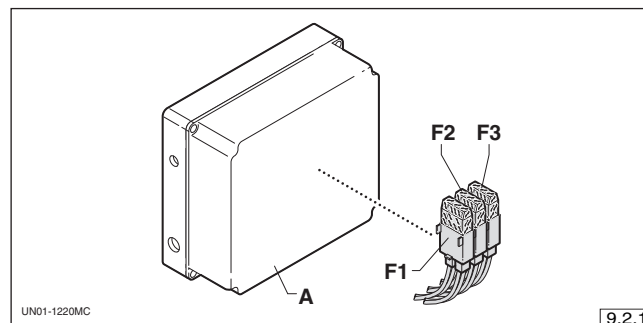
Replace the hose and tighten the joints.

### 9.2 - Fuse replacement

Before replacing the interrupted fuse, remove the cause of its blowing up.

Replace the blown fuse with a new one having the same characteristics.

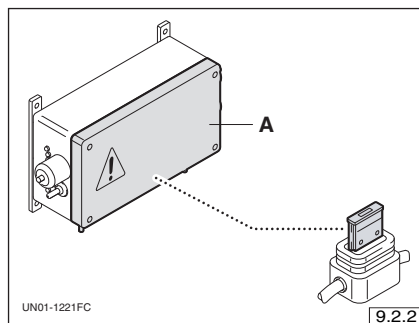
#### 9.2.1 - Connector block fuse replacement



Remove the cap "A" and replace the interrupted fuse.

| Pos. | Protected circuit                              | Ampère |
|------|------------------------------------------------|--------|
| F1   | Main circuit (electronic control units, radio) | 15     |
| F2   | Secondary circuit (operating control unit)     | 5      |
| F3   | Heat exchanger circuit                         | 20     |

### 9.2.2 - Radio receiver fuse replacement



Remove the cap "A" and replace the interrupted fuse with a 10 A new one.

## 9.3 - Filters replacement

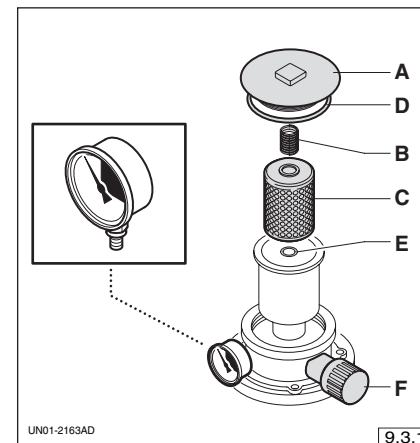
### 9.3.1 - Replacing the exhaust filter

When the filter cartridge is replaced, the exhaust plug "F", equipped with a 3 micron filtering grade air filter, must also be replaced.

Replace the filtering cartridge, when the pressure gauge needle is in the read section (filter clogged) as it is built of non-washable material.

In any case, carry out the replacement by the expiry date provided for in the planned maintenance schedule (see para. "Regular checks").

#### - Standard tank filter

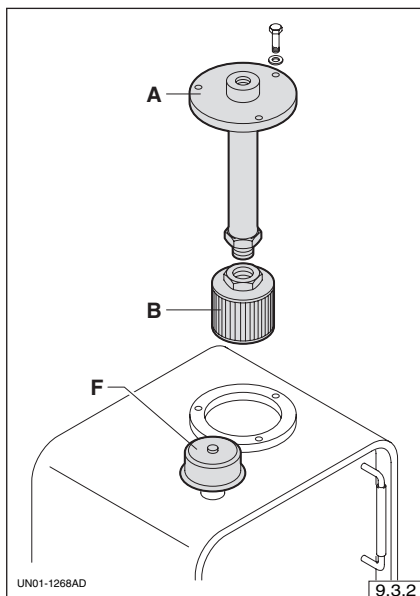


- 1 - Carefully clean the external surfaces of the filter;
- 2 - unscrew the screws on the lid "A";
- 3 - remove the spring "B" and the filtering cartridge "C";
- 4 - check the condition of the washers "D" and "E"; if they are damaged replace them.

To reassemble the filter, carry out the disassembly operations in reverse.

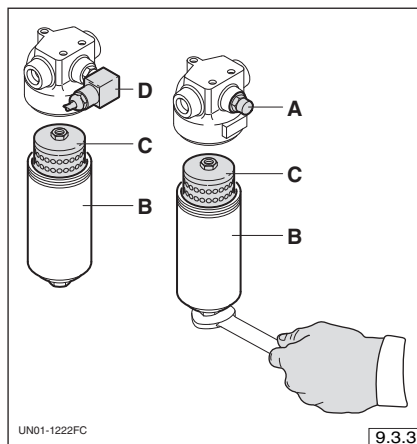


## - Separate tank filter



- 1 - Remove the cover "A" and take out filter unit;
- 2 - unscrew the cartridge "B".
- 3 - Replace the filter cartridge with a new;
- 4 - reassemble the cover.

## 9.3.2 - Delivery filter replacement



For machines fitted with a delivery filter, replace the filter cartridge when the clogging signal light "A" turns red or when the "filtered clogged" alarm message is displayed (for filters fitted with sensor "D").

In any case, carry out the replacement by the expiry date provided for in the planned maintenance schedule (see para. "Regular checks").

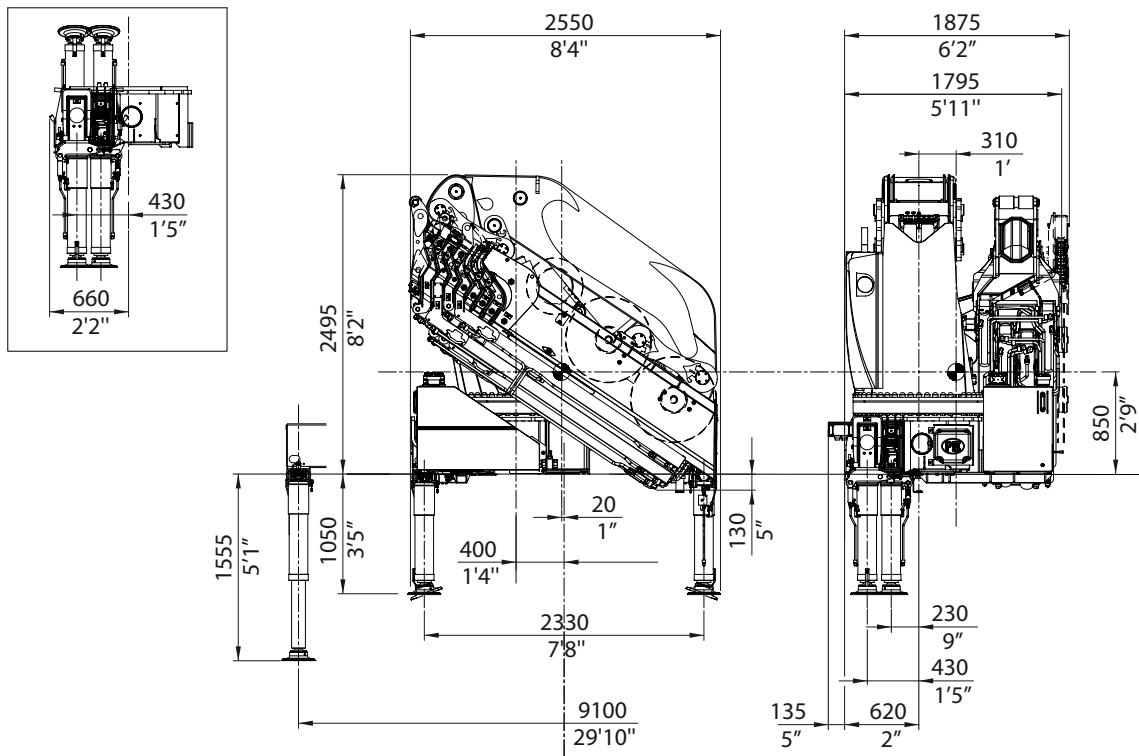
For the replacement proceed as follows:

- 1 - carefully clean the external surfaces of the filter;
- 2 - turn off the tank tap;
- 3 - unscrew the filter unit "B" and drain the oil inside it;
- 4 - replace the filter cartridge "C".

To reassemble the filter, carry out the disassembly operations in reverse. Tighten the filter unit to a tightening torque of 10 daNm (74 lbf - ft). Turn on the tank tap.

