

# M 10A.12

## use and maintenance

FROM SERIAL NUMBER \*0125\*

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## use and maintenance ORIGINAL INSTRUCTIONS

**THANK YOU FOR SELECTING ONE OF FASSI CRANES.**

This crane is the result of **FASSI** philosophy: ongoing research, rigorous testing, data verification, and analysis of performances.

Many years of experience has allowed us to grant you the maximum safety of operation together with the optimization of machine performances.

All this represents the core of **FASSI quality system**.

**FASSI quality system is in conformity with  
UNI EN ISO 9001:2000 (ISO 9001:2000)**

The fitment of the crane on the vehicle must be carried out in accordance with the instructions given by **FASSI** in the manual for hydraulic crane fitting and the relevant chassis manufacturers directives.

The Manufacturer declines all responsibility and guarantee if the fitting is entrusted to workshops without sufficient technical capability to carry out the work in conformity.

Be sure that the unit has been installed, inspected and tested in accordance with the local legal requirements.

As well as the principal safety norms, this manual contains a description of the crane and the instructions for use and maintenance.

The following instructions refer to mobile cranes in general and must be integrated with the manual for use supplied by the centre responsible for the crane fitting on truck, vehicle or other type of structure.

**READ THIS MANUAL CAREFULLY** prior to use or any maintenance. A few minutes spent now could save time and labour later.

Always conform to the safety norms and the instructions for use and maintenance contained in the present manual in order to guarantee a long life to the crane.

### NOTE

The original version of the present manual is in italian.

**The spare parts catalogue for the crane can be viewed in the Internet site: [www.fassicat.com](http://www.fassicat.com)**



## 2 CLASSIFICATION OF THE CRANE MODEL

### 2.1 Generality

The design of this crane has been carried out in respect of **DIN 15018** norms, fatigue test classification **H1B3**. The crane can operate, intermittently, with lifting devices other than the hook. The dimensions and the capacity of the implements must be proportioned with crane performances.

### 2.2 Hydraulic jibs (not available)

### 2.3 Technical data

#### M 10A.12

Lifting capacity	Standard reach	Hydraulic extension	Rotation arc	Rotation torque	Working pressure	Pump capacity	Oil tank capacity	Crane weight	Max. working pressure on the outrigger ( $\Phi$ 120)
1,1 tm 10,8 kNm 7.956 lbf.ft	2,70 m 8'10" ft	1,6 m ft 5'2"	325°	0,19 tm 1,9 kNm 1.374 lbf.ft	18 MPa 2.611 psi	6 l/min 1,59 gal/min	15 l 3,96 gals	155 kg 342 lbs	12 daN/cm <sup>2</sup> 174,05 psi



# M10A.11 M10A.12

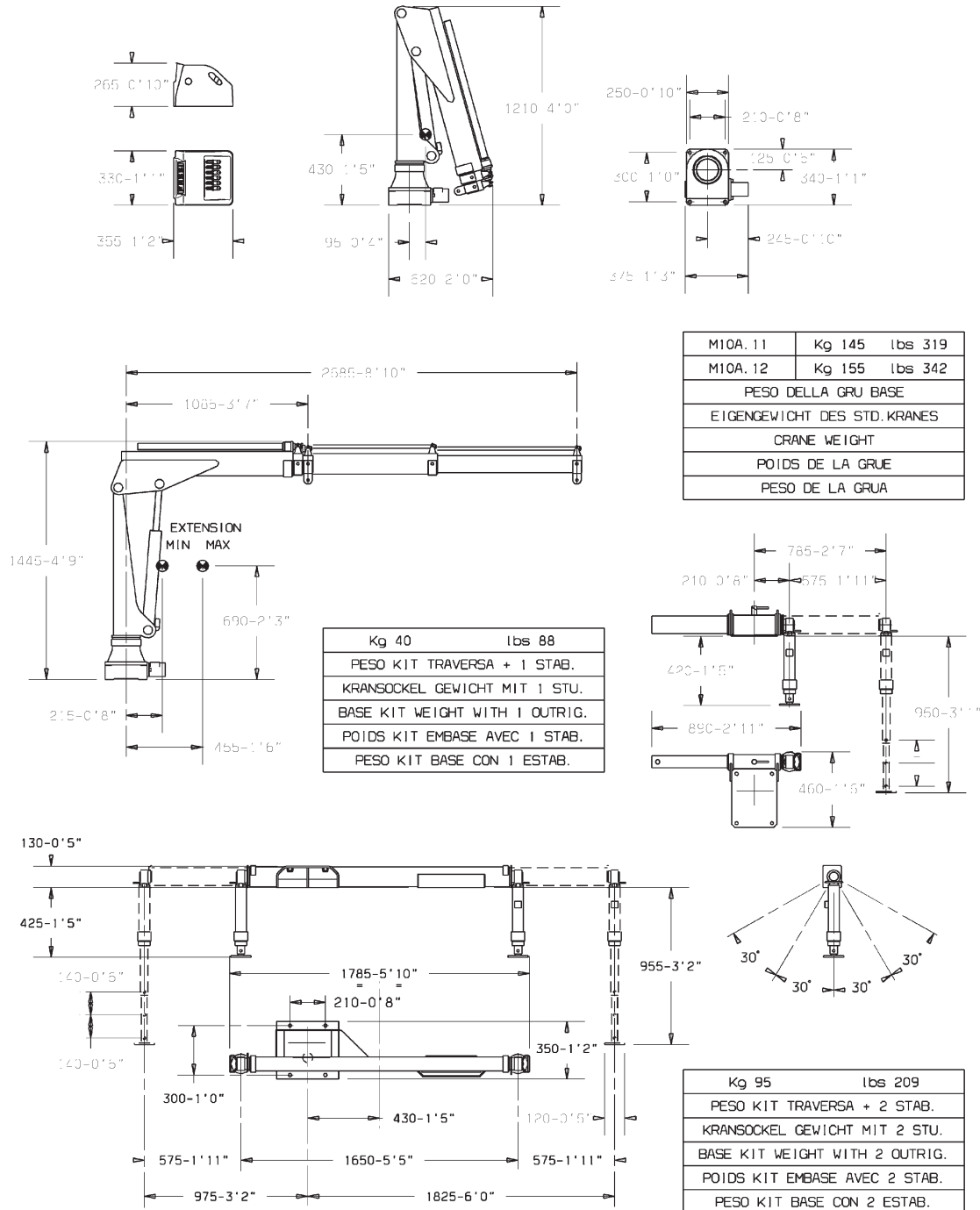
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01

Informazioni tecniche  
Technische informationen  
Technical information  
Informations techniques  
Informacion tecnica

PESI, DIMENSIONI E POSIZIONE BARICENTRO  
GEWICHTE, ABMESSUNG UND POSITION DES KRANSCHWERPUNKTES  
WEIGHT, DIMENSIONS AND BARYCENTRE POSITION  
POIDS, DIMENSIONS ET POSITION DU BARYCENTRE  
PESO, DIMENSIONES Y CENTRO GRAVEDAD

Data  
Ausgabe  
Edition  
Edition  
Fecha  
99/02/17



Dati e dimensioni sono forniti a titolo indicativo e non impegnativo  
Unverbindliche Angaben, Konstruktionsänderungen vorbehalten  
Data and descriptions are approximate and not binding  
Toutes les données et descriptions sont fournies à titre indicatif sans engagement  
Datos y descripciones todos a título indicativo y no imperativo

### 3 CAPACITY PLATES

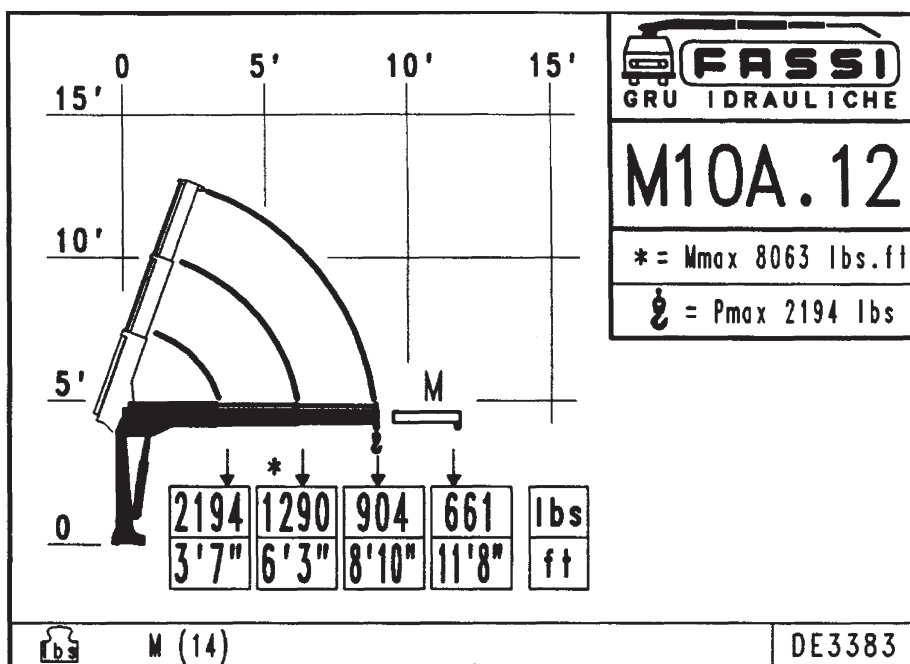
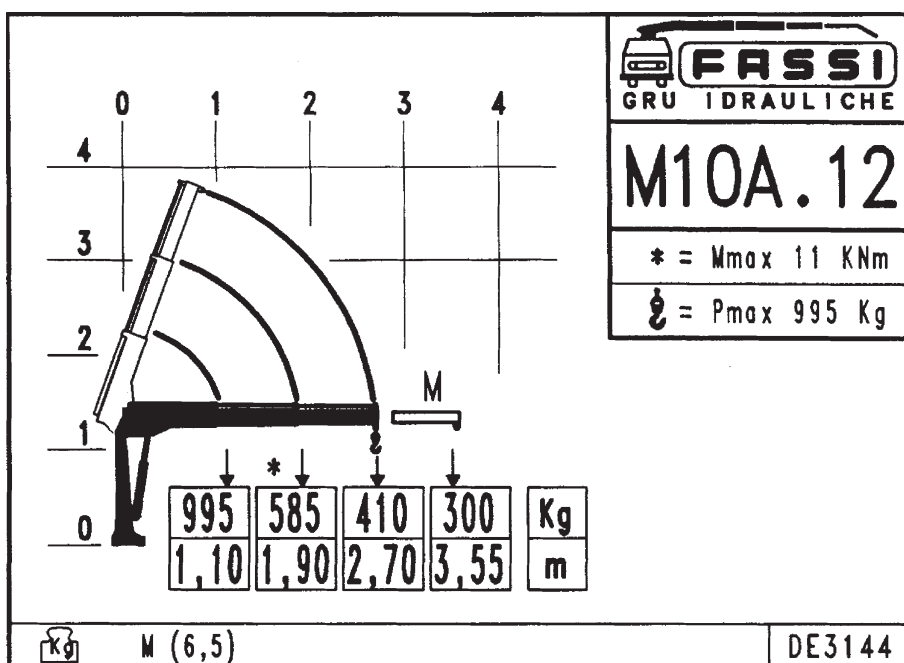
#### 3.1 Generality

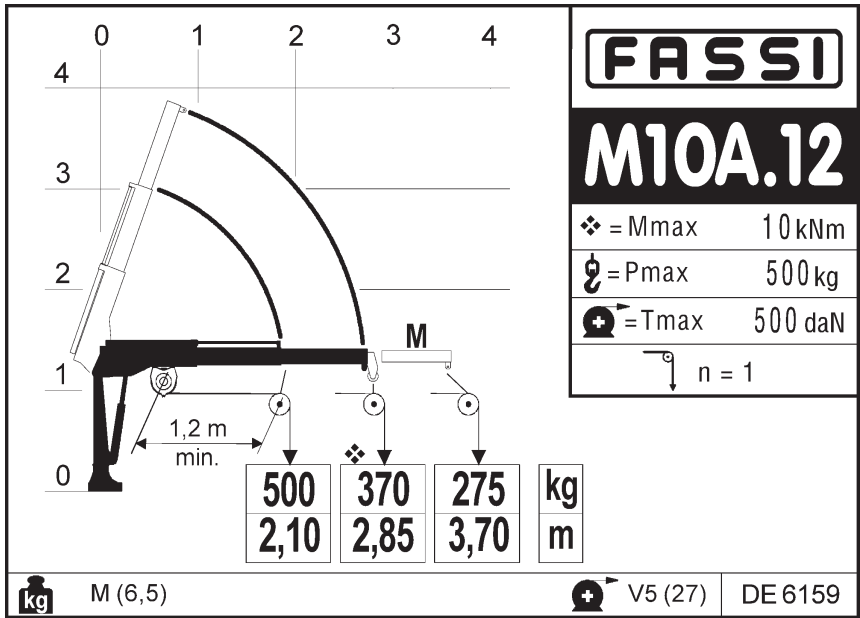
The represented plates refer to the nominal design capacities.

**(!) WARNING (!)**

If the capacities are downgraded or partially reduced (e.g. sector in front of vehicle cab) capacity plates must be applied in line with the final test figures.

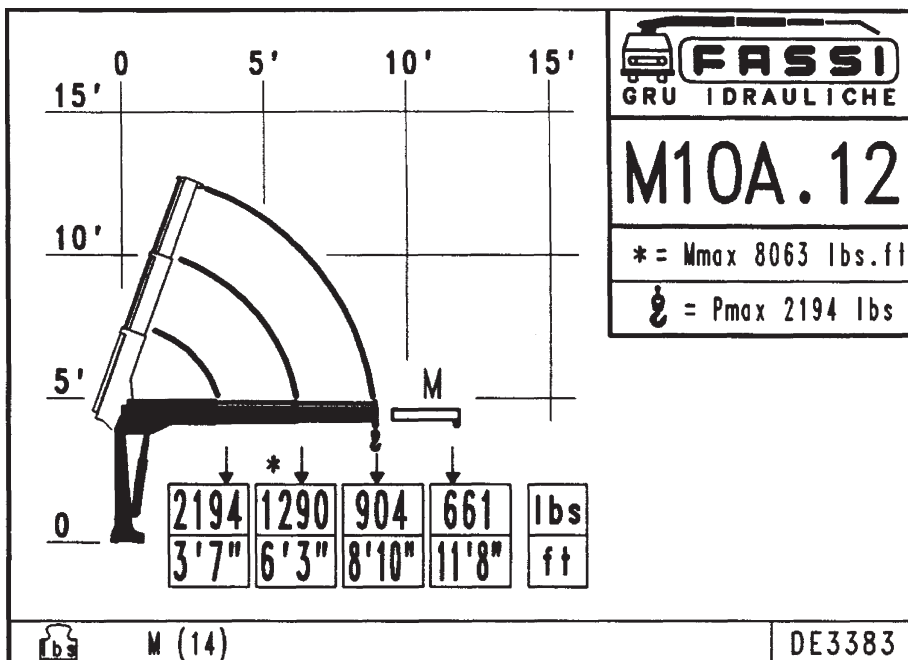
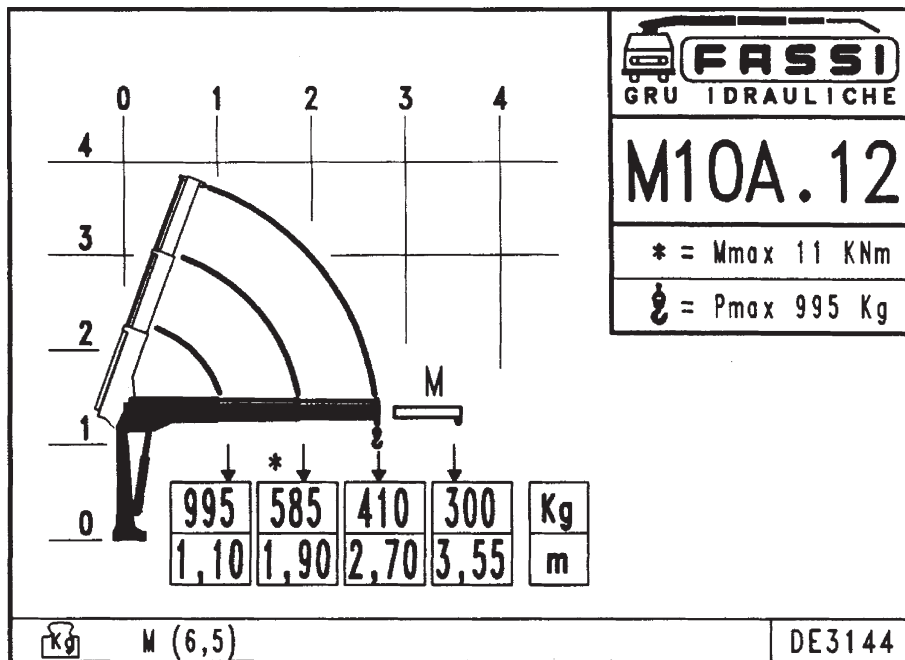
#### 3.2 Capacity plates with load limiting device







