FASSI CRANE USE AND MAINTENANCE MANUAL

Translation of the original instructions EN

UM004

(Amendment 00 - Edition 23/02/2015)

Index

Chapter 1 – Introduction

1.1 – Introduction

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 9001:2008 (ISO 9001:2008)

FASSI cranes conform with the European Standard EN12999:2011 (only for cranes with CE marking).

The crane fitment on the vehicle must be carried out by an authorised FASSI service centre in accordance with the instructions given by FASSI in the manual for hydraulic crane mounting.

The Manufacturer declines any responsibility and disclaims all warranties if the fitment 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 are general and refer to loader cranes mounted on truck, vehicle or static foundation, even for use in marine environment.

These instructions 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.

Some of the options described in the use and maintenance manual are available on request; therefore they may not be on your crane.

Read this manual carefully prior to activation, use, maintenance or any other operation. A few minutes spent now could save time and labour later.

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

The original version of the present manual is in Italian.
The spare parts catalogue is available in electronic format on the website www.fassicat.com.

1.2 – Use of manual

These instructions for use are an integral part of the device.

They must be stored during the entire life cycle of the device and kept on the vehicle.

The instructions for use and the enclosed technical documentation can't replace any type of operator training prescribed by the national directives.

FASSI is constantly involved in research and development of technologically advanced components and instrumentation. This may involve deviations between the content of the instructions and the device itself.

FASSI reserves the right to change specifications, pictures, use and maintenance instructions without any notice.

In case of lacking, incomplete or wrong indications or descriptions, please contact a FASSI service centre.

Schematics, images and photos in this manual are merely indicative and have only illustrative function: they cannot be used in order to lodge complaints or make legal claims.

The copy, even partial, is possible only if authorised in written form by:

FASSI GRU S.p.A.
v. Roma, 110
24021 Albino (BG)
ITALY

These instructions are valid only for the crane model indicated on the cover of Appendix A and only if they are completed by appendices and instructions of every equipment used with the device.

This manual may include references to equipment or implements which are not provided on your crane.

Enclosed to this manual you can also find the "Interactive training" FASSI DVD.

1.3 – Symbols used in the manual

Inside the manual some ideograms are used in order to point out dangerous and forbidden situations related to the device, as well as very important remarks for the crane operator.

Important remark or particularly interesting information for the operator.

Danger Attention: potential hazards for the operator and other persons.
Accidents (even serious) or injuries for the operator and other persons and damages to the crane may occur if this warning is ignored.

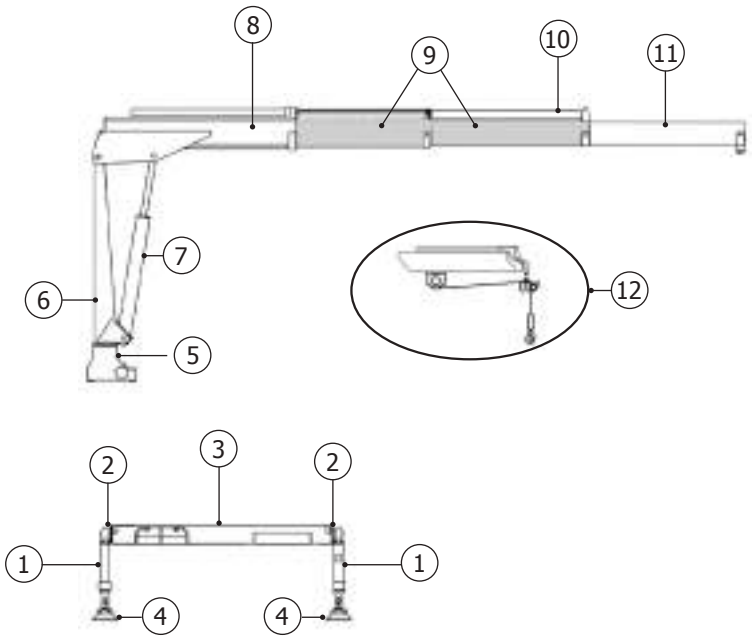
Forbidden situation or operation. The non-observance of this prohibition may cause accidents (even serious) for the operator and other persons, as well as damage to the crane.

Ideogram used inside the pictures of the present manual to indicate allowed situations.

Ideogram used inside the pictures of the present manual to indicate forbidden situations.

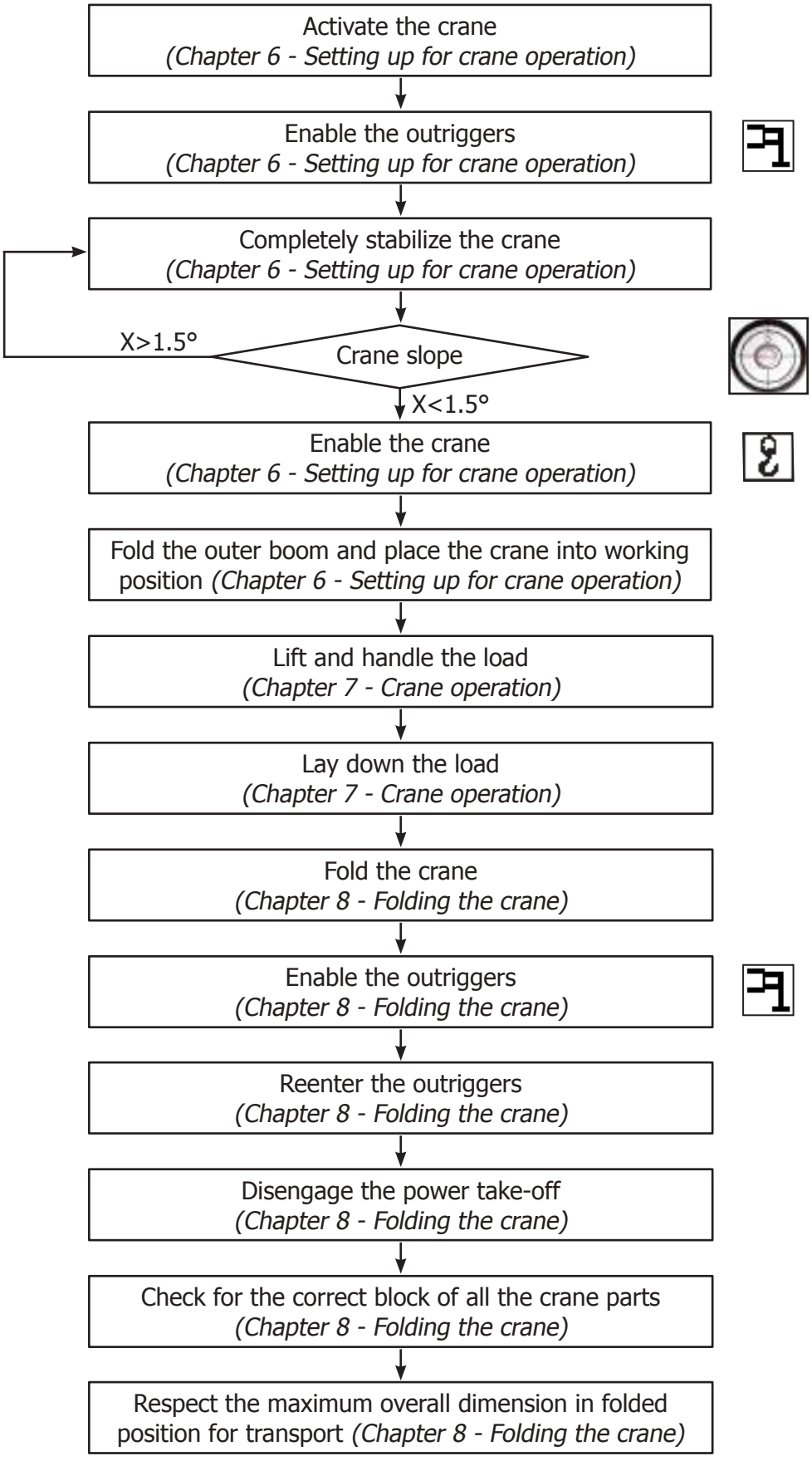
1.4 – General nomenclature of FASSI crane and implements

1. Outrigger rams
2. Outrigger supports
3. Base frame or base beam
4. Outrigger plates
5. Base
6. Column
7. Lifting ram
8. Boom
9. Extension boom sections
10. Boom extension rams
11. Manual extension
12. Winch system



1.5 – General procedure to operate the crane

Respect the safety instructions included in the use and maintenance manual of crane and implements.



Chapter 2 – General specifications

2.1 – Identification

CE marking

The CE mark indicates that the crane complies with safety and health requirements, as requested by the Machinery Directive 2006/42/EC. The mark can be considered effective only if provided together with a written declaration of conformity released by FASSI.

Identification data are indicated on the plate DE5891 (fig. 2.1), used for the CE mark.

Fig. 2.1

1. Crane model
2. Serial number
3. Year of manufacture

The crane must not be put into service within the European Community unless the machine on which it is mounted also conforms with the prescribed Directive.

In accordance with the Machinery Directive, every change of use, modification or addition of implements not specified by this manual compels to renew the CE marking.

A further plate (fig. 2.2), which is fixed near the crane by the installer, quotes the identifying data of the mounting and the final CE mark.

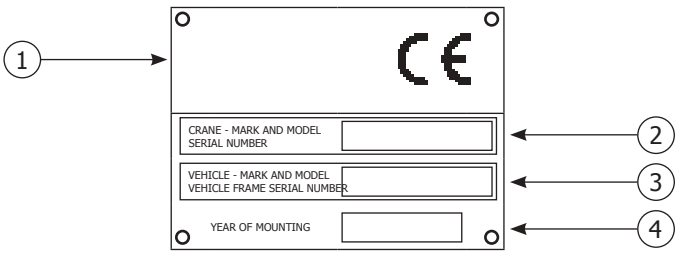


Fig. 2.2

1. Name of the installer who applied the final CE mark
2. Crane mark, model and serial number
3. Vehicle mark, model and frame number
4. Year of mounting

It is forbidden to alter the data marked on the plates.

Icon legend (CE Declaration of conformity)

							
IT	Gru	Prolunga idraulica	Radiocomando	Verricello	Traversa stabilizzatori supplementari	Prolunga manuale	Carrucola
UK IE CY	Loader crane	3rd boom	Remote control system	Hoist	Stabilizer	Boom extension manual	Sheave
FR BE LU CH	Grue de chargement	3ème flèche	Système à télécommande	Palan	Traverse supplémentaire	Rallonge de flèche manuelle	Poulie
DE AT LU CH LI	Ladekran	Hydraulische Knickverlängerung	Funkfernsteuerung	Winde	Zusatzabstützungen	Manuelle Armverlängerung	Seilrolle
NL	Laadkraan	3e mast	Afstandsbedienings-systeem	Hijsinrichting	Stabilisator	Mastverlenging, handmatig	Katrolschijf
PT	Grua industrial de carga	3° braço	Sistema controlo remoto	Guincho	Estabilizador	Braço extensível, manual	Roldana
ES	Grúa	Prolonga hidráulica	Mando a distancia por radio	Cabrestante	Estabilizadores suplementarios	Prolonga manual	Polea
SE	Kran	Jib	Radiostyrning	Vinsch	Extra stödbensbrygga	Manuell förlängningsarm	Linhjul
FI	Kuormausnosturi	Jibipuomi	Radio-ohjaus	Vinssi	Tukijalka	Mekaaninen puominjatke	Taittopyörästö
DK	Lastekran	3.udskud	Radiostyring	Løft	Støtteben	Manuelt udskud	Blok
LV	Hidromanipulators	3-ā izlice	Distances vadības sistēma	Vinča	Stabilizators	Izlices pagarinājums, manuāls	Bloks
LT	Krovinių kėlimo kranas	Papildoma strėlė	Nuotolinio valdymo sistema	Gervė	Atrama	Mechaniškai išilginama strėlė	Skriemulys
EE	Hüdrotõstuk	3 poom	Ditants juhimine	Vints	Tugijalad	Mehaaniline pikendus	(Vintsi) plokk
CZ	Nakládací jeřáb	Třetí hydraulické rameno	Dálkové ovládání	Zdvihadlo	Podpěra	Výsuv ramene, manuální	Kladka
SK	Nakladací žeriav	3. výložník	Dial'kové ovládanie	Naviják	Stabilizátor	Manuálne predĺženie výložníka	Kladka
PL	Żuraw przeladunkowy	Bocian	Sterowanie radiowe	Wciągarka	Podpory	Ramię wysuwane ręcznie	Zblocze
SI	Manipulativno dvigalo	Zglobna roka	Sistem daljinskega upravljanja	Vitel	Stabilizator	Teleskopski podaljšek, ročni	Škripec
HU	Önrakokó daru	Lengőgém	Rádió távirányító rendszer	Emelőszerkezet	Kitalpaló	Mechanikus gémtoldat	Görgő
RO	Macara incarcator	Extensie hidraulica brat	Telecomanda	Troliu	Stabilizator	Extensie manuala brat	Scripete
BG	Кран	Хидравлично Удължение	Дистанционно управление	Лебедка	Напречна греда допълнителни стабилизатори	Ръчно удължение	Шайба
TR	Yükleyici vinç	Üçüncü bom	Uzaktan kumanda sistemi	kaldırma	Dengeleyici	Manüel bom uzatma	Kasnak
MT	Loader krejn	3 boom	Sistema Motorizzata	Arblu	Stabbilizzatur	Estenzjoni tal boom, Manwali	Taljola
EL	Γερανός	3η τηλεσκοττικός βραχίονας	Αττομακρυσμένο σύστημα ελέγχου	Ανύψωση	Σταθεροττοιητής	Τηλεσκοττική προέκταση, χειροκίνητη	Τροχαλία
IS	Hleðslukrani	3ja bóma	Fjarstýring	Spil	Krana lappir	handútdrag	Svívill
NO	Lastebilkran	Hydraulisk rorlenger	Radio styring	Vinsj	Støtteben	Teleskoparm manuell	Skive

No CE marking

Identification data of cranes for extra EC market are indicated on the plate DE5892 (fig. 2.3).

Fig. 2.3

1. Crane model
2. Serial number
3. Year of manufacture

2.2 – Technical data

Classification and design standards

The design of this crane has been carried out in respect of HC1/S2 (ex H1B3) classification, as specified by the standard EN 12999.

Technical features

Refer to Appendix A of the present manual for the specific technical features of your crane.

Intended use of the lifting device according to its design

The non-conformity with the use instructions involves both hazards for the operator and the persons in the vicinity and damages to crane and implements. This causes the loss of every form of responsibility and warranty by FASSI.

It is allowed to use the crane and its implements in the load area indicated on the lifting diagrams in order to lift, handle, keep suspended and release the loads.

It is permitted:

- to load and unload one's own vehicle or other vehicles;
- to lift and keep suspended loads for mounting operations;
- to lift and handle loads with a hook;
- to occasionally use a bucket to lift and handle gravel or sand (the lifted and then released load must not be higher than twice the weight of the lifting device).

Dimensions and capacity of other implements than the hook must be proportioned with crane performances.

It is allowed to use the crane and its implements during load lifting and handling operations only with stationary vehicle and under complete stability conditions.

Forbidden use of the lifting device

The non-conformity with the use instructions involves both hazards for the operator and the persons in the vicinity and damages to crane and implements. This causes the loss of every form of responsibility and warranty by FASSI.

It is prohibited:

- to use crane and implements for other aims than the ones indicated previously;
- to misuse the device;
- to unblock, hit or crush the loads;
- to push and drag the loads;
- to dig with buckets;
- to use crane and implements for wood or scrap iron;
- to use crane and implements in potentially explosive environments;
- to operate boom system or implements in strong currents, such as in a river;
- to fix loads to other points than the intended lifting attachments, which are represented by the hook on the capacity plates;
- to carry out traction in every direction or vehicles towing;
- to move the vehicle with suspended load;
- to move the vehicle with the crane not in the expected transport configurations;
- to use crane and implements to lift or carry people.

  Exception:

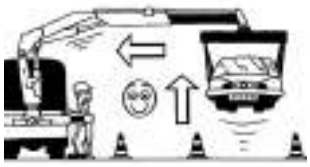
  It is permitted to use work platforms (WP) to lift people only changing the end use of the crane (Mobile Elevating Work Platform - MEWP) and after evaluation of its conformity with the binding standards (EN 280) by a notified body.

  In particular, the complete unit crane-vehicle with work platform (MEWP) is intended only to move persons to working positions, where operations can be carried out from the WP.

  The possible combinations with WP and the relevant technical documentation are available by all FASSI dealers.

  In any case, it is prohibited to apply WP if a bucket or another implement other than the hook are installed (or have been installed) on the crane.

If the vehicle is not completely stabilized, it may overturn. Working without proper stabilization is forbidden.



If the use instructions of optional implements allow certain operations which are forbidden by the current instructions, give always priority to the crane use instructions.

Service and storage conditions

The non-conformity with service conditions may cause both hazards for operator and persons in the vicinity and damages to crane and things.

The crane is designed to be used in the temperature range indicated in the following table. If the temperature range for crane operation is not included in these limits, the crane functionality may be discontinuous and damages to the hydraulic and electrical systems may occur.

Temperature range for operation and storage of the crane	
Temperature of the crane working environment	-30°C to +50°C
Temperature of the crane storage environment	-40°C to +70°C

In case of work in another temperature range than the one prescribed in the table, it is compulsory to request FASSI specific authorization.

The crane must be used with wind speed lower than 13,8 m/s (50 Km/h - maximum value of degree 6 of Beaufort scale) and in absence of thunderstorms.

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	0,3 ÷ 1,5	Light breeze	Smoke reveals the direction of the wind, one can feel the wind blowing, leaves start fluttering.
2	1,6 ÷ 3,3		
3	3,4 ÷ 5,4	Moderate breeze	Leaves and branches are in constant motion, small branches start fluttering. Dust and papers dance on the ground.
4	5,5 ÷ 7,9		
5	8,0 ÷ 10,7	Fresh breeze	Small green branches bend, the surface of waterways and lakes is wavy.
6	10,8 ÷ 13,8	Near gale	Big branches bend, wind whistles through high-tension cables, it's difficult to walk keeping the umbrella open.
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).

While working with the crane vertical up, it is recommended to consider the working limit speed of the wind decreased of 5 km/h every 10 m height (refer to EN 1991-1-4).

The conditions of the ground or the support must be suitable to the maximum pressure exercised by the device.
The value of the pressure exercised on the ground by the outriggers is indicated in the schedule "Crane technical data" in Appendix A of the present manual ("Max. working pressure on the outrigger Ø ... ") and has to be compared with the below table.

Admitted pressure on the ground (Load capacity of the ground) - Ref. DIN 1054			
A	Made ground, not compacted artificially		0÷10 daN/cm² = 0÷1 MPa
B	Asphalt		20 daN/cm² = 2 MPa
C	Compact ground, not removed		
	1	Mud, peat, marshy ground	0 daN/cm² = 0 MPa
	2	Not compacted ground, adequately solid	
		From fine to middle sand	15 daN/cm² = 1.5 MPa
		From thick sand to gravel	20 daN/cm² = 2 MPa
		Shattered and compacted stones	25 daN/cm² = 2.5 MPa
	3	Compact ground	
		Wet	0 daN/cm² = 0 MPa
		Soft	4 daN/cm² = 0.4 MPa
		Compact	10 daN/cm² = 1 MPa
		Half-solid	20 daN/cm² = 2 MPa
		Hard (solid)	30 daN/cm² = 3 MPa
	4	Rock	
		Eroded	100 daN/cm² = 10 MPa

Noise emission values

The risk due to noise is mainly caused by truck engine and auxiliary hydraulic supply system. The installer must provide for the phonometric assessment and the relevant declaration after mounting, according to the reference norms in force where the crane is used.