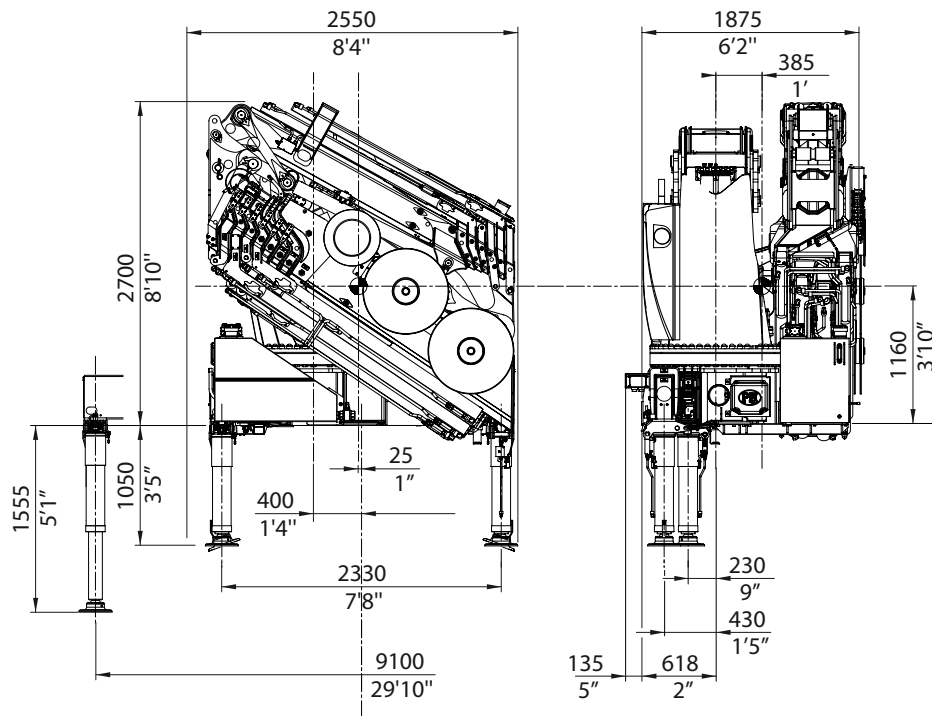


## - Overall dimensions



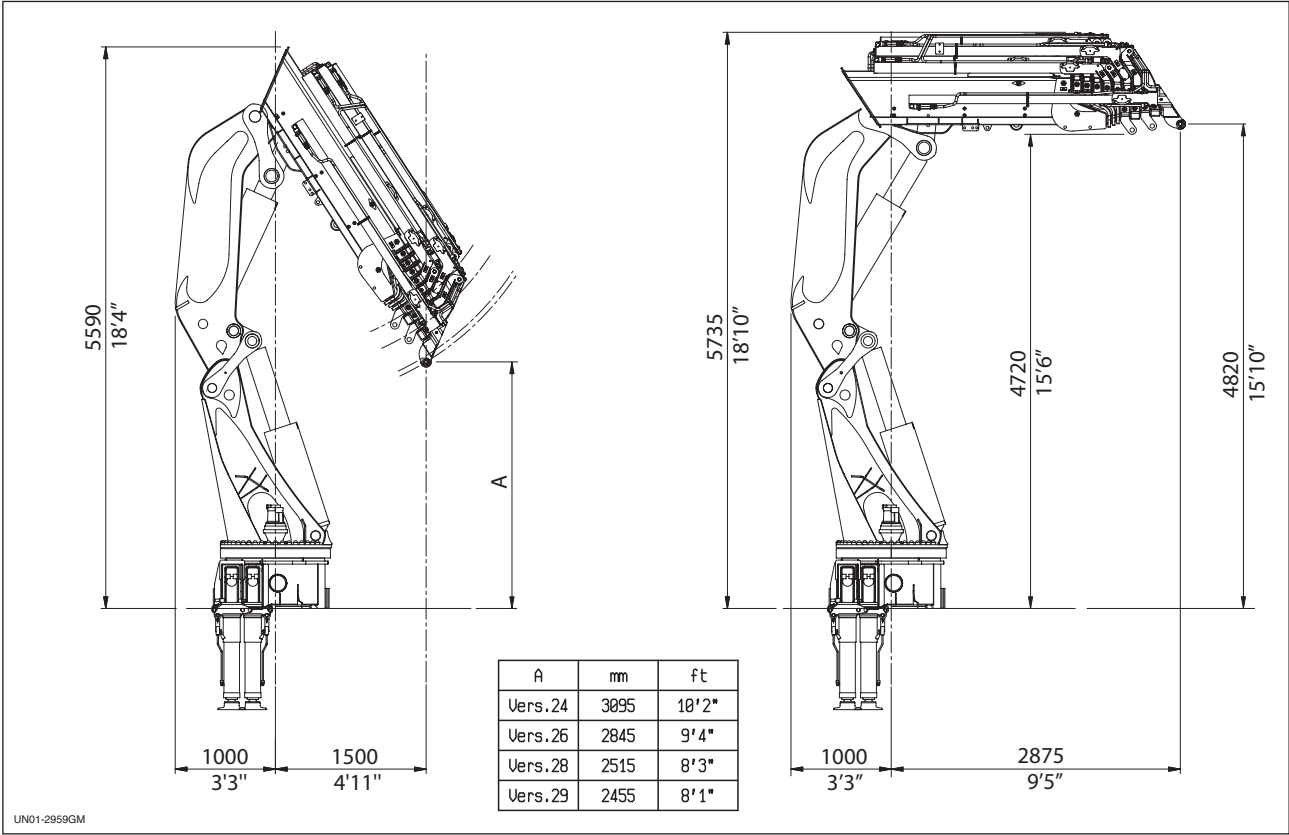
UN01-2957GM

- Overall dimensions of standard basic machine with jib



UN01-2958GM

- Overall dimensions of standard machine



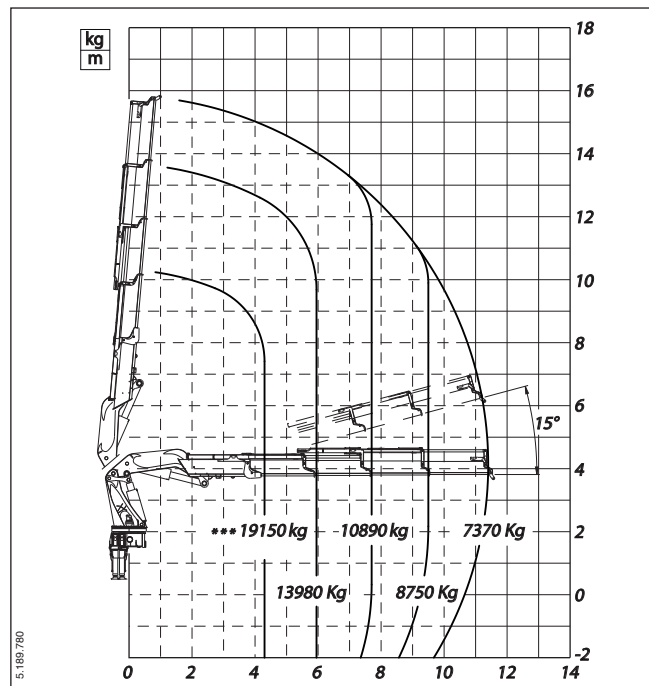
## - Specifications and performances

### PM 10024 SP

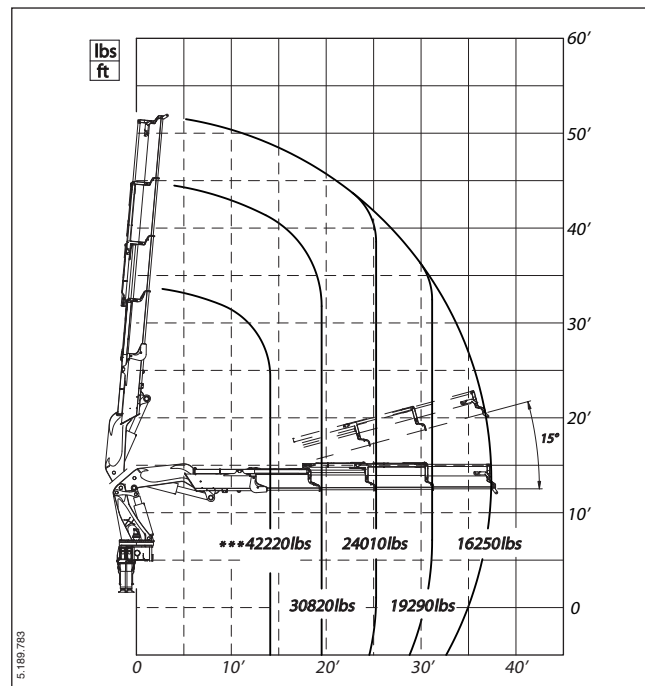
|                                                                      |       |            |          |        |
|----------------------------------------------------------------------|-------|------------|----------|--------|
| <b>Max. lifting momentum</b> .....                                   | kNm   | 824.....   | ft lbs   | 607570 |
|                                                                      | tm    | 84,0.....  | /        | /      |
| <b>Hydraulic outreach:</b>                                           |       |            |          |        |
| Horizontal .....                                                     | m     | 11,55..... | ft       | 37'11" |
| Vertical .....                                                       | m     | 15,65..... | ft       | 51'4"  |
| <b>Outreach with manual extensions:</b>                              |       |            |          |        |
| Horizontal .....                                                     | m     | /.....     | ft       | /      |
| Vertical .....                                                       | m     | /.....     | ft       | /      |
| <b>Hydraulic system:</b>                                             |       |            |          |        |
| Recommended capacity.....                                            | l/min | 90.....    | gals/min | 24     |
| Maximum pressure.....                                                | Mpa   | 35.....    | psi      | 5080   |
| Oil tank capacity.....                                               | l     | 290.....   | gals     | 77     |
| <b>Rotation unit:</b>                                                |       |            |          |        |
| Rotation angle.....                                                  | cont. | .....      | cont.    |        |
| Rotation torque.....                                                 | kNm   | 82,0.....  | ft lbs   | 60480  |
| Weight of standard crane without oil tank.....                       | kg    | 7615.....  | lbs      | 16790  |
| Maximum power absorbed by the hydraulic pump .....                   | kW    | 58,3.....  | HP       | 78     |
| Maximum force exerted on ground by stabilisers .....                 | kN    | 245.....   | lbs      | 55078  |
| Specific operating pressure of each                                  |       |            |          |        |
| stabiliser with Ø 278 mm (11") disk .....                            | Mpa   | 4,0.....   | psi      | 586    |
| Arm pack extension time for standard machine (Plus device off) ..... | sec.  | /.....     | sec.     | /      |
| "Mobile" hook maximum load capacity - Hook capacity.....             | kg    | 22000..... | lbs      | 48500  |

## - Capacities diagram

PM 10024 SP



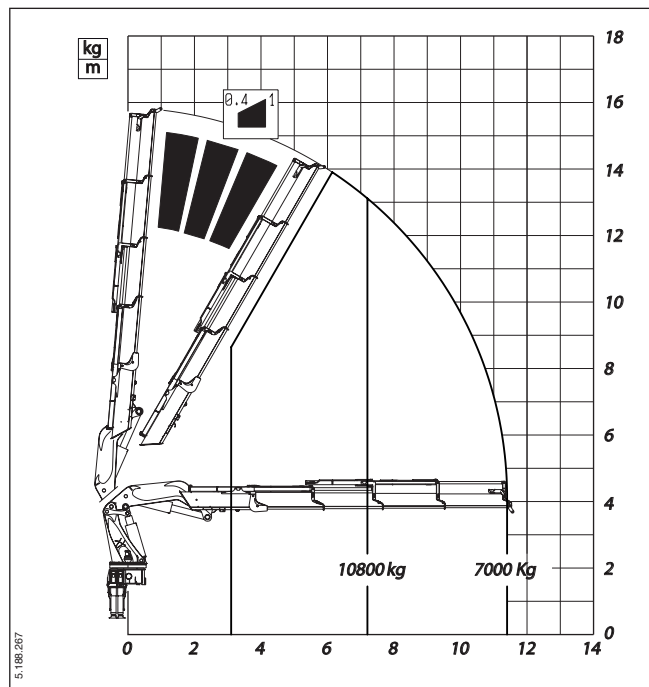
\*\*\* Maximum capacity from horizontal to vertical  
 Note: the performances stated are obtained with the main arm inclined to 20°



\*\*\* Maximum capacity from horizontal to vertical  
 Note: the performances stated are obtained with the main arm inclined to 20°

## - Capacities diagram

### PM 10024 SP - standard basic machine with TC5 winch



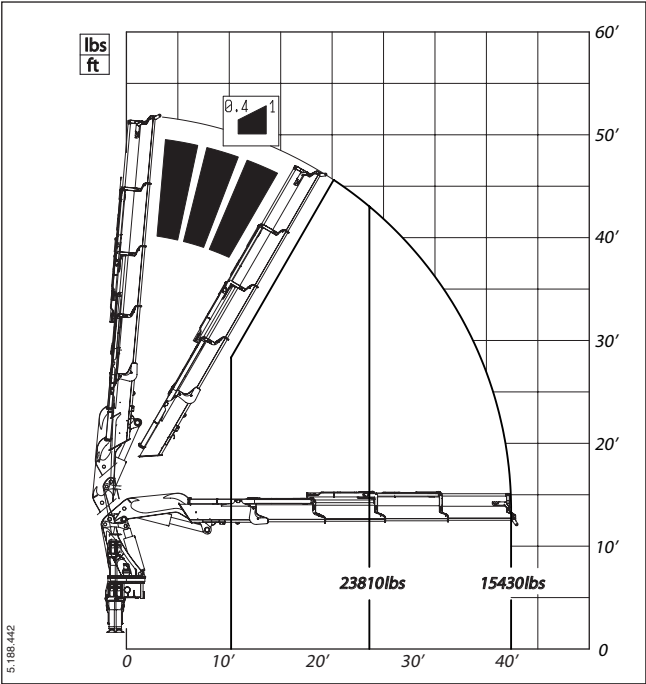
| Cable layer | Capacity kg | Pull        |
|-------------|-------------|-------------|
| 1°          | 10800       | $n = 2$<br> |
| 2°          | 9800        |             |
| 3°          | 9000        |             |
|             |             |             |