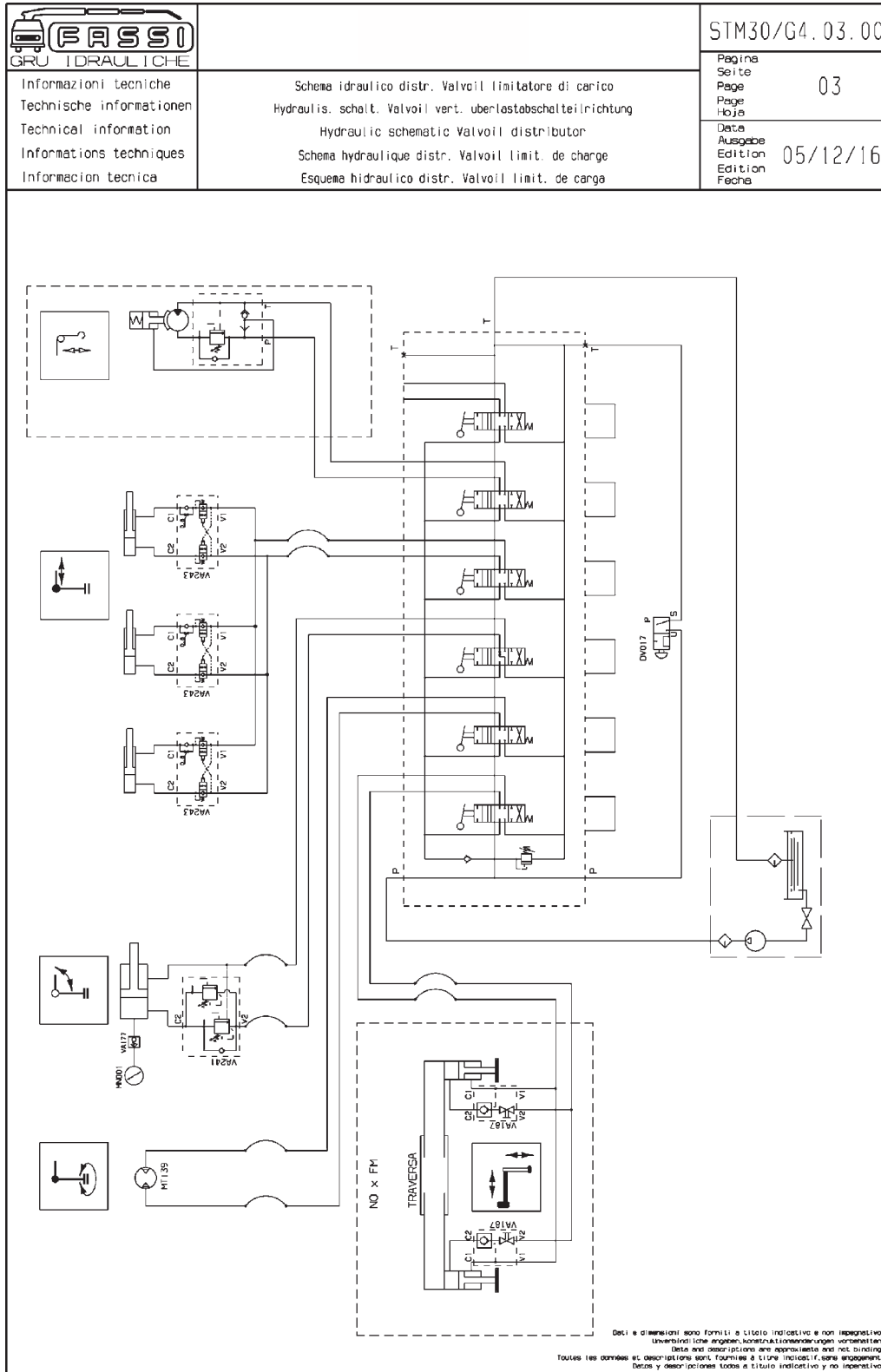
### 3.3 Capacity plates with lifting moment limiting device





# 4 HYDRAULIC SCHEMATICS (version with load limiting device)

Hydraulic schematic for crane - Walvoil distributor - load limiting device



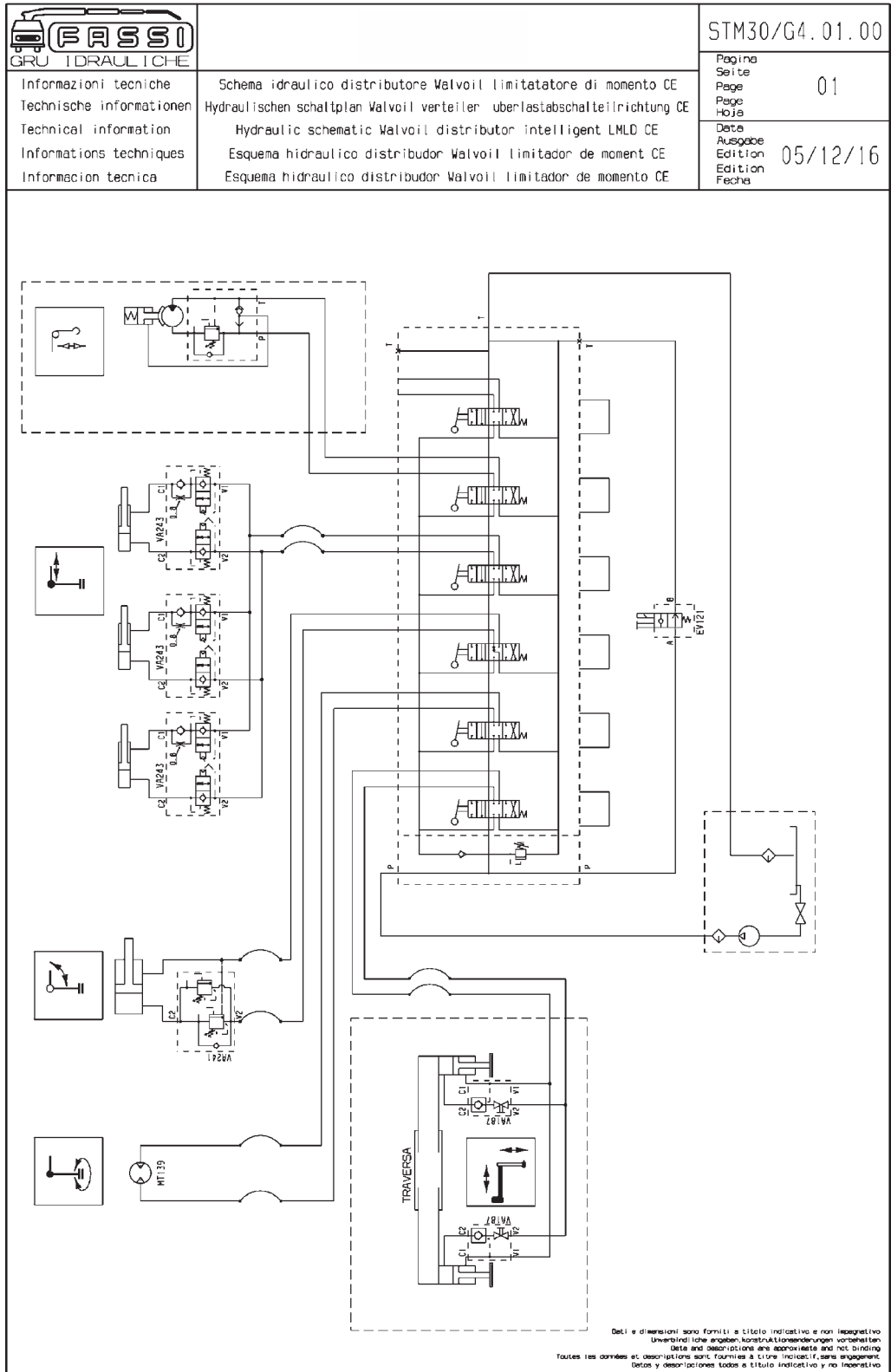
CODE DESCRIPTION

DV017	HYDRAULIC BUTTON	VA187	BLOCK VALVE + FAUCET
MN001	GAUGE QUICK CONNECTION	VA241	SIMPLE EFFECT BLOCK VALVE
MT	MOTOREducer	VA243	DOUBLE EFFECT BLOCK VALVE
VA177	PARACHUTE VALVE		



# 4.1 HYDRAULIC SCHEMATICS (version with lifting moment limiting device)

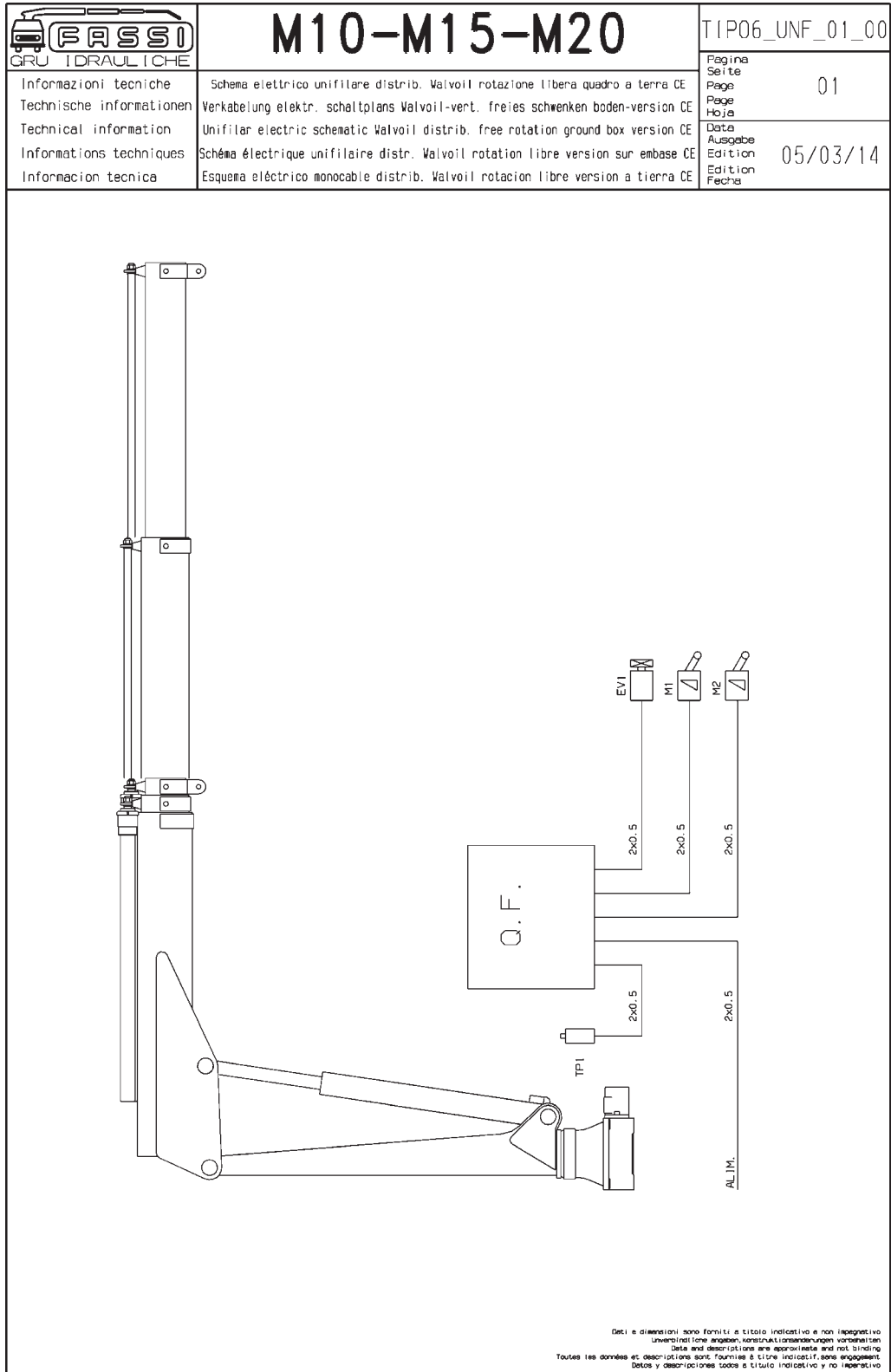
Hydraulic schematic for crane - Walvoil distributor - lifting moment limiting device - CE



CODE	DESCRIPTION		
EV121	ELECTROVALVE	VA241	SIMPLE EFFECT BLOCK VALVE
MT	MOTOREDUCTOR	VA243	DOUBLE EFFECT BLOCK VALVE
VA177	BLOCK VALVE + FAUCET		



Electric schematic - Walvoil distributor - free rotation - control panel on ground - CE



CODE DESCRIPTION

ALIM	ELECTRICAL FEED CABLE MAIN CONTROL PANEL	M1	HANDLING MICROSWITCH
EV1	EMERGENCY ELECTROVALVE	M2	MICROSWITCH FOR THE EXTENSION BOOM RE-ENTRY
F1	PROTECTION FUSE	TP1	PRESSURE TRANSDUCER FOR INNER RAM





## 6 SAFETY NORMS

Strictly conform to the norms reported by the plates **DE2499B** (fig. 1) or **DE4236** (fig. 1a) placed next to the controls, in order to avoid possible accidents while operating the crane.

Only authorized persons are allowed to operate the crane.

The crane must be used on firm, level ground.

Check that the vehicle hand brake is on and that the wheels are chocked.

Before every operation make sure that:

- no-one is within the working area of the crane;
- the safety devices are in place and operative;
- the minimum safe working distances from power lines are observed;
- the load is correctly slung and hooked.

Stabilize the vehicle by the outrigger rams, making sure that:

- the lateral supports are fully extended;
- the wheels are in contact with the ground and the suspension is not completely unloaded.

Use the crane in accordance with the use and maintenance manual, making sure that:

- the load and radius are within the maximum limits shown on the crane capacity plate;
- the crane is used progressively avoiding sudden load movements
- swinging or dragging of the load is avoided;
- the load is lifted before rotating.


When using implements protect the crane working area with a barrier.

The vehicle/crane are not left unless the power take off is disengaged and the load is on the ground.

Before driving the vehicle make sure that the outriggers are fully retracted and re-entered, the safety taps closed and the crane is in folded position.

### VERTICAL VERSION

fig. 1



**FASSI**  
GRU IDRAULICHE

FASSI GRU IDRAULICHE SpA  
24021 ALBINO (BG) ITALIA - Via dei Carmelitani, 2  
Tel. + 39 35 77.64.00 - Fax + 39 35 75.50.20


DE2499B

#### INSTRUCTIONS FOR SAFE USE OF THE CRANE

- 1 Only authorized persons are permitted to operate the crane.
- 2 The crane must be used on firm, level ground.
- 3 Check that the vehicle hand brake is on and that the wheels are chocked.
- 4 Before operation make sure that:
  - no-one is within the working area of the crane;
  - the safety devices are in place and operative;
  - the minimum safe working distances from power lines are observed;
  - the load is correctly slung and hooked.
- 5 Stabilize the vehicle with the outriggers, making sure that:
  - the lateral supports are fully extended;
  - the wheels are in contact with the ground and the suspension is not completely unloaded.
- 6 Use the crane in accordance with the use and maintenance manual, making sure that:
  - the load and radius are within the maximum limits shown on the crane capacity plate;
  - the crane is used progressively avoiding sudden load movements;
  - swinging or dragging of the load is avoided;
  - the load is lifted before rotating.
- 7 When using implements protect the working area with a barrier.
- 8 The vehicle/crane are not left unless the power take off is disengaged and the load is on the ground.
- 9 Before driving the vehicle ensure that the outriggers are fully retracted and re-entered, the safety taps closed and the crane is in the folded position.

### HORIZONTAL VERSION

fig. 1a



**FASSI**  
GRU IDRAULICHE

FASSI GRU IDRAULICHE SpA  
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Tel. + 39 35 77.64.00 - Fax + 39 35 75.50.20

DE4236

#### INSTRUCTIONS FOR SAFE USE OF THE CRANE

- 1 Only authorized persons are permitted to operate the crane.
- 2 The crane must be used on firm, level ground.
- 3 Check that the vehicle hand brake is on and that the wheels are chocked.
- 4 Before operation make sure that:
  - no-one is within the working area of the crane;
  - the safety devices are in place and operative;
  - the minimum safe working distances from power lines are observed;
  - the load is correctly slung and hooked.
- 5 Stabilize the vehicle with the outriggers, making sure that:
  - the lateral supports are fully extended;
  - the wheels are in contact with the ground and the suspension is not completely unloaded.
- 6 Use the crane in accordance with the use and maintenance manual, making sure that:
  - the load and radius are within the maximum limits shown on the crane capacity plate;
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- 7 When using implements protect the working area with a barrier.
- 8 The vehicle/crane are not left unless the power take off is disengaged and the load is on the ground.
- 9 Before driving the vehicle ensure that the outriggers are fully retracted and re-entered, the safety taps closed and the crane is in the folded position.