Permanent low or short high noise emission levels damage the health of operators and other persons in the working area.

Near the control stations of loader cranes installed on diesel engine vehicles, the noise emission level depends on mounting and working conditions and it may reach the following values:

- 72 to 84 db(A) with low or high idling speed of the truck motor;
- 79 to 86 db(A) during crane operation;
- the maximum noise level ranges between 92 and 100 db(A).

While assessing the mounting, it is recommended to consider the minimum engine speed.

If you use the radio remote control, it is recommended to work over 1 m far from the vehicle engine.

In hazardous situations, it is compulsory to use the personal protective equipment against noise.

Lifting capacity

It is forbidden to exceed the allowed limits of outreach and load represented on the capacity plates.

Exceeding the allowed limits of outreach and load involves hazards of accidents (even serious) for operator and persons in the vicinity, vehicle overturning and breaking of crane components.

The specific design rated capacity plates of the crane are enclosed in Appendix A of the present manual.

It is permitted to use the crane only in compliance with the lifting diagrams which are indicated on the capacity plates.
Loads indicated on the capacity plates refer to crane without implements: so, prior to every lifting operation, it is necessary to deduct the weight of the optional implements mounted on the crane (e.g. manual extensions) from the load values represented on the plates.

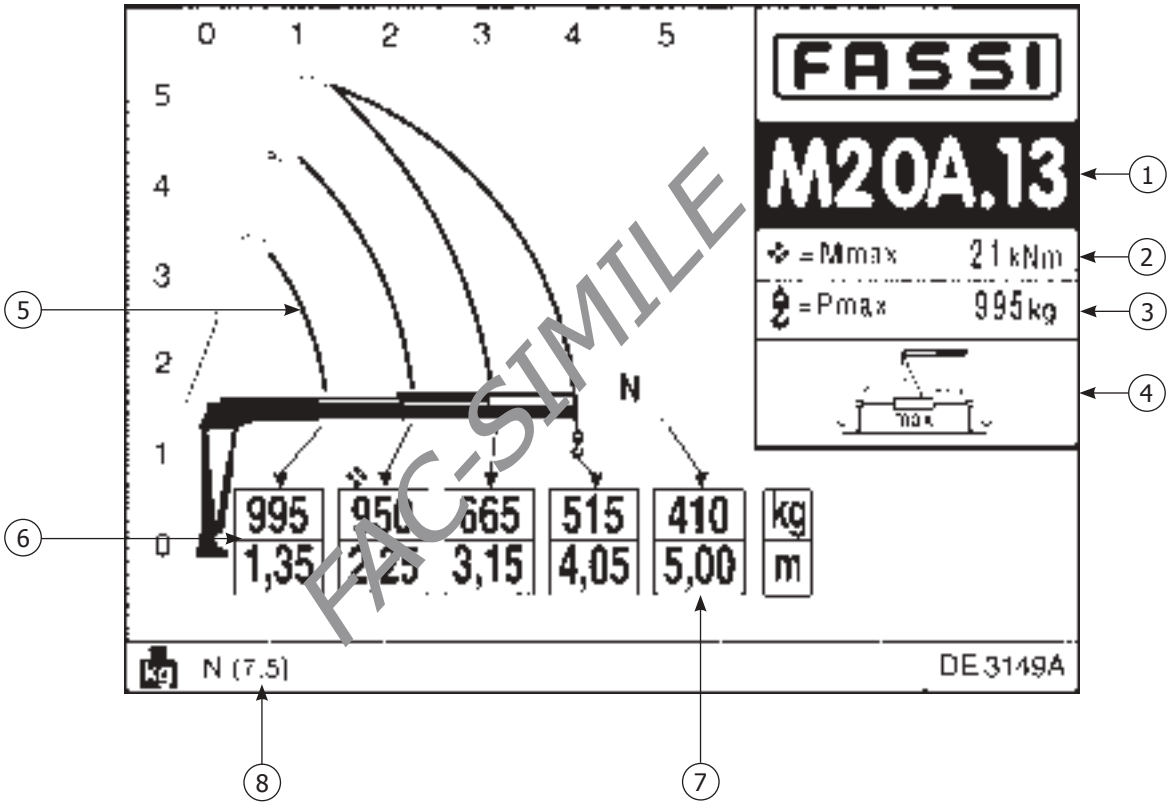
Always use a hook having the same or higher lifting capacity than the one of the load to be lifted or handled.
Even if the lifting moment limiting device is fitted, the operator is obliged to respect the lifting diagrams represented on the capacity plates.

All the loads indicated on the capacity plates are considered to be valid after the positive result of the stability test carried out by the final installer as per the standard EN 12999, part 6.

In case of derated or partially decreased capacities (e.g. in the sector in front of the vehicle cab), the operator must consider the plates defined after the final stability test which is carried out by the installer.

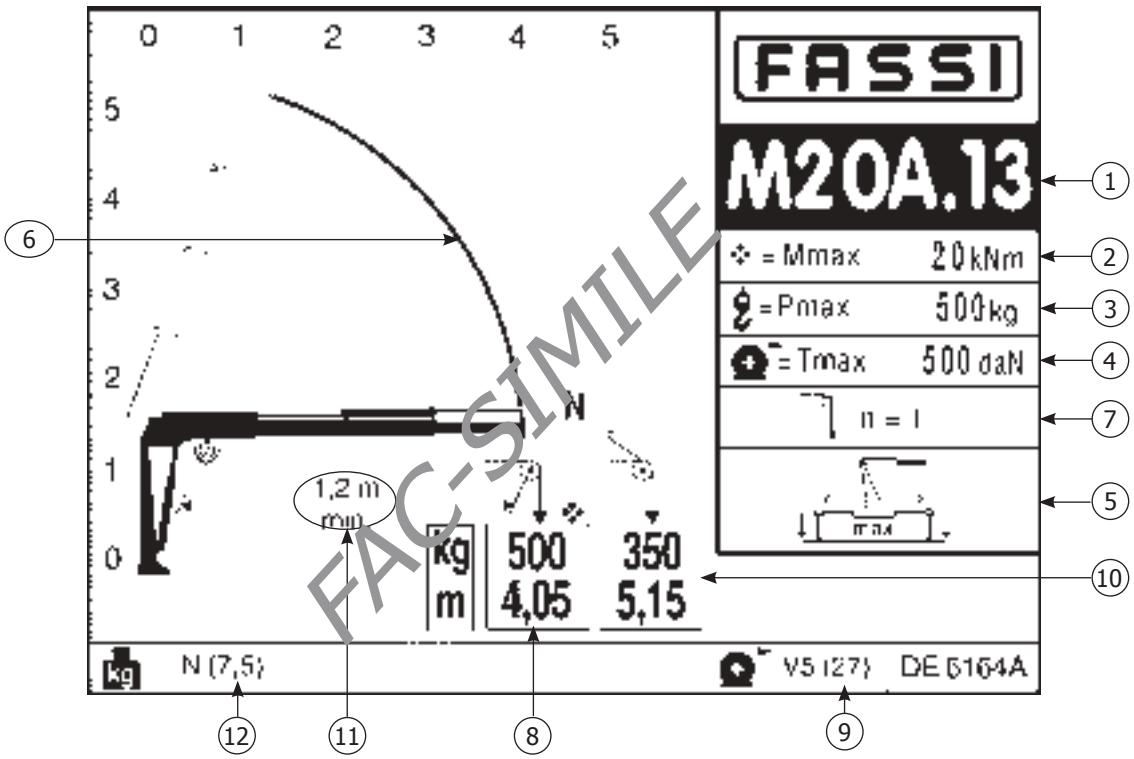
The loads represented on the capacity plates for crane with winch can be lifted only respecting the number of pulls specified in the plate.

Illustrative schematic for the capacity plate of a standard crane



1. Crane model
2. Maximum design lifting moment ❖
3. Maximum lifting capacity of the crane
4. The crane must be completely stabilized in order to lift and handle the plate loads
5. Lifting curves according to the outreach
6. Crane maximum loads according to the outreach
7. Manual extension maximum loads
8. Manual extension weight

Illustrative schematic for the capacity plate of a crane with winch



1. Crane model
2. Maximum design lifting moment ❖
3. Maximum lifting capacity of crane-with winch
4. Winch maximum pull
5. The crane must be completely stabilized in order to lift and handle the plate loads
6. Lifting curves according to the outreach
7. Number of winch pulls
8. Maximum loads of crane with winch according to the outreach
9. Winch weight
10. Maximum loads of manual extensions with winch
11. Minimum distance between winch and first pulley
12. Manual extension weight

Chapter 3 – Health and safety instructions

3.1 – Personnel in charge

For the activation of this device the operator must:

- be authorised and previously trained about operation (refer to standard ISO 9926-1– Cranes – Training of drivers – General);
- have knowledge of the content of the present manual;
- possess a certified professional training;
- have knowledge of the instructions of all the optional implements;
- be aware of the local standards and norms necessary to safely operate this device and its implements;
- be physically and psychologically suitable;
- not be under the influence of alcohol or drugs;
- possess concentration skill and prove to be responsible and reliable;
- possess the requested qualifications as per the local laws;
- respect the minimum working age prescribed in the country of operation.

A high risk for the operator and persons in the vicinity occurs if the device is used by an operator lacking of the proper qualifications, the necessary professional training, the suitable psycho-physical condition and the knowledge of the present instructions.

The operator is the only person in charge of the lifting device and its implements, their movements, the load movements and the whole working area of the crane.

Use of personal protective equipment

According to the hazardous situation, use the proper personal protective equipment during all the operations with the device, such as:

- mounting,
- operation,
- cleaning and maintenance,
- repair,
- daily check.

3.2 – General instructions

This device is a working machine and must be used only by one operator. It has been built in conformity with the safety norms and directives in force in the EU; anyway unforeseen hazards could occur for persons, the device itself and other things.

It is prohibited for the operator to use the device if he is not able to guarantee his safety and the safety of the other persons and things, as well as of the device itself.

Operate the device only for the tasks and in the service conditions that are allowed by the present manual and the optional implement manuals.

It is forbidden to tamper with or remove safety and protection devices, plates, control symbols, signals and warnings.

If capacity, warning, instruction or manoeuvre plates are lacking or not visible, please contact a FASSI service centre for their replacement.

It is prohibited to move the vehicle with the crane not placed in one of the intended transport configurations.

It is forbidden to move the vehicle with suspended load.

The operator must know exactly the weight he has to lift.

Some residual risks remain, as they cannot be completely foreseeable. They may endanger the operator, the device and other persons and things, so it is necessary to be very careful while unfolding and folding the crane, stabilizing and handling loads.

Some of the residual risks linked mainly to load lifting and handling are described in the following paragraphs. Because of these risks, special attention is needed during operation.

3.3 – Crushing, trapping and shearing danger

The crane is provided with a lot of moving parts that cannot be covered. The operator must always take into consideration this residual risk and avoid all the situations which may involve crushing, trapping and shearing danger while stabilizing the vehicle, moving the crane and handling the load.

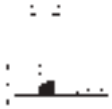
The operator is responsible for himself and all the persons who work near the crane or may come close to it, even though not authorized.

It is compulsory to enclose the working area. No one shall stop or pass in the crane working area. In this area it is forbidden to carry out other tasks.

It is prohibited to stop or pass under a suspended load.

A residual risk of shearing, trapping and crushing danger occurs in areas concerning outriggers moving to transport position. In particular, when reentering the manually extendable outrigger supports, pay special attention and use the specific handles.

The minimum safety gaps related to parts of the human body are indicated in the following table. The figures represent not dangerous situations if the minimum gaps are observed. In case of crushing danger for different parts of the human body, consider the minimum gap requested for the bigger part.

Minimum gaps to avoid crushing of parts of the human body (ref. EN 349)					
Part of the body	Minimum gap (mm)	Figure	Part of the body	Minimum gap (mm)	Figure
Body	500		Head	300	
Leg	180		Foot	120	
Foot fingers	50		Arm	120	
Hand, wrist, fist	100		Hand finger	25	

The non-observance of the minimum gaps may involve a grave risk or cause even serious accidents.

Zones subjected to crushing, trapping or shearing danger

The image above represents the zones subjected to crushing, trapping or shearing danger. It has only illustrative function and is not complete of all the possible crane configurations.

3.4 – Electric shock danger

Keep the safety distance from high-voltage lines.

The minimum distance is seven (7) meters. For safe operation it is compulsory to follow the current local regulations.

The non-observance of the minimum distance may produce an electric arc (even fatal) for the operator and the persons in the vicinity.

It is absolutely prohibited to work under high-voltage lines. The crane is not insulated from electric contacts and thus is not equipped for working under high-voltage lines, not even for accidental contact.

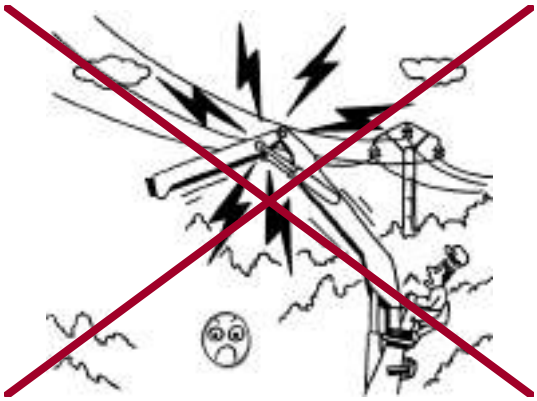
It is absolutely prohibited to operate the crane during thunderstorms.

It is forbidden to operate the crane in case of wind gusts: the wires of electric lines could swing and come into contact with the crane.

If the crane comes into contact with an electric line, follow this procedure:

- do not touch the crane, the vehicle or the load;
- prior to any movement, carefully consider the hazard. If you are closer than 10 meters from the crane, the vehicle, the load or the electric line, move at least 10 meters away with small steps in order to avoid an excessive electric potential difference between the feet;
- prevent anyone from coming close;
- call for help and ask somebody to de-energize the line;
- do not try to move an unfortunate before the power has been disengaged;

- if you are in the cab, stay inside without touching the bodywork: it is more dangerous if you go out before the line is de-energized;
- help the electrocuted person if you know the first-aid procedures, otherwise wait for the paramedics to arrive.



3.5 – Burn danger

During crane operation, oil and all the hydraulic system components reach high temperatures.

Do not touch hoses, pipes, quick coupling connectors and hydraulic system components while the crane is working.

In order to avoid burns, the gas exhaust system must be covered or kept at a safe distance.

3.6 – Fall danger

It is forbidden to climb on the device.

There is higher risk of falls and accidents for the operator and persons in the vicinity in case of snow, ice and dirt on controls, plates, support surfaces, steps and rises.

3.7 – Noise emission danger

Permanent low or short high noise emission levels damage the health of operators and other persons in the working area.

In hazardous situations, it is compulsory to use the personal protective equipment against noise.

While assessing the mounting, it is recommended to consider the minimum engine speed.

If you use the radio remote control, it is recommended to work over 1 m far from the vehicle engine.

3.8 – Exhaust gas emission danger

Before starting the vehicle engine in an indoor space, ensure there is a proper ventilation. Eject exhaust gases from the control station by using proper piping in diameter and length.

3.9 – Danger due to unfavourable service conditions

It is forbidden to operate the crane:

- during thunderstorms or at wind speed higher than 13,8 m/s (50 km/h - maximum value of degree 6 of Beaufort scale; refer to paragraph 2.2 "Technical data");
- at environmental temperatures below -30°C and over +50°C.

Too high or low temperatures may damage hydraulic and electric system components and compromise the crane working.
If you use the crane in ice or snow condition, start the hydraulic system at the minimum engine speed and let the oil circulate for some minutes, till its warming.

A wind gust may make an electric line swing and come into contact with the crane, involving an electric shock danger.

A wind gust may cause loss of stability with consequent vehicle overturning and it may seriously damage operator, persons in the vicinity and crane.

A risk of electric shock due to lightnings occurs in case of thunderstorms: in this situation it is forbidden to operate the crane and it is compulsory to fold it into rest condition.

There is higher risk of falls and accidents for the operator and persons in the vicinity in case of snow, ice and dirt on controls, plates, support surfaces, steps and rises.

3.10 – Danger related to the control station

Before operating from the control station, carefully check there are no dangers for the operator (pay attention to vicinity of operator to the load, position of escapes, etc.).

In case of hazardous or dangerous situations for the operator, it is compulsory to operate the crane from a different control station. If it is not fitted, the crane must be equipped with radio remote control or remote control via cable.

The control station must be properly enlightened, in order to guarantee the safe working of the crane.

Load and working area must be clearly and fully visible to the operator. If this is not possible, the operator must receive instructions (checking the communication efficacy) by another operator who has the full view of the working area. Otherwise, he must provide the crane with a radio remote control, in order to have an unobstructed view of the working area. The operator must instruct his coworker so as to avoid mutual damage during manoeuvres.

The operator is the only person in charge of the lifting device and its implements, their movements, the load movements and the whole working area of the crane. Check the coworker's working conditions comply with the essential health, safety and welfare requirements.

Controls, control stations, support surfaces, rises and steps must be clear of snow, ice, dirt (oil, grease, etc.) and any object.

There is higher risk of falls and accidents for the operator and persons in the vicinity in case of snow, ice and dirt on controls, plates, support surfaces, steps and rises.

During indoor operation, exhaust gases of the vehicle engine must be correctly ejected.

3.11 – Danger related to working area

Carefully check the working area and assess the possible risks for operator, persons in the vicinity and crane. In particular, pay attention to ground characteristics (see chapter 2 "General specifications"), clearance from scarps (see chapter 6 "Setting up for crane operation"), vicinity of operator to the load, possible impacts against building walls, balconies, gutters, scaffoldings, tree branches, other lifting devices or machines, electric lines or anything that could interfere with the manoeuvres.

Operate the crane with adequate lighting to perform crane work safely (see EN 12464-1 and EN 12464-2 - Light And Lighting - Lighting Of Work Places).

Load and working area must be clearly and fully visible to the operator.

It is prohibited to stop or pass under a suspended load.

Take proper measures to avoid the risk that various elements fall on operator, crane or control system.

It is compulsory to enclose the working area. No one shall stop or pass in the crane working area. In this area it is forbidden to carry out other tasks.

3.12 – Danger related to wrong operation

The crane may get damaged and/or overturn if the operator carries out a wrong operation due to lack of knowledge of the intended operating procedures and/or unsuitable psychophysical conditions.

The current regulations prescribe a proper personnel training prior to safely operating similar machines.

The operator is the only person in charge of the lifting device and its implements, their movements, the load movements and the whole working area of the crane.

It is forbidden to operate the crane in a psychophysical condition that is unsuitable for the use of a lifting device.