- Capacities diagram

PM 10024 SP - standard basic machine with TC5 winch

(USA)



| Cable layer | Capacity lbs | Pull        |
|-------------|--------------|-------------|
| 1°          | 23809        | $n = 2$<br> |
| 2°          | 21605        |             |
| 3°          | 19841        |             |
|             |              |             |

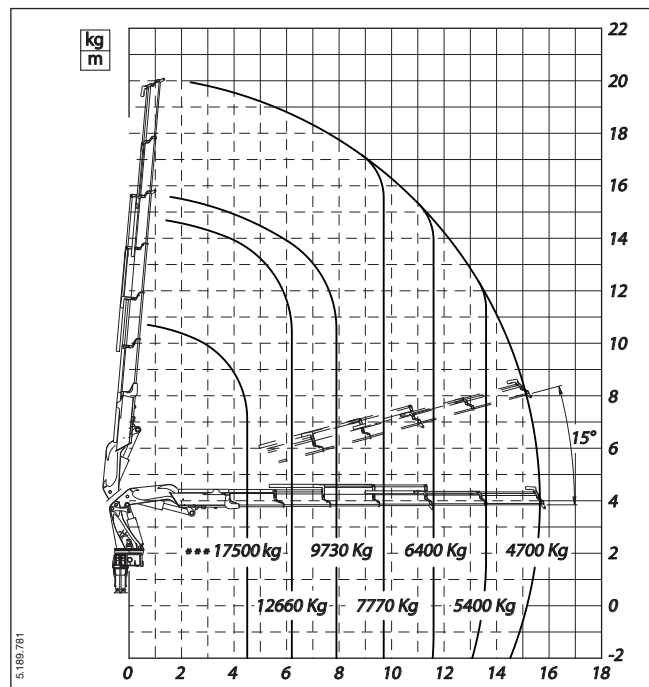
## - Specifications and performances

|           |
|-----------|
| PM 100026 |
|-----------|

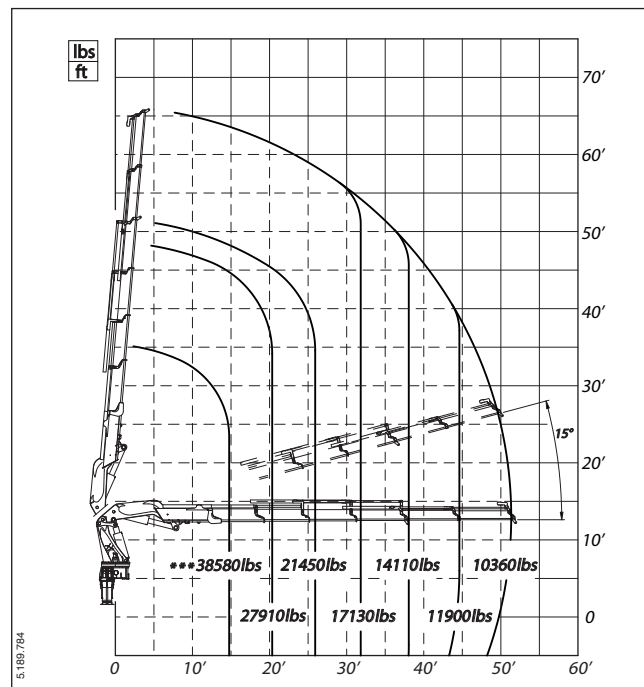
|                                                                      |       |            |          |        |
|----------------------------------------------------------------------|-------|------------|----------|--------|
| <b>Max. lifting momentum</b> .....                                   | kNm   | 785.....   | ft lbs   | 578640 |
|                                                                      | tm    | 80,0.....  | /        | /      |
| <b>Hydraulic outreach:</b>                                           |       |            |          |        |
| Horizontal .....                                                     | m     | 15,80..... | ft       | 51'10" |
| Vertical .....                                                       | m     | 19,85..... | ft       | 65'1"  |
| <b>Outreach with manual extensions:</b>                              |       |            |          |        |
| Horizontal .....                                                     | m     | /.....     | ft       | /      |
| Vertical .....                                                       | m     | /.....     | ft       | /      |
| <b>Hydraulic system:</b>                                             |       |            |          |        |
| Recommended capacity.....                                            | l/min | 90.....    | gals/min | 24     |
| Maximum pressure.....                                                | Mpa   | 35.....    | psi      | 5080   |
| Oil tank capacity.....                                               | l     | 290.....   | gals     | 77     |
| <b>Rotation unit:</b>                                                |       |            |          |        |
| Rotation angle.....                                                  | cont. | .....      | cont.    |        |
| Rotation torque.....                                                 | kNm   | 82,0.....  | ft lbs   | 60480  |
| Weight of standard crane without oil tank.....                       | kg    | 8300.....  | lbs      | 18300  |
| Maximum power absorbed by the hydraulic pump .....                   | kW    | 58,3.....  | HP       | 78     |
| Maximum force exerted on ground by stabilisers .....                 | kN    | 245.....   | lbs      | 55078  |
| Specific operating pressure of each                                  |       |            |          |        |
| stabiliser with Ø 278 mm (11") disk .....                            | Mpa   | 4,0.....   | psi      | 586    |
| Arm pack extension time for standard machine (Plus device off) ..... | sec.  | /.....     | sec.     | /      |
| "Mobile" hook maximum load capacity - Hook capacity.....             | kg    | 22000..... | lbs      | 48500  |

## - Capacities diagram

PM 10026 SP



\*\*\* Maximum capacity from horizontal to vertical  
Note: the performances stated are obtained with the main arm inclined to 20°



\*\*\* Maximum capacity from horizontal to vertical  
Note: the performances stated are obtained with the main arm inclined to 20°

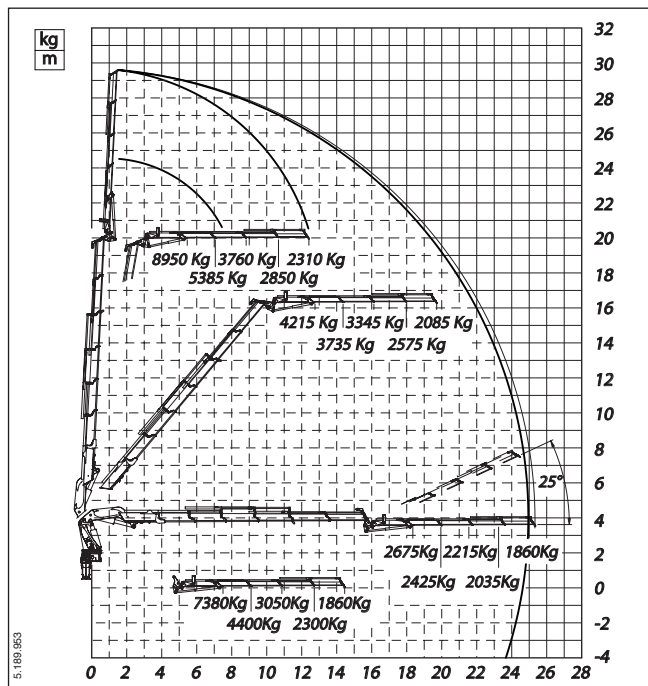
## - Specifications and performances

PM 100026 - with jib J 2414.25

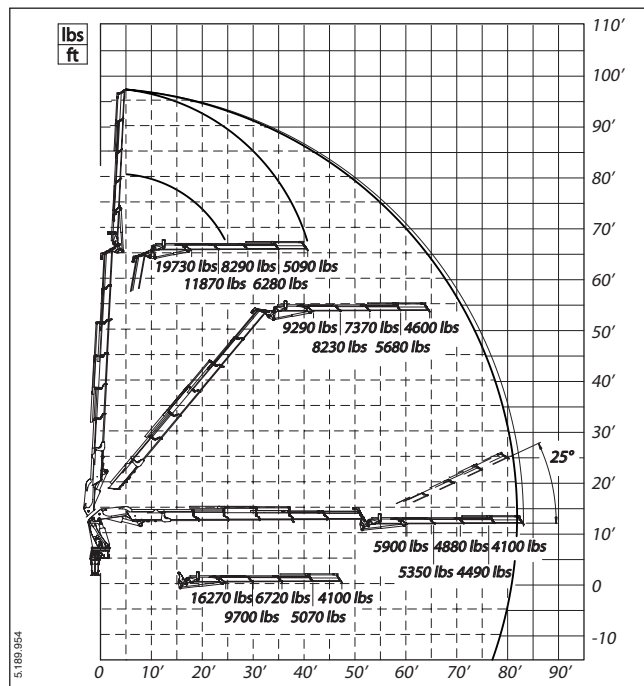
|                                                                                  |       |                 |        |
|----------------------------------------------------------------------------------|-------|-----------------|--------|
| Max. lifting momentum.....                                                       | kNm   | /.....ft lbs    | /      |
|                                                                                  | tm    | /...../         | /      |
| <b>Hydraulic outreach:</b>                                                       |       |                 |        |
| Horizontal .....                                                                 | m     | 21,60.....ft    | 70'10" |
| Vertical .....                                                                   | m     | 25,50.....ft    | 83'8"  |
| <b>Outreach with manual extensions:</b>                                          |       |                 |        |
| Horizontal .....                                                                 | m     | /.....ft        | /      |
| Vertical .....                                                                   | m     | /.....ft        | /      |
| <b>Hydraulic system:</b>                                                         |       |                 |        |
| Recommended capacity.....                                                        | l/min | 90.....gals/min | 24     |
| Maximum pressure.....                                                            | Mpa   | 35.....psi      | 5080   |
| Oil tank capacity.....                                                           | l     | 290.....gals    | 77     |
| <b>Rotation unit:</b>                                                            |       |                 |        |
| Rotation angle.....                                                              | cont. | .....cont.      |        |
| Rotation torque.....                                                             | kNm   | 82,0.....ft lbs | 60480  |
| Weight of standard crane without oil tank.....                                   | kg    | 9930.....lbs    | 21895  |
| Maximum power absorbed by the hydraulic pump .....                               | kW    | 58,3.....HP     | 78     |
| Maximum force exerted on ground by stabilisers .....                             | kN    | 245.....lbs     | 55078  |
| Specific operating pressure of each<br>stabiliser with Ø 278 mm (11") disk ..... | Mpa   | 4,0.....psi     | 586    |
| Arm pack extension time for standard machine (Plus device off) .....             | sec.  | /.....sec.      | /      |
| "Mobile" hook maximum load capacity - Hook capacity.....                         | kg    | 22000.....lbs   | 48500  |
| Jib hook - Hook capacity .....                                                   | kg    | 5000.....lbs    | 11025  |