## 7 WARNING AND INSTRUCTIONS

### 7.1 Generality

The use of the crane is reserved to authorized personnel, instructed in advance, who has to conform to the safety norms and instructions contained in the use manual supplied with the crane. (See norms ISO 9926-1)

It is absolutely prohibited to walk or stop under a suspended load

It is prohibited for unauthorized persons to be within the working area.

Under no circumstances interfere with the safety and protection devices.

Warning plates, as well as instruction and operation plates must be replaced when no longer readable or missing. See Paragraph 25 Instruction and warning plates.

Do not use the outriggers to raise the vehicle.

To avoid hitting bridges or tunnels check and record the overall height of your crane in the folded position or in laid position in the body or on the load. Always respect and pay proper attention to road signs placed in proximity of such obstacles.

### 7.2 Before operating

#### (!) ATTENTION (!)

**Check that protections are in their place and that all safety devices are fitted and active. (See norms ISO 9927-1)**

Keep the ladder and the control station on the top seat, clean; Normally, the seat can tilt forward.

Make sure that control stations are properly lit so as to ensure safety while operating and allow instruction plates to be visible.

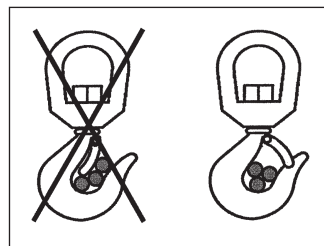
Check that the working area is adequate and properly lit for your crane.

Make sure that the hook is always free to rotate on its pin and that nothing obstructs its vertical positioning.

Check the efficiency of the hook safety catch.

Carefully inspect the condition of ropes or chains. (if present)

Make sure that the pallet fork (if present) is connected to the crane hook by means of a chain having at least **three (3)** rings.



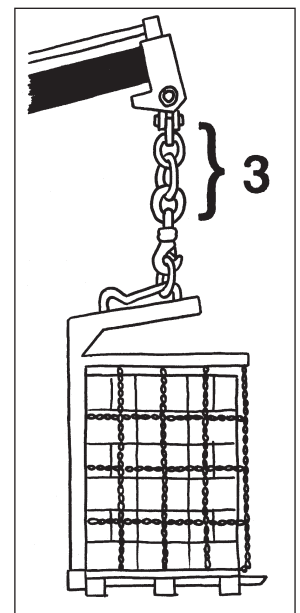
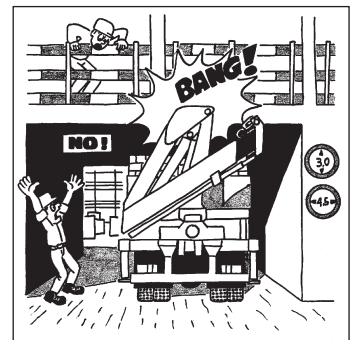
### 7.3 During operation

Take the vehicle fumes away from the working area by fitting an extension tube of a suitable diameter and a right length to the exhaust system. Do not run the engine in a indoor area without first making sure there is adequate ventilation.

When using the ladder to reach the control station on the top seat, avoid knocking into the controls while going up or down the ladder.

The control station on the top seat is provided with side safety guards; stay within these guards.

Make sure that no one is within the working area of the crane.

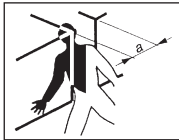
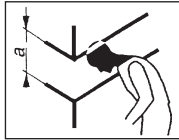

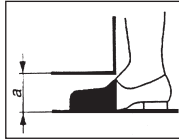
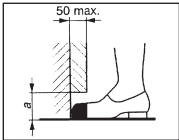
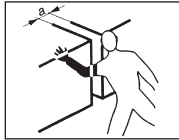
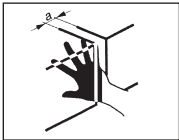
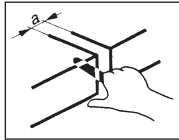


**(!) ATTENTION (!)**

Avoid swinging the load above working and transit areas; any hidden danger situation must be audibly alarmed.

Avoid all those situations which may result in crushing during vehicle stabilization, crane movement and load handling.

(In conformity with EN 349 standard the minimum safe working distances to avoid crushing parts of the body)

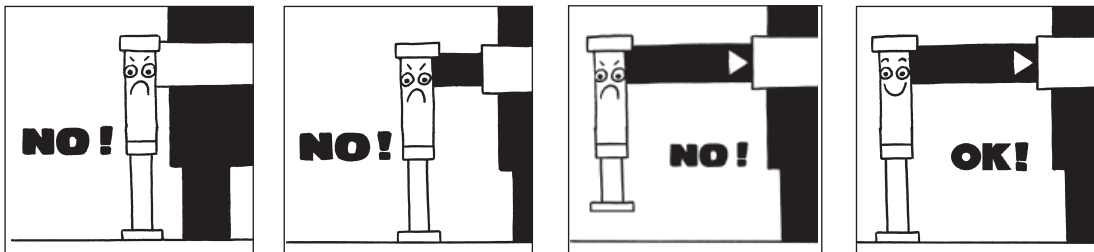
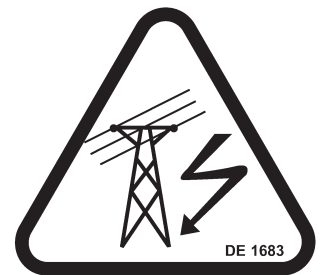
Parts of the Body	Minimum safe working distance mm	Figure	Parts of the Body	Minimum safe working distance mm	Figure
Body	500		Head	300	
Leg	180		Foot	120	
Toes	50		Arm	120	
Hand Wrist Fist	100		Finger	25	

The table indicates the minimum safety working distances concerning the various parts of the body.

The figures illustrate circumstances which may turn out to be dangerous if you fail to respect the minimum safe distances and if it is impossible to introduce larger parts of the body.

**(!) ATTENTION (!)**

For designated areas as: outrigger running towards rest position, leaning and folding points of the booms in rest position, control platform and swinnig column, top seat and running inner boom, where no carter is possible to be placed, please observe the shear and trapping hazard stickers nearly placed.



**(!) ATTENTION (!)**

Failure to respect the minimum safe distances may result in a safety hazard and a deadly risk.

Remember that the stability of the unit (crane-vehicle) is only guaranteed by the complete lateral extension of the outriggers and by the observance of the capacity plates.

Stabilize the vehicle on a horizontal plane with a maximum tolerance of 1,5 degrees. Make sure that the outrigger rams rest on a solid base, if necessary use larger outrigger base plates (available on request) to avoid sinking. If you adopt other means, make sure that they are suitably sized for the load they must bear.



**(!) ATTENTION (!)**

Respect the safety distances from electric lines; the minimum distance is, according to CEN norms, five (5) meters, except for otherwise prescribed by national norms.

**(!) ATTENTION (!)**

Failure to respect the minimum safe distances may result in electrical hazards for the operator and his assistants.

**ELECTRICUTION:**

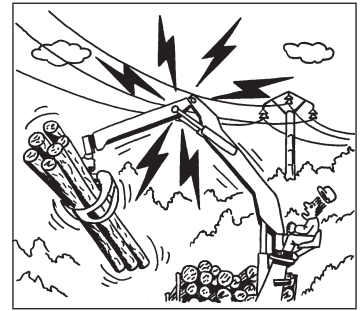
General safety precautions for the operator and potential co-workers. If the crane hits an overhead power line, do not touch the crane, the truck or the load.

Carefully evaluate the danger before moving. If you are closer than 10 meters from the crane, the truck, the load or the electric line, move at least 10 meters away, by shuffling away with small steps, in order to minimize the chance of getting a too high voltage difference between the feet.

Warn others to stay away; call for help and contact the power company to de-energize the line: do not attempt to assist someone in direct or indirect contact with the power line before the power has been disabled: you run the risk of being electricuted yourself.

If you are in the truck cabin, stay inside without touching the vehicle body because it's extremely hazardous to go out before the line is de-energised.

Help the electricuted person if you know the first-aid procedures, otherwise wait for the paramedics to arrive.

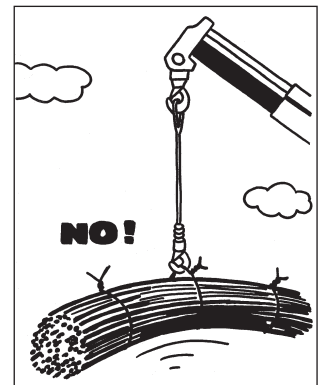


**(!) ATTENTION (!)**

Do not utilize the crane during thunderstorms and with wind speed exceeding 13,8 m/s (50 km/h), maximum value of the Beaufort scale degree 6.

**Indications about wind speed**

Force of the wind Beaufort scale	Wind speed m/s	Classification	Characteristics
0	0,0 - 0,2	Calm	Calm wind, smoke goes up quite vertically
1 2	0,3 - 1,5 1,6 - 3,3	Light breeze	Smoke reveals the direction of the wind, one can feel the wind blowing, leaves start fluttering.
3 4	3,4 - 5,4 5,5 - 7,9	Moderate breeze	Leaves and branches are in constant motion, small branches start fluttering. Dust and papers dance on the ground.
5	8,0 - 10,7	Fresh breeze	Small green branches bend, the surface of waterways and lakes are wavy.
6	10,8 - 13,8	Near gale	<b>Big branches bend, wind whistles through high-tension cables, it's difficult to walk keeping the umbrella open.</b>
7	13,9 - 17,1	Moderate gale	Trees sway, it's hard to walk
8	17,2 - 20,7	Storm wind	Branches get broken, it's hard to walk.
9	20,8 - 24,4	Storm	It damages houses (antennas and roof tiles fall down)



**(!) ATTENTION (!)**

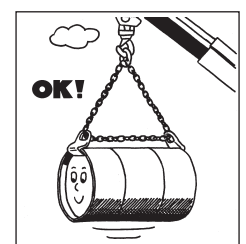
**Carefully inspect the load rigging.**

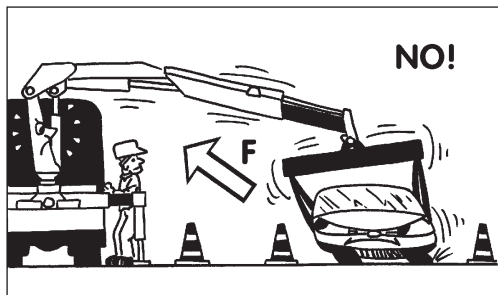
Hook up the load, checking that it does not exceed the capacity indicated on the lifting diagram specific to each load configuration.

Make sure that the lifted load is balanced.

Avoid swinging the load above the control station; in cases where the load is too close, the crane must be operated from the opposite side or with the radio-remote control.

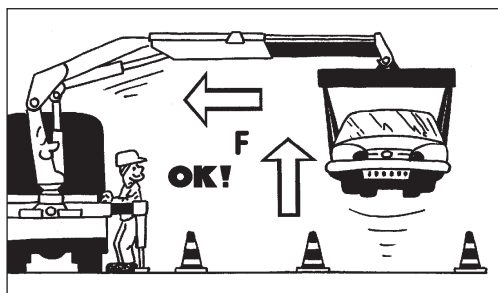
When operating through a winch, lift the load vertically using the cable and not the booms in order to avoid swinging the load.





Do not rotate the crane before the load is lifted.

Do not operate with sudden movements, activate the controls with slow and progressive movements; rotate slowly and with care paying attention to the stability of the vehicle.



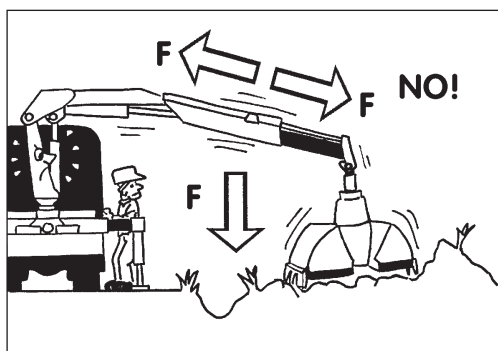
With vertical lift, on hydraulic and mechanical extension, rotate slowly in order to avoid side-skidding.

**(!) ATTENTION (!)**

Do not utilize the crane for pushpull (F), lateral (F) or sideways (F) operations.

**(!) ATTENTION (!)**

Crushing (F) or push (F) manoeuvres are not permitted.



**(!) Never operate the outriggers when the crane is loaded.**

**(!) ATTENTION (!)**

The vehicle\crane must not be left unless the load is on the ground, the booms of the crane (and of the hydraulic jib), are folded and laid on a solid base and the power take-off is disengaged.

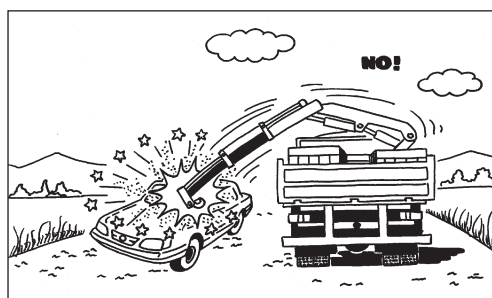
Do not move the vehicle with the crane not in transport position and not with a load suspended on the crane.

## 7.4 At the end of the operation (Prior to driving the vehicle)

Fold the crane.

If the booms of the crane (or of the hydraulic jib) are to be laid on the body or on the load, they must be suitably blocked to prevent possible sideways movements.

Make sure that the indications about the overall dimensions are respected.



**NOTE**

Implements can be left mounted on the booms of the crane (or of the hydraulic jib) only if the overall dimensions are respected; they must be suitably blocked to prevent possible sideways movements.

If an accessory (fork, ...) is mounted, it must be tied down at all times during transport.

Make sure that the outrigger supports and rams are re-entered within the overall width of the truck and locked by the safety devices.

Disengage the power take off.

## 7.5 Residual risks

**NOTE:** This reasoned list does not carry the complete list of the residual risks, which are examined more in detail paragraph by paragraph in the manual under "**(!) ATTENTION (!)**"; it is instead a way to exemplify to the operator the types of hazards linked to the use of the crane, which basically involves a lifted load in movement. Therefore we confirm you the following

**It is absolutely forbidden to use the crane without having read and understood the manual for use and maintenance and without having been previously instructed by experienced personnel on all aspects of safe crane operation.**

**Risk evaluation shall be followed by adequate provisions in order to avoid risks and damages to people and things.**

**The crane operator shall be held directly responsible for the correct operation of the crane also according to the jobsite conditions.**

**Overturn:** the crane can overturn, thus hurting people and damaging things specially in following conditions:

- if it is not correctly stabilized
- if the moment limiting device is disabled
- if the ground conditions at the jobsite are not stable enough with respect to the dimensions of the outrigger base and/or of the additional base plate
- if you increase the design dynamic increasing the pump oil flow.

**Moment limiting device:** never try to bypass nor tamper with the moment limiting device and the various safety systems installed on the crane. In such case the operator shall be held responsible for the subsequent crane performance. It is also important to understand the alarm messages generated by the "moment limiting device" and act consequently.

**Control seat:** before operating from the control seat the operator shall make sure that he's safe from hazards (i.e. he stands clear of the load, there is a way of escape,..). Otherwise he shall manoeuvre from a different control seat; if there is none available, the crane should be equipped with a radio control or remote control in order to allow the operator to operate the crane in absolute safety.

From the control seat the operator shall be able to visually inspect the whole working area at all times. If it is not possible he shall team up with a co-worker able to control the whole area; otherwise the crane shall be equipped with a radio control in order to ensure the operator with the perfect position to see all potential hazards clearly at all times. Naturally the operator shall also teach this eventually co-worker with the scope of not harm each other with control commands.

**Load rigging:** carefully inspect the load rigging; the operator shall make sure that the load is properly attached and balanced and that all unexpected movements are not allowed. Be careful not to hit any potential impediments during the crane movements.

**Jobsite conditions:** prior to use always ascertain that the working area is free and clear of potential obstacles to crane operations (people, building walls, balconies, eaves, scaffoldings, tree branches, other lifting means or machines, electric lines,...). This may hurt people, damage both the impediments and the crane, and provoke also the crane overturn.

Make sure that there is no risk of elements falling on the operator or on the crane and take the right precautions to prevent it.

**Overload and/or fatigue:** the crane can break down due to fatigue or overload:

- If it is misused (with cycles, loads or pump oil flow not pertinent to the crane class)
- If it is used for improper tasks (side, oblique or reversal pull)
- If it is used in poor jobsites (corrosive environment, too high or too low temperature, foundry,... [see conditions of use])
- If the load exceeds the rated capacity indicated on the relevant plates

**Wrong manoeuvring:** the crane can fall break or overturn if the operator performs a wrong manoeuvre due to the lack of familiarity with the operation procedures (see manual of use and maintenance) or due to inadequate psychophysical conditions: we remind you that the directives in force impose a suitable training of the personnel before using these types of machines and require an adequate psychophysical condition to operate safely a lifting device that always implies the intrinsic danger of a lifted load.