3.13 – Overturn danger

The crane may overturn, involving a very high risk of damage and accidents for operator and persons in the vicinity, especially under the following conditions:

- if it is not correctly stabilized ([1]);
- if you reenter or extend the outrigger supports without the crane being placed in rest condition;
- if you deactivate or tamper with safety devices;
- if you stabilize on a ground that is not sufficiently resistant according to the dimensions of the outrigger plate (see chapter 6 "Setting up for crane operation");
- if you increase the design speeds and/or the rated flow of the pump;
- if you exceed the allowed limits of outreach and/or load that are represented on the capacity plates;
- if you don't respect the service conditions indicated in the current manual.

([1]) It's under the installer's responsibility to carry out the stability test and verify if it is necessary to provide the crane with a stabilization system, in order to ensure the unit (crane-vehicle) stability.
The installer must also take-charge of the related safety analysis and risk assessment. FASSI declines any responsibility if fitments don't comply with the binding norms and directives.

3.14 – Danger due to overload and fatigue of the crane

The crane can get damaged because of fatigue or overload, with very high risk of damage and accidents for operator and persons in the vicinity, especially under the following conditions:

- if it is used differently from what is indicated in the present manual (for instance: exceeding the maximum number of cycles pertinent to the crane class, or increasing the design speed and/or the rated flow of the pump);
- if it is used for improper tasks (for instance: for side, oblique or reversal pull, for wood or scrap iron);
- if it is operated in unsuitable service conditions (for instance: corrosive environment, too high or too low temperature);
- if the intended capacity plates aren't respected.

Use the crane only for the intended tasks and in the service conditions described in the present instructions. Follow all the information indicated on the capacity plates.

In order to perform an ordinary and extra maintenance on the crane that guarantees its functionality and safety, conform to the indications of chapter 10 "Maintenance" of this manual.

3.15 – Danger due to overload of manual extensions

Manual extensions are controlled by the electronic check system for load, according to what is described in chapter 9 "Use of implements".

The electronic check system for load hooked on manual extensions is not always active (unlike the lifting moment limiting device of the crane), but it has to be activated by the operator just to check if the load can be handled safely.

Even if the lifting moment limiting device is fitted, the operator is obliged to observe the lifting diagrams represented on the capacity plates.

It is forbidden to exceed the allowed limits of outreach and load represented on the capacity plates.

Exceeding the allowed limits of outreach and load involves hazards of accidents (even serious) for operator and persons in the vicinity, vehicle overturning and breaking of crane components.

Carefully read chapter 9 "Use of implements" prior to working with manual extensions.

3.16 – Danger related to lifting moment limiting device and safety devices

For lifting moment limiting device and safety devices operation refer to chapter 4 "Safety devices and special functions".

Even if the lifting moment limiting device is fitted, the operator is obliged to observe the lifting diagrams represented on the capacity plates.

It is forbidden to bypass, uninstall or tamper with the lifting moment limiting device and all the safety systems fitted on the crane.

While operating the crane, pay attention to the alarms generated by the lifting moment limiting device as well as the other safety devices and take the proper measures.

Perform a daily operational check of lifting moment limiting device and safety devices: replace the damaged or broken components in order to work safely and obtain the maximum crane performances.

FASSI declines any responsibility if not allowed interventions are carried out on the lifting moment limiting device or the safety systems.

3.17 – Danger related to use of implements

Pay special attention to assembly and disassembly of implements (extensions, buckets, baskets, etc.): before these operations, check their weight, fixing systems and relevant assembly/disassembly instructions. Evaluate the centre of gravity of implements and use the proper temporary fixing systems to avoid unexpected movements.

Prior to working with implements, carefully read their use and maintenance instructions.

Loads indicated on the capacity plates refer to crane without implements: so, prior to every lifting operation, it is necessary to deduct the weight of the optional implements mounted on the crane (e.g. manual extensions) from the load values represented on the plates.

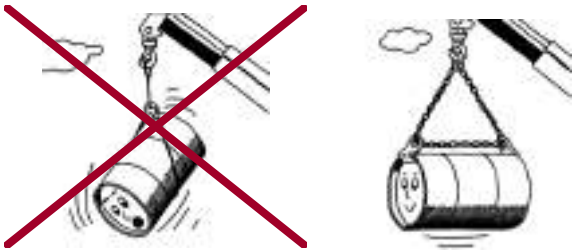
Correctly insert the fixing devices during operation and transport.

Sling implements in order to avoid unexpected movements during their transport on the vehicle.

3.18 – Danger resulting from wrong securing of loads

Pay special attention to slinging loads during both handling and loading/unloading operations.

Make sure the load is well secured and balanced and unexpected movements are prevented.



During load movements, pay attention in order to avoid impacts against possible obstacles.

3.19 – Danger related to crane transport

After folding the crane and reentering the outriggers, correctly fix all the crane parts in order to avoid the exit of extension boom sections and outriggers during transport.

Implements can be kept mounted on the extension boom sections of the crane only if maximum allowed overall dimensions are observed and implements are properly secured against possible uncontrolled movements.

Properly fix and balance the load, in order to avoid its fall from the vehicle during transport.

Take note of the vehicle (included load and implements) maximum dimensions. Observe the maximum overall dimension in folded position for the transit under tunnels, bridges, underpasses, power lines.

Observe the maximum allowed loads on the vehicle axles.

3.20 – Danger due to lacking or wrong maintenance

Maintenance is particularly important. If it is not carried out or it is performed in a wrong way, it may involve serious damages to things or persons.

In chapter 10 "Maintenance" you find all the necessary operations to maintain your crane efficient and avoid damages to things and persons due to crane bad working because of lacking or wrong maintenance.

When you connect/disconnect any hydraulic pipe or hose, take proper preventative measures to make sure there is no pressure in the system (even if the feeding is deactivated).

FASSI declines any responsibility for ruptures or damages to product, persons or things due to a lack of maintenance.

3.21 – Danger due to special working conditions

If you need to work in special conditions which are not included in this manual, contact FASSI After Sales department.

3.22 – Plate of instructions for safe use of the crane - Legend

The following plates, in vertical and horizontal version, are placed near the controls and have to be strictly followed, in order to avoid possible accidents while operating 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;
   - the outriggers safety taps, if present, are closed.

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.

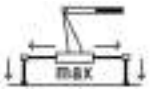
8. The vehicle/crane are not left unless the power take off is disengaged and the load is on the ground.

9. Before driving the vehicle ensure that the outriggers are fully retracted and reentered, the safety taps closed and the crane is in the folded position.

Carefully read the use and maintenance manual of crane and implements prior to start up, operation, maintenance or any other intervention on crane or implements.

It is obligatory to use the necessary personal protective equipment.

Make sure that loads and outreaches are within the maximum limits shown on the capacity plate.

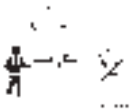


The crane must be completely stabilized in order to lift and handle the loads indicated on the plate.

It is prohibited to stop or pass under a suspended load.

Pay maximum attention while stabilizing the vehicle; make sure nobody stops or passes in proximity of the outrigger ram working area.

Hand shearing danger because of moving parts (see paragraph "Crushing, trapping and shearing danger").



It is prohibited to operate from the side where the crane opens/ folds because of the overall dimensions of booms.

Keep the safety distance from electric lines. The minimum distance is seven (7) meters, except for otherwise prescribed current local regulations.

Prohibition of washing using high-pressure and direct water jets.

Chapter 4 – Safety devices and special functions

4.1 – Index of paragraphs

Safety devices

	Capacity < 1000 kg	Capacity ≥ 1000 kg
STOP button (paragraph 4.2.1)		◍
Immediate stop device and pressure gauge (paragraph 4.2.2)	◍	
Load limiting device (paragraph 4.2.3)	●	● 1
Electronic lifting moment limiting device (paragraph 4.2.4)		◍
Visual indicator (paragraph 4.2.5)	◍ 2	◍ 2
Rated capacity acoustic indicator (paragraph 4.2.6)	◍ 2	◍ 2
Acoustic warning (paragraph 4.2.7)	◍ 2	◍ 2
Mechanical rotation lock (paragraph 4.2.8)	○	○
FSC (Fassi Stability Control) (paragraph 4.2.9)		◍ 3
MOL (Manual Outrigger Lock) (paragraph 4.2.10)	◍ 4	◍ 4
Inner boom horizontal position indicator (paragraph 4.2.11)	◍	◍ 5
CPM (Crane Position Monitoring) (paragraph 4.2.12)		◍ 6

○ = optional
◍ = compulsory for EC market
● = standard

1 = for extra EC market
2 = for crane with radio remote control
3 = for crane with outriggers
4 = for crane with manually extendable outrigger supports
5 = without FSC (compulsory for cranes in fixed and marine versions, if the installation is carried out on boats used for inland waters or for inshore use)
6 = with FSC

4.2 – Safety devices

4.2.1 - STOP button

Crane control stations are provided with a STOP button that enables the immediate stop of all crane movements.

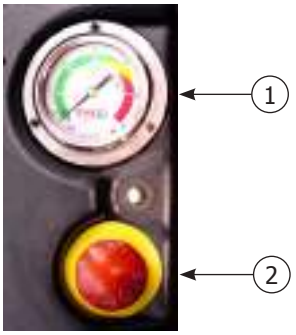
In case of emergency, immediately release all the control levers and push the STOP button: in this way, all the crane and supplementary functions are blocked.

If you push the STOP button and the crane doesn't stop or other functions are still active, high risk of accidents (even serious) occurs for the operator and other persons: do not operate the crane and immediately contact an authorised FASSI service centre.

Unblock the STOP button only if the crane can operate safely; high risk of even serious accidents occurs if you unblock the STOP button before ensuring a safe crane operation.

4.2.2 - Immediate stop device and pressure gauge

On cranes with CE mark and fitted with load limiting device, a STOP button and a pressure gauge are placed on the control stations. The pressure gauge enables to visualize the approximate percentage of the crane capacity.



1. pressure gauge
2. STOP button (refer to paragraph 4.2.1)

The dial is divided into three sectors, which indicate the following loading conditions:

- green sector, under 90% of crane capacity;
- yellow sector, between 90% and 99% of crane capacity;
- red sector, over 99% of crane capacity.

For extra EC market, immediate stop device and pressure gauge are on request, so one of them (or both) could be absent on the crane.

4.2.3 - Load limiting device

During load handling, if you exceed the maximum crane capacity, the load limiting device automatically starts, involving the slow reentering of the lifting ram. In this way, it signals to the operator the exceeding of the maximum limit.

This reentry occurs through the opening of the special valve placed on the crane lifting ram. So, at certain values of pressure induced by overload, the valve opens and causes the slow reentering of the ram.
In order to stop the descent of load, it is necessary to approach it to the column by reentering the crane extension boom sections.
This operation must be performed at the beginning of the load descent.

Close to vertical configuration, an overload condition involves serious hazards: as a matter of fact, if you don't stop immediately the boom descent caused by the opening of the valve by reentering the extension boom sections and by lifting the boom, the outreach increases, involving major overload and overturning danger.

Even if the load limiting device is fitted, the operator is obliged to observe the lifting diagrams represented on the capacity plates.

4.2.4 - Electronic lifting moment limiting device

Generality

The "crane lifting moment" is defined by the rated capacity (N) multiplied by the outreach (m).

The electronic lifting moment limiting device is composed of an electronic system that informs the operator about the loading conditions of the crane. It also blocks any operation increasing the lifting ram pressure induced by load over critical values that cannot be exceeded and that determine the activation levels.

Even if the lifting moment limiting device is fitted, the operator is obliged to observe the lifting diagrams represented on the capacity plates.

On cranes without radio remote control, any block condition prevents from operating lifting devices other than the hook (bucket, rotator, etc.).

During load handling in vertical configuration or close to it, the operator must strictly refer to the loads indicated on the capacity plates, since the limiting device could appear to be not particularly sensitive with operations induced by vertical lifts.

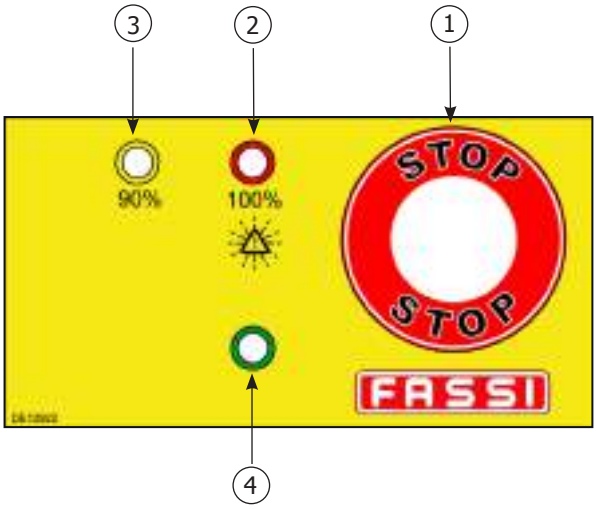
Working logic

During crane operation, when you reach the value for the limiting device activation, the system blocks the crane controls, except for the extension boom section reentry. The blocked manoeuvres can be reactivated only when the lifting ram pressure goes under the value for the limiting device activation. For winch, refer to the corresponding paragraph in chapter 9 "Use of implements".

Rotation block

According to the crane fitting, refer to paragraph "Mechanical rotation lock".

Control panel



1. STOP button (refer to paragraph 4.2.1)
2. Red LED: capacity over 99%
3. Orange LED: capacity between 90% and 99%
4. Green LED: feeding tension detected

The lighting of the green LED signals that tension is detected and that the fuse in the unit correctly works.

The lack of electric power causes the deactivation of all crane functions.

Signals

Orange LED	Red LED	Description
Off	1 flashing	Failure in the pressure transducer reading.
On	Off	99% of the maximum capacity has been reached.
On	On	100% of the maximum capacity has been reached.

4.2.5 - Visual indicator (EN 12999: "Operational warning")

In compliance with safety regulations in force in EC countries, cranes with radio remote control are equipped with a visual indicator (1 high-visibility flashing yellow light) that warns persons in the vicinity that the crane is in operation.

4.2.6 - Rated capacity acoustic indicator

In compliance with safety regulations in force in EC countries, cranes with radio remote control are equipped with an acoustic indicator that (through an intermittent sound) warns persons in the vicinity when the loading condition is between 90% and 99% of the crane or winch capacity in the working configuration. When it reaches 100% of the capacity, the sound becomes continuous.

4.2.7 - Acoustic warning

In compliance with safety regulations in force in EC countries, cranes with radio remote control are equipped with an acoustic warning that enables the operator to warn persons in the vicinity against dangerous situations.

4.2.8 - Mechanical rotation lock

If stability is not sufficient in a working sector (for instance in front of the vehicle cab), the rotation arc is limited by the mechanical rotation lock, which enables to operate only in the "stable" zone.

4.2.9 - FSC (Fassi Stability Control)

The FSC system has been developed by FASSI in compliance with the Machinery Directive 2006/42/EC and the harmonized technical standard EN 12999, which require the stability control to be included in the safety function of the lifting moment limiting device (for cranes having a minimum capacity of 1000 kg or a minimum lifting moment of 40000 Nm).
This system is proposed in different variants, according to crane models (where the lifting moment limiting device is fitted) and mountings.

FSC/L

The FSC/L system allows crane operation only when all the outrigger supports are completely extended and all the outrigger rams are placed in working position touching the ground.

The following condition signals that crane operation is allowed:

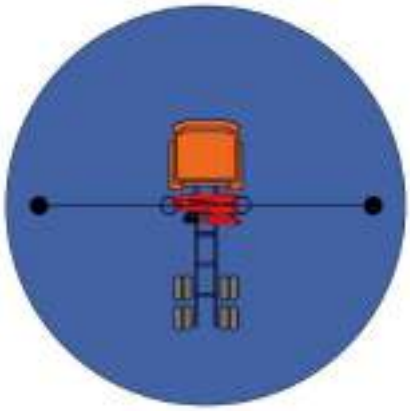
- LED on electrovalve EV1 turned on;
- detection of pressure (represented on the pressure gauge) in the distributor while operating a control lever.

When you start to control the crane, the outrigger condition is no more considered; so, during crane operation the outrigger placed opposite to the load, because of a balance effect, may be no more in contact with the ground, without any crane block.

With FSC/L system, a unique working level is available: L3.

In this working level: the pressure for the activation of the lifting moment limiting device is the rated one; outrigger supports are completely extended; outrigger rams are placed in working position in contact with the ground.

If you work with capacity plate loads and stability is not guaranteed in the front sector (over cab), it is necessary to install a rotation block device.



L3 level

4.2.10 - MOL (Manual Outrigger Lock)

In compliance with safety regulations in force in EC countries, the MOL device detects the lock in transport position of manually extendable outrigger supports.

The MOL device signals to the driver the failed lock through an acoustic and visual alarm (red LED), emitted by a panel (fig. 4.1) placed by the installer inside the vehicle cab.

4.2.11 - Inner boom horizontal position indicator

In compliance with safety regulations in force in EC countries, cranes which are not fitted with CPM device may be provided with an inner boom horizontal position indicator. If the crane exceeds the maximum height in transport position, the indicator signals it to the driver through an acoustic and visual alarm (red LED), emitted by a panel (fig. 4.1) placed by the installer inside the vehicle cab.
On cranes in fixed and marine versions, the inner boom horizontal position indicator is compulsory if the installation is carried out on boats used for inland waters (such as rivers, canals and lakes), as well as on boats for inshore use.

4.2.12 - CPM (Crane Position Monitoring)

In compliance with safety regulations in force in EC countries, the CPM device detects the correct positioning of outrigger supports and the crane maximum height in transport condition.

If the crane exceeds the maximum height in transport position and if the outrigger supports are not completely reentered within the vehicle overall dimension, the CPM device signals this condition to the driver through an acoustic and visual alarm (red LED), emitted by a panel (fig. 4.1) placed by the installer inside the vehicle cab.

Fig. 4.1

Before driving the vehicle, make sure that outriggers are reentered within the vehicle overall dimension, safety devices are locked and the crane is in transport position.

Chapter 5 – Control systems

5.1 – Pictograms for crane and implement control

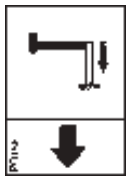
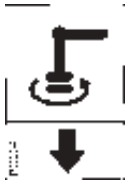
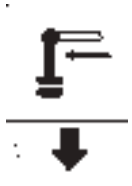
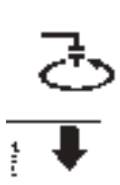
Pictograms for crane and implement control			
			
Column rotation for mono-boom cranes (clockwise)	Column rotation for mono-boom cranes (anti-clockwise)	Boom movement for mono-boom cranes (lift)	Boom movement for mono-boom cranes (descent)
			
Extension boom movement for mono-boom cranes (exit)	Extension boom movement for mono-boom cranes (reentry)	Implement rotation (clockwise)	Implement rotation (anti-clockwise)
			
Winch movement (lift)	Winch movement (descent)	Bucket movement (open)	Bucket movement (close)

5.2 – Layout of crane and implement controls

In compliance with the standard EN 12999, the layout order of bi-directional controls must follow the sequence of working functions from the base to the load.

5.2.1 - Horizontal layout order

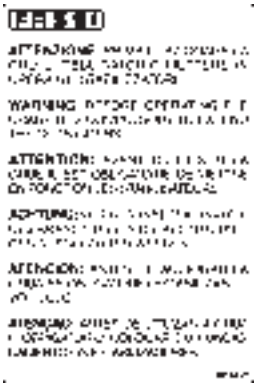
The following sequence is valid from left to right or conversely. The pictograms referring to implements are to be considered according to what is fitted on the crane.