## - Capacities diagram

PM 100026 SP - with jib J 2414.25



Note: the performances stated are obtained with the main arm inclined to 20°



Note: the performances stated are obtained with the main arm inclined to 20°

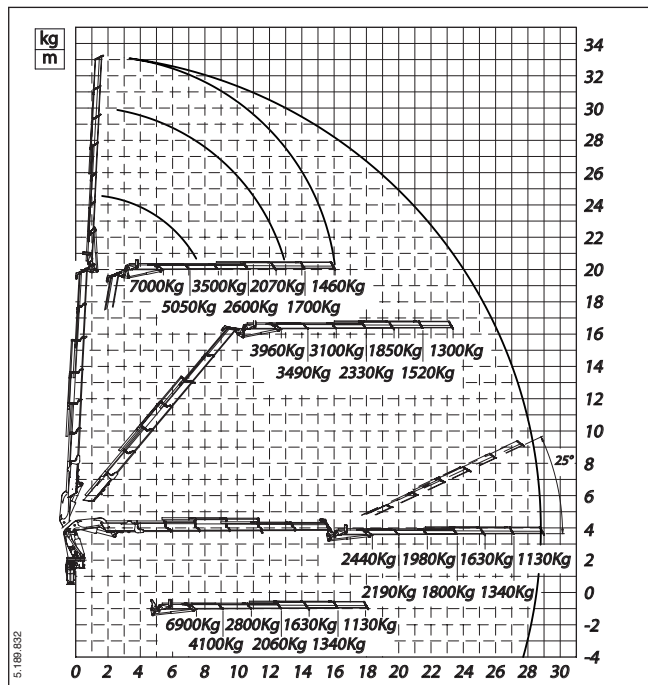
## - Specifications and performances

PM 100026 - with jib J 2416.25

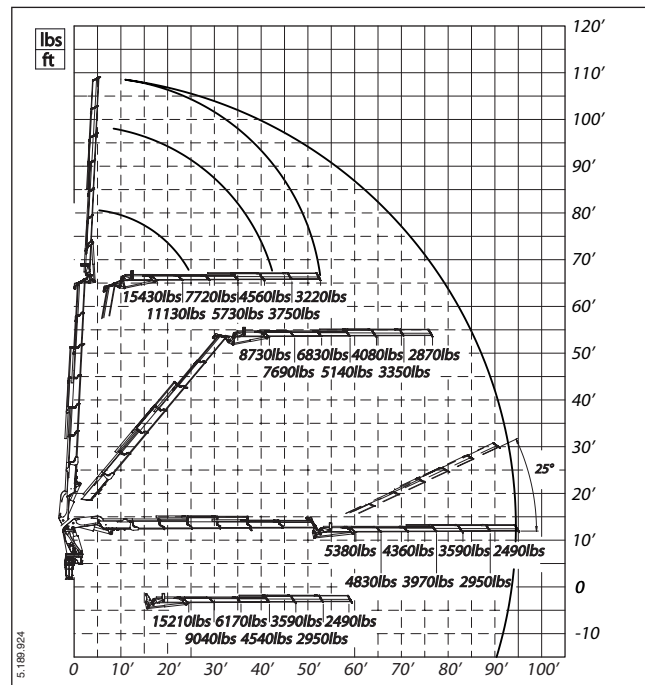
|                                                                                  |       |                 |       |
|----------------------------------------------------------------------------------|-------|-----------------|-------|
| Max. lifting momentum.....                                                       | kNm   | /.....ft lbs    | /     |
|                                                                                  | tm    | /...../         | /     |
| <b>Hydraulic outreach:</b>                                                       |       |                 |       |
| Horizontal .....                                                                 | m     | 25,20.....ft    | 82'8" |
| Vertical .....                                                                   | m     | 29,10.....ft    | 95'6" |
| <b>Outreach with manual extensions:</b>                                          |       |                 |       |
| Horizontal .....                                                                 | m     | /.....ft        | /     |
| Vertical .....                                                                   | m     | /.....ft        | /     |
| <b>Hydraulic system:</b>                                                         |       |                 |       |
| Recommended capacity.....                                                        | l/min | 90.....gals/min | 24    |
| Maximum pressure.....                                                            | Mpa   | 35.....psi      | 5080  |
| Oil tank capacity.....                                                           | l     | 290.....gals    | 77    |
| <b>Rotation unit:</b>                                                            |       |                 |       |
| Rotation angle.....                                                              | cont. | .....cont.      |       |
| Rotation torque.....                                                             | kNm   | 82,0.....ft lbs | 60480 |
| Weight of standard crane without oil tank.....                                   | kg    | 10190.....lbs   | 22470 |
| Maximum power absorbed by the hydraulic pump .....                               | kW    | 58,3.....HP     | 78    |
| Maximum force exerted on ground by stabilisers .....                             | kN    | 245.....lbs     | 55078 |
| Specific operating pressure of each<br>stabiliser with Ø 278 mm (11") disk ..... | Mpa   | 4,0.....psi     | 586   |
| Arm pack extension time for standard machine (Plus device off) .....             | sec.  | /.....sec.      | /     |
| "Mobile" hook maximum load capacity - Hook capacity.....                         | kg    | 22000.....lbs   | 48500 |
| Jib hook - Hook capacity .....                                                   | kg    | 5000.....lbs    | 11025 |

## - Capacities diagram

PM 100026 SP - with jib J 2416.25



Note: the performances stated are obtained with the main arm inclined to 20°



Note: the performances stated are obtained with the main arm inclined to 20°

## - Specifications and performances

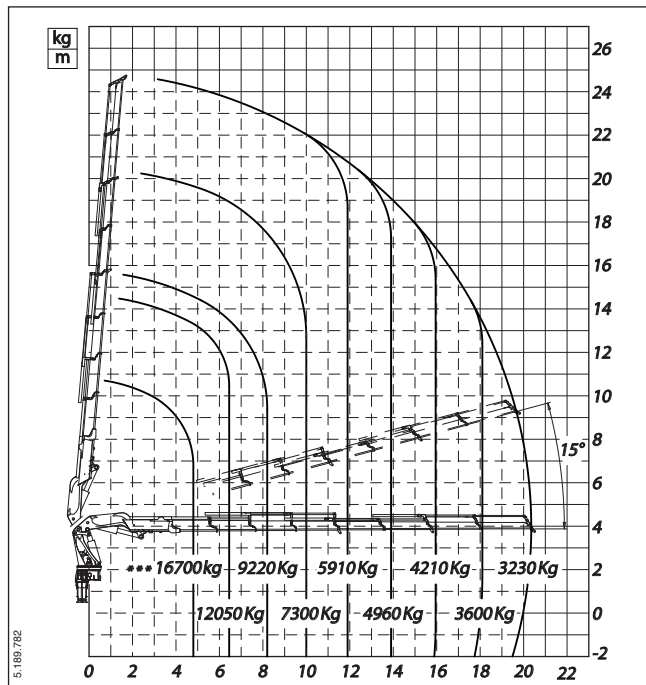
|           |
|-----------|
| PM 100028 |
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|                                                                                  |       |            |          |        |
|----------------------------------------------------------------------------------|-------|------------|----------|--------|
| <b>Max. lifting momentum</b> .....                                               | kNm   | 782.....   | ft lbs   | 576470 |
|                                                                                  | tm    | 79,7.....  | /        | /      |
| <b>Hydraulic outreach:</b>                                                       |       |            |          |        |
| Horizontal .....                                                                 | m     | 20,50..... | ft       | 67'3"  |
| Vertical .....                                                                   | m     | 24,50..... | ft       | 80'5"  |
| <b>Outreach with manual extensions:</b>                                          |       |            |          |        |
| Horizontal .....                                                                 | m     | /.....     | ft       | /      |
| Vertical .....                                                                   | m     | /.....     | ft       | /      |
| <b>Hydraulic system:</b>                                                         |       |            |          |        |
| Recommended capacity.....                                                        | l/min | 90.....    | gals/min | 24     |
| Maximum pressure.....                                                            | Mpa   | 35.....    | psi      | 5080   |
| Oil tank capacity.....                                                           | l     | 290.....   | gals     | 77     |
| <b>Rotation unit:</b>                                                            |       |            |          |        |
| Rotation angle.....                                                              | cont. | .....      | cont.    |        |
| Rotation torque.....                                                             | kNm   | 82,0.....  | ft lbs   | 60480  |
| Weight of standard crane without oil tank.....                                   | kg    | 8900.....  | lbs      | 19625  |
| Maximum power absorbed by the hydraulic pump .....                               | kW    | 58,3.....  | HP       | 78     |
| Maximum force exerted on ground by stabilisers .....                             | kN    | 245.....   | lbs      | 55078  |
| Specific operating pressure of each<br>stabiliser with Ø 278 mm (11") disk ..... | Mpa   | 4,0.....   | psi      | 586    |
| Arm pack extension time for standard machine (Plus device off) .....             | sec.  | /.....     | sec.     | /      |
| "Mobile" hook maximum load capacity - Hook capacity.....                         | kg    | 22000..... | lbs      | 48500  |

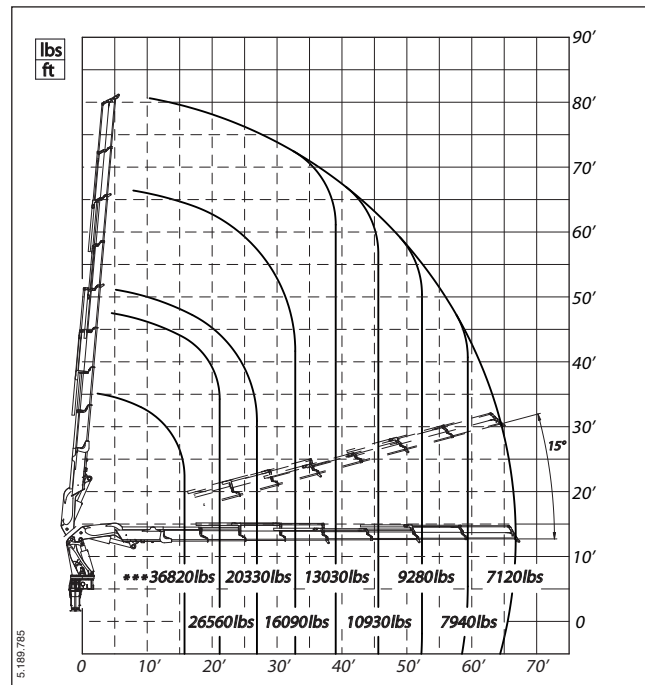


## - Capacities diagram

PM 10028 SP



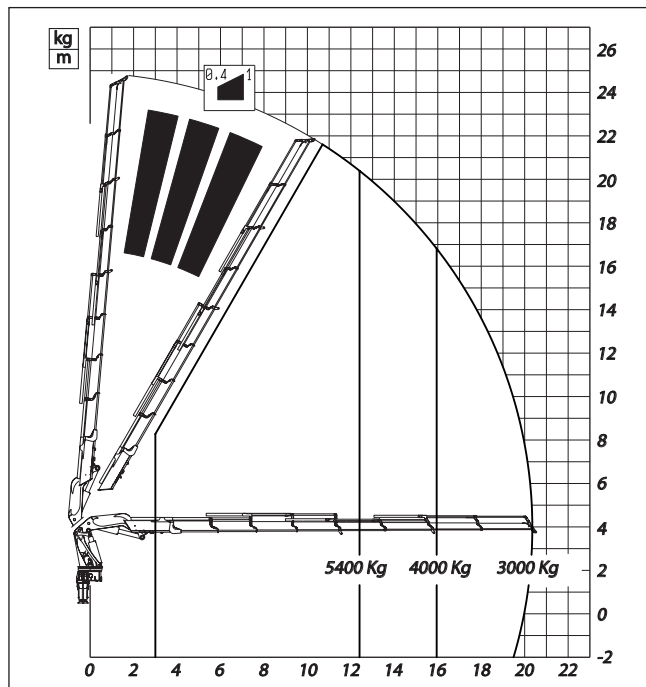
\*\*\* Maximum capacity from horizontal to vertical  
 Note: the performances stated are obtained with the main arm inclined to 20°