**Weather conditions:** too high or too low temperatures may damage the components of the oleodynamic and electric circuits (See max and min conditions of use); it is forbidden to operate the crane during a storm with lightning hazards, so we recommend to fold it and put it to rest. Furthermore when the wind is too strong the crane can overturn or break down.

**Shearing, entrapment:** the crane has a lot of parts in movement that it is impossible to cover; therefore the operator shall always be aware of this residual risk and keep clear from the parts in movement, particularly from the load; the operator is held responsible not only for himself but also for those working in proximity of the crane and for those who may draw closer even if not authorized.

**Electricution:** the crane is not insulated from electric contacts and therefore it is not equipped to work under tension, even if the contact is accidental. Therefore be compliant with the min clearance prescribed by the national directives in force. Generally speaking the clearance from electric lines with a max tension of 38.000 volts should be at least 5 meters: Higher tensions require higher clearance to be verified case by case together with competent technicians and with respect to the environment conditions.

**Manual extension overload:** manual extensions are controlled by the moment limiting device only under the conditions described in the relative chapter; the control system of the manual extension overload must be activated by the operator as described.

**Accessories:** be careful when assembling and disassembling the accessories (extensions, buckets, baskets,...); first verify the weight, the securing systems and the instructions for assembly and dismantlement; then appraise their barycentre and provide for adequate provisional blocking systems in order to avoid sudden movements.

**(!) ATTENTION (!)**

**IF IN THE FOLDING CONDITION THE HOOK IS OUT OF TRUCK SIZE, IT MUST BE TAKEN AWAY BEFORE TRAVELLING.**

**Breakdown of some sensors**

The system "**moment limiting device - intelligent type**" is always monitored during ignition (the system, after having activated the various circuits, checks the presence of all the inputs for around 4 seconds) and then continuously monitors the operation and the efficiency of the limiting device (approx. every 25 milliseconds).

For most of the components the system checks also the congruence of the incoming signal with the one the system expects.

**Maintenance:** maintenance is particularly important; the lack of it may damage things or hurt people.

**Particular operations:** if you are required to operate under particular conditions not illustrated in the manual of use and maintenance, analyse carefully the situation and always refer to an authorised Fassi shop or to the Fassi technical support service or to experienced operators before starting working.



## 8 IDENTIFICATION OF THE CRANE MODEL

### 8.1 Generality

The exact **crane model**, **serial number** and description of **implements** will enable **FASSI Service Department** to give a rapid and efficient response.

### 8.2 Crane mark

Identification data are marked on the plate DE5892, rivetted on the base with personalized rivets FASSI. (fig. 2)

- 1 - Crane model
- 2 - Serial Number
- 3 - Year of manufacturing

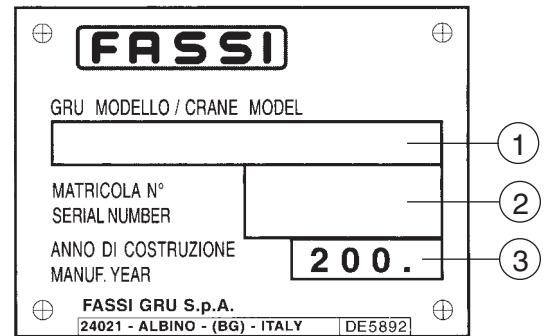


fig. 2

(!) **UNDER NO CIRCUMSTANCES SHOULD THE DATA MARKED ON THE PLATES BE ALTERED.**



# 9 CRANE NOMENCLATURE AND SAFETY AND PROTECTION DEVICES

## 9.1 Crane nomenclature (fig. 5)

**Pos. Description**

- 1. Base
- 2. Rotation hydraulic motor
- 3. Rotation reducer assembly
- 4. Column
- 5. Inner ram
- 6. Inner boom
- 7. Booms extension rams
- 8. Extension boom sections
- 9. Lifting hook
- 10. Crane control assembly
- 11. Mounting frame and outrigger assembly (optional)
- 12. Manual extensions (optional)
- 13. Oil tank (optional)

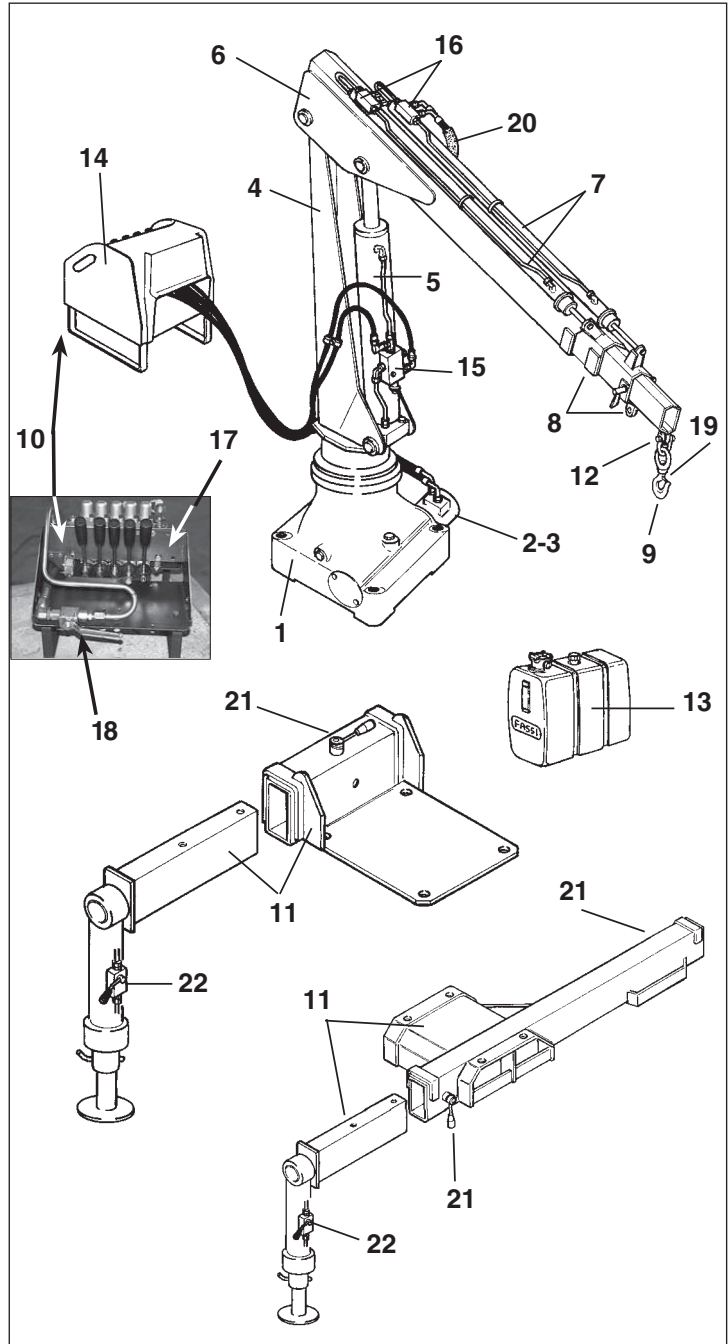


fig. 5

## 9.2 Safety and protection devices (fig. 5)

**Pos. Description**

- 14. Crane control assembly
- 15. Check valve for inner ram
- 16. Check valve for boom extension ram
- 17. Main pressure valve (crane control)
- 18. Safety stop
- 19. Hook safety device
- 20. Hose protections

**When fitted the mounting frame and outrigger assembly**

- 21. Locking devices for outrigger support
- 22. Tap and check valve for outrigger ram

**(!) Before crane use check that safety and protection devices are fitted and active.**

**(!) Under no circumstances interfere with the safety and protection devices.**

**(!) Interference with the check valves and removal of the lead seals remove the Manufacturer and invalidate the warranty.**



## 12 TILTABLE OUTRIGGER RAMS

### 12.1 Tilttable outrigger rams with adjustable height

Tilttable outrigger rams' main characteristics are the following:

- they can be placed in a vertical (at 180°) or inclined position (at 30° and at 60°) to avoid obstacles on the truck frame;
- if needed they can be easily extended to reach the level of the truck frame: an extension placed inside the hydraulic ram allows the adjustment of the base plate at three (3) different heights. The extension locking is secured through a locking pin and a security pin. (fig. 13-13a)

After the extension of the lateral outrigger supports, place the outrigger rams in a working condition as follows:

- Supporting the ram, remove the check pin and the locking pin from their positions (fig. 14); when the ram is in the vertical position, a stop prevents it permits from overturning.
- Position, carefully, the ram in working condition, insert the locking pin in its new position (fig. 15) and secure it with the check pin.
- Extend (eventually) the outrigger ram.

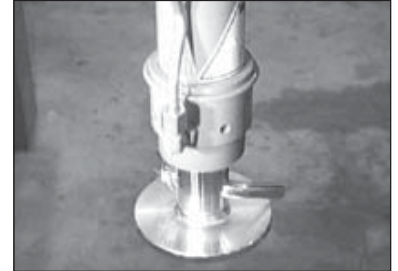


fig. 13

To re-position the rams to the folded position.

- Re-enter the outrigger ram.
- Remove the check pin and the locking pin from their position.
- Carefully position, the ram in a upward direction and support the ram, insert the locking pin in its new position and secure it with the check pin; if the ram is placed in a vertical position, a rotation stop prevents overturning.



fig. 13a

**(!) The locking pin is held to the base structure by a chain in order to prevent its loss.**

**(!) The locking pin is constructed from special material**  
**- do not replace it with a non original part**  
**- your security depends on it**



fig. 14

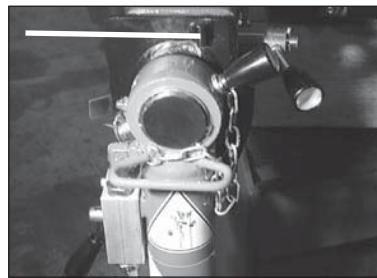


fig. 15



# 13 MANOEUVRES AND CONTROLS TO STABILIZE THE VEHICLE

## 13.1 Generality

The outriggers rams prevent damaging stresses both to the frame and to the vehicle suspensions on which the crane is mounted to and assure the stability of the unit during load handling.

### (!) ATTENTION (!)

**Be very careful when stabilizing the vehicle; make sure that no one is or transits in close proximity of the working area of the outriggers.**

### (!) ATTENTION (!)

**The crane stability is maintained by the maximum extension of the outrigger supports, by the solidity of the base underneath the plates of the outrigger rams and by the observance of the capacity plates.** To check the maximum working pressure see Paragraph 2.3 Technical data

Check that the outrigger rams are applied on a solid base; if necessary use larger outrigger base plates (available on request) to avoid sinking.

When stabilization is complete the wheels of the vehicle must still be in contact with the ground and the suspensions must not be fully unloaded.

Stabilize the crane so as to operate on a horizontal plane with a maximum tolerance of 1,5 degrees.

While loading, it may be necessary to vertically adjust the outrigger rams to prevent an overload on the outriggers, then stabilize again.

While unloading, the outrigger rams may not be perfectly in contact with the ground because of a rise in the suspension; it is therefore recommended to stabilize the vehicle during operation to avoid an overturn.



DE 6409A





## 13.2 Base beam and supplementary outriggers with manually extendable outrigger support/s.

Upon request we supply special mounting units to install on the crane base, which can include the following (according to your needs):

- Base beam, manual outrigger support (installed on the right or left side) and tiltable outrigger ram.
- Supplementary outrigger beam, manual outrigger support (installed on the side closer to the column) and tiltable outrigger ram.
- Beams, manual outrigger supports and tiltable outrigger rams.

The tiltable outrigger rams (if needed) can be placed in a vertical (up at 180°) or inclined position (at 30° or at 60°), to avoid obstacles on the truck frame.

**(!) The extension supports are kept in position by safety devices so as to assure the impossibility of accidental movements.**

### 13.2.1 Manoeuvres for the manual extension of the outrigger supports

**(!) ATTENTION (!)**

**To manoeuvre the supports hands must only grab the handles placed on the outrigger rams.**

#### Base beam with outrigger support.

- Position the lever **B** of the locking device (fig. 8), placed on the base beam, in the position of the fig. 8a; the spring loaded security pin of the device will be released from its position.
- Pull, extending from the base beam, the outrigger support.
- Position the lever **B** in the previous position; the locking loaded security device remains released.
- Pull, extending the outrigger support until the coupling pin engages.

#### Supplementary outriggers with outrigger support/s.

- Position the lever **B** of the locking device (fig. 9), placed on the supplementary outriggers, towards the column (fig. 9a); the spring loaded security pin of the device will be released from its position.

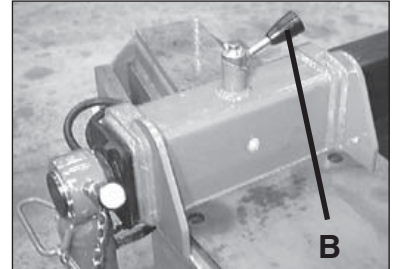


fig. 8



fig. 8a

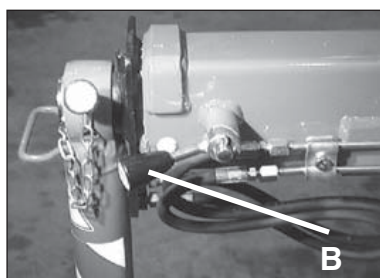


fig. 9

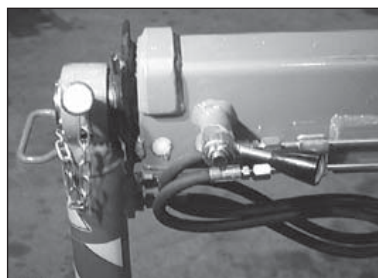


fig. 9a

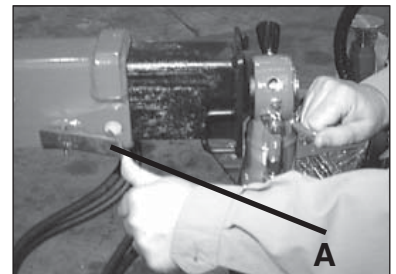


fig. 9b

- Disengage the locking device (fig. 9b) bringing it to the outside of the hook spring **A** and simultaneously pull, extending from the base the outrigger support.
- Position the lever **B** in the previous position; the locking loaded security device remains released.
- Pull, extending the outrigger support till the coupling of the pin.
- By the same sequence, repeat the operations described to extend the other support (when fitted).

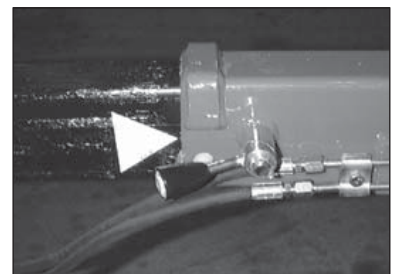


fig. 10

**(!) ATTENTION (!)**

**The complete extension of the outrigger support is visually indicated by the yellow triangle which is found at the end of the beam. (fig. 10-11).**

**Always check that the outriggers supports, once in their rest position, are locked in their seat by the locking devices (spring loaded security pin); this will ensure complete extension of the outrigger support (essential for the stability of the complete crane vehicle unit) and the impossibility of accidental movement.**

### 13.2.2 Manoeuvres for the re-entry of the outrigger supports

#### Base beam with outrigger support.

- Position the lever **B** (fig. 11) in the position of the fig. 11 a; the spring loaded security pin will be released from its position.
- Re-enter, by pushing, the outrigger support.
- Position the lever **B** in the previous position; the locking loaded security device remains released.
- Push, by re-entering, the outrigger support till the coupling of the locking devices.

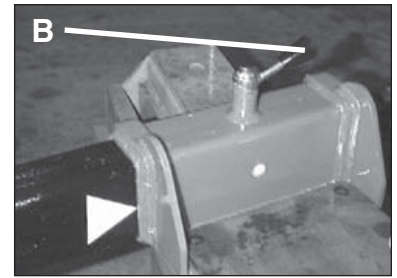


fig. 11

#### Supplementary outriggers with outrigger support/s.

- Position the lever **B** (fig. 12) towards the column; the spring loaded security pin will be released from its position.
- Re-enter, by pushing, the outrigger support.
- Position the lever **B** in the previous position; the locking loaded security device remains released.
- Push, by re-entering, the outrigger support till the coupling of the locking devices and stops.
- By the same sequence, repeat the operations described to re-enter the other support (when fitted).



fig. 11a

#### (!) WARNING (!)

Keep hands clear of automatic stop device (hook-spring-A).

Always check that the outriggers supports, once in their rest position, are locked in their seat by the locking devices, so as to assure the impossibility of accidental movement.