Standard crane				Implements		
						

5.3 – Manual control

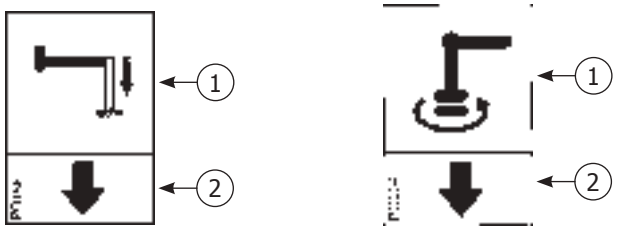
5.3.1 - Controlling outriggers (if fitted) and crane

It is allowed to use the crane and its implements during load lifting and handling operations only with stationary vehicle and under complete stability conditions.



The pictograms placed near the levers indicate their operating direction in relation to the controls you want to perform (refer to paragraph 5.1 "Pictograms for crane and implement control").

Position 1 represents the operation which is associated to the lever movement indicated in position 2.



Refer to paragraph 5.2 "Layout of crane and implement controls" for any explanation about the sequence of pictograms.

Make sure that the lever you are going to operate corresponds to the control you want to perform.

The outrigger ram control lever is represented in figure 5.1 (position 1).

Fig. 5.1

5.4 – Radio remote control

5.4.1 - Analogue radio remote control

If the crane is equipped with analogue radio remote control (HBC Radiomatic or SCANRECO), refer to the relevant documentation that is attached to this manual.

5.4.2 - Controlling the crane by radio remote control

It is allowed to use the crane and its implements during load lifting and handling operations only with stationary vehicle and under complete stability conditions.

The pictograms placed near the levers indicate their operating direction in relation to the controls you want to perform (refer to paragraph 5.1 "Pictograms for crane and implement control").

Refer to paragraph 5.2 "Layout of crane and implement controls" for any explanation about the sequence of labels.

Make sure that the lever you are going to operate corresponds to the control you want to perform.

Chapter 6 – Setting up for crane operation

6.1 – Preliminary checks

6.1.1 - Checks on the crane

Carry out the daily checks as prescribed in paragraph 10.2 "Checks and preventive maintenance".

Prior to starting operation with crane and implements, check their safety devices in loadless condition and with reentered extension boom sections.

In particular, follow this procedure to check the STOP button working:

- operate any crane control: movements should perform without any problem;
- push the STOP button during crane operation: the crane should stop;
- operate again any crane control: no operation should be possible;
- unblock the STOP button: crane operations should perform without any problem.

If you push the STOP button and the crane doesn't stop or other functions are still active, high risk of accidents (even serious) occurs for the operator and other persons: do not operate the crane and immediately contact an authorised FASSI service centre.

Operating the crane with STOP button not working properly is a serious operator's negligence.

If you find any of the following defects on the crane:

- damages or cracks on components or weld joints;
- damages in the hydraulic system;
- oil cooling system not working properly;
- damages in the safety devices;
- loosened screws;
- unsecured pins;
- unusual noises;
- unusually quick or slow movements;
- failure of the control system;
- control levers not returning back automatically;
- faulty components, buttons, levers;
- damaged seals;
- malfunctioning of the hose tray system;
- missing protections;
- damaged ropes, chains and pulleys;
- faulty rope run;
- suitability of added components for the intended use not verified;
- excessive clearance between components (e.g. extension booms, joints, pins, etc.)

do not start the device or immediately stop it (refer to standard ISO 9927-1 – Cranes - Inspections-General). Reactivation is possible only if the fault is solved and if safe working is guaranteed.

The list above could be incomplete: the operator must evaluate possible crane defects and take proper measures.

Controls, control stations, support surfaces, rises and steps must be clear of snow, ice, dirt (oil, grease, etc.) and any object.

There is higher risk of falls and accidents for the operator and persons in the vicinity in case of snow, ice and dirt on controls, plates, support surfaces, steps and rises.

Plates, control pictograms, signs and warnings must be clearly visible and identifiable.

The control station must be properly enlightened, in order to guarantee the safe working of the crane.

6.1.2 - Check of working area and service conditions

The whole working area is considered to be high risk zone for accidents (even serious) for the operator and other persons. The access to the working area by unauthorized persons is prohibited.

It is compulsory to enclose the working area. No one shall stop or pass in the crane working area. In this area it is forbidden to carry out other tasks.

To enclose the working area and signal the crane operation you can use: barriers, cones, emergency lights, red and white stripe warning stickers, etc.

It is prohibited to stop or pass under a suspended load.

The working area must be properly enlightened, in order to guarantee the safe working of the crane.

Load and working area must be clearly and fully visible to the operator. If this is not possible, the operator must receive instructions (checking the communication efficacy) by another operator who has the full view of the working area. Otherwise, he must provide the crane with a radio remote control, in order to have an unobstructed view of the working area.

The operator must instruct his coworker so as to avoid mutual damage during manoeuvres.

The operator is the only person in charge of the lifting device and its implements, their movements, the load movements and the whole working area of the crane. Check the coworker's working conditions comply with the essential health, safety and welfare requirements.

Keep the safety distance from high-voltage lines.
The minimum distance is seven (7) meters. For safe operation it is compulsory to follow the current local regulations (refer to paragraph 3.4 "Electric shock danger").

Evaluate the necessary space for crane and outrigger operation: movements must not be obstructed by other objects.

The operator must know exactly the weight he has to lift.

The conditions of the ground or the support must be suitable to the maximum pressure exercised by the device.

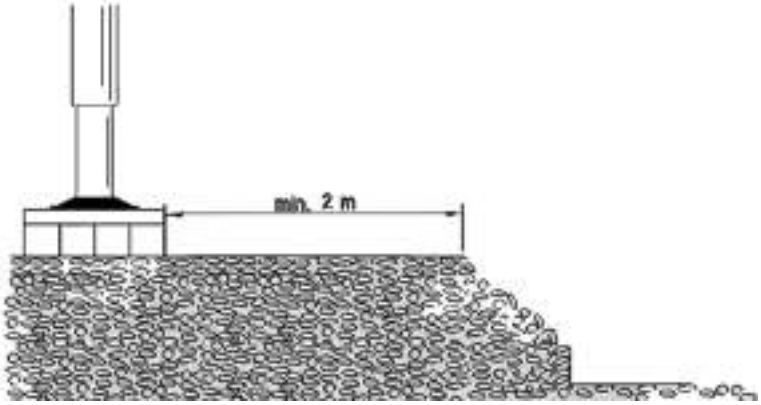
The value of the pressure exercised on the ground by the outriggers is indicated in the schedule "Crane technical data" in Appendix A of the present manual ("Max. working pressure on the outrigger Ø ... ") and has to be compared with the below table.

Admitted pressure on the ground (Load capacity of the ground) - Ref. DIN 1054			
A	Made ground, not compacted artificially		0÷10 daN/cm² = 0÷1 MPa
B	Asphalt		20 daN/cm² = 2 MPa
C	Compact ground, not removed		
	1	Mud, peat, marshy ground	0 daN/cm² = 0 MPa
	2	Not compacted ground, adequately solid	
		From fine to middle sand	15 daN/cm² = 1.5 MPa
		From thick sand to gravel	20 daN/cm² = 2 MPa
		Shattered and compacted stones	25 daN/cm² = 2.5 MPa
	3	Compact ground	
		Wet	0 daN/cm² = 0 MPa
		Soft	4 daN/cm² = 0.4 MPa
		Compact	10 daN/cm² = 1 MPa
		Half-solid	20 daN/cm² = 2 MPa
		Hard (solid)	30 daN/cm² = 3 MPa
	4	Rock	
		Eroded	100 daN/cm² = 10 MPa

If necessary, use larger outrigger plates (available on request) to avoid sinking.

Pay attention to the proximity of manhole covers, holes, etc.

Keep outriggers at a safety distance (at least 2 meters) from possible scarps.



Make sure that the temperature range for crane operation isn't lower than -30°C and higher than +50°C.

Check that the wind speed is lower than 13,8 m/s (refer to paragraph 2.2 "Technical data").

It is absolutely forbidden to use the crane during thunderstorms or in unfavourable climatic conditions.

If you use the crane in ice or snow condition, start the hydraulic system at the minimum engine speed and let the oil circulate for some minutes, till its warming.

When you restart working in low temperature conditions, it is recommended that you reentry a ram to its stroke end, in order to bring quite quickly hydraulic oil up to working temperature.

6.2 – Activating the crane

Engage the power take off. Start the pump with adequate engine speed.

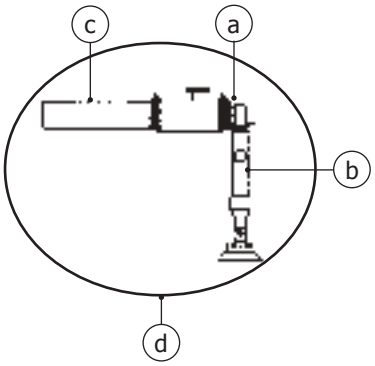
If the crane is fitted with electrohydraulic box (12/24V), the electric pump is activated by operating any control lever. In this way, it is possible to start the crane also with the vehicle engine turned off. Anyway, if possible, it is recommended that you turn on the engine, in order to keep the battery charged.

6.3 – Stabilizing the vehicle

6.3.1 - Nomenclature of the stabilization group

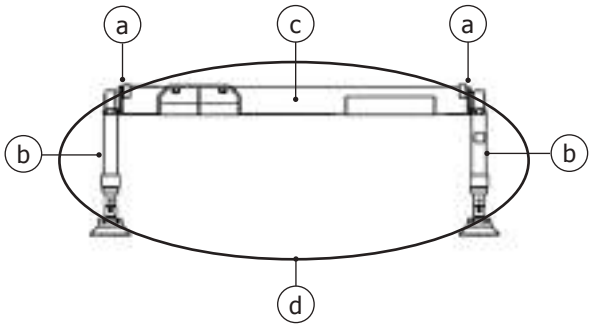
The stabilization group (if fitted) may be composed of:

- single or double outrigger ram, including fixing plate;
- base beam, manually extendable outrigger support (mounted on the right or left side) and manually tiltable outrigger ram;



a. outrigger support
b. outrigger ram
c. base beam
d. stabilization group

- base frame, manually extendable outrigger support (mounted on the side closer to the column) and manually tiltable outrigger ram;
- base frame, manually extendable outrigger supports and manually tiltable outrigger rams.



a. outrigger supports
b. outrigger rams
c. base frame
d. stabilization group

It's under the installer's responsibility to carry out the stability test and verify if it is necessary to provide the crane with a stabilization system, in order to ensure the unit (crane-vehicle) stability.
The installer must also take-charge of the related safety analysis and risk assessment.
FASSI declines any responsibility if fitments don't comply with the binding norms and directives.

6.3.2 - Instructions

Place yourself as close as possible to the loading and unloading area. Park the vehicle correctly and check that the vehicle hand brake is on and that the wheels are chocked.

Working at short outreach guarantees safer operations and longer life to the crane.

It is allowed to use the crane and its implements during load lifting and handling operations only with stationary vehicle and under complete stability conditions.

The unit (crane-vehicle) stability is only ensured by the complete lateral extension of outrigger supports, by outrigger rams properly touching the ground, by the base solidity underneath the outrigger ram plates and by the observance of capacity plates.

Carry out stabilization carefully and gradually, keeping the vehicle as much as possible in horizontal position, in order to prevent spring overloads and chassis torsions.

Pay special attention during stabilization and make sure there are no obstacles and that nobody stops or passes in proximity of the outrigger ram working area. Ensure a full view of outrigger movements, especially while working from the opposite side.

The non-observance of the minimum gaps may involve a grave risk or cause even serious accidents (see paragraph 3.3 “Crushing, Trapping and shearing danger”).

Check that the vehicle wheels are always in contact with the ground and the suspension is not completely unloaded. Do not lift the vehicle.

Control the outriggers from the side where you have the full view of the whole operating area.

During stabilization, the last manoeuvre to carry out on each outrigger ram must be the ram descent.

Make sure outrigger supports are well-greased, in order to ensure their correct working.

6.3.3 - Controlling the outriggers

As general procedure, extend all the outrigger supports, tilt the outrigger rams into working position and then extend them till they are solidly placed on the ground (refer to the following paragraphs).

The complete extension of outrigger supports is visually indicated by yellow triangles near the edge of the beam (fig. 6.1).

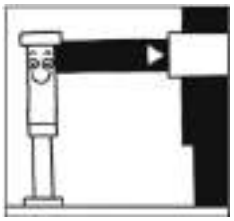
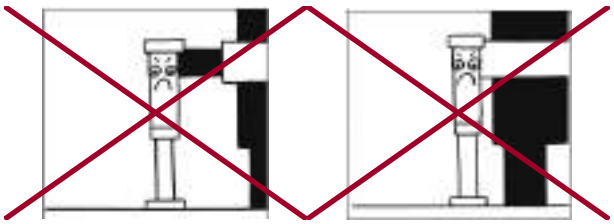


Fig. 6.1

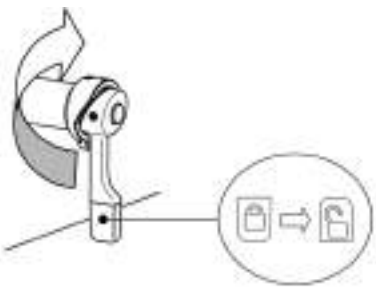


Extending the outrigger supports

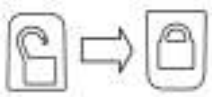
In order to extend the outrigger supports, follow this procedure.

- Unlock the locking device.

- Rotate the safety lever placed on the base frame/beam to the open padlock position (180°). In this way the safety pin is disengaged.



- Completely extend the outrigger support by operating the specific handle.
- Once the extension is completed, rotate the safety lever from open padlock position to closed padlock position (180°).



While operating outrigger supports, grab only the dedicated handles.

Above operations must be carried out for every locking device that is fitted on manually extendable supports.

Make sure outrigger supports are completely extended and locked (the safety pin levers must be in closed padlock position).
Check that the yellow triangle vertices are near the edge of the beam (fig. 6.1).

Placing the outrigger rams into working position

In order to place the outrigger rams into working position, follow this procedure.

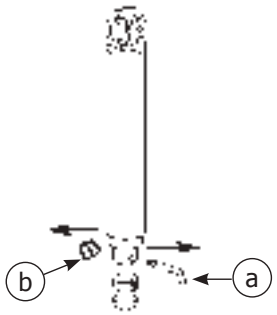
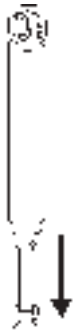
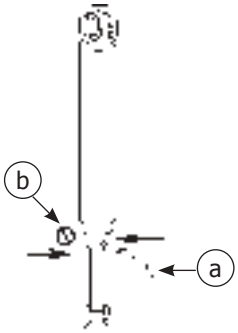
- Manually support the outrigger ram, remove the check pin (fig. 6.2 - position 1) and then the locking pin (fig. 6.2- position 2) from the seat.

  Once the locking pin (fig. 6.2 - position 2) is removed, the outrigger ram may fall down, therefore a residual crushing risk occurs for operator and persons in the vicinity. In order to prevent it, during this operation it is necessary to manually support the ram and be out of its working area.

- Carefully place the outrigger ram into working position (vertically towards the ground), insert the locking pin in its seat and secure it with the check pin.

Fig. 6.2

- If necessary, extend the rod extension following this procedure:

◇ remove the check pin (position b) and then the locking pin (position a);	
◇ extend the rod extension;	
◇ insert again the locking pin (position a) and secure it with its check pin (position b), in order to lock the rod extension.	

- Open the tap of fig. 6.3 to enable the outrigger ram exit.

Fig. 6.3

Make sure the tap of the outrigger ram placed on the opposite side (not visible) is closed. The outrigger ram operation on the not visible side may involve a grave risk or cause even serious accidents.

- Extend the outrigger ram by operating the specific lever (represented in the following figure), so that the ram is solidly placed on the ground and the vehicle stability is guaranteed.

In order to operate the outrigger ram control lever, it is necessary to push it and move it into the operating direction that corresponds to the control you want to perform.

- Close the tap of fig. 6.3.

The locking pin is made of special material. Do not replace it with others: your safety depends on it.

It is forbidden to use plumbing pipes to tilt the outrigger rams.

Check the locking pin is correctly inserted and secured.

6.3.4 - Placing the vehicle in horizontal position

Stabilize the vehicle on a horizontal plane with a maximum tilting angle of 1,5°.

Check the vehicle tilt on the level indicator. The bubble must be contained in the internal circle, and in any case it shall not go out from the external circle (5°).

Carry out stabilization carefully and gradually, keeping the vehicle as much as possible in horizontal position, in order to prevent spring overloads and chassis torsions.

6.4 – Unfolding the crane into working position

6.4.1 - Instructions

It is allowed to use the crane and its implements during load lifting and handling operations only with stationary vehicle and under complete stability conditions.

It is forbidden to operate near the overall dimensions of the moving boom, as crushing, trapping and shearing danger occurs. Thus, do not operate from the side where the crane opens/folds.

The non-observance of the minimum gaps may involve a grave risk or cause even serious accidents (see paragraph 3.3 "Crushing, Trapping and shearing danger").

Before unfolding the crane, make sure that:

- the securing devices of implements are correctly locked;
- the vehicle is properly stabilized;
- neither persons nor objects are in the crane working area;
- the operator has the full view of the working area.

6.4.2 - Unfolding the crane into working position

To unfold the crane into working position, follow this procedure:

• make sure extension boom sections are reentered;		
• lift the boom over the horizontal position;		
• exit the extension boom sections and position the hook on the vertical line above the load.		

Chapter 7 – Crane operation

7.1 – Instructions

The operator is the only person in charge of the lifting device and its implements, their movements, the load movements and the whole working area of the crane (refer to chapter 3 "Health and safety instructions").

Ensure no one stops or passes in the crane working area. Activate the acoustic warning (fitted on cranes with radio remote control) to warn persons in the vicinity and eventually make them go away from the danger zone.

The crane must be used only by one operator.

It is allowed to use the crane and its implements during load lifting and handling operations only with stationary vehicle and under complete stability conditions.

Use the crane only for the intended tasks and in the service conditions described in the present instructions.
Follow the maximum capacities and the lifting diagrams which are indicated on the capacity plates according to every working configuration.

Diagrams on capacity plates indicate the maximum load the crane can handle at a certain outreach and height.

It is prohibited to stop or pass under a suspended load.

It is forbidden to move the vehicle with suspended load.

During operations it is forbidden to leave the control station or to abandon the remote control.
Before leaving the control station: place the load to the ground; reenter all the extension boom sections and lay them on a solid and safe base; disengage the power take-off. Secure the crane against not authorized activation.

The non-observance of the minimum gaps may involve a grave risk or cause even serious accidents (see paragraph 3.3 "Crushing, Trapping and shearing danger").

When you operate the winch, lift the load vertically using the rope and not the boom, in order to avoid possible load dangerous swinging, boom instability and premature guide shoe wear.