\*\*\* Maximum capacity from horizontal to vertical  
 Note: the performances stated are obtained with the main arm inclined to 20°

## - Capacities diagram

### PM 10028 SP - standard basic machine with TC5 winch

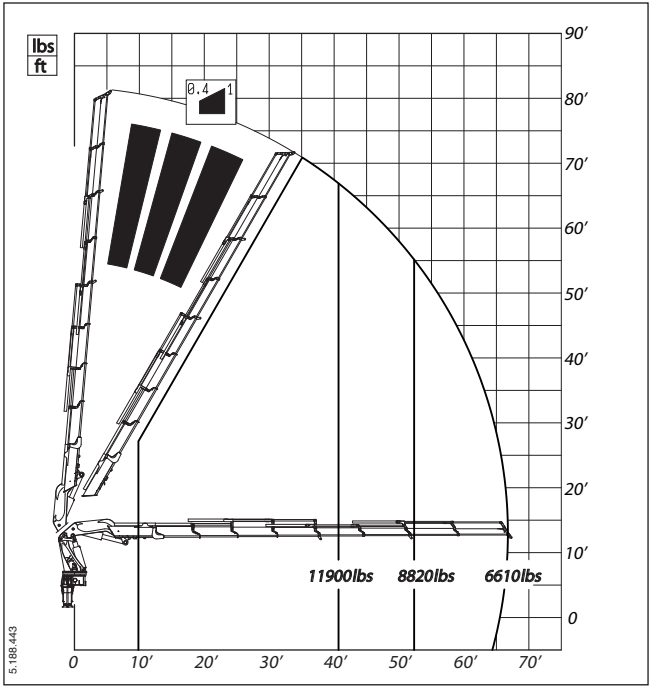


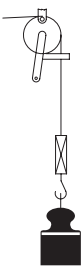
| Cable layer | Capacity kg | Pull        |
|-------------|-------------|-------------|
| 1°          | 5400        | $n = 1$<br> |
| 2°          | 4900        |             |
| 3°          | 4500        |             |
|             |             |             |

- Capacities diagram

PM 100028 SP - standard basic machine with TC5 winch

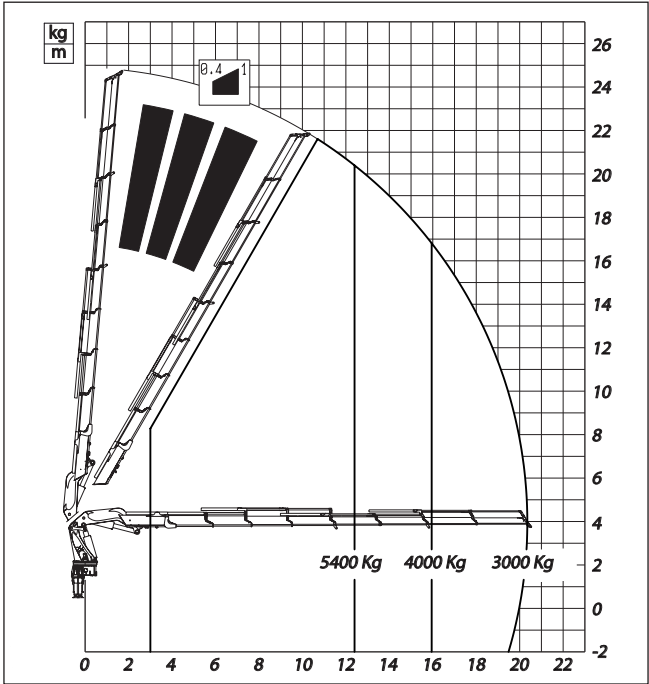
(USA)

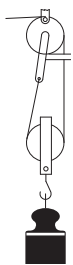


| Cable layer | Capacity lbs | Pull                                                                                |
|-------------|--------------|-------------------------------------------------------------------------------------|
| 1°          | 11904        |  |
| 2°          | 10802        |                                                                                     |
| 3°          | 9920         |                                                                                     |
|             |              |                                                                                     |

- Capacities diagram

PM 10028 SP - standard basic machine with S 19 L winch

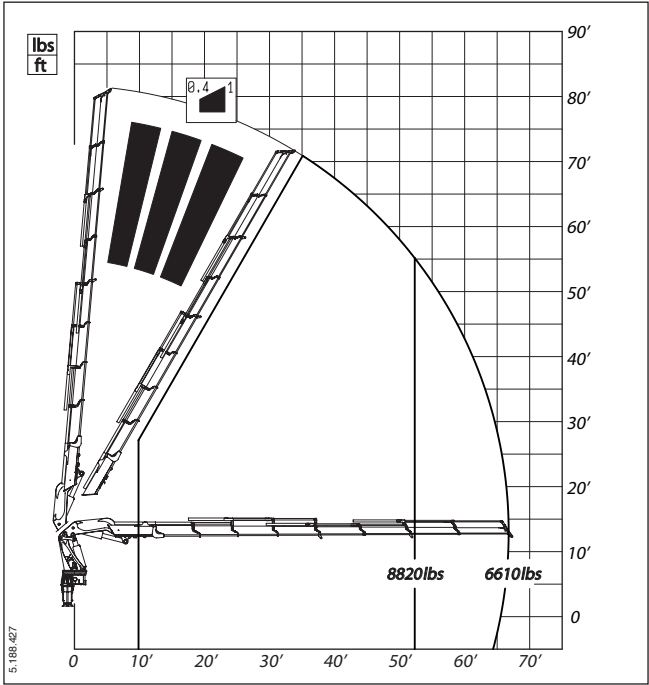


| Cable layer | Capacity kg | Pull                                                                                                 |
|-------------|-------------|------------------------------------------------------------------------------------------------------|
| 1°          | 5000        | <div>n = 2</div>  |
| 2°          | 4500        |                                                                                                      |
| 3°          | 4100        |                                                                                                      |
| 4°          | 3800        |                                                                                                      |

- Capacities diagram

PM 100028 SP - standard basic machine with S 19 L winch

(USA)



| Cable layer | Capacity lbs | Pull      |
|-------------|--------------|-----------|
| 1°          | 11023        | <br>n = 2 |
| 2°          | 9920         |           |
| 3°          | 9038         |           |
| 4°          | 8377         |           |

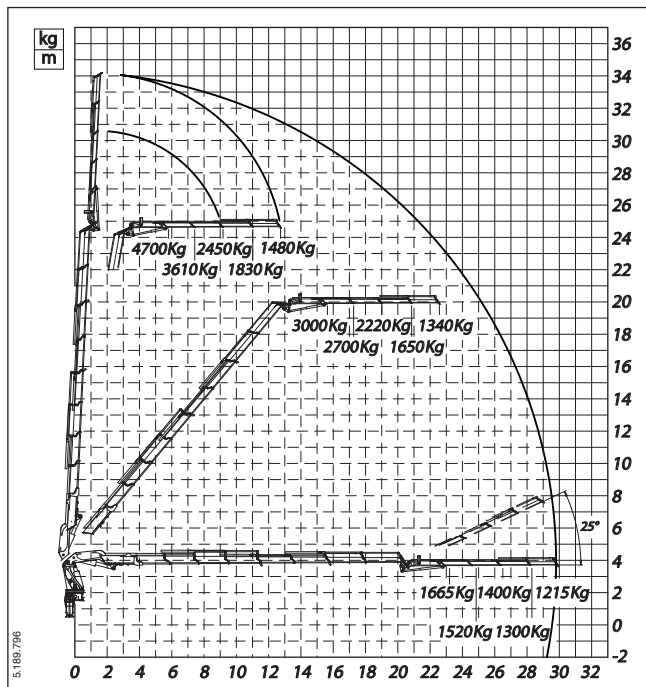
## - Specifications and performances

PM 100028 - with jib J 1614.25

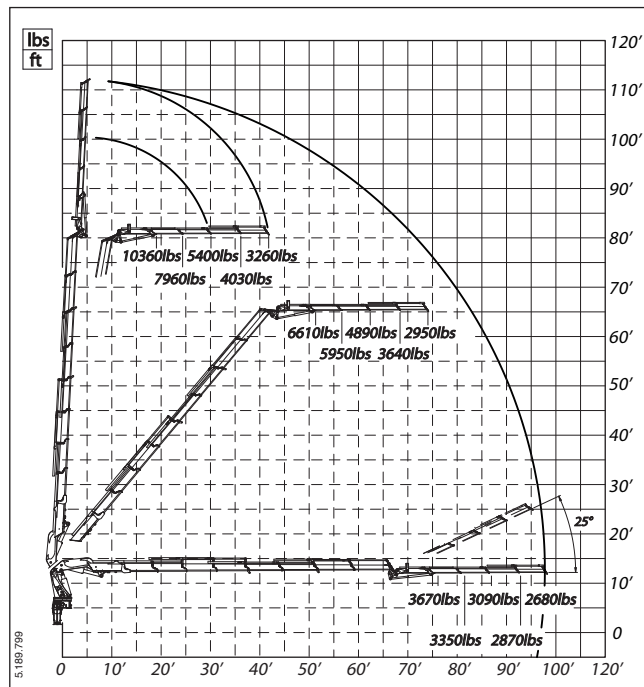
|                                                                                  |       |                 |        |
|----------------------------------------------------------------------------------|-------|-----------------|--------|
| Max. lifting momentum.....                                                       | kNm   | /.....ft lbs    | /      |
|                                                                                  | tm    | /...../         | /      |
| <b>Hydraulic outreach:</b>                                                       |       |                 |        |
| Horizontal .....                                                                 | m     | 30,05.....ft    | 98'7"  |
| Vertical .....                                                                   | m     | 33,85.....ft    | 111'1" |
| <b>Outreach with manual extensions:</b>                                          |       |                 |        |
| Horizontal .....                                                                 | m     | /.....ft        | /      |
| Vertical .....                                                                   | m     | /.....ft        | /      |
| <b>Hydraulic system:</b>                                                         |       |                 |        |
| Recommended capacity.....                                                        | l/min | 90.....gals/min | 24     |
| Maximum pressure.....                                                            | Mpa   | 35.....psi      | 5080   |
| Oil tank capacity.....                                                           | l     | 290.....gals    | 77     |
| <b>Rotation unit:</b>                                                            |       |                 |        |
| Rotation angle.....                                                              | cont. | .....cont.      |        |
| Rotation torque.....                                                             | kNm   | 82,0.....ft lbs | 60480  |
| Weight of standard crane without oil tank.....                                   | kg    | 10120.....lbs   | 22315  |
| Maximum power absorbed by the hydraulic pump .....                               | kW    | 58,3.....HP     | 78     |
| Maximum force exerted on ground by stabilisers .....                             | kN    | 245.....lbs     | 55078  |
| Specific operating pressure of each<br>stabiliser with Ø 278 mm (11") disk ..... | Mpa   | 4,0.....psi     | 586    |
| Arm pack extension time for standard machine (Plus device off) .....             | sec.  | /.....sec.      | /      |
| "Mobile" hook maximum load capacity - Hook capacity.....                         | kg    | 22000.....lbs   | 48500  |
| Jib hook - Hook capacity .....                                                   | kg    | 5000.....lbs    | 11025  |