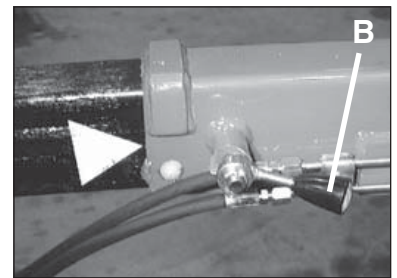


fig. 12

### 13.3 Description of the controls to stabilize the vehicle

#### Lever function C

- Lever **C** Outrigger rams control distributor for the crane. Fig. 16

The controls of the outrigger supports and rams, indicated in the fig. 16 coincide with the plates **DE3142** or **DE3434** or **DE3445** placed, according to the equipment, on the console of the crane control. The symbol and the graphic indicate the operating lever **C** in relation to their movement.

As previously indicated

- Manually extend the outrigger supports of the crane.
- Position the outrigger rams in a working condition.

#### (!) ATTENTION (!)

When controlling from the side of the vehicle where it is not possible visually to check the operation, it is compulsory to make sure that no one is or transits in close proximity to the outrigger rams.

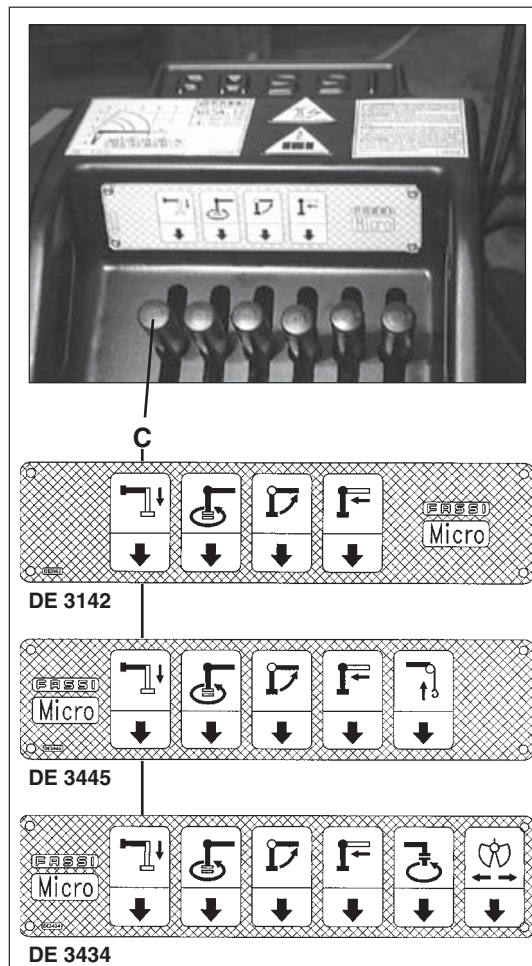


fig. 16

**“Separate” control of the outrigger ram descent**

- Open the tap of the valve for the required outrigger ram. Fig. 17
- Operate the control lever **C** (fig. 16) to obtain the outrigger ram descent.
- Close the tap of the valve after having completed the descent and stabilisation manoeuvres.
- Complete, with the same procedure, the other stabilizer ram to stabilize the vehicle.

**“Contemporary” control of the outrigger rams descent**

- Open the taps of the valves placed on the outrigger rams. Fig. 17
- Operate the control lever **C** (fig. 16) to obtain the outrigger rams descent.
- Close the taps of the valves after having completed the descent and stabilisation manoeuvres.

**(!) ATTENTION (!)**

During the stabilisation operations, for each outrigger ram, it is recommended to DESCENT the outrigger as the last manoeuvre.

**(!) ATTENTION (!)**

The stabilization has to be carried out with care and gradually keeping the vehicle in horizontal levelled condition to prevent spring overloads and chassis twisting.

**13.3.1 Manoeuvres for re-entry of the outriggers within the overall vehicle width after crane use.**

- Open the taps of the valves (fig. 17) placed on the rams.
- Operate the control lever **C** (fig. 16) to re-enter the outrigger rams.
- Close the taps of the valves after having completed the re-entry the outrigger rams.
- Stow the tiltable outrigger rams and the outrigger supports (see page 14-15).

**(!) Always check that the outrigger supports, once in their rest position, are locked in their seat by the locking devices, so as to assure the impossibility of accidental movements.**

**(!) It is compulsory to close the outriggers rams valves taps before moving the truck.**

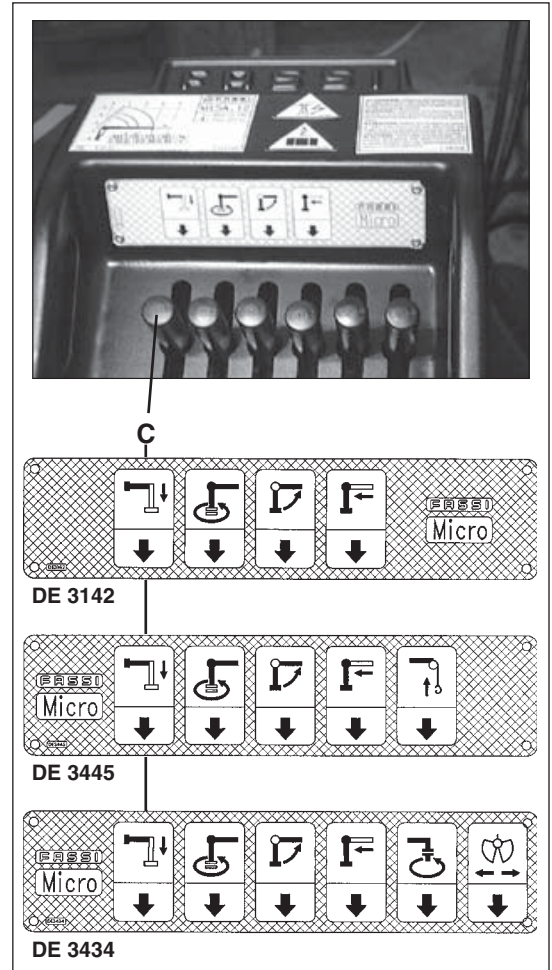


fig. 16

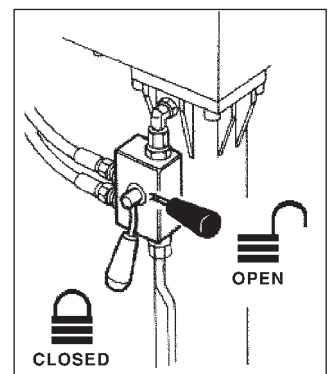


fig. 17



# 14 CONTROLS TO OPERATE THE CRANE

## 14.1 Generality

### (!) WARNING (!)

Before operating the crane it is compulsory to set the outriggers and to shut the safety check valve taps (when fitted).

This coincides with that indicated on the plate **DE2327** placed on the outriggers. (Fig. 14)


The crane and hydraulic implements can be operated with manual controls placed on the control console.

The symbols and the graphics of the plates **DE3142** or **DE3445** or **DE3434** (according to the equipments) reported over each lever define their function in relation to their movement.

### (!) WARNING (!)

If the crane is equipped with electro-hydraulic gearcase when you operate the control lever the motor pump turns on.

The crane can be operated with the power source turned off but we recommend to keep the vehicle's engine on to change the battery (See Chapter 07 "Safety norms").



**ATTENZIONE:** PRIMA DI AZIONARE LA GRU E' OBBLIGATORIO METTERE IN OPERA GLI STABILIZZATORI.

**WARNING:** BEFORE OPERATING THE CRANE IT IS COMPULSORY TO EXTEND THE OUTRIGGERS.

**ATTENTION:** AVANT D'UTILISER LA GRUE IL EST OBLIGATOIRE DE METTRE EN FONCTION LES STABILISATEURS.

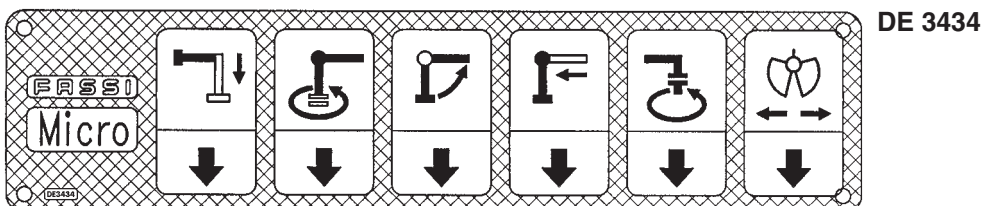
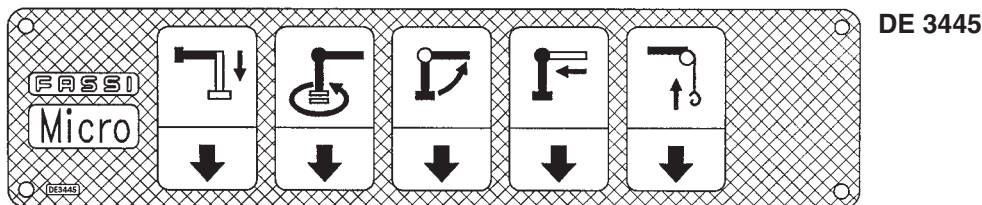
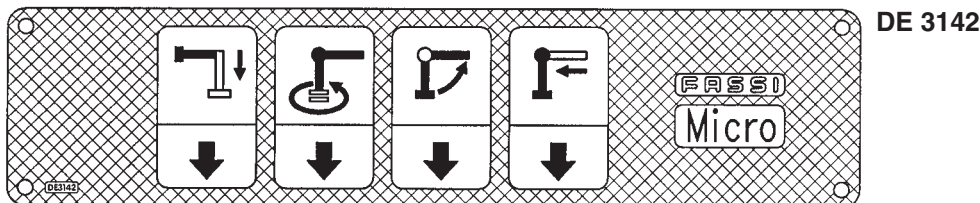
**ACHTUNG:** VOR INBETRIEBNAHME DES KRANS MUESSEN DIE ABSTUETZUNGEN AUSGEFAHREN.

**ATENCIÓN:** ANTES DE ACCIONAR LA GRUA ES OBLIGATORIO ESTABILIZAR EL VEHICULO.

**ATENÇÃO:** ANTES DE UTILIZAR A GRUA É OBRIGATORIO COLOCAR EM FUNCIONAMENTO OS ESTABILIZADORES.

**DE2327**

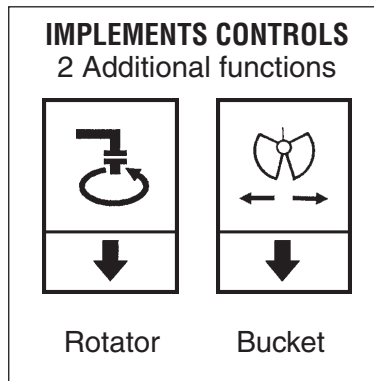
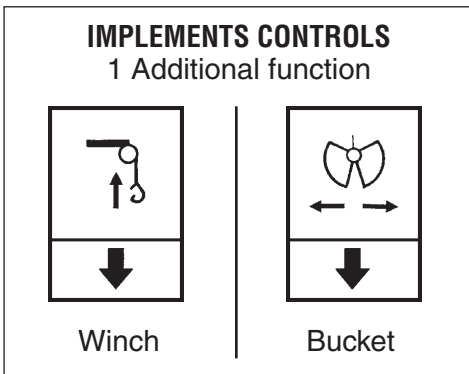
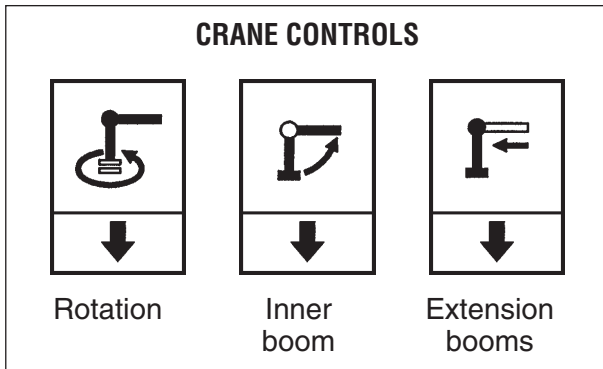
fig. 14



**(!) ATTENTION (!)**

The sequence of the plates placed on the crane controls may be different.

Make sure that the lever you are going to operate correspond to the control you selected.



**(!) Operate the levers smoothly and gradually (!)**

When carrying out simultaneous movements of two or more functions, also related to pump flow and lever travel, it is possible that on reaching the stroke end of a particular function, an increase in speed of the other functions will occur.

## 14.2 Manoeuvres to unfold the crane into a working condition

- Engage the power take off (when fitted).
- Stabilize the vehicle as described on paragraph 13 "Manoeuvres and controls to stabilize the vehicle", if the stabilizing assembly is fitted.

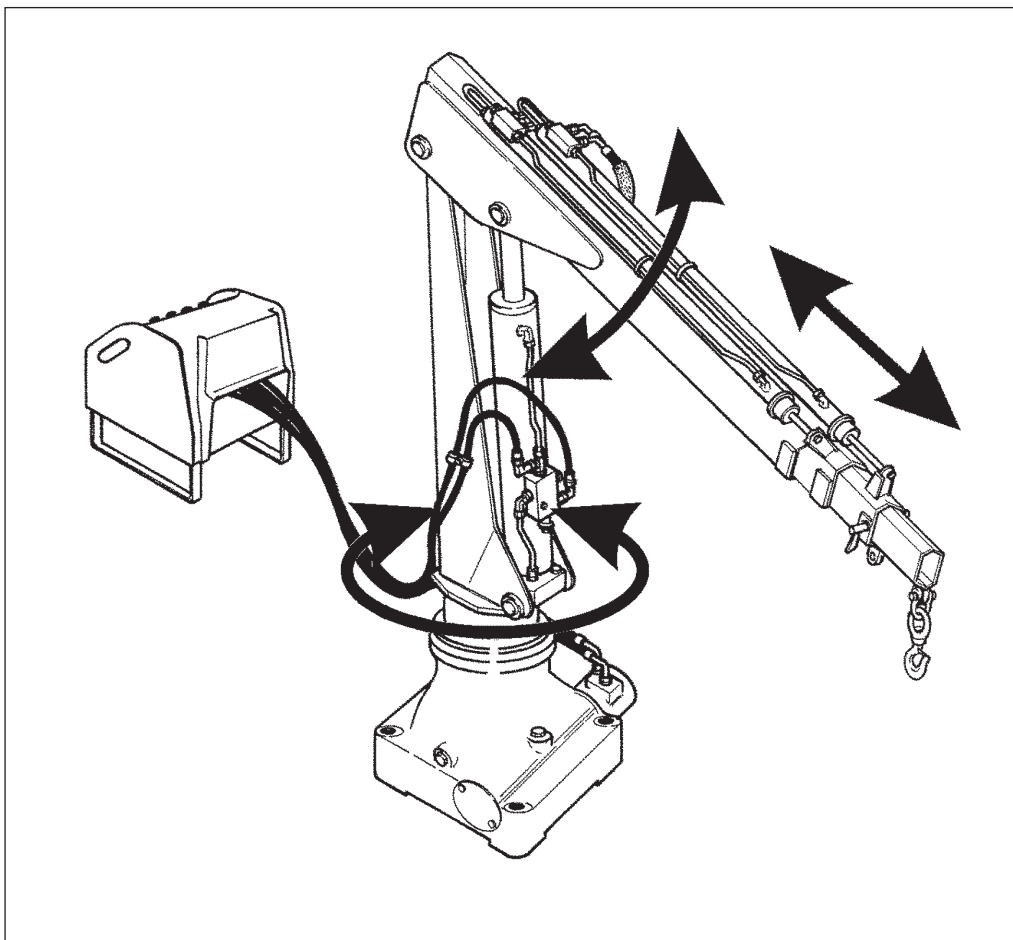
By operating the corresponding levers:

- make sure that the extension booms are closed;
- lift the inner boom;
- position the hook on the vertical line above the load.

## 14.3 Manoeuvres to fold the crane into the rest condition

By operating the corresponding levers:

- fold the extension booms to their stroke end;
- rotate the crane (if necessary);
- fold the inner boom to its stroke end;
- Lift and re-enter the outriggers to within the overall vehicle width as described on paragraph 13 "Manoeuvres and controls to stabilize the vehicle", if the stabilizing assembly is fitted.







## **15 MANOEUVRES OF THE CRANE LOADS (version with load limiting device)**

### **15.1 Generality**

- (!) Before manoeuvring the load, verify that the working area is suitable for your crane.

The lifting curves of the capacity plate indicate the maximum load that the crane can lift at a certain radius and at a certain height. To utilize the maximum capacity of the crane, it is necessary to position the inner boom as indicated on the capacity plate. A characteristic which permits the classification of cranes is their lifting capacity or maximum lifting moment. The moment is defined by the value obtained from the weight of the load to be lifted (**kg**) by its distance (**meters**) from the centerline of the crane rotation.