It is forbidden to operate the crane (with or without load) continuously and at full speed, in order to avoid greater weak of components and shorter crane life.

If the vehicle is equipped with pneumatic suspensions, block them during crane operation.

7.2 – Checking the load

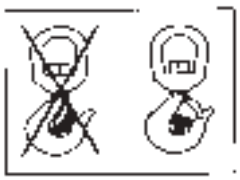
Carefully evaluate the load and its characteristics in order to choose the proper lifting devices. You must know the precise weight to lift. Correctly sling the load and check the proper working of lifting devices.

Make sure the hook is always unrestrained to pivot and vertically work.

Check the efficiency of the hook safety catch.

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

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



Carefully handle wet or icy loads, as this involves slipping danger.
Before lifting, it is compulsory to clean the load from ice or snow.

Make sure the load doesn't exceed the capacity indicated on the capacity plates, according to the related working configuration.

Prior to working with implements, carefully read their use and maintenance instructions.

7.3 – Hooking up or unhooking the load

To hook up the load place the hook on the vertical line above the load centre of gravity.

Stop the crane movements and hook up the load.

Make sure the crane is not in operation when hooking up or unhooking the load. If it is accidentally activated by others, high risk of accidents occurs for operator and persons in the vicinity.

If a co-worker assists the operator:

- the co-worker can reach the working area only after the operator's authorization;
- the co-worker can hook up or unhook the load only if the crane is not in operation and only after the operator's authorization;
- after hooking up or unhooking operation, the co-worker must immediately leave the working area;
- it is under the operator's responsibility to check that the coworker's working conditions comply with the essential health, safety and welfare requirements.

If the operator is not assisted by any co-worker, he must:

- turn off the crane;
- hook up or unhook the load;
- start the crane.

7.4 – Handling the load

Crane and implements can be operated by different control modes. They may be:

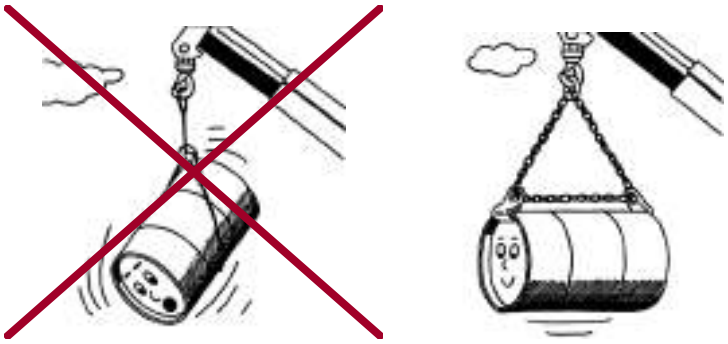
- by manual controls;
- by radio remote control.

The pictograms placed near the levers indicate their operating direction in relation to the controls you want to perform (refer to paragraph 5.1 "Pictograms for crane and implement control").

Examples of pictograms for crane and implement control		
		
Column rotation for mono-boom cranes (clockwise)	Boom movement for mono-boom cranes (descent)	Extension boom movement for mono-boom cranes (exit)
		
Implement rotation (clockwise)	Winch movement (descent)	Bucket movement (open)

Do not rotate the crane before the hooked load is lifted. Rotate slowly and carefully, paying attention to the stability of vehicle and load.

Make sure the lifted load is balanced.



While lifting and handling operations, keep the load continually checked and monitored.

Keep the safety distance from high-voltage lines.
The minimum distance from electric lines is seven (7) meters. For safe operation it is compulsory to follow the current local regulations (refer to paragraph 3.4 "Electric shock danger").

Operate the levers smoothly and gradually.
When operating at the same time two or more functions, by the stroke end of a function an uncontrolled speed increase of the other functions may occur.

Rubbing of load or lifting devices on the crane boom is prohibited.

With vertical lift, especially with manual extensions, rotate slowly in order to avoid as much as possible side-swinging.

Handle the load very carefully and avoid swinging and impacts.

Avoid quick movements and temporary stops, since they may cause the load swinging.

Check that the vehicle is always in contact with the ground.

It is forbidden to pass with suspended load where other persons transit or work. If necessary, warn through acoustic signals against the possible danger.

It is forbidden to pass with suspended load over the control station. While handling the load, if it is too close operate from the opposite side or by radio remote control (if fitted).

While crane working, a high risk of accidents for operator and persons in the vicinity, as well as of damage of the crane occurs if you notice damages or malfunctions and you don't stop operation.

In order to prevent overload on the outriggers, during vehicle loading it may be necessary to vertically adjust the outrigger rams, so that load is distributed on suspensions.

While unloading, the outrigger ram plates may not be perfectly in contact with the ground because of a rise of suspensions; it is therefore recommended to stabilize again to avoid an overturn.

These corrections in stabilization are allowed only under the following conditions:

- crane without load;
- reentered extension boom sections;
- crane with boom positioned over the vehicle body.

7.5 – Laying down the load

Lower the load without increasing the outreach.

The place where the load is laid down must be clear of obstacles.

Load must not be laid down on snow, ice, steep ground, holes, humps, etc.

Load must be laid down on even and solid ground.

Before unhooking the load from the crane, make sure it is firmly placed on the ground.

7.6 – In case of emergency

In case of emergency, immediately stop all the crane movements (see paragraph 4.2.1 "STOP button").

In case of emergency, it's under the operator's responsibility to evaluate if it is necessary to stop crane and implement operations or if it is better to lay down the load and guarantee the safety.

Chapter 8 – Folding the crane

8.1 – Instructions

It is forbidden to operate near the overall dimensions of the moving boom, as crushing, trapping and shearing danger occurs. Thus, do not operate from the side where the crane opens/folds.

The non-observance of the minimum gaps may involve a grave risk or cause even serious accidents (see paragraph 3.3 "Crushing, trapping and shearing danger").

8.2 – Folding the crane into transport position

If implements are fitted on the crane, refer to chapter 9 "Use of implements" and/or to the specific instructions given by the implement manufacturer.

After unhooking the load, follow this procedure to fold the crane into transport position:

• completely reenter the extension boom sections;		
• lift the boom almost to its stroke end;		
• rotate the crane until the reference indicators on column and base coincide;		
• fold the boom to its stroke end;		
• reenter the outriggers (if fitted) as described in paragraph 8.3 "Reentering the outriggers".		

8.3 – Reentering the outriggers

8.3.1 - Nomenclature of the stabilization group

Refer to paragraph 6.3.1 "Nomenclature of the stabilization group" for any explanation concerning nomenclature.

8.3.2 - Instructions

Pay special attention while reentering outriggers and make sure there are no obstacles and that nobody stops or passes in proximity of the outrigger ram working area. Ensure a full view of outrigger movements, especially while working from the opposite side. A residual risk of shearing, trapping and crushing danger occurs in areas concerning outriggers moving to transport position. In particular, when reentering the manually extendable outrigger supports, pay special attention and use the specific handles.

Reenter the outrigger supports one at a time while checking every moving part. Ensure a full view during each outrigger reentry operation.

The non-observance of the minimum gaps may involve a grave risk or cause even serious accidents (see paragraph 3.3 "Crushing, Trapping and shearing danger").

Make sure outrigger supports are well-greased, in order to ensure their correct working.

8.3.3 - Controlling the outriggers

As general procedure, completely reenter all the outrigger rams, then reenter the outrigger supports and tilt the outrigger rams into transport position (vertical upwards or inclined - refer to the following paragraphs).

Placing the outrigger rams into transport position

In order to place the outrigger rams into transport position, follow this procedure.

- Open the tap of fig. 8.1 to enable the outrigger ram reentry.

Fig. 8.1

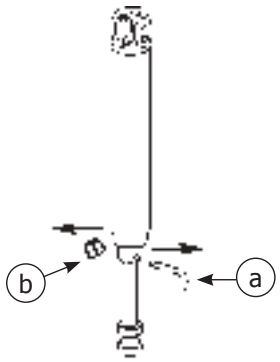
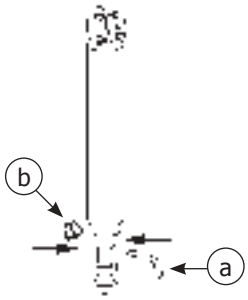
Make sure the tap of the outrigger ram placed on the opposite side (not visible) is closed. The outrigger ram operation on the not visible side may involve a grave risk or cause even serious accidents.

- Completely reenter the outrigger ram by operating the specific lever (represented in the following figure).

In order to operate the outrigger ram control lever, it is necessary to push it and move it into the operating direction that corresponds to the control you want to perform.

- Close the tap of fig. 8.1.

- If fitted, reenter the rod extension following this procedure:

◇ remove the check pin (position b) and then the locking pin (position a);	
◇ reenter the rod extension;	
◇ insert again the locking pin (position a) and secure it with its check pin (position b), in order to lock the rod extension.	

- Remove the check pin of the outrigger ram (fig. 8.2 - position 1) and then the locking pin (fig. 8.2 - position 2) from the seat.

- Carefully place the outrigger ram into transport position (vertical upwards or inclined). Manually support the outrigger ram, insert the locking pin in its new seat and secure it with the check pin.

Fig. 8.2

The locking pin is made of special material. Do not replace it with others: your safety depends on it.

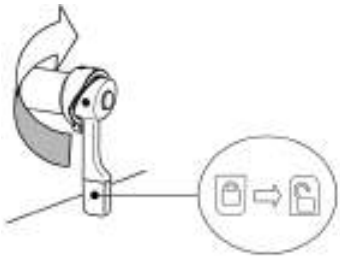
It is forbidden to use plumbing pipes to tilt the outrigger rams.

Check the locking pin is correctly inserted and secured.

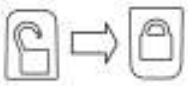
Reentering the outrigger supports

In order to reenter the outrigger supports, follow this procedure.

- Rotate the safety lever placed on the base frame/beam to the open padlock position (180°). In this way the safety pin is disengaged.



- Completely reenter the outrigger support by operating the specific handle.
- Once the reentry is completed, rotate the safety lever from open padlock position to closed padlock position (180°).

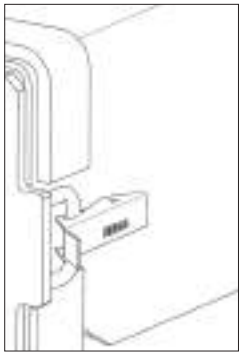


While operating outrigger supports, grab only the dedicated handles.

Above operations must be carried out for every locking device that is fitted on manually extendable supports.

Make sure outrigger supports are completely reentered and locked (the safety pin levers must be in closed padlock position).

The engaging of the locking device is automatic: don’t put your hands on it.



8.4 – Deactivating the crane

Disengage the power take off. Deactivate the pump.

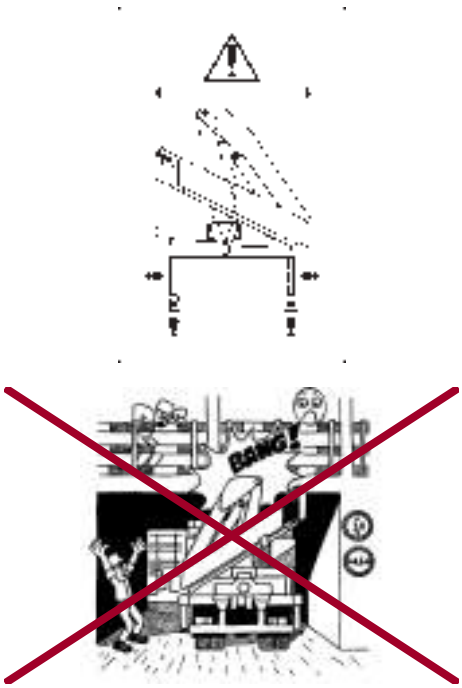
8.5 – Securing load and crane

Fix all the crane parts and implements in order to avoid exit of extension boom sections and outriggers during transport.

Properly fix and balance the load, in order to avoid its fall from the vehicle during transport.

Implements can be kept mounted on the extension boom sections of the crane only if maximum allowed overall dimensions are observed and implements are properly secured against possible uncontrolled movements.

Take note of the vehicle (included load) maximum dimensions. Observe the maximum overall dimension in folded position for the transit under tunnels, bridges, underpasses, power lines and the maximum allowed loads on the vehicle axles.



Pay special attention to road signs.

If the crane is fitted with safety devices signalling the exceeding of overall dimensions, pay always attention to the alarms emitted in the vehicle cab and take proper measures to reenter within the overall dimensions.

Chapter 9 - Use of implements

9.1 – Generality

According to HC1/S2 (ex H1/B3) classification, the crane may be provided with the following implements:

- manual extensions;
- winch;

- clamshell bucket;
- rotator;
- auger.

If the use instructions of implements allow certain operations which are forbidden by the current instructions, give always priority to the crane use instructions.

Dimensions and capacity of other implements than the hook must be proportioned with crane performances.

Loads indicated on the capacity plates refer to crane without implements: so, prior to every lifting operation, it is necessary to deduct the weight of the optional implements mounted on the crane (e.g. manual extensions) from the load values represented on the plates.

Implements can be kept mounted on the extension boom sections of the crane only if maximum allowed overall dimensions are observed and implements are properly secured against possible uncontrolled movements.

Before operating implements (such as bucket, rotator and auger), it is necessary to refer to an authorised FASSI service centre and check their suitability to the crane: as a matter of fact, it could be necessary to derate the crane.

Prior to working with implements, carefully read their use and maintenance instructions.

9.2 – Controls to operate hydraulic implements

The pictograms placed near the levers indicate their operating direction in relation to the controls you want to perform.

Make sure that the lever you are going to operate corresponds to the control you want to perform.

Examples of pictograms for implement control		
		
Winch movement (descent)	Bucket movement (open)	Implement rotation (clockwise)

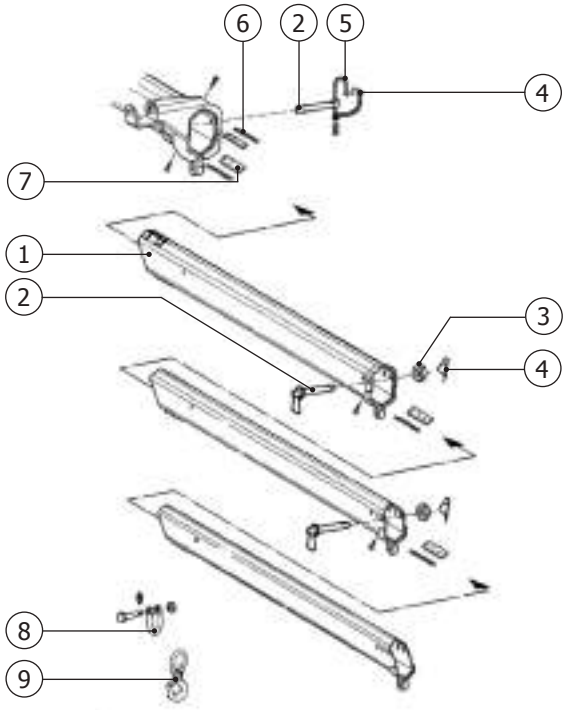
9.3 – Manual extensions

9.3.1 - Generality

Manual extensions can be inserted in the last crane extension boom section in order to increase the machine outreach. Special FASSI locking pins enable their correct positioning and fixing.

Each FASSI manual extension can be mounted only on certain FASSI crane models. You can find the possible combinations in Appendix A of the use and maintenance manual.

9.3.2 - General nomenclature



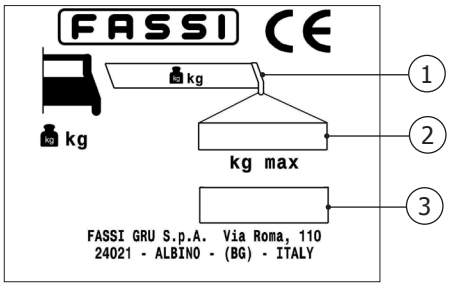
1. Manual extension
2. Locking pin
3. Nut
4. Check pin
5. Safety pin
6. Mechanical stroke end devices
7. Guide shoes
8. Shackle
9. Hook

Fig. 9.M.1

9.3.3 - Technical specifications

The manual extension maximum capacity is indicated on the capacity plates.

This capacity is also indicated on the following plate, that is applied to manual extensions for EC market.



1. Manual extension weight
2. Manual extension maximum capacity
3. Manual extension type

Operate manual extensions according to the maximum capacity indicated on the capacity plates.

Prior to every operation with the crane, it is necessary to consider the weight of manual extensions. If they are mounted, deduct their weight from the load values represented on the capacity plates.

For dispositions concerning service and storage conditions, refer to chapter 2 "General specifications" of the crane use and maintenance manual, as the same instructions for crane operation are valid for manual extensions.

9.3.4 - Health and safety instructions

Refer to chapter 3 "Health and safety instructions" of the crane use and maintenance manual, as the same instructions for crane operation are valid for manual extensions.

The operator must know exactly the weight he has to lift: use the electronic check system for the load hooked on manual extensions (if fitted).

Before starting operation, make sure the locking pins are inserted and secured with the check pins, in order to prevent an accidental exit.

Operating manual extensions, it is forbidden to lift higher loads than the allowed ones as per the capacity plates.

It is possible to move manual extensions only if they weigh less than 20 kg, otherwise it is necessary to use proper tools. The operator must choose the tool according to the manual extension weight.

m < 20 kg

m > 20 kg

9.3.5 - Safety devices

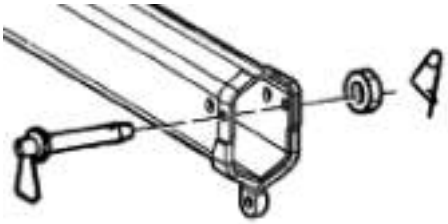
Mechanical stroke end

Each manual extension is provided with a mechanical stroke end device that prevents its accidental exit.

removable stroke end device

Locking systems

Each manual extension is provided with a locking and a check pin, in order to prevent its accidental exit during transport and working.



The locking pins are made of special material. Before crane and implement operation, make sure they are in a good state of repair: in case of wear or damages, replace them only with original FASSI spare parts. Your safety depends on it.

Electronic check system for load hooked on manual extensions

In compliance with safety regulations in force in EC countries, if the crane is provided with electronic lifting moment limiting device it is compulsory to install and use the LLV (rated load reader for manual extensions) and check, prior to every lifting operation, the load to be handled. Follow the instructions that are provided together with the device.

LLV

The electronic check system for load hooked on manual extensions is not always active (unlike the lifting moment limiting device of the crane), but it has to be activated by the operator just to check if the load can be handled safely.

Even if the electronic check system for load is fitted, the operator is obliged to observe the lifting diagrams represented on the capacity plates.

Once activated, the check system for load hooked on manual extensions compares the real load hooked on manual extensions (included possible implements) with the admissible load.

It is forbidden to add or replace loads once the check procedure has been performed.

Prior to starting the load check procedure, extend the manual extensions as per the sequence indicated on the capacity plate.

The check procedure enables to verify if a load can be handled when using manual extensions.

The procedure gives back the following information:

- admissible/not admissible load handling;
- approximate calculation of the load weight.

9.3.6 - Setting up for manual extension operation

Instructions

Do not place limbs, fingers or any other part of your body into areas of the crane where shearing danger occurs, without having arranged proper lock systems for these areas.