## - Capacities diagram

PM 100028 SP - with jib J 1614.25



Note: the performances stated are obtained with the main arm inclined to 20°



Note: the performances stated are obtained with the main arm inclined to 20°

## - Specifications and performances

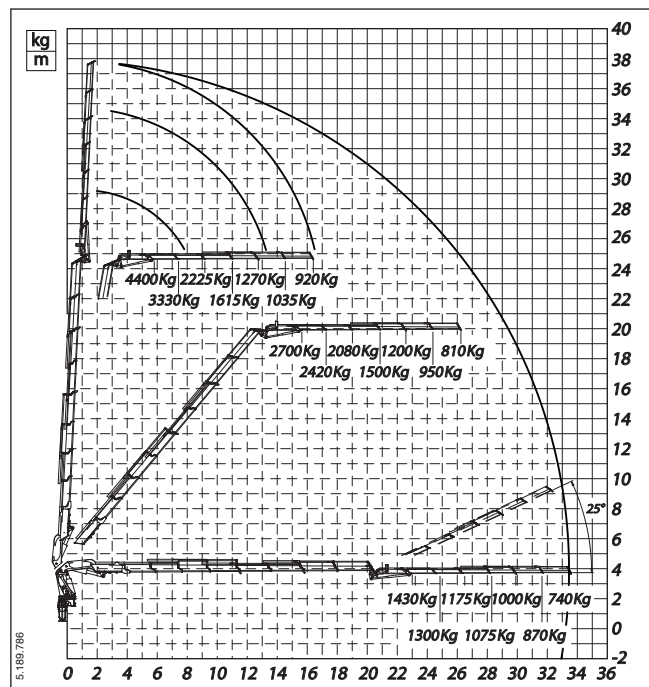
PM 100028 - with jib J 1616.25

|                                                                      |       |                 |        |
|----------------------------------------------------------------------|-------|-----------------|--------|
| Max. lifting momentum.....                                           | kNm   | /.....ft lbs    | /      |
|                                                                      | tm    | /...../         | /      |
| <b>Hydraulic outreach:</b>                                           |       |                 |        |
| Horizontal .....                                                     | m     | 33,55.....ft    | 110'1" |
| Vertical .....                                                       | m     | 37,35.....ft    | 122'6" |
| <b>Outreach with manual extensions:</b>                              |       |                 |        |
| Horizontal .....                                                     | m     | /.....ft        | /      |
| Vertical .....                                                       | m     | /.....ft        | /      |
| <b>Hydraulic system:</b>                                             |       |                 |        |
| Recommended capacity.....                                            | l/min | 90.....gals/min | 24     |
| Maximum pressure.....                                                | Mpa   | 35.....psi      | 5080   |
| Oil tank capacity.....                                               | l     | 290.....gals    | 77     |
| <b>Rotation unit:</b>                                                |       |                 |        |
| Rotation angle.....                                                  | cont. | .....cont.      |        |
| Rotation torque.....                                                 | kNm   | 82,0.....ft lbs | 60480  |
| Weight of standard crane without oil tank.....                       | kg    | 10340.....lbs   | 22800  |
| Maximum power absorbed by the hydraulic pump .....                   | kW    | 58,3.....HP     | 78     |
| Maximum force exerted on ground by stabilisers .....                 | kN    | 245.....lbs     | 55078  |
| Specific operating pressure of each                                  |       |                 |        |
| stabiliser with Ø 278 mm (11") disk .....                            | Mpa   | 4,0.....psi     | 586    |
| Arm pack extension time for standard machine (Plus device off) ..... | sec.  | /.....sec.      | /      |
| "Mobile" hook maximum load capacity - Hook capacity.....             | kg    | 22000.....lbs   | 48500  |
| Jib hook - Hook capacity .....                                       | kg    | 5000.....lbs    | 11025  |

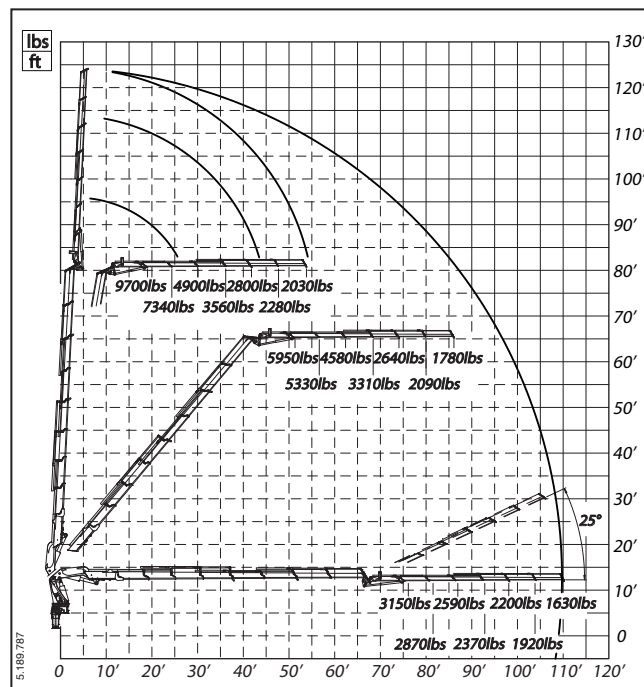


## - Capacities diagram

PM 100028 SP - with jib J 1616.25



Note: the performances stated are obtained with the main arm inclined to 20°

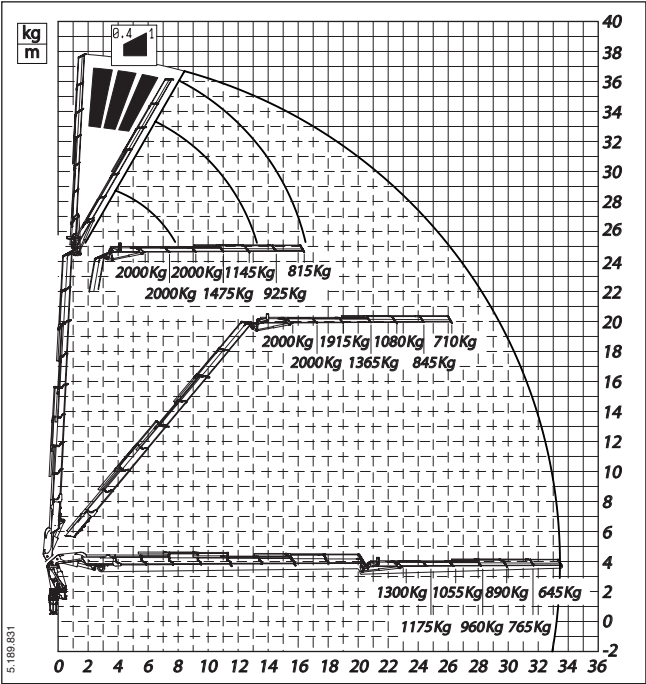


Note: the performances stated are obtained with the main arm inclined to 20°

ENCLOSURES

- Capacities diagram

PM 10028 SP - standard basic machine with J 1616.25 jib and S 19 L winch

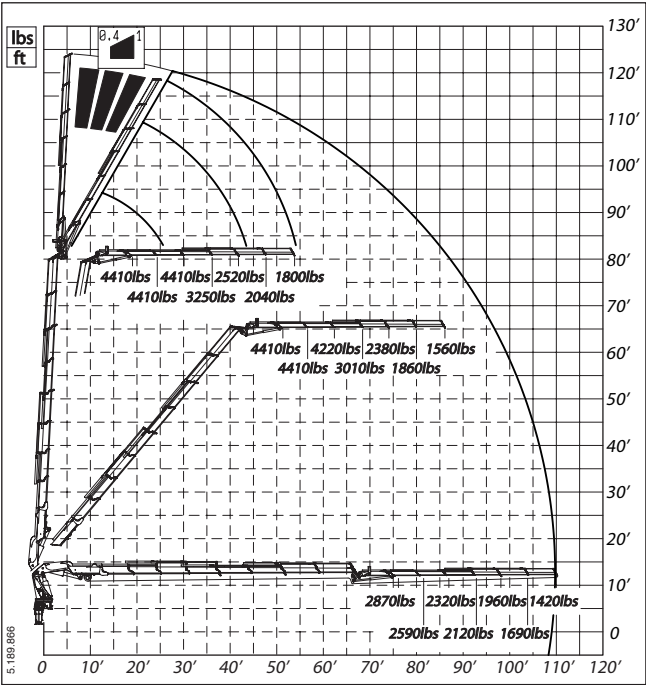


| Cable layer | Capacity kg | Pull |
|-------------|-------------|------|
| 1°          | 2500        |      |
| 2°          | 2250        |      |
| 3°          | 2050        |      |
| 4°          | 1900        |      |

- Capacities diagram

PM 100028 SP - standard basic machine with J 1616.25 jib and S 19 L winch

(USA)



| Cable layer | Capacity lbs | Pull |
|-------------|--------------|------|
| 1°          | 5511         |      |
| 2°          | 4960         |      |
| 3°          | 4519         |      |
| 4°          | 4188         |      |