#### **Crane with load limiting device**

During load handling, do not exceed the reach limits given, or the load indicated on the above mentioned charts. If the limits are exceeded, the load limiting device, permitting the slow descent of one of the two, or both, lifting rams (or if the jib is fitted: the jib outer ram) will be immediately activated.

### **15.2 Load limiting device - stop button**

A characteristic which permits the classification of cranes is their lifting capacity or maximum lifting moment. The moment is defined by the value obtained from the weight of the load to be lifted (**kg**) by its distance (**meters**) from the centerline of the crane rotation.

#### **Load limiting device**

##### **(!) ATTENTION (!)**

The device called "load limiting device" utilizes the opening caused by the overload-induced pressure of the safety check valves of the crane inner and outer rams. When the intervention values are reached, these valves are activated, permitting the slow descent of one of the two, or both, lifting rams and preventing use of the crane in an overloaded condition.

When the configuration is next to the horizontal, to stop the load descent, it is compulsory to reduce the load radius towards the column, operating the control lever to re-enter the boom extension rams of the crane.

- (!) This operation must be carried out within and not over 5 seconds from the beginning of the load descent.

In the upper part of the lifting curves, the overload condition generates a very dangerous situation: in fact the opening of the safety check valves causes the lowering of the booms. If this descent is not stopped straight away by re-entering the boom extension rams and by lifting the inner boom (in case it's lowering), it may provoke a huge increase in the reach limits with consequent additional overload and turnover hazard.

##### **(!) ATTENTION (!)**

**THE USER SHALL ALWAYS COMPLY TO THE LIFTING CURVES INDICATED ON THE CAPACITY PLATES.**

## Stop button

This device is activated (pressing the button down) when you need to interrupt the feeding of the oil under pressure to the distributor and therefore you necessitate to suspend the functionality of its components (i.e. in case of block of one of the distributor levers when in control position).

### **(!) ATTENTION (!)**

**This device immediately stops the movement of all crane functions (by pressing down of the stop button); this system stops the oil developing pressure within the distributor.**

After operating, the button, remains in the down position, keeping the crane not working; to restore the functions you must pull back the button, to its original position.

## 16 MANOEUVRES OF THE CRANE LOADS (version with lifting moment limiting device)

### 16.1 Generality

- (!) Before manoeuvring the load, verify that the working area is suitable for your crane.

The lifting curves of the capacity plate indicate the maximum load that the crane can lift at a certain radius and at a certain height. To utilize the maximum capacity of the crane, it is necessary to position the inner boom as indicated on the capacity plate. During load handling, do not exceed the reach limits given, or the load indicated on the above mentioned charts. If the limits are exceeded, the limiting device, allowing all manoeuvres, which reduce the lifted load within the permitted reach limits and forbid all other manoeuvres, will be immediately activated.

#### Lifting moment limiting device

A characteristic which permits the classification of cranes is their lifting capacity or maximum lifting moment. The moment is defined by the value obtained from the weight of the load to be lifted (**kg**) by its distance (**meters**) from the centerline of the crane rotation.

The device called "lifting moment limiting device" preserves the crane structure from overloads, as it prevents any movement which increases the value of the moment up to the maximum established value.

## 16.2 "Electronic" lifting moment limiting device

This device utilises an electro-hydraulic system managed by an electronic logic that prevents any operation tending to cause an increase in the pressure induced by the load in the lifting ram up to the critical values. These values, which are not exceedable, determine the intervention levels and provide the data for setting the device.

The pressure value detected in the lifting ram is turned into an electric signal by the transducer, and sent to the electronic logic of the device which determines the locking or unlocking of the controls concerned when the crane is in block.

The device features an electro-hydraulic control that does not allow the set value to be exceeded, by deactivating the controls (levers in neutral position) commanded by the limiting device. When the controls are released (levers in neutral position) the only manoeuvre permitted by the limiting device is the re-entry of the extensions. The other manoeuvres will be activated only when the pressure in the lifting ram will be lower than the intervention value of the limiting device.

### (!) ATTENTION (!)

**The presence of the lifting moment limiting device does not release the user from the obligation to respect what is indicated on capacity plates and lifting curves.**

## 16.3 Control panels for lifting moment limiting device

Layout of the control panel (fig. 17), placed next to the distributor of the crane

- A - Yellow light: load between 90 and 100%
- B - Red light: load higher than 100%
- C - "STOP" button
- D - Green warning light (electric on)
- E - Fuse

If the **green warning light D** comes on, it confirms that the electric circuit is active.

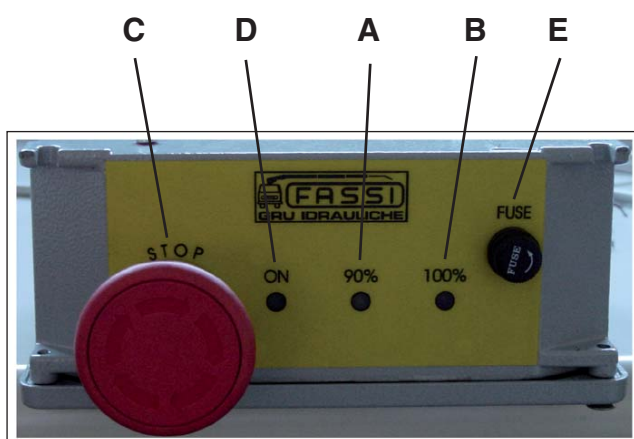


fig. 17

**!NOTE!** In the absence of electric power all crane functions will be deactivated.

If the **yellow led light A** comes on during load handling, 90% of the capacity (lifting moment) has been reached.

If during operation the **red led light B** comes on, the activation value of the lifting moment limiting device has been reached.

When there are serious, imminent and dangerous conditions for persons and things during load handling, operate on the **STOP** button, which isolates all crane functions.

## 16.4 Temporary OVERRIDE-REACTIVATION for the crane functions with "electronic" lifting moment limiting device

- In case of an electrical failure:

On the left side of the distributor it has been installed an electro-valve with a manual locking function (fig. 22) which allows to reactivate all the crane functions in case of absence of the electric power. Only in these conditions it is permitted to remove the lead seal which protects the device. Push the button and turn it into the clockwise sense (fig. 22a pos. 1-2); the button stays in stable and closed position.

- (!) **When the electric power is reestablished, remember to put the button in its original position, turning it into the anti-clockwise sense. (fig. 22a pos. 3-4)**

### (!) ATTENTION (!)

#### Activation of the reactivation button.

This activation prevents the operation of the lifting moment limiting device, consequently, the operation under such conditions can involve an overload condition. In such an emergency condition (where the lifting moment limiting device has been disabled), the operator, who is responsible for the machine safety, must:

- carefully consider the manoeuvres required to return to normal working conditions: it is however compulsory to effect the re-entry of the extension booms at first,
- calmly and carefully assess the type and scale of the hazards arising from these manoeuvres and the possible reaction of the crane (tipping over, frame overload, uncontrolled fall of the load due to a hydraulic system overload etc.);
- make all movements as slowly as possible to reduce the dynamic overload to the minimum.

After such emergency operations and prior to re-use of the crane, you must immediately go to **FASSI authorised Center** for testing the structure and re-sealing of the device.



fig. 22

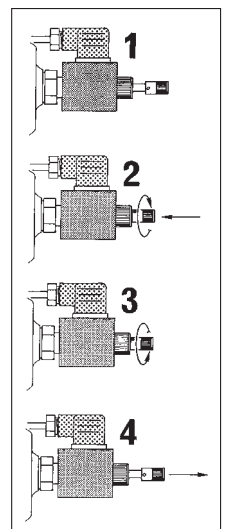


fig. 22a



## 17.1 Generality

The crane, in load condition **H1B3**, can be provided with implements such as:

- Manual extensions
- Winches
- Hydraulic extensions
- Personnel baskets
- Clam 'shell buckets
- Augers

- (!) When using an implement it is always necessary to check that its weight, dimension and capacity is matched to the crane performances.  
For further information please refer to **FASSI GRU IDRAULICHE**

Warning and norms for crane use also apply for hydraulic implement use.

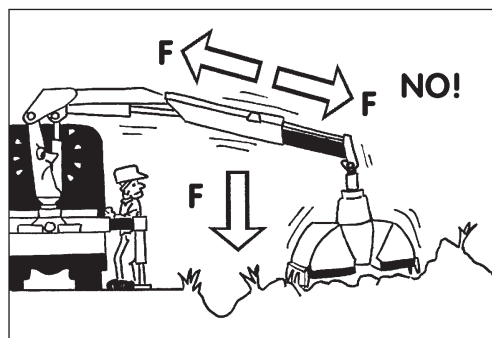
Before using a personnel basket it is necessary to provide the crane with the safety devices requested by the local norms in force, EN280 in Europe, and prior to use of the crane it has to be tested and inspected in accordance with the local legal requirements.

- (!) When the crane is fitted with implements or laid on the truck body it is necessary to check they are locked to assure the impossibility of accidental movements and that the led signalling maximum obstruction in height (if fitted) confirms the correct positioning of the crane.
- (!) The crane can operate, intermittently and not continuously, with lifting devices other than the hook, only on loose and light materials (not on scrap iron).

### (!) ATTENTION (!)

**In case of using the crane with lifting devices other than the hook, the access to the working area at the persons must be prevented.**

The dimensions and the capacity of the implements must be proportioned with crane performances.



### (!) WARNING (!)

**CRUSHING (F) OR PUSH (F) MANOEUVRES ARE NOT PERMITTED.**

## 17.2 Hydraulic connections for implements - supplementary hoses.

### **(!) WARNING (!)**

To ensure that the control corresponds to the implement movement, hydraulic connections are symmetrically fitted with coupling unions. Never invert such positions: movements inversion as well as operating difficulties or unusual overload with implement itself could occur.

### **NOTE**

When using coupling unions it is necessary to verify that there is no trace of soil, dirt etc. on the unions and inside the seats so as to avoid the oil contamination and consequently wear the tightening " surface " of unions or ram seals.

## 17.3 Oil cooler (heat exchanger)

The crane is equipped with an oil cooler (air-oil heat exchanger) to prevent damage caused by an excessive increase of the oil temperature.

### **NOTE**

**When working in a low temperature climate, we recommend to bring the hydraulic oil up to working temperature prior to starting work, This is best done by operating the crane thru all its functions ram stroke end.**

### **(!) WARNING (!)**

The heat exchanger openings must be kept clear and clean. At no time should it be covered.



### 18.1 Generality

These are additional extensions, which are placed in the hydraulic extensions of the crane and of the hydraulic jib and secured by locking pins.

Manual extensions have a maximum capacity independent from the crane configuration as shown on the capacity plates.

#### **(!) ATTENTION (!)**

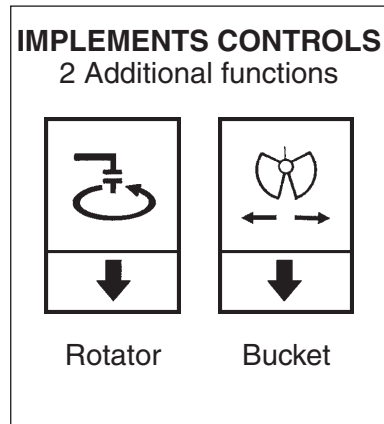
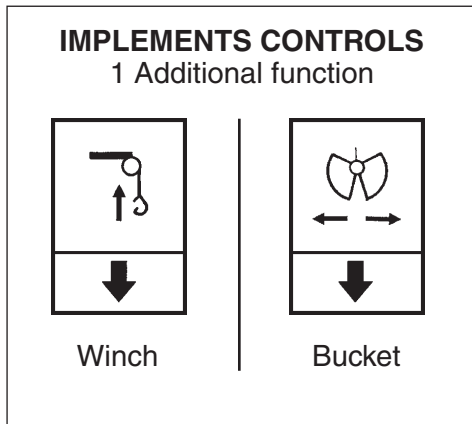
Manual extensions can be extracted from the rest position and be operative, once the security pins have been removed, with the outer boom in sliding position.

#### **(!) ATTENTION (!)**

- Do not stand in front of stabilisers during operation!  
Operate from a lateral position in respect of the extension movement of the manual extensions; operation from the frontal position is dangerous.
- Verify that the area is suitable for this operation and there are no unauthorized persons in the working area.
- Do not permit the extension to slide out at speed as this will damage the stroke end stops.
- Do not try to align the holes (slots) for the locking pins with your fingers; always use a suitable tool.
- When manual extensions are in place, fit the locking pins and secure them with the check pins to prevent accidental escape.

**(!)** Always remember that when operating with implements, their tare weight must be deducted from the capacity of the crane.





The plates placed over each lever define their function in relation to their movement.

**(!) ATTENTION (!)**

The sequence of the plates placed on the crane controls may be different.

Make sure that the lever you are going to operate correspond to the control you selected.



## 21.3 Generality (version with load limiting device)

The winch is made of a drum that can rotate by means of a hydraulic motor, on a structure fixed on the crane. The rotation of the drum on which the cable winds is achieved by a hydraulic motor controlled by a safety check valve connected to the crane circuit. A parking brake integrated to the motoreducer group hold the load in position when the winch control lever is in neutral position.

### Nomenclature of winch unit (Fig. 23)

- | Pos. | Description                    |
|------|--------------------------------|
| 1.   | Winch                          |
| 2.   | Cable                          |
| 3.   | Fixed pulley                   |
| 4.   | Balance weight                 |
| 5.   | Hook                           |
| 6.   | Transmission pulley            |
| 7.   | Block (double-triple.... line) |

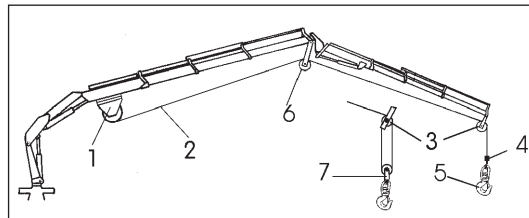


Fig. 23

### (!) ATTENTION (!)

Check the condition of wire rope.

- (!) **On winches not equipped with cable layer, check the rewinding of the cable on winch drum proceeds regularly and without overlapping: it is suggested to rewind the cable only if it is sufficiently taut.**

Do not rotate the crane before the load is lifted. Lift the load vertically using the cable and not the boom in order to avoid swinging the load. With the suspended load rotate slowly and with care checking the stability of the vehicle.

## 21.4 Winch for crane

The identification data and the essential characteristics are marked on a plate fixed by the manufacturer.

- Manufacturer mark ...
- Winch type ...
- Serial number ...
- Maximum line in N at the 4th layer...
- Maximum speed in m/min ... or Maximum capacity pump l/min

- (!) See operator winch manual supplied by the winches' manufacturer.

**The winch has a maximum capacity (which cannot be exceeded), indicated by a plate, not related to the crane capacities which can also be lower.**

**Consequently avoid to lift, with the winch, heavier loads than those allowed by the capacity plate of the crane with the winch.**

**Note: We do not recommend using the winch with load moving (winch in or out) at the same time as the extension booms or the crane and hydraulic jib (if fitted), since it accelerates the wear of the extension guide pads reducing their life to one third compared to a standard application.**

The cranes with winch feature a sensor that deactivates the exit of the extension boom sections when the load on the winch exceeds the nominal load by 20%. There is no other control on the maximum load lifting which is therefore limited only by the lifting limit of the winch itself. In order not to overload the winch, it is therefore forbidden to lift a load attached to the winch cable using the crane rams when the load exceeds the values indicated on the capacity plate of the crane with winch.

## 21.4.1 Winches equipped with a mechanical stroke end device

### (!) ATTENTION (!)

The end stroke condition makes place when the block takes contact with the pulley structure. The operator must stop the manoeuvre before the block rotates the pulley completely. Such end stroke device shall be used only under emergency conditions and not as a simple end stroke interrupter.

When the load exceeds the winch nominal load by 20% the exit of the extension boom sections is deactivated.

When unwinding, an electric device maintains at least **three (3)** turns of the lifting cable wound around the winch drum on activation the following controls are deactivated.

Manoeuvres not allowed:

- Winch rope descent

Manoeuvres allowed:

- all other movements

### (!) ATTENTION (!)

Limit the exit speed of the extension rams when, during the lifting, the hook bracket (or pulley/snatch block) is next to the fixed pulley, in order to avoid unnecessary stress to the cable.

### (!) ATTENTION (!)

When the hook bracket (or pulley/snatch block, in case of double or triple line) and the fixed pulley are very close, and the operator needs to manoeuvre in their proximity (i.e. operations like load hook-up, arms folding, etc), we recommend to always stand side on with respect to the pulley plan (never in front or at the back) and to operate the crane at a low speed, since the contact (especially without load) can result in rapid and violent rotations of the hook group (from the fig. 26 to the fig. 27).