It is forbidden to exit manual extensions too fast: this would cause damages to the stroke end devices.

During operations to extend and reenter manual extensions, it is necessary to work from a lateral position. Operating in front of the exit direction of manual extensions is dangerous, therefore it is forbidden.
Make sure the area used to extend and reenter manual extensions is adequate and suitable.

Extend the manual extensions according to the sequence and loads indicated on capacity plates.

Mounting the manual extensions

Mounting must be performed by a competent person in a workmanlike manner: refer to an authorised FASSI service centre.

Insert the manual extensions in the last crane extension boom section by means of suitable tools.

Mount the removable mechanical stroke end devices on the end of each manual extension and secure the manual extension with the locking pins.

Extending the manual extensions

1. Orientate the extension boom group downwards.

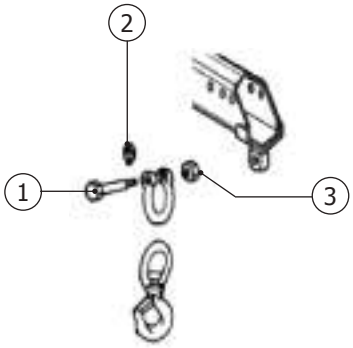
2. Exit the extension boom sections as long as the manual extensions you want to extend, laying the last manual extension on the ground (in case, use a wooden plate between manual extension and soil in order to avoid surface damage).
3. Unlock and extract the locking pin (fig. 9.M.1 - position 2) of the manual extension you want to extend.
4. Slowly reenter the extension boom sections in order to enable the manual extension exit.
5. Once the manual extension is extended, insert the locking pin (fig. 9.M.1 - position 2) and secure it with the nut (fig. 9.M.1 - position 3) and the check pin (fig. 9.M.1 - position 4).
6. Repeat above-mentioned operations 3, 4 and 5 for each manual extension you want to extend.
7. Mount the hook.

Do not try to line-up the holes/slots for the locking pin insertion with your fingers; always use a suitable tool.

Check all the locking pins are correctly inserted and the manual extensions properly secured.

Mounting the hook on manual extensions

Mount the hook as represented in the following figure.



Make sure all the locking pins (position 1), nuts (position 3) and check pins (position 2) are correctly mounted.

9.3.7 - Manual extension operation

It is allowed to operate manual extensions only in compliance with the maximum capacity indicated on the capacity plates.

The operator must know exactly the weight he has to lift: use the electronic check system for the load hooked on manual extensions (if fitted).

On cranes for EC market and with electronic lifting moment limiting device, it is necessary to install the LLV (rated load reader for manual extensions) and check, prior to every lifting operation, the load to be handled. Follow the instructions that are provided together with the device.

The electronic check system for load hooked on manual extensions is not always active (unlike the lifting moment limiting device of the crane), but it has to be activated by the operator just to check if the load can be handled safely.

Loads indicated on the capacity plates refer to crane without implements: so, prior to every lifting operation, it is necessary to deduct the weight of manual extensions from the load values represented on the plates.

9.3.8 - After manual extension operation

Instructions

Slowly reenter manual extensions. Do not place limbs, fingers or any other part of your body into areas of the crane where shearing danger occurs, without having arranged proper lock systems for these areas.

During operations to extend and reenter manual extensions, it is necessary to work from a lateral position in order to prevent possible impacts.

Reentering the manual extensions

1. Remove the hook.
2. Orientate the extension boom group downwards.

3. Lay the last manual extension on the ground (in case, use a wooden plate between manual extension and soil in order to avoid surface damage).
4. Unlock and extract the locking pin (fig. 9.M.1 - position 2) of the manual extension you want to reenter.
5. Slowly extend the extension boom sections in order to enable the manual extension reentry.
6. Once the manual extension is reentered, insert the locking pin (fig. 9.M.1 - position 2) and secure it with the nut (fig. 9.M.1 - position 3) and the check pin (fig. 9.M.1 - position 4).
7. Repeat above-mentioned operations 4, 5 and 6 for each manual extension you want to reenter.

Do not try to line-up the holes/slots for the locking pin insertion with your fingers; always use a suitable tool.

Check all the locking pins are correctly inserted and the manual extensions properly secured.

Removing the manual extensions

The removal of manual extensions must be performed by a competent person in a workmanlike manner: refer to an authorised FASSI service centre.

In order to carry out the operation, sling and support the manual extensions, then remove the mechanical stroke end devices and extract the manual extensions by means of proper tools.

9.3.9 - Maintenance and dismantling

For instructions concerning maintenance and dismantling of manual extensions, refer to chapter 10 “Maintenance” of the crane use and maintenance manual.

9.4 – Winch system

9.4.1 - Generality

The winch system is composed of a rotating drum fixed to a structure which is integrally connected to the crane and of lifting devices.
A hydraulic motor (controlled by a safety check valve that is connected to the crane circuit) enables the rotation of the drum on which the rope winds.
When the winch control lever is in neutral position, the load is kept in position by a fail-safe negative brake integrated into the motoreducer unit.

Prior to winch operation, read the use and maintenance instructions provided by the manufacturer.

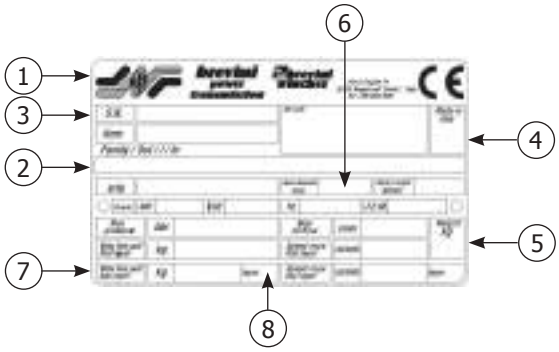
9.4.2 - General nomenclature

1. Winch
2. Rope
3. Fixed pulley
4. Balance weight/ Rope stretcher
5. Hook
6. Mobile pulley (if fitted)

9.4.3 - Technical specifications

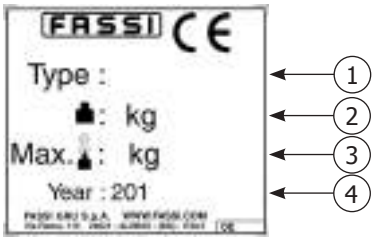
Winch identification data and technical features are indicated on a metallic plate. It is applied on the winch by its manufacturer and is used for CE mark, according to the Machinery Directive.

The identification data on the plate are the following:



1. Manufacturer's name
2. Winch type
3. Serial number
4. Year of manufacture
5. Winch weight
6. Rope diameter
7. Maximum pull at the datum layer
8. Datum layer

Moreover, the following adhesive plate is applied on pulleys.



1. Pulley code
2. Pulley weight
3. Pulley maximum capacity
4. Year of manufacture

Each FASSI pulley can be used only in combination with certain winch models, which in turn can be mounted only on certain FASSI crane models.
You can find the possible combinations crane - winch in Appendix A of the use and maintenance manual.

For dispositions concerning service and storage conditions, refer to chapter 2 "General specifications" of the crane use and maintenance manual, as the same instructions for crane operation are valid for the winch system.

9.4.4 - Health and safety instructions

Refer to chapter 3 "Health and safety instructions" of the crane use and maintenance manual, as the same instructions for crane operation are valid for the winch system.

The capacity plates for crane with winch indicate the maximum load that can be lifted by a crane provided with winch system in the different working configurations.

It is forbidden to exceed the allowed limits of outreach and load represented on the capacity plates for crane with winch. Exceeding the allowed limits of outreach and load involves hazards of accidents (even serious) for operator and persons in the vicinity, vehicle overturning and breaking of crane components.

It is forbidden to exit the crane extension boom sections when the load is lifted by the winch.

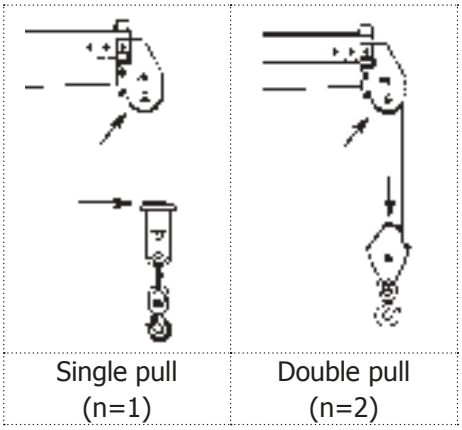
During lifting operation with balance weight or mobile pulley next to the fixed pulley, reduce the exit speed of extension boom sections in order to prevent stresses on the rope.

The locking pins are made of special material. Do not replace them with others: your safety depends on it.

9.4.5 - Safety devices

Mechanical stroke end

The stroke end condition occurs when mobile pulley or balance weight come in contact with the fixed pulley structure (the following figures show the parts coming in contact).
Prior to starting a lifting manoeuvre, carefully check quotas and overall dimensions.



Single pull (n=1)	Double pull (n=2)

Fig. 9.V.1 shows a normal working situation.
Fig. 9.V.2 shows the activation of the mechanical stroke end device.

Fig. 9.V.1

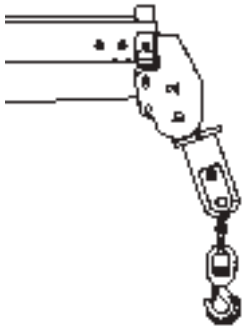


Fig. 9.V.2

Block due to activation of limiter and safety functions of the winch

Electronic lifting moment limiting device

On cranes fitted with electronic lifting moment limiting device, the activation of the winch limiter due to overload blocks the following manoeuvres:

- boom lift and descent;
- exit of crane extension boom sections;
- lift of the winch rope.

The block caused by winch rope totally unwound prevents this manoeuvre:

- descent of the winch rope.

The extension boom section block due to winch overload (with winch capacity over certain parameters) prevents this manoeuvre:

- exit of crane extension boom sections.

The block due to activation of the mechanical stroke end device prevents the following manoeuvres:

- exit of crane extension boom sections;
- lift of the winch rope.

Load limiting device

On cranes fitted with load limiting device, when the stress value on the rope is higher than the set limit value (10% of the maximum pull), the winch load limiting device blocks the exit of the crane extension boom sections. If you still try to operate the exit of the extension boom sections, any other simultaneous manoeuvre is blocked.

If the rope is completely unwound, the winch descent and any other simultaneous manoeuvre are blocked.

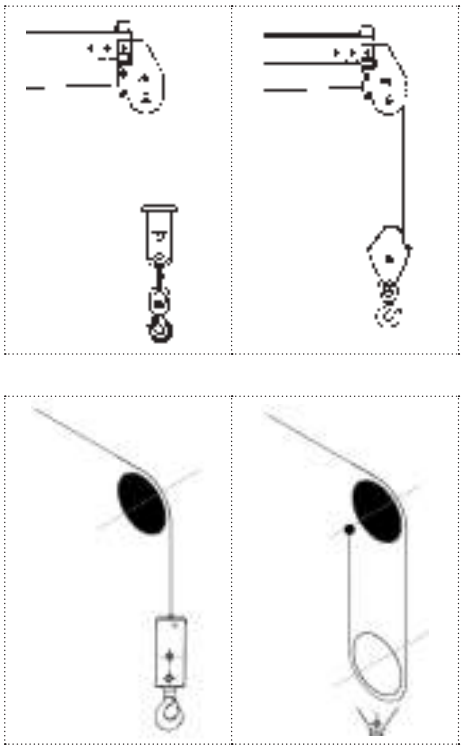
Winch fail-safe negative brake

For any information about the integrated fail-safe negative brake, refer to the use and maintenance instructions provided by the winch manufacturer.

9.4.6 - Setting up for winch system operation

Working types

In fig. 9.V.3 you can find the mounting scheme of fixed pulley, balance weight and mobile pulley.

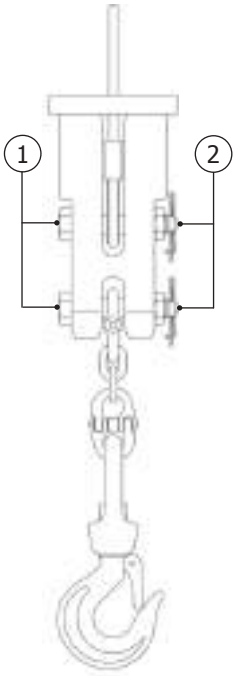


Single pull (n=1)	Double pull (n=2)

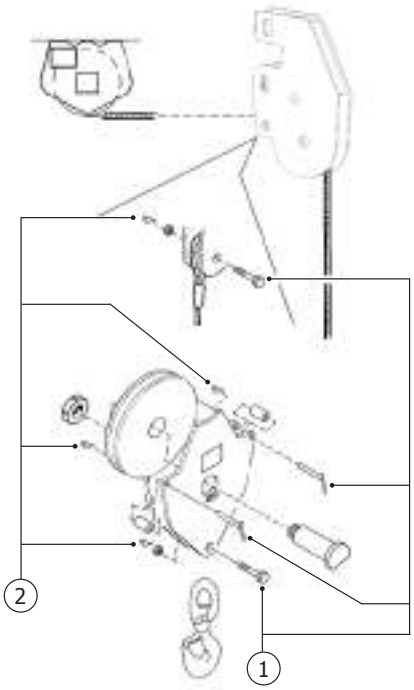
Fig. 9.V.3

Mounting mobile pulleys and balance weight

According to the working type, mount mobile pulley or balance weight as per the following figures: insert the locking pins (position 1) and secure them with nut and check pins (position 2).



n=1



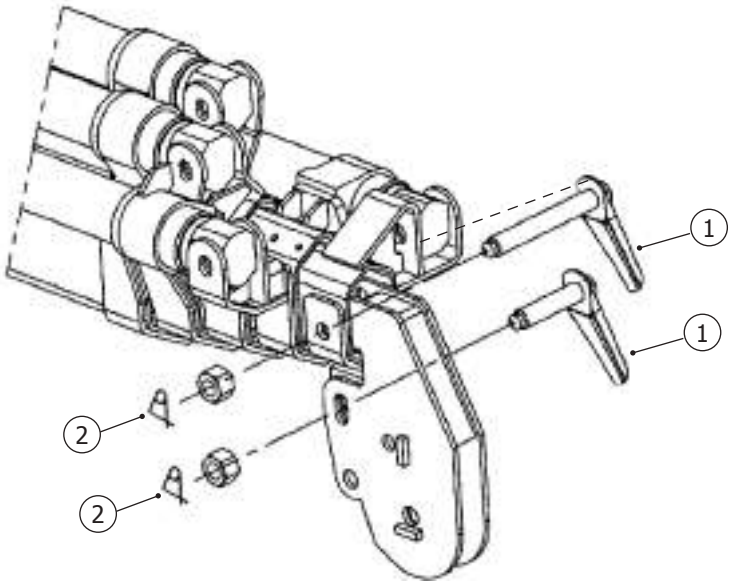
n=2

Prior to starting operation, check the locking pins are inserted and secured by their check pins.

The loads represented on the capacity plates for crane with winch can be lifted only respecting the number of pulls specified in the plates.

Mounting the fixed pulleys on crane

Mount the fixed pulley by the hook attachment by inserting the locking pins (position 1) and securing them with nut and check pins (position 2).



fixed pulley

9.4.7 - During winch system operation

The pictograms placed near the levers indicate their operating direction.

Pictograms for winch control	
	
Winch movement (descent)	Winch movement (lift)

Do not rotate the crane before the hooked load is lifted.

Lift the load vertically using the rope and not the boom, in order to avoid possible load dangerous swinging, boom instability and premature guide shoe wear.

With suspended load, rotate slowly and carefully, paying attention to the vehicle stability..

When balance weight or mobile pulley are very close to the fixed pulley and you have to work in their vicinity, place yourself laterally and not in front or behind the pulley and operate at slow speed, since the contact (especially without load) may result in abrupt movements of the hook group (fig. 9.V.4 and 9.V.5).

Fig. 9.V.4

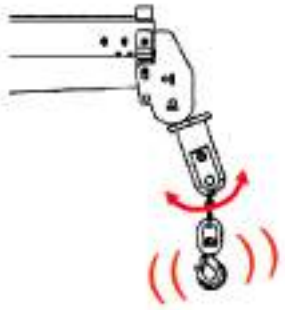


Fig. 9.V.5

Operating the winch, it is forbidden to lift higher loads than the allowed ones as per the relevant capacity plates.

Check that the rope rewinding on winch drum occurs regularly and without overlapping. It is suggested that you rewind the rope only if it is taut enough.
For the proper rope rewinding on winch drum, the distance between winch and first pulley shall correspond at least to the one represented on the capacity plates.

Prior to operation, check there are no wear signs on the rope.

9.4.8 - After winch system operation

Prior to folding the crane into transport position, remove all the pulleys by extracting locking and check pins.

Completely rewind the rope on winch drum, checking the operation occurs properly.

9.4.9 - Maintenance and dismantling

For instructions concerning maintenance and dismantling of the winch system, refer to chapter 10 "Maintenance" of the crane use and maintenance manual.

Chapter 10 – Maintenance

10.1 – Generality

In this chapter you can find the check and planned maintenance programme of a FASSI crane, together with the detailed instructions concerning maintenance operations. Good maintenance and correct use are essential to ensure and safeguard the crane functionality and safety.

In order to ensure long life for the crane, it is necessary to scrupulously follow instructions and maintenance programmes of this chapter.

At least once a year you must take the crane to an authorised FASSI service centre for a check.

Each crane is provided with a "Check register" where you must record all the checks and ordinary and extra maintenance operations you carry out on the crane.

FASSI declines any responsibility for ruptures or damages to product, persons or things due to a lack of check and maintenance.

If you repair or replace any crane component, you must use original FASSI spare parts. In this way only you can ensure a constant and regular crane working and avoid early warranty rescission.

While repairing or checking hydraulic system and rams, don't use or approach materials that may damage the system or contaminate the hydraulic oil (hemp filaments, oakum, metal shavings, sand and powdered materials, etc.).

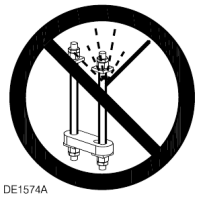
All maintenance operations must be carried out with stationary machine, turned off engines and depressurized hydraulic system.

In order to depressurize the system, disengage the power take-off and move the distributor levers.

During maintenance operations, do not place limbs, fingers or any other part of your body into areas of the crane where shearing, cutting, crushing, trapping or impact danger occurs, without having arranged proper lock systems for these areas.

During maintenance operations pay special attention because of burn danger due to possible hot components.

It is forbidden to carry out on the crane welding, drilling, grinding or any other action that is not described among maintenance operations, without FASSI authorization.



In the following paragraphs you can find check and maintenance lists for operator, competent personnel and FASSI authorised service centre (ISO 9927), as well as necessary instructions for operations carried out by operator and competent personnel (for instructions related to the operations performed by the service centre, refer to the installation manual).

Icon legend for check and maintenance lists:

- Operator's checks
- Checks and preventive maintenance by the competent personnel (ISO 12480-1)
- Maintenance by the authorised FASSI service centre
- Visual check
- Functional check
- Cleaning
- Lubrication
- Replenish / Replacement
- Nondestructive check

The operator is not allowed to carry out maintenance operations that are reserved to authorised FASSI service centres.