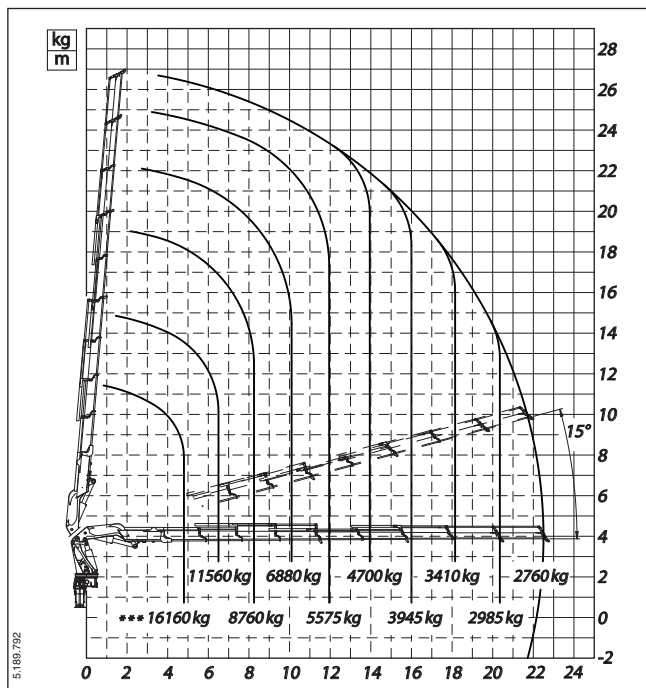
## - Specifications and performances

|           |
|-----------|
| PM 100029 |
|-----------|

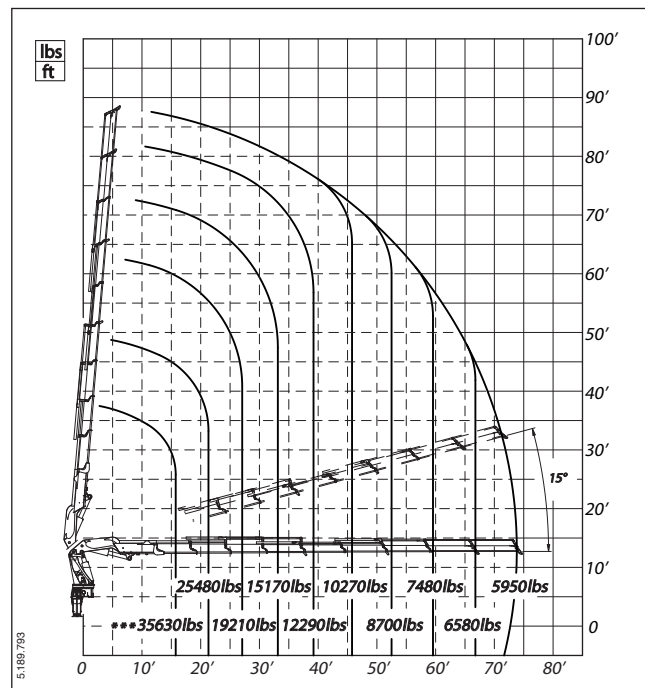
|                                                                      |       |            |          |        |
|----------------------------------------------------------------------|-------|------------|----------|--------|
| <b>Max. lifting momentum</b> .....                                   | kNm   | 760.....   | ft lbs   | 560560 |
|                                                                      | tm    | 77,5.....  | /        | /      |
| <b>Hydraulic outreach:</b>                                           |       |            |          |        |
| Horizontal .....                                                     | m     | 22,70..... | ft       | 74'6"  |
| Vertical .....                                                       | m     | 26,70..... | ft       | 87'7"  |
| <b>Outreach with manual extensions:</b>                              |       |            |          |        |
| Horizontal .....                                                     | m     | /.....     | ft       | /      |
| Vertical .....                                                       | m     | /.....     | ft       | /      |
| <b>Hydraulic system:</b>                                             |       |            |          |        |
| Recommended capacity.....                                            | l/min | 90.....    | gals/min | 24     |
| Maximum pressure.....                                                | Mpa   | 35.....    | psi      | 5080   |
| Oil tank capacity.....                                               | l     | 290.....   | gals     | 77     |
| <b>Rotation unit:</b>                                                |       |            |          |        |
| Rotation angle.....                                                  | cont. | .....      | cont.    |        |
| Rotation torque.....                                                 | kNm   | 82,0.....  | ft lbs   | 60480  |
| Weight of standard crane without oil tank.....                       | kg    | 9180.....  | lbs      | 20240  |
| Maximum power absorbed by the hydraulic pump .....                   | kW    | 58,3.....  | HP       | 78     |
| Maximum force exerted on ground by stabilisers .....                 | kN    | 245.....   | lbs      | 55078  |
| Specific operating pressure of each                                  |       |            |          |        |
| stabiliser with Ø 278 mm (11") disk .....                            | Mpa   | 4,0.....   | psi      | 586    |
| Arm pack extension time for standard machine (Plus device off) ..... | sec.  | /.....     | sec.     | /      |
| "Mobile" hook maximum load capacity - Hook capacity.....             | kg    | 22000..... | lbs      | 48500  |

## - Capacities diagram

PM 10029 SP



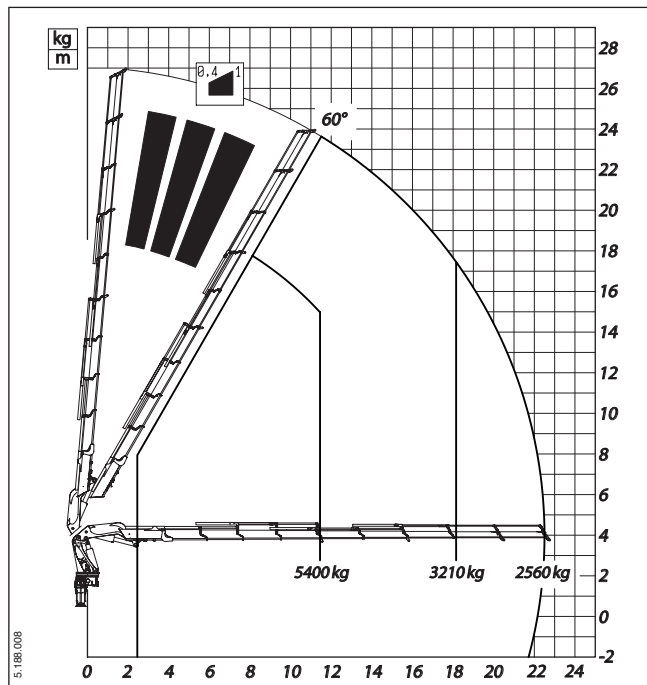
\*\*\* Maximum capacity from horizontal to vertical  
Note: the performances stated are obtained with the main arm inclined to 20°



\*\*\* Maximum capacity from horizontal to vertical  
Note: the performances stated are obtained with the main arm inclined to 20°

## - Capacities diagram

### PM 10029 SP - standard basic machine with TC5 winch

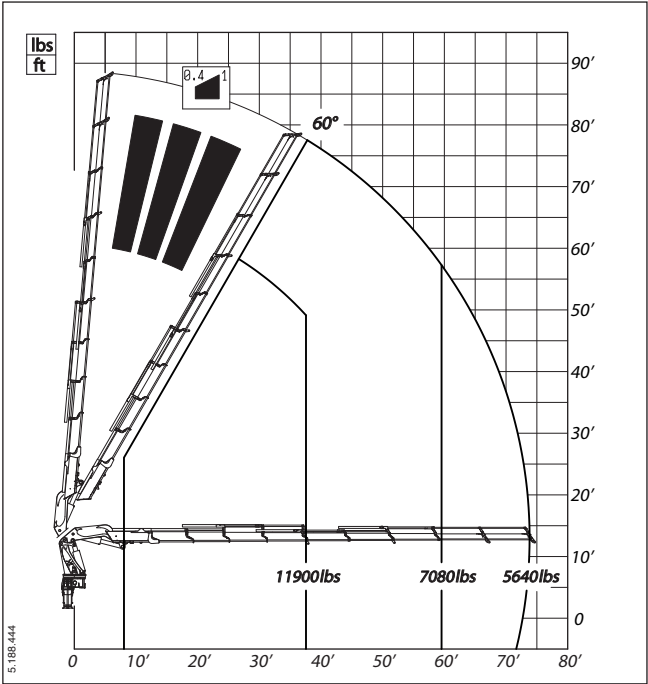


| Cable layer | Capacity kg | Pull        |
|-------------|-------------|-------------|
| 1°          | 5400        | $n = 1$<br> |
| 2°          | 4900        |             |
| 3°          | 4500        |             |
|             |             |             |

- Capacities diagram

PM 10029 SP - standard basic machine with TC5 winch

(USA)



| Cable layer | Capacity lbs | Pull      |
|-------------|--------------|-----------|
| 1°          | 11904        | <br>n = 1 |
| 2°          | 10802        |           |
| 3°          | 9920         |           |
|             |              |           |

## - “CE” declaration of conformity of the machine

The figure shows a copy of the “CE” declaration of conformity; the original is issued by the manufacturer together with this manual.

- a) Crane model
- b) Serial number
- c) Date of declaration
- d) Signature of the person authorised to write the declaration

If the machine is equipped with accessories.

- e) Accessory name
- f) Accessory model
- g) Accessory serial number



**CE declaration of conformity**

**PM Group S.p.A.**  
Via Verdi 22  
41018 San Cesario sul Panaro MO Italia

Declares that the loader crane

a

b

Equipped with the following accessories

| Name | Model | Serial No. |
|------|-------|------------|
| e    | f     | g          |
|      |       |            |
|      |       |            |
|      |       |            |

c

d

Complies in all its parts with directive 2006/42/EC  
and directive 2004/108/EC.

The technical dossier can be requested by writing to the manufacturer  
PM Group S.p.A.Via Verdi 22 41018 San Cesario sul Panaro MO Italia [info@pm-group.eu](mailto:info@pm-group.eu)

San Cesario s.p.à " / / "

The legal representative  
" " "

UN01-2642AG



- Register of the periodic technical inspections of the control and limiting devices

|               |                      |                      |                      |
|---------------|----------------------|----------------------|----------------------|
| Crane model   | <input type="text"/> | Year of manufacture  | <input type="text"/> |
| Serial number | <input type="text"/> | Year of installation | <input type="text"/> |

| Device inspected | Kind of inspection performed | Inspection result | Date | Date of next inspection | Name, businnes name and signature of the person responsible for inspection |
|------------------|------------------------------|-------------------|------|-------------------------|----------------------------------------------------------------------------|
|                  |                              |                   |      |                         |                                                                            |

| Device inspected | Kind of inspection performed | Inspection result | Date | Date of next inspection | Name, businnes name and signature of the person responsible for inspection |
|------------------|------------------------------|-------------------|------|-------------------------|----------------------------------------------------------------------------|
|                  |                              |                   |      |                         |                                                                            |

| Device inspected | Kind of inspection performed | Inspection result | Date | Date of next inspection | Name, businnes name and signature of the person responsible for inspection |
|------------------|------------------------------|-------------------|------|-------------------------|----------------------------------------------------------------------------|
|                  |                              |                   |      |                         |                                                                            |

| Device inspected | Kind of inspection performed | Inspection result | Date | Date of next inspection | Name, businnes name and signature of the person responsible for inspection |
|------------------|------------------------------|-------------------|------|-------------------------|----------------------------------------------------------------------------|
|                  |                              |                   |      |                         |                                                                            |

| Device inspected | Kind of inspection performed | Inspection result | Date | Date of next inspection | Name, businnes name and signature of the person responsible for inspection |
|------------------|------------------------------|-------------------|------|-------------------------|----------------------------------------------------------------------------|
|                  |                              |                   |      |                         |                                                                            |

**- EXTRAORDINARY MAINTENANCE check register**

| Description of the operations carried out<br>and/or parts replaced | Actual hours<br>of work<br>(hour meter) | Servicing<br>date | Stamp and signature of<br>authorised service centre |
|--------------------------------------------------------------------|-----------------------------------------|-------------------|-----------------------------------------------------|
|                                                                    |                                         |                   |                                                     |
|                                                                    |                                         |                   |                                                     |
|                                                                    |                                         |                   |                                                     |

**NB:** after servicing make sure that this register has been correctly filled in and stamped by the PM GROUP authorised service centre.

| Description of the operations carried out<br>and/or parts replaced | Actual hours<br>of work<br>(hour meter) | Servicing<br>date | Stamp and signature of<br>authorised service centre |
|--------------------------------------------------------------------|-----------------------------------------|-------------------|-----------------------------------------------------|
|                                                                    |                                         |                   |                                                     |
|                                                                    |                                         |                   |                                                     |
|                                                                    |                                         |                   |                                                     |

**NB:** after servicing make sure that this register has been correctly filled in and stamped by the PM GROUP authorised service centre.