### (!) ATTENTION (!)

The end stroke condition makes place when the block takes contact with the pulley structure. The operator must stop the manoeuvre before the block rotates the pulley completely. Such end stroke device shall be used only under emergency conditions and not as a simple end stroke interrupter.



fig. 26

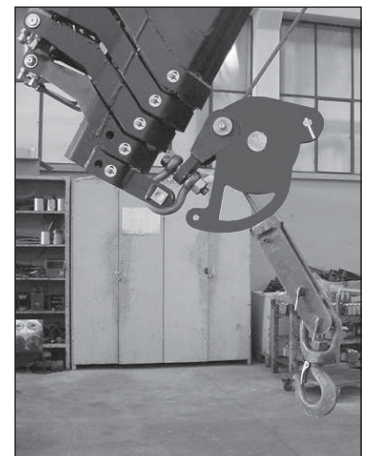
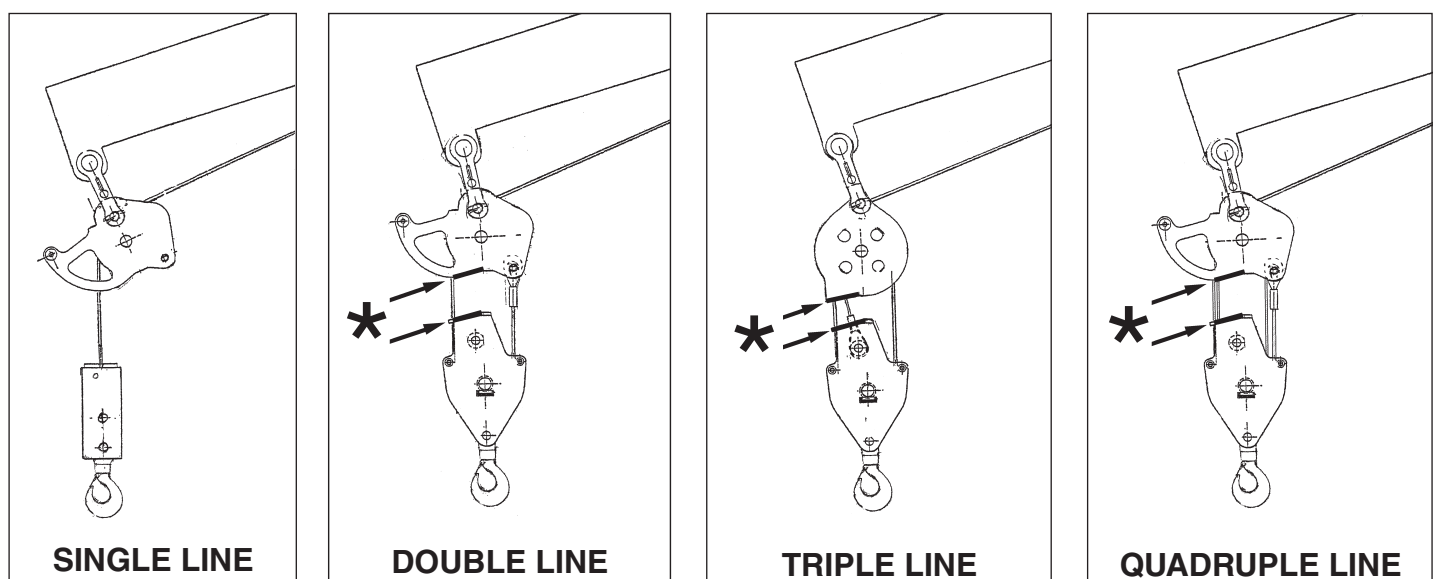


fig. 27



\* CORRECT POSITION FOR THE PULLEY AND THE PULLEY BLOCK

### 22.1 Generality

To assure a long life to the crane, it is necessary to meticulously follow the maintenance instructions.

General lubrication and small repairs can be carried out by the user; repairs of a more complicated nature must be carried out by authorized service personnel.

Spare parts must be original.

Good maintenance and proper use are imperative to maintain efficient use and guarantee the safety of the crane.

At least once a year you must take the crane to a **Fassi Service Center** for a check.

**(!)** Before disconnecting any hydraulic hoses, ensure that there is no pressure in the hydraulic circuit. After removing hoses always mark them and their respective ports on the crane. Faulty replacement can cause damage to the rams and to the hydraulic circuit.

Respect the information supplied for maintenance and technical assistance.

Any maintenance operation must be carried out with the crane power source turned off. (in case of fixed mounting with hydraulic power pack, the electric motor has to be turned off).

Do not place limbs, fingers or any other parts of anatomy into areas of the crane, which present possibilities of shearing, without having blocked such parts of the crane.

Do not weld, drill or grind any part of the crane without the Manufacturer's authorisation.

Do not weld the fixing rods of the crane (see plate **DE1574** fig. 29)

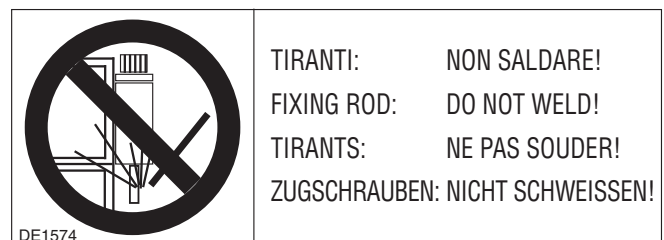
When repairs to, or checks of, the hydraulic circuit and of the rams are carried out, it is very important not to use, or be in the proximity of, materials which can damage the circuit or contaminate the hydraulic oil eg. metal shavings, sand or dust.

Do not use the high pressure washing on the controls (deviators, distributors, double controls, hand cable controls...), on the electronic components (boxes, control panels...), on the tanks.

Never use detergents, petrolsol or inflammable liquids, always use non flammable or non toxic liquids.

To avoid down time, it is recommended to periodically carry out the following checks.

fig. 29



## 22.2 Timer (fig. 29a) (if fitted)

The control panel of the “**electronic**” lifting moment limiting device, placed next to the distributor of the crane, features an alphanumeric readout for displaying the date, the activation time expressed in hours-minutes of the electric control panel (“**Partial Time**” and “**Total time**”) or the working time of the crane whilst being operated via the control levers (“**Work Time**”).

### How to view the date

Press button **C2** (clock/-) to have the current date visualized on display **B**. Fig. 29.

### Partial time

How to view the partial time of the electric panel; which can be reset.

- Keep button **C2 (-)** pressed until you read “**Time**” on display **B**.
- Press button **C1 (+)** until you see “**Partial time**”.
- Press button **C3 (enter)** to view the time.

### How to reset the “Partial time”.

To start a new count perform the following:

- Keep button **C2 (-)** pressed until you read “**Time**” on display **B**.
- Press button **C1 (+)** to read “**Partial time**” on the display.
- Press button **C1 (+)** again to read “**Total time**” on the display. Fig. 29a
- Press button **C1 (+)** again to read “**Work time**” on the display.
- Press button **C1 (+)** again to read “**Reset partial**” on the display.
- Press button **C3 (enter)** to read “**Enter to confirm**” on the display.
- Press button **C3 (enter)** again; the timer is reset and it will start recording again.



fig. 29a

### Total time

How to view the total activation time of the electric panel; this cannot be reset.

- Keep button **C2 (-)** pressed until you read “**Time**” on display **B**.
- Press button **C1 (+)** to read “**Partial time**” on the display.
- Press button **C1 (+)** again to read “**Total time**” on the display.
- Press button **C3 (enter)** to visualize, for about 5 seconds, the total time expressed in hours and minutes.

### Work time

How to view the work time which is the actual time recorded whilst a crane operating lever/function is being activated.

- Keep button **C2 (-)** pressed until you read “**Time**” on display **B**.
- Press button **C1 (+)** to read “**Partial time**” on the display.
- Press button **C1 (+)** again to read “**Total time**” on the display.
- Press button **C1 (+)** again to read “**Work time**” on the display.
- Press button **C3 (enter)** to view, for about 5 seconds the work time of the crane expressed in hours and minutes.



## 22.3 After every 8 working hours or at the end of every working day

- Check that all safety devices are efficient.
- Check the level of the hydraulic oil in the tank.
- Check all the components of the hydraulic circuit for possible leaks.
- Check that the control and the oil diverter levers can easily be positioned; they must show no signs of forcing.
- Check the condition of shackles, hooks, wire ropes and any other lifting equipment.

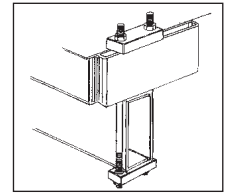


fig. 30

## 22.4 After every 40 working hours or after every working week

Check the tightening torque of the fixing rods of the crane (fig. 30).

See table at paragraph 22.5

Clean the oil filter placed in the oil tank of the crane and if any, on the pump section and pressure hoses.

**NOTE** The filters of fibre or paper can not be cleaned, they must be replaced.

Cleaning of the wire mesh filter on the tank (oil return to the oil-tank) fig. 31.

- Unscrew the security bolts of the filter cover 1 and remove it.
- Extract the cartridge, clean by flushing with a non flammable, non corrosive and non toxic solvent (gas oil or other). Thoroughly dry the filter inside and out (do not use compressed air).
- Check if the cartridge has collapsed; if so, replace it!
- Remove the filter body 3 and clean it.
- Re-assemble the filter body and the cartridge: check the sealing of the 'O' ring 4-5-6; in case, replace it!

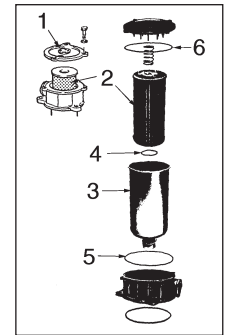


fig. 31

**NOTE** Take care that no contaminated material passes into the tank.

Replacement of the filter on the delivery line (before the distributor) fig. 32.

- When the visual indicator becomes red, replace the cartridge.
- Unscrew with a suitable spanner the filter body (1) from the head (2).
- Remove the cartridge (3) and clean inside the holder (1).
- Insert a new cartridge and re-assemble the filter body into the head checking the seal (4).

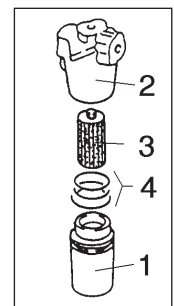


fig. 32

Check the oil level in the tank with the crane in the folded position and with the outriggers (crane and supplementary) fully re-entered. The oil level must not exceed the maximum or be lower than the minimum (fig. 33).

Top up using hydraulic oil with the same characteristics as those indicated in the table at paragraph 23.

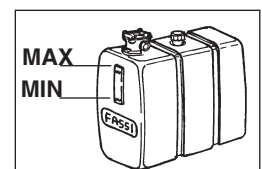


fig. 33

The following lubricators have been centralized and gathered in a case (fig. 33a) positioned on the base (crane distributor side):

- rack guide shoe - rotation,
- upper and lower bush of the column - column support,
- rack group - column gear,
- column support group - pendulum beam.

### (!) WARNING (!)

At low temperatures, the grease shall not crystallize or, to be more precise, shall not change its characteristics. At the effective operative temperature, the grease we recommend shall have a fluidity at least equal to rating **NLGI 0** or max. 1.

### (!) WARNING (!)

**Centralized lubrication shall not be used when room temperature is below -10°C / -20°C.**

All the lubricators mounted on the crane are protected by a plastic cap so to avoid the oil contamination.

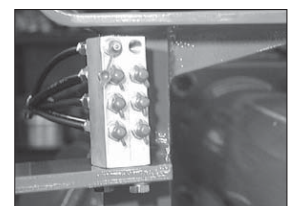


fig. 33a

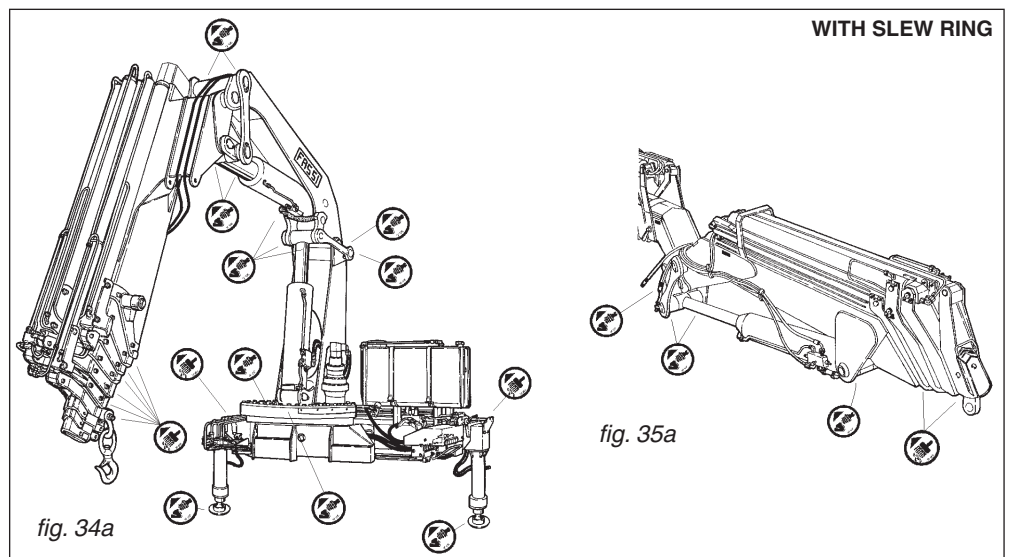
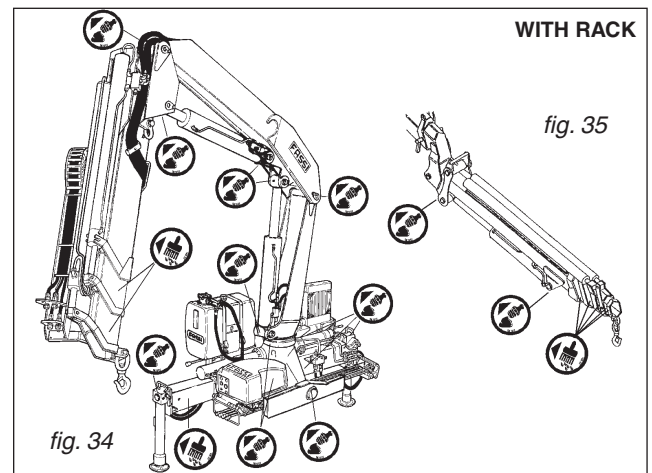
## 22.5 After every 100 working hours or more frequently in case of more intensive utilisation

### WITH RACK

Periodically grease the points indicated on the crane (fig. 34) (and on the hydraulic jib, when fitted, fig. 35) paying particular attention to the points not easily detected. For the sliding sections of the outrigger supports and of the extension booms guide shoes made from a special material have been fitted: to ease their movement it is recommended to smear a light film of grease on them, taking care that the surfaces of the extension booms are free from impurities such as sand etc. Top up using hydraulic oil with the same characteristics as those indicated in the table at paragraph 23.

### WITH SLEW RING

Grease the slew gear to prevent friction during rotation and to ensure that it is stable by preventing water (corrosion protection) and contaminants from entering the bearings. For a better internal distribution of the grease it is advisable to rotate the crane and grease it in such a way as to see grease at the seals. Top up using hydraulic oil with the same characteristics as those indicated in the table at paragraph 23. Grease the winch cable (if fitted) after having first cleaned the cable of any encrustation (grease mixed with sand, dust, dirt etc.) The lubricant used must guarantee a good level of penetration in order to lubricate both the inside and the outside of the cable. Top up using hydraulic oil with the same characteristics as those indicated in the table at paragraph 23.



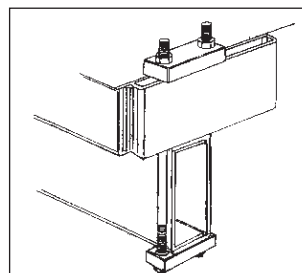
## 22.6 After every 500 working hours or after every 6 working months

Check the tightening torque:

- of the fixing rods of the crane; consult the following table in order to find its value according to the bolt diameter:

*Table of the tightening torques of the fixing rods of the crane on the vehicle  
From "C0404 Kit for crane fixing".*

D. Fixing rods	Tightening torque = Nm
M22x1,5	300
M24x2,0	400
M27x2,0	600
M30x2,0	471
M33x2,0	1200
M39x3,0	1800



**WITH SLEW RING**

- of the slew gear screws (bolts M20 Class 12.9: Tightening torque = 620 Nm)

**WITH RACK**

- of the securing bolts for the ram pins and of all the other bolts and screws, where the tightening torque is not expressly indicated, consult the following table in order to find it's value according to the bolt diameter and class.