10.2 – Checks and preventive maintenance

	Daily checks Time required: 15 minutes		
Element	**Description**		**In case of anomalies (1)**
Lifting hook (ISO 17440)		Check the functionality of hook and its safety devices.	Go to an authorised service centre or replace the hook.
		Visually check the physical integrity of hook and its components, to make sure there are no surface damages and excessive deformations.	
Crane and accessories		Carry out a general check of cleaning conditions and make sure there are no foreign substances (dust, ice, snow, grease, oil, etc.).	Clean crane and accessories (§ 10.3.3).
		Carry out a general functional check to make sure there are no malfunctioning, irregular noises and movements.	Go to an authorised service centre.
		Carry out a general check of the physical integrity, to make sure there are no lacking, damaged or unsuitable components.	
Metal carpentry (2)		Visually check the physical integrity of the metal structure, paying special attention to weld joints (absence of breaks, cracks, paint flaking, cuts, incisions, etc.).	
Bolts and screws (2)		Visually check that threaded connections are not loosened.	
Winch rope (ISO 4309)		Visually check the physical integrity of the rope segment in use (§ 10.3.2).	
Hydraulic system (2)		Visually check there are no oil leakages.	
Tank		Visually check the oil level in the tank by the specific indicator (§ 10.3.6).	Replenish the lacking oil.
Safety devices		Check the safety system functionality (§ 10.3.8).	Go to an authorised service centre.
		Check that removable locking devices are fitted and well-functioning.	
Warning and capacity plates, use and maintenance manual		Visually check the physical integrity of warning and capacity plates.	
		Check the use and maintenance manual is provided.	
		Visually check that warning and capacity plates are clean and readable.	Clean warning and capacity plates.
Transducers and sensors (2)		Carry out a general check for the correct working of transducers and sensors (check the conformity between crane configuration and sensor output).	Go to an authorised service centre.
Control levers (2)		Visually check the physical integrity of control levers.	
		Manually check the operating fluidity of control levers.	
		Check that control levers automatically return to neutral position without any problem.	

	**Weekly checks and preventive maintenance** Time required: 20 minutes (Before the following operations, carry out the daily checks)		
Element	**Description**		**In case of anomalies (1)**
Lifting hook (ISO 17440)		Check that the hook safety device and its spring are clean.	Clean the hook safety device and its spring.
		Check and detect the critical dimensions of hook and its components, according to § 10.3.1.	
Winch rope (ISO 4309)		Visually check the physical integrity of the rope segment in use (considering besides 5 turns around the drum). Check there are no broken wires, deformations, flattening, corrosion, wrinkles, etc. (§ 10.3.2).	Go to an authorised service centre.
Rams (2)		Dissolve and remove impurities on ram rods. Rub the surface using an industrial oil-soaked cloth (use low viscosity protective oil - see § 10.3.5).	
Lubrication		Lubricate crane and its components according to the planned lubrication programme (§ 10.3.7).	
		Visually check the lubrication of extension boom sections and guide shoes.	Lubricate extension boom sections and guide shoes.

	**Quarterly checks and preventive maintenance** Time required: 45 minutes (Before the following operations, carry out daily checks and weekly checks/preventive maintenance)		
Element	**Description**		**In case of anomalies (1)**
Rotation group		Visually check through the greasing cap that there are no foreign parts (metal shavings or fragments, etc.); check there are no irregular noises and the rotation torque is observed.	Lubricate the rotation group through the greasing cap; Go to an authorised service centre.
Metal carpentry (2)		Carry out a careful visual check of the physical integrity of the metal structure, paying special attention to structural weld joints (absence of breaks, cracks, paint flaking, cuts, incisions, etc.).	Go to an authorised service centre.
Rams (2)		Visually check the physical integrity of the ram cylinder, making sure there are no deformations.	
		Visually check the surface covering of ram rods, making sure there are no deformations.	
Outrigger rams		Visually check the physical integrity of the outrigger ram plate.	
		Manually check that the outrigger ram plate is free to move.	Check the joint lubrication - Go to an authorised service centre.
Bolts and screws (2)		Visually check the physical integrity of bolts and screws.	Go to an authorised service centre.
Pivot points (2)		Visually and manually check there are no clearances in the pivot points, paying special attention to snap rings (1).	

	**Quarterly checks and preventive maintenance** Time required: 45 minutes (Before the following operations, carry out daily checks and weekly checks/preventive maintenance)		
Element	**Description**		**In case of anomalies (1)**
Winch		Visually check the physical integrity of winch and its components (cable gland, pulleys, etc.).	Go to an authorised service centre.
		Carry out a functional check of winch and its components (cable gland, pulleys, etc.).	
		Carry out a test to check that load is kept in position by the brake (§ 10.3.2).	
Hydraulic system (2)		Visually check hydraulic system and its components, verifying their physical integrity and the absence of corrosion, cracks, cuts, abrasions, disjunctions, lacerations and other surface damages.	
		Visually check hydraulic system and its components, making sure there are no oil leakages.	
Tank		Manually check that the tap switches smoothly.	
		Visually check there is no filter obstruction (§ 10.3.6).	Replace the cartridge (§ 10.3.6).
Grease nipples (2)		Visually check the physical integrity of grease nipples (§ 10.3.7).	Go to an authorised service centre.
Electric and electronic devices (2)		Visually check the physical integrity of electric and electronic equipment.	
Transducers and sensors (2)		Check the physical integrity of the metal reader for proximity sensor.	
Lubrication		Lubricate crane and its components according to the planned lubrication programme (§ 10.3.7).	
Crane cleaning		Clean crane and its implements using suitable products (§ 10.3.3).	

	**Every 100 hours (Work Time) of utilization of each component / quarterly**		
Element	**Description**		**In case of anomalies (1)**
Lubrication		Lubricate crane and its components according to the planned lubrication programme (§ 10.3.7).	

(1) The described operations must be carried out by competent personnel (ISO 12480-1).

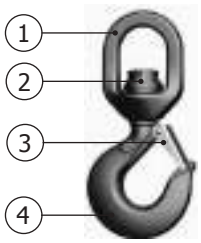
(2) See the list of components in paragraph 10.4 "Checks and maintenance by the authorised FASSI service centre".

10.3 – Instructions for checks and preventive maintenance

10.3.1 - Lifting hook

Nomenclature

The hook is the crane part in direct contact with load. In order to ensure its proper working condition, it is necessary to check and record its correct functionality and also its wear and deformation conditions.



1. Ring
2. Pin
3. Safety device
4. Hook

Fig. 10.1

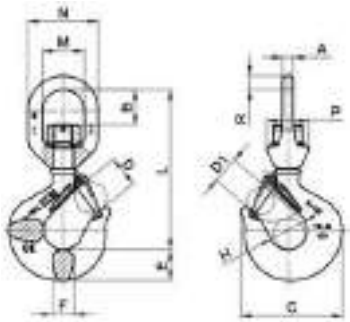


Fig. 10.2

Hook

Deformations

Measure the hook opening (measure D1 - fig. 10.2) and check permanent deformation doesn't exceed 10% of the value detected during the first measurement.

Wear condition

Measure the thickness of the hook lower part (measure E - fig. 10.2) and check that it doesn't decrease over 5% of the original value detected during the first measurement. No gaps or discontinuity shall be found on the hook surfaces subject to wear.

If the component is over-deformed or worn, you must demolish and scrap it.

Ring

Deformations

Measure the major axis of the ring (measure B - fig. 10.2) and check that permanent deformation doesn't exceed 10% of the value detected during the first measurement.

Wear condition

Measure the thickness of the hook ring (measure R - fig. 10.2) and check that it doesn't decrease over 5% of the original value detected during the first measurement. No gaps or discontinuity shall be found on the hook surfaces subject to wear.

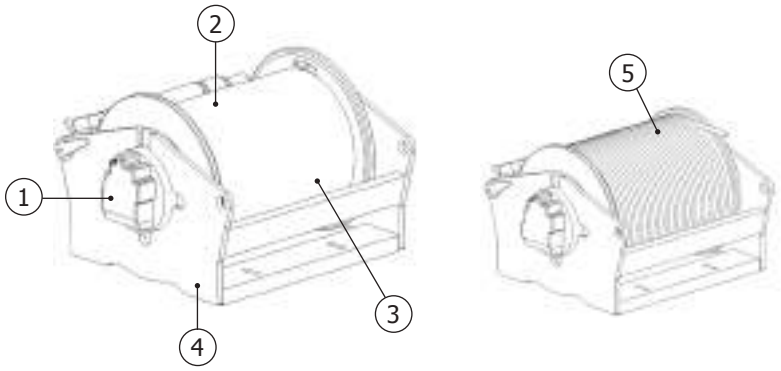
If the component is over-deformed or worn, you must demolish and scrap it.

Functional check

- Check that the hook safety device properly returns to its position.
- Carry out a functional check of the bearing by swivelling the hook in respect of the ring.

10.3.2 - Winch

Nomenclature



1. Hydraulic motor and safety check valve
2. Drum
3. Reduction unit
4. Frame
5. Rope

Fail-safe negative brake

A brake is fitted on the winch, in order to hold load while at rest.

To check the brake correct working, follow this procedure:

1. place the crane in horizontal configuration as per the capacity plate, with one extension boom section out and observing the minimum distance between winch and first pulley;
2. lift the rated load by the winch a few centimetres from the ground, with single pull increased of 5%;
3. turn off the vehicle engine;
4. operate the winch lift and descent control levers;
5. hold the load in position (at least 5 minutes);
6. if the load doesn't sink, the brake working is correct.

If load moves excessively, go to an authorised FASSI service centre.

Rope

For any detail about rope maintenance, refer to the use and maintenance instructions provided by the winch manufacturer.

10.3.3 - Crane cleaning

Wash the crane using a high-pressure water jet and cleaners in compliance with binding norms.

Do not use clothes that could scratch or damage the crane surfaces.

Crane cleaning must be carried out with:
- crane stabilized or placed in transport position;
- power take-off disengaged;
- engine turned off;
- hydraulic system depressurized.

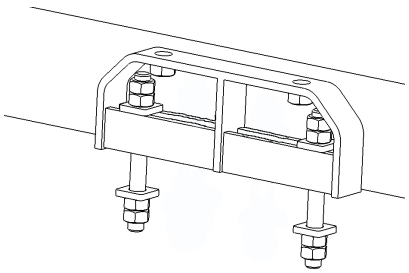
It is forbidden to use high-pressure washing on crane controls (distributors, control levers, etc.), electrical components (boxes, control panels, etc.), tanks and ram rods.

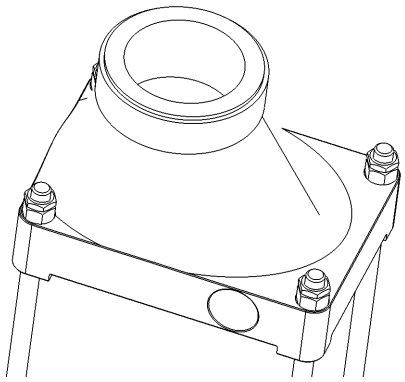
It is forbidden to use detergents such as petrol and flammable cleaning solvents or liquids. Choose and use non-flammable and nontoxic cleaning solvents.

10.3.4 - Base

Fixing rods integrally connect crane and vehicle, in order to avoid disconnections and corresponding movements that could be dangerous and compromise the crane functionality.

Loosened or damaged bolts may cause unexpected breaks and serious consequences for persons and/or things.





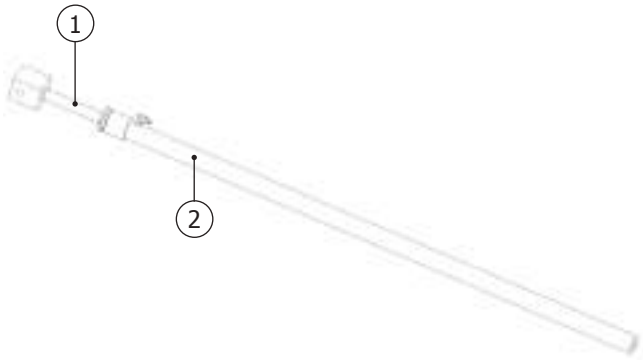
Controlling the fixing rods enables to find possible loosenings and to avoid malfunctioning and/or dangers.

In order to control the fixing rods:

- visually check if there are signs of rubbing, scratches and traces due to movements of screwed and bolted parts;
- manually check if bolts and screws are loosened.

10.3.5 - Rams

Nomenclature



1. Rod
2. Cylinder

Rod

In order to ensure the correct working of rams and safeguard them from corrosion, their rods must be clear of impurities and protected by an oily film.

Preventive maintenance must be carried out in a very dry place.

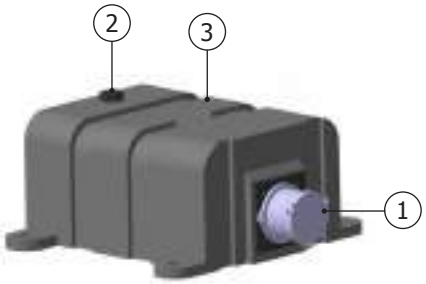
1. Dissolve and remove with clean water any remains of salt, sand and production material, as well as any other impurity on the rods.
2. Let rods dry in the open air.
3. Soak an industrial cloth (that leaves no remains) in low viscosity protective oil and rub the whole rod surface.

Do not use steam cleaners or high-pressure water jets.

For oil characteristics, see paragraph 10.3.7.

10.3.6 - Tank

Nomenclature



1. Oil filter
2. Cap with dipstick for oil level monitoring
3. Tank

Oil level

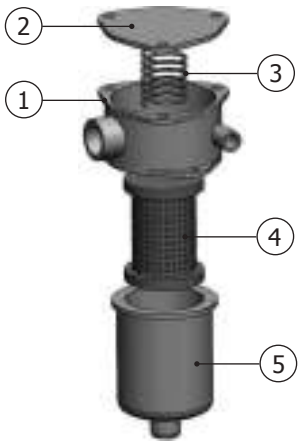
Check the oil level in the tank using the specific dipstick connected to the cap. This check must be carried out with cold oil, crane in transport position, all outrigger rams reentered and vehicle in horizontal position.

If oil is insufficient, replenish it.

The figure above has only illustrative function and could differ from the tank provided by the installer.

Oil filter

The filter holds in its cartridge all the solid particles that oil gathers along the hydraulic circuit. If you don't remove these solid particles, premature component wear may occur.



1. Head
2. Cap
3. Spring
4. Cartridge
5. Filter case

According to the planned maintenance programme, open and clean the filter, then replace the cartridge following this procedure:

- unscrew the cap fixing screws and remove cap and spring (if fitted);
- remove the cartridge;
- clean the inner part of the filter case using a non-flammable cleaning solvent;
- insert a new cartridge and the spring (if fitted);
- check the wear condition of seals (in case of excessive wear replace them) and screw again the cap on the head.

Table of hydraulic oil characteristics

High viscosity hydraulic oil: ISO-L-HV		
Outdoor minimum temperature	**Oil maximum temperature**	**Gradation**
-35° C	+45° C	ISO VG 32
-20° C	+75° C	ISO VG 46

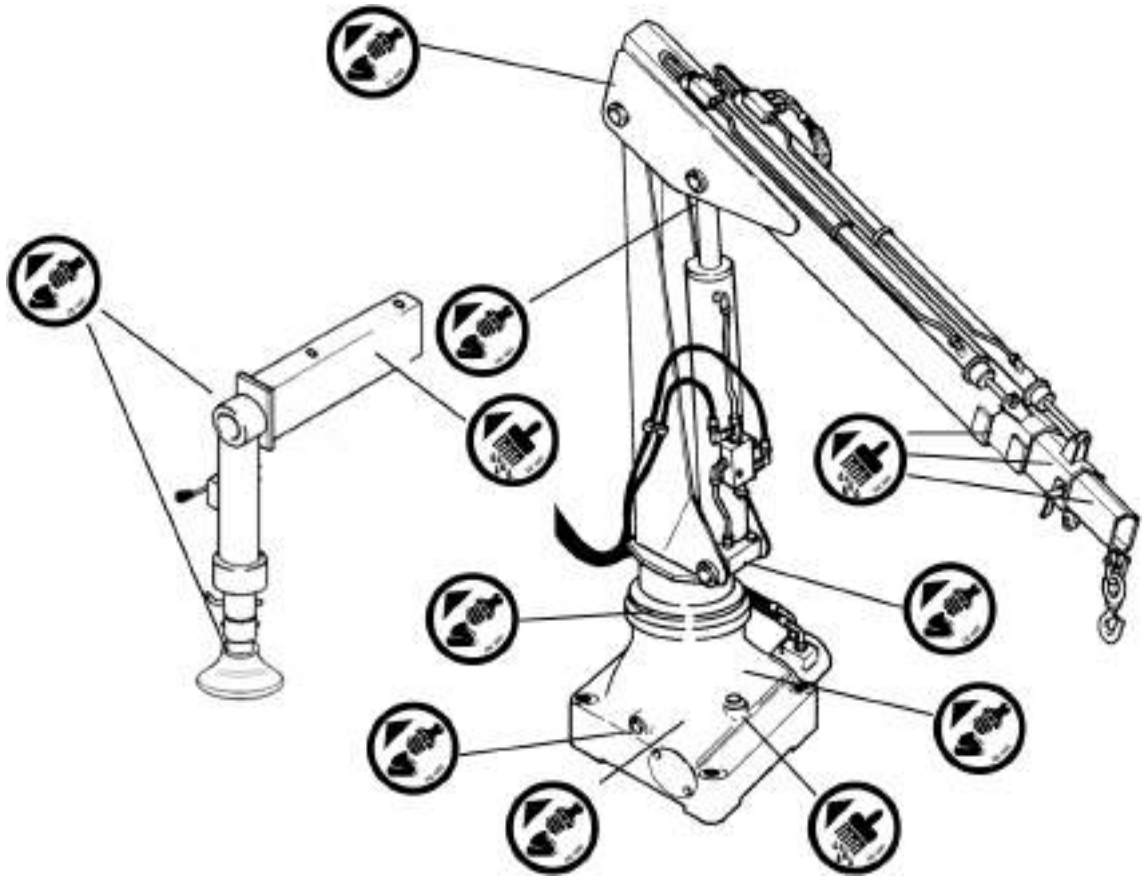
Wear resistant hydraulic oil: ISO-L-HM		
Outdoor minimum temperature	**Oil maximum temperature**	**Gradation**
-10° C	+60° C	ISO VG 32
+0° C	+75° C	ISO VG 46
+5° C	+85° C	ISO VG 68
+10° C	+90° C	ISO VG 100

10.3.7 - Lubrication

In order to ensure that mobile components of crane and implements correctly work, it is necessary to grease or lubricate the different parts according to the following table.

Lubricating points are indicated on crane and implements by specific symbols. For example, their positioning is represented in the following figures. In particular:

 This symbol indicates that a grease nipple is fitted in order to lubricate the component. Lubrication must be carried out using a pump or a suitable grease gun.	 This symbol indicates that a lubricating point is fitted. Lubrication must be carried out directly on the component, using specific instruments (e.g. brushes, grease rollers, etc.).



Before lubrication, remove old grease or lubricant, dirt and impurities.
During lubrication, it is suggested that you move components slowly, in order to better and uniformly distribute the lubricant.
Apply grease till it comes out.
After lubrication, remove grease in excess.

