FASSI CRANE USE AND MAINTENANCE MANUAL

Translation of the original instructions EN

UM001

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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.

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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.

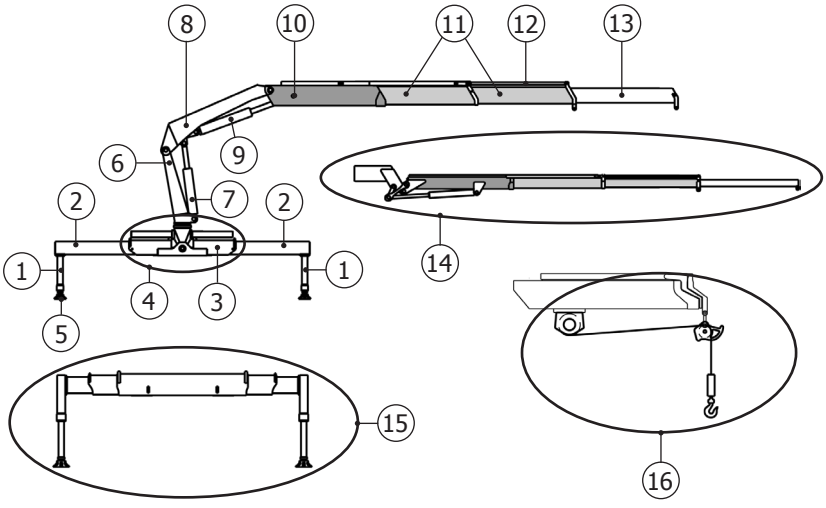
Forbidden situation or operation. The non-observance of this prohibition may cause accidents (even serious) for the operator and other persons, as well as damage to the crane.

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.

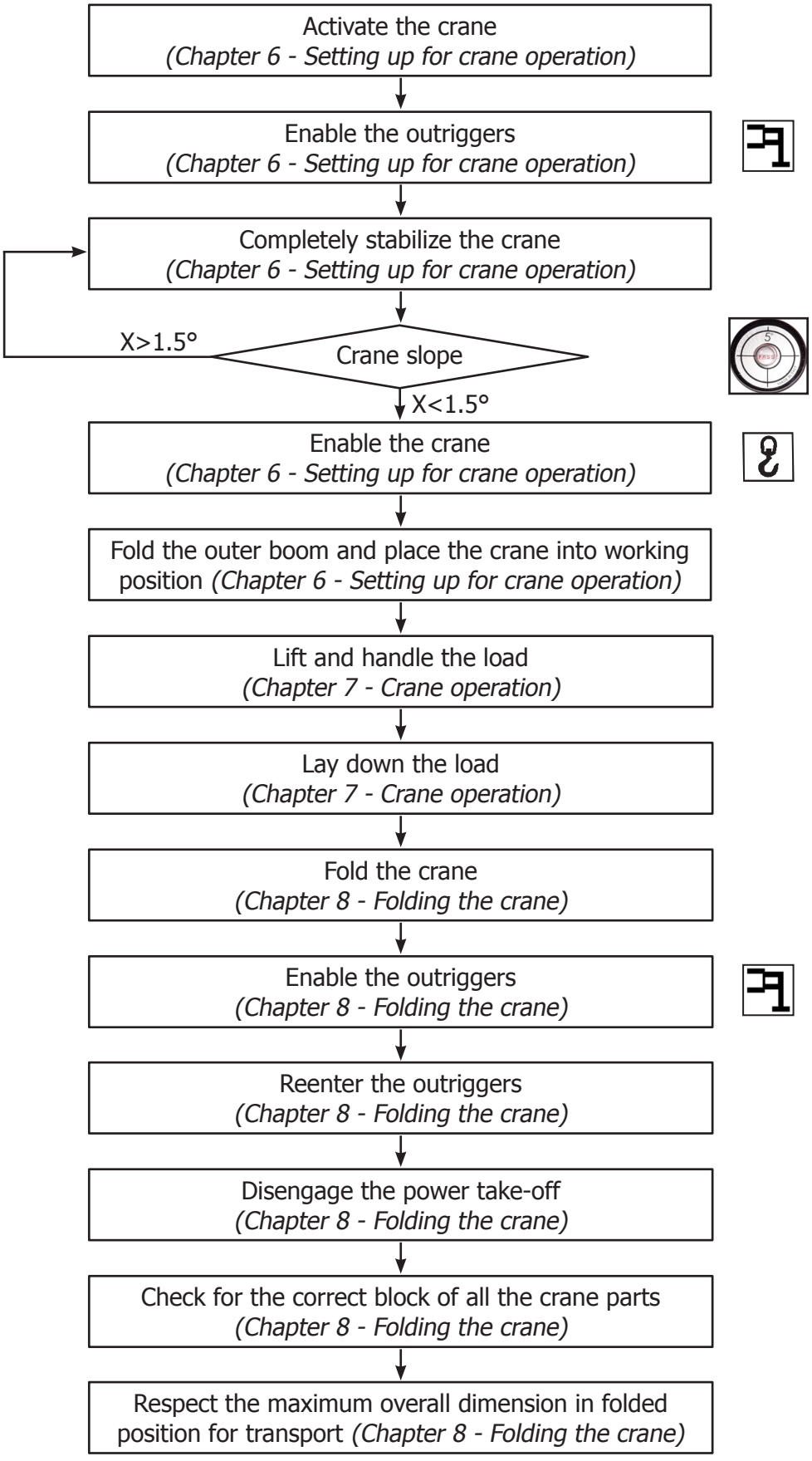
1.4 – General nomenclature of FASSI crane and implements