*Table of the bolts tightening torque, in general, with average friction value (0,15) and average-good tightening accuracy (C).*

From... "ELEMENTS DE FIXATION - ASSEMBLAGES VISES" (AFNOR E 25-030 1984)

Diameter Bolt = D	Class 8.8 Torque = Nm	Class 10.9 Torque = Nm	Class 12.9 Torque = Nm
3	1,06	1,56	1,83
4	2,44	3,58	4,19
5	4,83	7,10	8,30
6	8,30	12,30	14,30
8	20	29	35
10	40	59	69
12	69	102	119
14	111	163	191
16	173	255	298
18	239	352	412
20	339	499	584
22	466	685	802
24	584	858	1004
27	865	1271	1487
30	1173	1723	2016
33	1594	2342	2740
36	2046	3006	3517
39	2658	3905	4570

**WITH SLEW RING**

Check the rotation control motoreducer oil level. Fig. 34

- Remove the bleed plug (1) using a 22 mm Allen wrench.
- Remove the plug (2) using an 8 mm Allen wrench and the O-ring.
- Top up, if necessary, with the same type of oil as indicated in the table at Paragraph 23 via the mouth (bleed plug).
- The correct level is reached when oil starts to escape from the threaded hole in plug (2).
- Check the state of wear of the O-rings (replace if necessary) and then return the plugs. The lubrication oil can be drained completely by removing plug (3) using an 8 mm Allen wrench.

Check the guide shoe wear as it affects the sliding section tolerances; if the clearances are considerable, damage to the rams and the structure may occur.

Clean the air filter placed in the top of the oil tank filter cap.

Completely replace the hydraulic oil and the filter cartridges.

**(!) The waste oil and the filter cartridges MUST be disposed of by authorized persons.**

**(!) CAUTION DANGER (!)**

On the outer boom there is a mercury capsule (mercury level switch) duly protected and provided with the following warning stickers.

**MERCURY IS EXTREMELY TOXIC. IN CASE OF REPLACEMENT AND/OR SCRAPPING, DISPOSE OF OR RECYCLE THE CAPSULE CONTAINING MERCURY WITH MAXIMUM CARE, AND IN ACCORDANCE WITH THE NATIONAL REGULATIONS IN FORCE.**

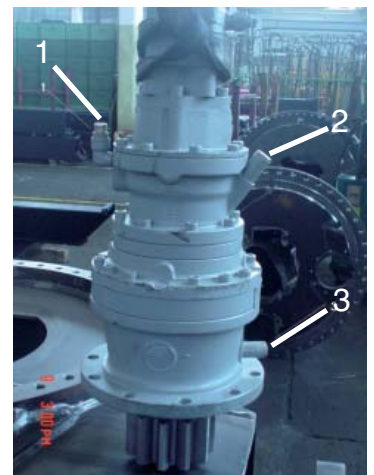


fig. 34

**Contiene mercurio: smaltire secondo le leggi in vigore**

Hg

**Es hat quecksilber: bitte beseitigen so wie gesetzlich**

**Mercury inside: scrap following laws in force**

**Contient du mercure: recycler selon les lois en vigueur**

## 22.7 After every 1000 working hours or after every working year

Perform: Washing, Function Testing, Testing according to the capacity plates

Check: Identification plates, Capacity plates

Checklist in accordance with ISO 9927-1

Element	Checks to be carried out:
Subframe Structure and fixing rods	Tightening torque of the fixing rods, wear and any deformation, actions
<i>For crane with rack:</i> Base Rack group, compensator	Lubrication, tightening torque of the rods, wear and any deformation, actions
<i>For crane with slew ring:</i> Base Slew ring group, compensator	Lubrication, tightening torque of the screws wear and any deformation, actions
Outriggers Supports, rams, base plates safety catches, hoses	Greasing of extension supports, oil-leaks, wear, actions, inspection of hoses
Rotation cylinders Cylinders, pistons, seals,	Oil-leaks, chromium plating, any deformation, inspection of hoses
Column Inner boom connection, outrigger connection, pins, bushes	Lubrication, wear and any deformation, actions
Inner boom Pins, outrigger connections	Lubrication, wear and any deformation, actions
Inner ram Cylinder, rod, piston, seals, hoses	Oil-leaks, chromium plating, any deformation, inspection of hoses
Outer boom Pins, outrigger connections	Lubrication, wear and any deformation, actions
Outer ram Cylinder, rod, piston, seals, hoses	Oil-leaks, chromium plating, strains, inspection of hoses
Extension booms Guide shoes, pins, outrigger connections	Lubrication, wear and any deformation, actions
Extension rams Cylinder, rod, piston, seals, hoses	Oil-leaks, chromium plating, any deformation, inspection of hoses
Hydraulic jib Booms, pins, outrigger connections	Lubrication, wear and any deformation, actions
Rams (hydraulic jib): Cylinder, rod, piston, seals, hoses	Oil-leaks, chromium plating, any deformation, inspection of hoses
Winch Torque limiter, brake, rope slide guide, cable, stroke end, pulleys	Lubrication, wear and any deformation, actions
Distributors, deviators, valves Control levers, forks, joints, fixing screws, lead seals	Checking of the pressure, oil-leaks, wear and any deformation, actions,
Lifting moment limiting device Valves, pressure switches, electrovalves	Checking of the pressure, oil-leaks
Power take-off, pump, oil-tank Filters, hoses	Pump capacity, checking of the pressure, oil change, replacement of filters, inspection of hoses

Oil-pressure system Hoses, hose protection devices	Checking of the pressure, oil-leaks, inspection of hoses
Implements for lifting Hooks, chains, cables, slings	Safety check, wear and any deformation, actions
Implements Wallboard forks, buckets, rotators	Oil-leaks, wear and any deformation, actions, inspection of hoses
Seat, third control station Frame, fixing screws	Access inspection, wear and any deformation, strains
Tele(radio)remote control	Test

## 22.8 Complete overhaul of the crane is required when 10.000 working hours or 10 years' life are reached - i.e.:

When one of the limits indicated hereunder is reached:

**10.000 working hours**, (i.e.: 10 years, 50 weeks a year, 20 hours a week, or 5 years, 50 weeks a year, 40 hours a week)

or

**10 years' life of the crane**,

a complete overhaul with in-depth structural inspection of the crane must be carried out by the Manufacturer or by an authorised service centre.

## 22.9 Instructions for the dismantlement and the demolition of a FASSI crane

### INSTRUCTIONS FOR THE DISMANTLEMENT AND THE DEMOLITION OF A FASSI CRANE

In case of demolition it is necessary to dismantle the whole machine and separate the different types of materials according to the respective waste disposals requirements.

The materials involved are the following:

- Ferrous materials: fabrications and mechanical components.
- Plastic materials: gaskets, belts, covers.
- Electric materials: windings, controls, electrovalves and similar.
- Oils and lubricants: hydraulic oil, lubricants for reducers, lubricating greases.
- For the truck follow the indications of the manufacturer
- Different material: Mercury (level sensor)

Take extreme care when slinging the components to be disassembled especially with respect to their weight.

Completely release the residual pressure in the hydraulic circuits and then fully drain the oil present in the circuits before starting the dismantlement of the relevant components. Be careful not to let the oil drop on the ground, therefore collect it in special containers, since exhausted oil must be eliminated in compliance with the waste disposal rules in force.

Disable all the electric power supplies (batteries etc.) before dismantling the components of the electric circuits.

## 23 TABLE OF HYDRAULIC OIL AND LUBRICANTS CHARACTERISTICS

<b>HYDRAULIC OIL WITH HIGH VISCOSITY: ISO-L-HV</b>		
Minimal external temperature: -35°C -20°C	maximal oil temperature: +45°C +75°C	Gradation ISO VG 32 ISO VG 46

<b>HYDRAULIC OIL WEAR RESISTANT: ISO-L-HM</b>		
Minimal external temperature: -10°C + 0°C + 5°C +10°C	maximal oil temperature: +60°C +75°C +85°C +90°C	Gradation ISO VG 32 ISO VG 46 ISO VG 68 ISO VG 100

<b>GREASE (for centralized system)</b>
Use only GREASE NILEX EP1 of the firm NILS. NOTE: Do not ABSOLUTELY mix different types of grease.

<b>GREASE (for slew ring, extension booms, outrigger supports...)</b>
-30°C up to +130°C      EP1 Gradation (cold climate) EP2 Gradation (warm climate)
All grease used must be free from acid and resin, not hygroscopic and long-life such as BP GREASE LTX-EP1\EP2 or ELF EPEXA 1\2 ESSO BEACON EP1\EP2 or TEXACO EP1\EP2 MOBIL EP1\EP2 or SIMILAR.

<b>HYDRAULIC OIL FOR MOTOREDUCER</b>
Classification ISO-L-CC Gradation EP ISO-VG 150

<b>LUBRICATING OIL (for winch cable)</b>
The most suitable here is a general-purpose lubricating oil with about SAE 30° viscosity. A lubricating oil containing non-stick additives is recommended if the cables are expected to move quickly through the pulleys.  BRILUBE 50 (BRITISH ROPES - BRINDON)

**( ! ) WARNING ( ! )**

**Don't use greases with solid particles as "Bisulphide of Molybdenum" (not compatible with eventual teflon bushes).**

### 24.1 Generality

Many years experience of our product has allowed us to identify and classify the most common faults which occur. In most cases it requires accurate hydraulic and electric troubleshooting and simple rectification. In the following table we report the most frequent inconveniences and our suggested remedies.

(!) Checking and adjustment of oil pressures of valve settings must be carried out by an authorized service agent, under penalty of warranty forfeiture.

#### (!) ATTENTION (!)

In the event that the crane ceases to operate and the code "alarm" with a number appears on the Display B. Call your **FASSI authorised service centre** reporting the Alarm number with the crane model and serial numbers. If the fault cannot be cleared follow the procedure in the chapter "Controls to operate the crane" and override the dump valve EVI.

THIS IS ONLY A TEMPORARY ACTION FOR EMERGENCIES, the crane should be taken to a **FASSI service centre** for repair as soon as possible.

TO OPERATE THE CRANE FOR TOO LONGER PERIOD WITH THE OVERRIDE ACTIVATED MAY INVALIDATE THE CRANE WARRANTY.

### 24.2 Only operations which can be carried out by the user


**Note:** Any operation, other than those indicated hereunder, must be performed only and exclusively by specialized personnel from an authorized support centre, considering the potential residual risks.

FAULTS	CAUSE	REMEDIES
The crane does not rotate properly	Vehicle non in level position Lack of lubrication	Stabilize the vehicle  - <i>WITH RACK:</i> Grease the bushes and the rotation guide shoe - <i>WITH SLEW RING:</i> Grease the slew ring and the pinion gear-slew ring group
The extension booms do not completely extend or work jerkily	Lack of lubrication of the guide shoes	Grease the guide shoes
Crane controls are not active	Lack of electric energy  Winch stroke end active (if fitted)  The rotation limiting device is activated	Check the fuse, the battery and electric circuit  See 21.2  See 16.6
Vibrations in crane operations	Shortage of oil  Obstructed filters	Check the level and top up if necessary  Clean or replace the filter cartridge
Noteable decrease in movement speed	Obstructed filters	Clean or replace the filter cartridge

## 24.3 Operations to be carried out only by an authorized service center

FAULTS	CAUSE	REMEDIES
The crane does not lift the loads indicated on the capacity plate	<p>Non efficiency of the pump</p> <p>(main pressure or auxiliary) valves not properly adjusted, or worn</p> <p>Ram seals are not properly fitted</p>	<p>Replace the pump</p> <p>Check the pressure, adjust the valves or replace them!</p> <p>Replace the seals</p>
A boom of the crane does not hold up the load and visually lowers	<p>The safety check valve the ram is open</p> <p>Oil leaks inside the ram</p>	<p>Replace the valve</p> <p>Defective seals, replace them!</p>
<p>The crane does not rotate properly</p> <p>- <u>WITH RACK</u>:</p> <p>- <u>WITH SLEW RING</u>:</p>	<p>Valves controlling the rotation not adjusted</p> <p>Wear of rotation guide shoe</p> <p>Wear of the seals of the rotation cylinder</p> <p>Wear of the slew ring</p> <p>Wear of the motoreducer group</p>	<p>Adjust the valves</p> <p>Replace the guide shoe</p> <p>Replace the seals</p> <p>Check the slew ring wear, replace if necessary</p> <p>Check the motoreducer group wear, replace if necessary</p>
The extension booms do not completely extend or work jerkily	Wear of guide shoes	Check the guide shoes wear, replace if necessary
Vibrations in crane operations	Non efficient pump	Check the pump
Noteable decrease in movement speed	Non efficient pump	Check the pump






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DE2499B

### INSTRUCTIONS FOR SAFE USE OF THE CRANE

- 1 Only authorized persons are permitted to operate the crane.
- 2 The crane must be used on firm, level ground.
- 3 Check that the vehicle hand brake is on and that the wheels are chocked.
- 4 Before operation make sure that:
  - no-one is within the working area of the crane;
  - the safety devices are in place and operative;
  - the minimum safe working distances from power lines are observed;
  - the load is correctly slung and hooked.
- 5 Stabilize the vehicle with the outriggers, making sure that:
  - the lateral supports are fully extended;
  - the wheels are in contact with the ground and the suspension is not completely unloaded.
- 6 Use the crane in accordance with the use and maintenance manual, making sure that:
  - the load and radius are within the maximum limits shown on the crane capacity plate;
  - the crane is used progressively avoiding sudden load movements;
  - swinging or dragging of the load is avoided;
  - the load is lifted before rotating.
- 7 When using implements protect the working area with a barrier.
- 8 The vehicle/crane are not left unless the power take off is disengaged and the load is on the ground.
- 9 Before driving the vehicle ensure that the outriggers are fully retracted and re-entered, the safety taps closed and the crane is in the folded position.

**DE 2499B**  
Instruction plate and safety norms



**ATTENZIONE:** PRIMA DI AZIONARE LA GRU E' OBBLIGATORIO METTERE IN OPERA GLI STABILIZZATORI.

**WARNING:** BEFORE OPERATING THE CRANE IT IS COMPULSORY TO EXTEND THE OUTRIGGERS.

**ATTENTION:** AVANT D'UTILISER LA GRUE IL EST OBLIGATOIRE DE METTRE EN FONCTION LES STABILISATEURS.

**ACHTUNG:** VOR INBETRIEBNAHME DES KRANS MUESSEN DIE ABSTUETZUNGEN AUSGEFAHREN.

**ATENCIÓN:** ANTES DE ACCIONAR LA GRÚA ES OBLIGATORIO ESTABILIZAR EL VEHÍCULO.

**ATENÇÃO:** ANTES DE UTILIZAR A GRUA É OBRIGATÓRIO COLOCAR EM FUNCIONAMENTO OS ESTABILIZADORES.

**DE2327**

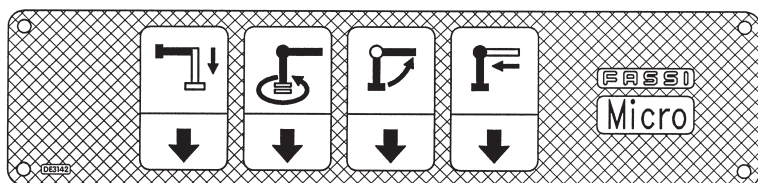
**DE 2327**  
Warning plate to stabilize the vehicle before using the crane



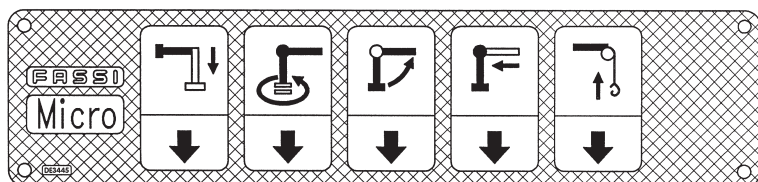
**DE 1067**  
Do not walk or stay under a suspended load and for unauthorized persons to be within the working area.



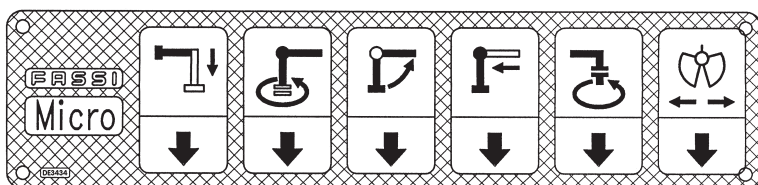
**DE 2100**  
Danger plate for crushing of lower limbs



**DE 3142**



**DE 3445**



**DE 3434**

Instruction plates  
to stabilize the vehicle



**DE 1681**  
Greasing points with brush



**DE 1682**  
Greasing points at pressure



**DE 4945**  
Warning of burn danger

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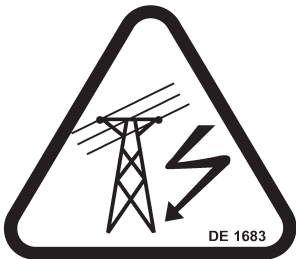
**DE 6409A**  
Warning of shearing danger

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**DE 1686**  
Do not walk or stop under a suspended  
load

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**DE 1683 / DE 2361**  
Do not operate in proximity of electric high-  
tension lines

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**DE 1679**  
Do not walk on...

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**DE 1680**  
Do not use water to extinguish fire

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**DE 1574**  
Do not weld the fixing rods



**DE 815**  
Do not weld the cast iron