| Description of the operations carried out<br>and/or parts replaced | Actual hours<br>of work<br>(hour meter) | Servicing<br>date | Stamp and signature of<br>authorised service centre |
|--------------------------------------------------------------------|-----------------------------------------|-------------------|-----------------------------------------------------|
|                                                                    |                                         |                   |                                                     |
|                                                                    |                                         |                   |                                                     |
|                                                                    |                                         |                   |                                                     |

**NB:** after servicing make sure that this register has been correctly filled in and stamped by the PM GROUP authorised service centre.



| Description of the operations carried out<br>and/or parts replaced | Actual hours<br>of work<br>(hour meter) | Servicing<br>date | Stamp and signature of<br>authorised service centre |
|--------------------------------------------------------------------|-----------------------------------------|-------------------|-----------------------------------------------------|
|                                                                    |                                         |                   |                                                     |
|                                                                    |                                         |                   |                                                     |
|                                                                    |                                         |                   |                                                     |

**NB:** after servicing make sure that this register has been correctly filled in and stamped by the PM GROUP authorised service centre.

| Description of the operations carried out<br>and/or parts replaced | Actual hours<br>of work<br>(hour meter) | Servicing<br>date | Stamp and signature of<br>authorised service centre |
|--------------------------------------------------------------------|-----------------------------------------|-------------------|-----------------------------------------------------|
|                                                                    |                                         |                   |                                                     |
|                                                                    |                                         |                   |                                                     |
|                                                                    |                                         |                   |                                                     |

**NB:** after servicing make sure that this register has been correctly filled in and stamped by the PM GROUP authorised service centre.

| Description of the operations carried out<br>and/or parts replaced | Actual hours<br>of work<br>(hour meter) | Servicing<br>date | Stamp and signature of<br>authorised service centre |
|--------------------------------------------------------------------|-----------------------------------------|-------------------|-----------------------------------------------------|
|                                                                    |                                         |                   |                                                     |
|                                                                    |                                         |                   |                                                     |
|                                                                    |                                         |                   |                                                     |

**NB:** after servicing make sure that this register has been correctly filled in and stamped by the PM GROUP authorised service centre.

**- CABLES AND CHAINS quarterly check register**

| Conditions | Inspector's observations | Inspection date | Inspector's signature |
|------------|--------------------------|-----------------|-----------------------|
|            |                          |                 |                       |
|            |                          |                 |                       |
|            |                          |                 |                       |
|            |                          |                 |                       |
|            |                          |                 |                       |
|            |                          |                 |                       |
|            |                          |                 |                       |
|            |                          |                 |                       |
|            |                          |                 |                       |
|            |                          |                 |                       |

| Conditions | Inspector's observations | Inspection date | Inspector's signature |
|------------|--------------------------|-----------------|-----------------------|
|            |                          |                 |                       |
|            |                          |                 |                       |
|            |                          |                 |                       |
|            |                          |                 |                       |
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|            |                          |                 |                       |
|            |                          |                 |                       |
|            |                          |                 |                       |
|            |                          |                 |                       |

| Conditions | Inspector's observations | Inspection date | Inspector's signature |
|------------|--------------------------|-----------------|-----------------------|
|            |                          |                 |                       |
|            |                          |                 |                       |
|            |                          |                 |                       |
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|            |                          |                 |                       |
|            |                          |                 |                       |
|            |                          |                 |                       |
|            |                          |                 |                       |

| Conditions | Inspector's observations | Inspection date | Inspector's signature |
|------------|--------------------------|-----------------|-----------------------|
|            |                          |                 |                       |
|            |                          |                 |                       |
|            |                          |                 |                       |
|            |                          |                 |                       |
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|            |                          |                 |                       |
|            |                          |                 |                       |
|            |                          |                 |                       |
|            |                          |                 |                       |

## NOTES



## - Maintenance intervention confirmation

The service interventions must be carried out in series respecting the schedule.

Interventions must be marked with a cross.

At 500 hours

- . Hydraulic oil pollution check ☐
- . Structural inspection ☐
- . Valves calibration ☐
- . Manual extension adjustments ☐

.....  
stamp

.....  
signature

At 1500 hours

- . Hydraulic oil pollution check ☐
- . Structural inspection ☐
- . Valves calibration ☐
- . Manual extension adjustments ☐

.....  
stamp

.....  
signature

At 1000 hours

- . Hydraulic oil replacement ☐
- . Structural inspection ☐
- . Valves calibration ☐
- . Manual extension adjustments ☐
- . Reduction gears oil replacement ☐
- . Inspection of control and limiting devices ☐

.....  
stamp

.....  
signature

At 2000 hours

- . Hydraulic oil replacement ☐
- . Structural inspection ☐
- . Valves calibration ☐
- . Manual extension adjustments ☐
- . Reduction gears oil replacement ☐
- . Inspection of control and limiting devices ☐

.....  
stamp

.....  
signature

At 2500 hours

- . Hydraulic oil pollution check ☐
- . Structural inspection ☐
- . Valves calibration ☐
- . Manual extension adjustments ☐

.....  
stamp

.....  
signature

At 3500 hours

- . Hydraulic oil pollution check ☐
- . Structural inspection ☐
- . Valves calibration ☐
- . Manual extension adjustments ☐

.....  
stamp

.....  
signature

At 3000 hours

- . Hydraulic oil replacement ☐
- . Structural inspection ☐
- . Valves calibration ☐
- . Manual extension adjustments ☐
- . Reduction gears oil replacement ☐
- . Inspection of control and limiting devices ☐

.....  
stamp

.....  
signature

At 4000 hours

- . Hydraulic oil replacement ☐
- . Structural inspection ☐
- . Valves calibration ☐
- . Manual extension adjustments ☐
- . Reduction gears oil replacement ☐
- . Inspection of control and limiting devices ☐
- . Runner replacement ☐
- . Hydraulic system washing ☐

.....  
stamp

.....  
signature

At 4500 hours

- . Hydraulic oil pollution check ☐
- . Structural inspection ☐
- . Valves calibration ☐
- . Manual extension adjustments ☐

.....  
stamp

.....  
signature

At 6500 hours

- . Hydraulic oil pollution check ☐
- . Structural inspection ☐
- . Valves calibration ☐
- . Manual extension adjustments ☐

.....  
stamp

.....  
signature

At 6000 hours

- . Hydraulic oil replacement ☐
- . Structural inspection ☐
- . Valves calibration ☐
- . Manual extension adjustments ☐
- . Reduction gears oil replacement ☐
- . Inspection of control and limiting devices ☐

.....  
stamp

.....  
signature

At 7000 hours

- . Hydraulic oil replacement ☐
- . Structural inspection ☐
- . Valves calibration ☐
- . Manual extension adjustments ☐
- . Reduction gears oil replacement ☐
- . Inspection of control and limiting devices ☐

.....  
stamp

.....  
signature

At 7500 hours

- . Hydraulic oil pollution check ☐
- . Structural inspection ☐
- . Valves calibration ☐
- . Manual extension adjustment ☐

.....  
stamp

.....  
signature

At ..... hours

.....  
.....  
.....  
.....  
.....  
.....  
.....

.....  
stamp

.....  
signature

At 8000 hours

- . Hydraulic oil replacement ☐
- . Structural inspection ☐
- . Valves calibration ☐
- . Manual extension adjustments ☐
- . Reduction gears oil replacement ☐
- . Inspection of control and  
limiting devices ☐
- . Runner replacement ☐
- . Hydraulic system washing ☐

.....  
stamp

.....  
signature

At ..... hours

.....  
.....  
.....  
.....  
.....  
.....  
.....

.....  
stamp

.....  
signature

**A**

|                                |      |
|--------------------------------|------|
| - Accessories .....            | 2.14 |
| - Additional crossmember ..... | 2.14 |

**B**

|                                |     |
|--------------------------------|-----|
| - Basic crane main parts ..... | 2.1 |
|--------------------------------|-----|

**C**

|                                                                                                      |      |
|------------------------------------------------------------------------------------------------------|------|
| - Cable check .....                                                                                  | 7.5  |
| - Cable lubrication .....                                                                            | 7.5  |
| - Capacities diagram PM 100024 SP .....                                                              | A.5  |
| - Capacities diagram PM 100024 SP - standard basic machine with TC5 winch .....                      | A.6  |
| - Capacities diagram PM 100026 SP .....                                                              | A.9  |
| - Capacities diagram PM 100026 SP - with jib J 2414.25 .....                                         | A.11 |
| - Capacities diagram PM 100026 SP - with jib J 2416.25 .....                                         | A.13 |
| - Capacities diagram PM 100028 SP .....                                                              | A.15 |
| - Capacities diagram PM 100028 SP - standard basic machine with J 1616.25 jib and S 19 L winch ..... | A.24 |
| - Capacities diagram PM 100028 SP - standard basic machine with S 19 L winch .....                   | A.18 |
| - Capacities diagram PM 100028 SP - standard basic machine with TC5 winch .....                      | A.16 |
| - Capacities diagram PM 100028 SP - with jib J 1614.25 .....                                         | A.21 |
| - Capacities diagram PM 100028 SP - with jib J 1616.25 .....                                         | A.23 |
| - Capacities diagram PM 100029 SP .....                                                              | A.27 |
| - Capacities diagram PM 100029 SP - standard basic machine with TC5 winch .....                      | A.28 |
| - "CE" declaration of conformity of the machine .....                                                | A.30 |
| - Checking for oil leaks from the hydraulic system .....                                             | 7.3  |
| - Checking the anchorage stay rods .....                                                             | 7.5  |
| - Checking the condition of the hoses .....                                                          | 7.2  |
| - Checking the efficiency of the control and limiting devices .....                                  | 6.51 |
| - Checking the emergency stop button .....                                                           | 6.51 |
| - Checking the hosing guards .....                                                                   | 7.2  |
| - Checking the hydraulic oil level .....                                                             | 7.4  |
| - Checking the jack sliding blocks .....                                                             | 7.6  |
| - Checking the load maintenance valve .....                                                          | 6.53 |
| - Checking the oil level in the rotation reduction gears .....                                       | 7.3  |
| - Checking the rotation block (fig. 6.7.1) .....                                                     | 6.52 |
| - Checking the rotation limiter (fig. 6.7.1) .....                                                   | 6.52 |
| - Checking the rotation limiter with stabilisation control device .....                              | 6.52 |

|                                                                   |      |
|-------------------------------------------------------------------|------|
| - Checking the supplementary crossmember .....                    | 7.6  |
| - Circulation on the roads.....                                   | 6.57 |
| - Cleaning the machine.....                                       | 7.8  |
| - Closing the crane in case of electrical-electronic failure..... | 6.67 |
| - Closing the crane in case of mains failure .....                | 6.66 |
| - Conditions of use .....                                         | 2.4  |
| - Connector block fuse replacement .....                          | 9.1  |
| - Control and limiting devices.....                               | 2.5  |
| - Control devices for transit on roads .....                      | 2.10 |
| - Controls .....                                                  | 6.1  |
| - Controls and signals/gauges located in the truck cab .....      | 6.3  |
| - Crane destabilisation .....                                     | 6.57 |
| - Crane destabilisation and circulation on the roads.....         | 6.57 |
| - Crane resting position.....                                     | 6.56 |
| - Crane resting position with jib.....                            | 6.56 |
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