1. Outrigger rams
2. Outrigger supports
3. Base beam
4. Base
5. Outrigger plate
6. Column
7. Inner ram
8. Inner boom
9. Outer ram
10. Outer boom
11. Extension boom sections
12. Boom extension rams
13. Manual extension
14. Hydraulic extension (jib)
15. Supplementary outrigger
16. 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.

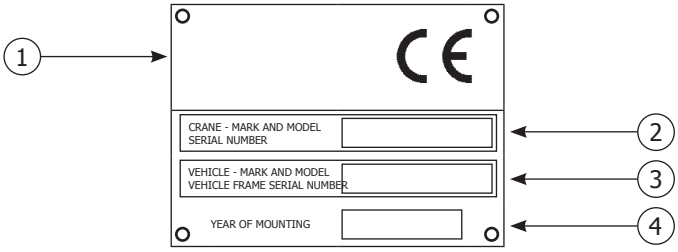


Fig. 2.2

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 use the hydraulic extension upside down (for instance with a platform working under bridges);
- 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:

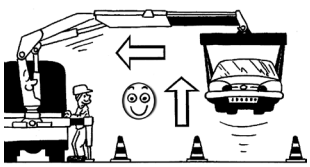
  It is permitted to use work platforms (WP) to lift people only changing the end use of the crane (Mobile Elevating Work Platform - MEWP) and after evaluation of its conformity with the binding standards (EN 280) by a notified body.

  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.

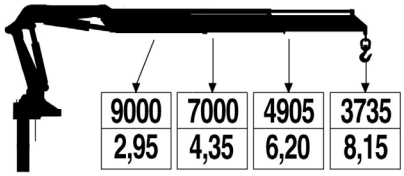
Exceeding the allowed limits of outreach and load involves hazards of accidents (even serious) for operator and persons in the vicinity, vehicle overturning and breaking of crane components.

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

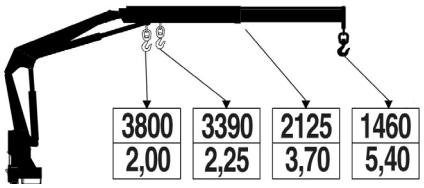
It is permitted to use the crane only in compliance with the lifting diagrams which are indicated on the capacity plates.
Loads indicated on the capacity plates refer to crane without implements: so, prior to every lifting operation, it is necessary to deduct the weight of the optional implements mounted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

Different hooks can be represented on the capacity plates. They are distinguished by different colours (white and black) and their maximum allowed capacity is indicated in the label:

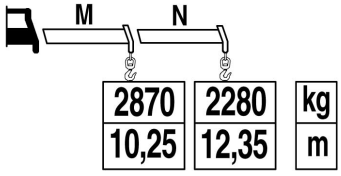
- a **black hook** is placed on the movable hook attachment of the crane/jib last hydraulic extension boom;



- a **black hook** is placed on the movable hook attachment of the crane/jib last hydraulic extension boom + a **white hook** is placed on the fixed hook attachment of the crane outer boom;



- a **white hook** is placed on the hook attachment of the manual extension (if fitted).