Compulsory periodic lubrication

	Group	Subgroup	Element	Maintenance frequency
	Rotation group		Endless screw	Every 100 working hours / quarterly
	Rotation group		Bushes on endless screw	Weekly
	Column		Bushes on column	
	Column	Pivot points	Bushes	Quarterly
	Column	Ram	Pivot point	
	Boom	Linkage system	Bushes	
	Boom	Ram	Pivot point	
	Extension boom sections		Extension boom sections	
	Extension boom sections		Guide shoes	
	Manual extensions		Guide shoes	
	Outrigger supports		Outrigger supports	
	Outrigger supports		Guide shoes	
	Outrigger rams		Plate and pivot joint	
	Winch		Fixed pulley	
	Winch		Winch rope	Quarterly (§ 10.3.2)

Table of lubricant/grease characteristics

Lubricating oil (for winch rope)
The most suitable here is a general-purpose lubricating oil with about SAE 30° viscosity. A lubricating oil containing sticky additives is recommended if ropes are expected to move quickly through the pulleys. BRILUBE 50 (BRITISH ROPES - BRINDON)

Grease (for extension boom sections, outrigger supports, gears, pins, bushes, hook)	
Temperature	**Gradation**
-30° C up to +130° C	EP1 (cold climate) EP2 (hot climate)

For **extension boom sections, outrigger supports, pins, bushes and hook** use NILEX grease by NILS firm.

For **gears** use CETAL grease by NILS firm.

Alternatively, you can use acid- / resin-free, not hygroscopic and long-life greases, with the following characteristics.

Characteristics of NILEX grease (for extension boom sections, outrigger supports, pins, bushes, hook)
Soap-thickener: aluminium complex
Base oil viscosity at 40° C (DIN 51562): min. 800 mm^2/s
4 balls Shell test - welding load (DIN 51350 T4): min. 3000 N
Corrosion protection (DIN 51802): degree 0/0
Classification (DIN 51502): KP 2P-20
Solid additives-free
Avoid use of spray and/or solvent based products

Characteristics of CETAL grease (for gears)
Soap-thickener: aluminium complex
Base oil viscosity at 40° C (DIN 51562): min. 500 mm^2/s
4 balls Shell test - welding load (DIN 51350 T4): min. 5000 N
Corrosion protection (DIN 51802): degree 0/0
Classification (DIN 51502): OGF 0S-30
Graphite solid additive

It is forbidden to mix different types of grease.

It is forbidden to use greases with solid particles as Molybdenum disulfide (not compatible with eventual Teflon bushes).

10.3.8 - Safety devices

Electronic lifting moment limiting device

Place the crane over the vehicle body, in load-less condition and with extension boom sections reentered.
Check the electronic lifting moment correct working.
If the electronic lifting moment limiting device blocks the crane (with rated capacity acoustic indicator and/or LEDs turned on) and it is not allowed to exit the extension boom sections, it means that the lifting device is correctly working. Otherwise, go to an authorised FASSI service centre.

Winch limiting devices

Procedure to check the correct working of the winch lifting couple limiter

On cranes fitted with electronic lifting moment limiting device and winch, follow this procedure to check the correct working of the winch lifting couple limiter:

1. place the crane in the configuration represented on the capacity plate;
2. slowly rewind the rope with single pull (n=1), in load-less condition and with counterweight and hook only;
3. when the counterweight touches the fixed pulley, the winch lift shall stop. All movements of the crane are prevented, except for the reentry of extension boom sections and winch descent.

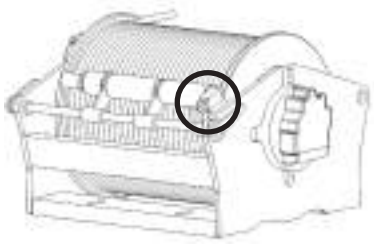
If the winch lifting couple limiter does not work correctly, go to an authorised FASSI service centre.

Procedure to check the correct working of the stroke end device for winch rope totally unwound

In order to check the correct working of the stroke end device for winch rope totally unwound, follow this procedure:

1. place the crane boom in such a way that the winch is as close as possible to the ground.
2. push the stroke end device (see figure below) by means of suitable tools.
3. holding the stroke end device pushed, operate the exit of extension boom sections.

If the operation is blocked, it means that the stroke end device for winch rope totally unwound is correctly working.



If the stroke end device for winch rope totally unwound does not work correctly, go to an authorised FASSI service centre.

STOP button

In order to check the STOP button correct working, follow this procedure:

- operate any crane control: movements should perform without any problem;
- push the STOP button during crane operation: the crane should stop;
- operate again any crane control: no operation should be possible;
- unblock the STOP button: crane operations should perform without any problem.

If you push the STOP button and the crane doesn't stop or other functions are still active, high risk of accidents (even serious) occurs for the operator and other persons: do not operate the crane and immediately contact an authorised FASSI service centre.

Operating the crane with STOP button not working properly is a serious operator's negligence.

Transducers and sensors

The general check for the correct working of transducers and sensors (whose list is at the end of paragraph 10.4) must be carried out to verify the conformity between sensor/transducer output and real value of the detected measure.

Carry out this check every day during normal crane work: if you find any inconsistencies between output signal and real detected value, go to an authorised FASSI service centre.

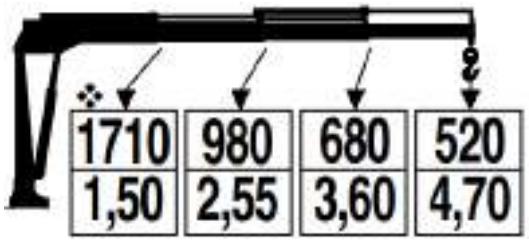
Examples of inconsistency between output signal and real detected value:

1. Transducer: Fassi Stability Control sensors.
2. Transducer: pressure transducer.
3. Pressure gauge.

1. Fassi Stability Control sensors

In case of crane fitted with FSC/L and stabilized as shown in the figure (outrigger rams touching the ground in correspondence to the black circles), an example of inconsistency is whether the sensor signals L3 working level.

2. Pressure transducer



In case of crane operation with load close to the one represented on the capacity plate, the pressure transducer shall detect a value close to the one indicated in the schedule "Crane technical data" in Appendix A.
If the pressure transducer detect a very low value, there is an inconsistency between detected measure and real value.

3. Pressure gauge

During crane operations, check that the capacity percentage shown on the pressure gauge is consistent with the effective outreach and load.

10.3.9 - Fixing rods, bolts and screws

Check that bolts are tightened: if it is not specifically indicated, their tightening torque must be obtained from this table, according to their diameter and class.

Table of the bolt tightening torque, in general, with average friction value (0,15) and average-good tightening accuracy (C). ("Eléments de fixation - assemblages vissés" - AFNOR E 25-030 1984)			
Bolt diameter	**Tightening torque (Nm)**		
	Class 8.8	**Class 10.9**	**Class 12.9**
M3	1,06	1,56	1,83
M4	2,44	3,58	4,19
M5	4,83	7,10	8,30
M6	8,30	12,30	14,30
M8	20	29	35
M10	40	59	69
M12	69	102	119
M14	111	163	191
M16	173	255	298
M18	239	352	412
M20	339	499	584
M22	466	685	802
M24	584	858	1004
M27	865	1271	1487
M30	1173	1723	2016
M33	1594	2342	2740
M36	2046	3006	3517
M39	2658	3905	4570

Fixing rod diameter	Tightening torque (Nm)
M16x1,5	125
M18x1,5	150
M20x1,5	250
M22x1,5	300
M24x2,0	400
M27x2,0	600
M30x2,0	900
M33x2,0	1200
M39x3,0	1800

10.4 – Checks and maintenance by the authorised FASSI service centre

	**Checks and maintenance after the first 50 hours (Work time) of crane utilization**		
Element	**Description**		**In case of anomalies**
Hydraulic motor for rotation		Restore the tightening torque of bolts and screws on the hydraulic motor according to the specific instructions (*).	
		Visually check the physical integrity of bolts and screws on the hydraulic motor.	Replace / repair the component.
Winch		Replace the hot lubricant oil in the winch reduction unit.	
Base		Restore the tightening torque of fixing rods, according to the specific instructions (*).	

	**Yearly checks and maintenance / after relevant modifications, repairs or long periods of non-utilization**		
Element	**Description**		**In case of anomalies**
Lifting hook (ISO 17440)		Check the wear condition of bearing using nondestructive methods (vibrations, noise analysis, etc.).	Replace / repair the component.
		Check there are no cracks and other surface damages using suitable methods (e.g. penetrating liquids, ultrasound, etc.).	
		Check there are no cracks and other surface damages on the ring, using suitable methods (e.g. penetrating liquids, ultrasound, etc.).	
		Restore the tightening torque of the nut connecting hook and ring, according to § 10.3.9.	
		Visually check if the bearing is lubricated.	Lubricate the bearing.
		Visually check the physical integrity of nut and threaded part of the hook.	Replace / repair the component.
Base		Restore the tightening torque of fixing rods, according to the specific instructions (*).	
Metal carpentry (2)		Visually check there are no deformations on metal carpentry.	Replace / repair the component.
		Visually check the physical integrity of the metal structure, paying special attention to weld joints (absence of breaks, cracks, paint flaking, cuts, incisions, etc.).	
Bolts and screws (2)		Restore the tightening torque of bolts and screws, according to the specific instructions (*).	
Functional check of the crane		Check the movement speed of the crane.	Check valve setting and pump flow.
		Carry out a lifting test with capacity plate loads.	Check the valve setting.
Winch		Carry out a test to check the winch lifting moment as per the capacity plate.	
		Go over the rope carrying out a magnet-inductive testing (ISO 4309).	Replace / repair the component.
		Replace hot lubricant oil in the winch reduction unit.	

	Yearly checks and maintenance / after relevant modifications, repairs or long periods of non-utilization		
Element	**Description**		**In case of anomalies**
Rotation group		Check the crane rotational power.	Replace / repair the component.
		Visually check the physical integrity of the hydraulic motor.	
		Visually check through the greasing cap that there are no foreign parts (metal shavings or fragments, etc.); check there are no irregular noises and the rotation torque is observed.	Lubricate the rotation group through the greasing cap.
		Restore the tightening torque of bolts and screws on the hydraulic motor according to the specific instructions (*).	
Manual extensions		Visually check the physical integrity of stroke end devices.	Replace / repair the component.
Rams (2)		Restore the tightening torque of ring nuts.	
		Visually check that ram seals withstand the maximum working pressures.	Replace / repair the component.
Pipes and hoses of hydraulic system		Restore the tightening torque of hydraulic system connections.	
		Visually check and make sure pipes withstand the maximum working pressures and there is no deformation or leakage.	Replace / repair the component.
		Visually check and make sure hoses withstand the maximum working pressures and there is no deformation, swelling or leakage.	
		Check that the sink rate measured at the boom system tip caused by leakage in hydraulic components does not exceed 0,5% of outreach per minute. For cranes with more than 12 m outreach, the sink rate shall not exceed 0,2% of outreach per minute. Sink rate shall be tested at maximum rated capacity and at maximum hydraulic outreach (i.e. without manual extensions).	
		Visually check there are no cracks, cuts, abrasions, wrinkles or flattening on pipes and hoses.	
		Check the expiry date of hoses (in any case, 5 years from date of manufacture).	
Pump		Restore the tightening torque of hydraulic system connections.	
		Visually check and make sure hoses (high pressure and return) withstand the maximum working pressures and there is no deformation, swelling or leakage.	Replace / repair the component.
		Check the expiry date of hoses (in any case, 5 years from date of manufacture).	
Safety devices		Carry out a functional test of the lifting moment / load limiting device.	
		Carry out a functional test of the winch limiter.	
Radio remote control		Check the connectivity between radio remote control and crane main unit.	
Radio receiver antenna		Check the connectivity between antenna and crane main unit.	
Electric wirings		Visually check physical integrity and wear condition of electric cables.	

	**Yearly checks and maintenance / after relevant modifications, repairs or long periods of non-utilization**		
Element	**Description**		**In case of anomalies**
Lead and other seals (2)		Check the physical integrity of lead and other seals.	Replace / repair the component.
Guide shoes (2)		Visually check the height of guide shoes and that they ensure a correct parallel alignment.	
Distributor		Check that maximum working pressures are reached.	Carry out the valve setting.

	**Ten-yearly checks and maintenance**		
Element	**Description**		**In case of anomalies**
Rotation group		Visually check physical integrity and wear condition of the cogwheel.	Replace / repair the component.
		Visually check the wear condition of bushes and bearings.	
		Visually check physical integrity and wear condition of the endless screw.	
Column		Visually check the wear condition of bushes and the coaxiality of rotating components.	
		Visually check physical integrity and wear condition of the thrust-bearing.	
Metal carpentry (2)		Check there are no deformations on metal carpentry using suitable methods.	
		Check there are no internal or external (but barely detectable by a visual check) damages in/on metal carpentry and weld joints, using suitable methods (ultrasound, x-rays, penetrant liquids, magnetoscope, etc.).	
Valves (2)		Check the valve setting and make sure there is no load loss of oil while circulating.	
Bushes (2)		Visually check wear condition of bushes and coaxiality of rotating components.	
Hydraulic system (2)		Clean the inner part of the hydraulic system using new oil.	

	**Every 500 hours (Work Time) of utilization of each component / yearly**		
Element	**Description**		**In case of anomalies**
Winch		Replace hot lubricant oil in the reduction unit.	
		Clean the inner part of the reduction unit using new oil.	
		Visually check the grease quantity in the drum support transmission bearing.	Restore the grease quantity.
		Visually check the physical integrity of the winch, making sure there are no surface damages, such as cracks, incisions, cuts, abrasions and covering loss.	Replace / repair the component.
		Visually check the physical integrity of bolts and screws on the winch and restore their tightening torque according to the manufacturer's instructions.	

	**Every 2000 hours (Total Time) of utilization of each component / yearly**		
Element	**Description**		**In case of anomalies**
Oil		Completely replace the crane hydraulic oil.	

	**As per the specific component expiry date (in any case, 5 years from date of manufacture)**		
Element	**Description**		**In case of anomalies**
Hydraulic system hoses		Replace hoses.	
Pump		Replace hoses.	

(*) Refer to the crane installation manual.

([2]) The elements indicated in the check and maintenance lists refer to the following components:

Metal carpentry
- Base
- Column
- Boom
- Extension boom sections
- Linkage system
- Manual extension
- Outrigger supports
- Winch and pulleys

Control levers
- Manual control
- Radio remote control

Valve lead seals
- Column
- Boom
- Extension boom sections
- Winch
- Outrigger rams
- Valves

Transducers and sensors
- FSC
- MOL
- Pressure transducer
- Pressure gauge
- Inductive proximity sensors:
  - inner boom horizontal position indicator
  - sensor for rams on the ground

Rams
- Boom
- Extension boom sections
- Outrigger rams

Grease nipples
- Base
- Column
- Boom
- Outrigger rams
- Outrigger supports

Circlips, ring nuts, pivot points
- Rams
- Column
- Boom
- Extension boom sections

Bushes
- Rams
- Boom
- Rotation group

Electric/electronic devices
- Limiting device main unit
- Radio remote control
- Radio receiver

Bolts and screws
- Column
- Boom
- Outrigger supports
- Outrigger rams
- Distributor
- Radio receiver antenna
- Winch
- Rotation group
- Fixing rods

Valves
- Column
- Boom
- Outrigger rams
- Winch
- Unloading valve
- Unloading valve with STOP button

Guide shoes
- Boom
- Extension boom sections
- Manual extensions
- Outrigger supports

Hydraulic system
- Hoses
- Pipes
- Rams
- Distributor
- Tank
- Valves

10.5 – Crane dismantling and/or demolition

For crane dismantling and/or demolition, refer to an authorised FASSI service centre.

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 are the following:

- Iron materials: carpentry and mechanical components;
- Plastic materials: seals, belts, protections;
- Electric materials: windings, controls, electrovalves and similar;
- Oils and lubricants: hydraulic oil, lubricants for reduction units, lubricating greases;
- For the vehicle follow the manufacturer's instructions;
- Different material: mercury (level sensor).

Take extreme care when slinging components to be disassembled, paying special attention to their weight.

Completely discharge the residual pressure and then fully drain the oil in the hydraulic systems before starting the dismantlement of components. Be careful not to let the oil drop on the ground: collect it in special containers.

Exhausted oil must be disposed of in compliance with the binding waste disposal norms.

Deactivate all the electric power supplies (batteries, etc.) before dismantling the electric circuit components.

Chapter 11 – Failure conditions

Tampering with check valves and/or breaking of safety seals don't ensure a correct working of the crane safety devices: therefore these operations release FASSI from any responsibility and invalidate the warranty.

In this situation, the operator is directly responsible for operations and machine safety.

11.1 – Temporary override of crane functions

In case of working anomalies of the lifting moment limiting device or radio remote control, or in case of irreversible crane block, it is necessary to deactivate all the safety devices by operating the override system placed on the distributor.

Remove the safety seal, push the tap (fig. 11.1 - position 1) and turn it clockwise (fig. 11.2).

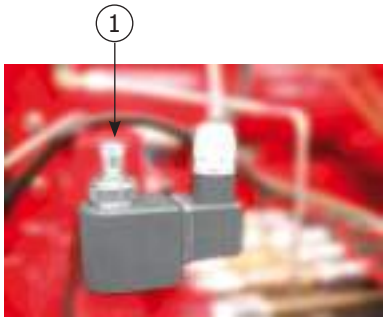


Fig. 11.1

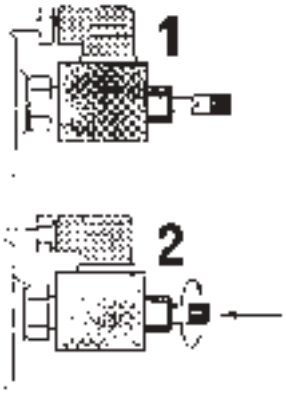


Fig. 11.2

Once the anomaly is solved, turn the tap anti-clockwise and pull it, in order to place it again into its original position.

It is forbidden to work once the safety seals have been removed.

Only in case of working anomalies of the lifting moment limiting device or radio remote control, or in case of irreversible crane block, it is possible to remove the seal on the override system and deactivate the safety devices.

The temporary exclusion of the lifting moment limiting device and the related manoeuvres may undergo an overload condition and involve hazards of accidents (even serious) for the operator and other persons, as well as damage to the crane.

In these conditions (with lifting moment limiting device deactivated), the operator, who is the main responsible for the machine safety, must:

- carefully consider the operations he wants to carry out, in order to exit from the emergency situation (in any case, with extension boom sections out, first it is compulsory to operate their reentry);
- calmly and carefully assess the type and scale of the hazards arising from these manoeuvres and the possible reaction of the crane (overturning, frame overload, uncontrolled load descent due to hydraulic system overload, etc.);
- perform all movements as slowly as possible, to minimize the dynamic overload.

Once the emergency operations are completed and prior to other crane operations, immediately go to an authorised FASSI service centre to check the structure and seal the device.

Tampering with check valves and breaking of safety seals release FASSI from any responsibility and invalidate the warranty.

11.2 – Rupture of the crane pump

In case of rupture of the crane pump, immediately turn off the vehicle engine, close the pump tap and contact an authorised FASSI service centre.