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.

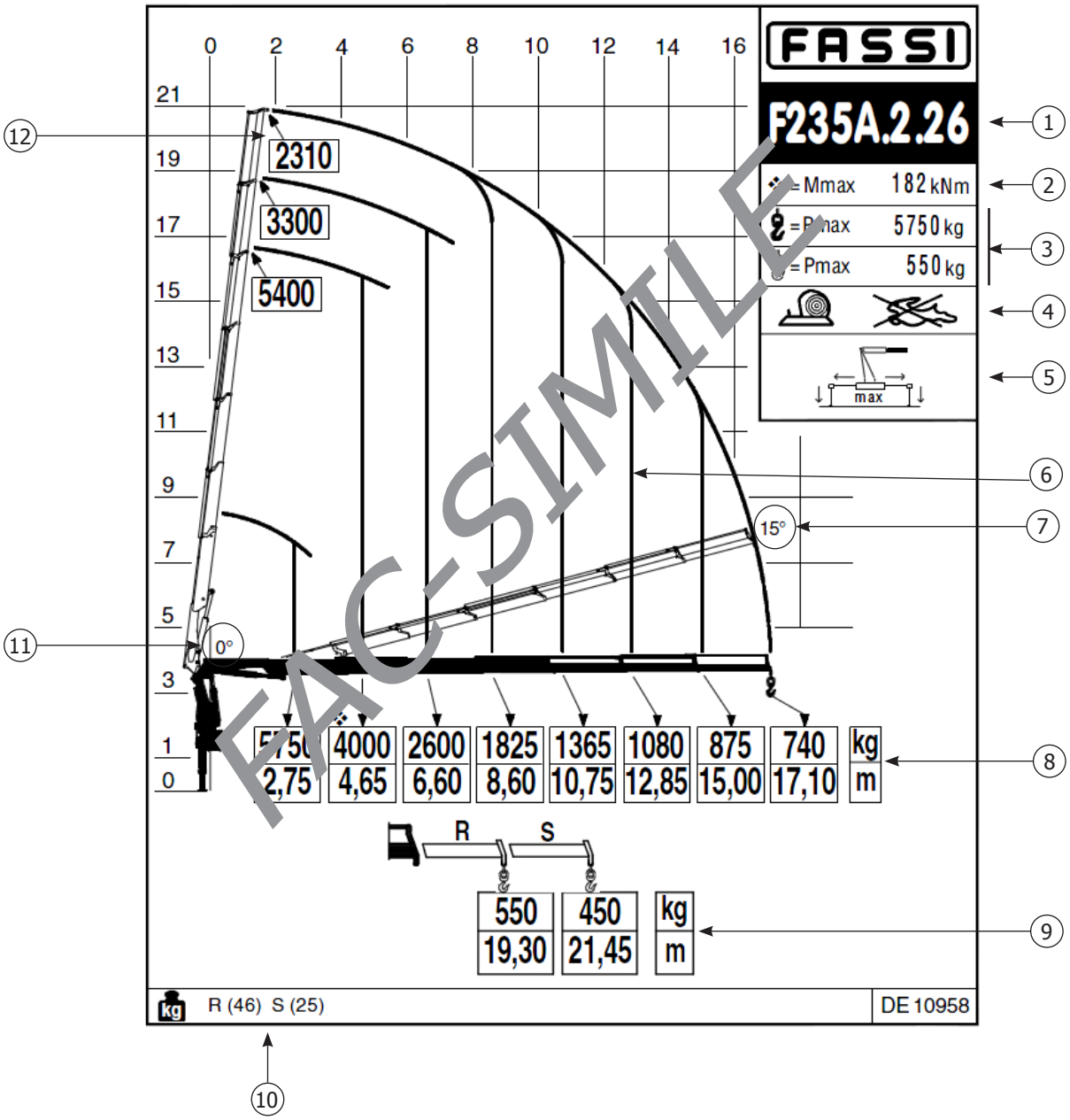
PROLINK function is available only if the electronic lifting moment limiting device is fitted.

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.

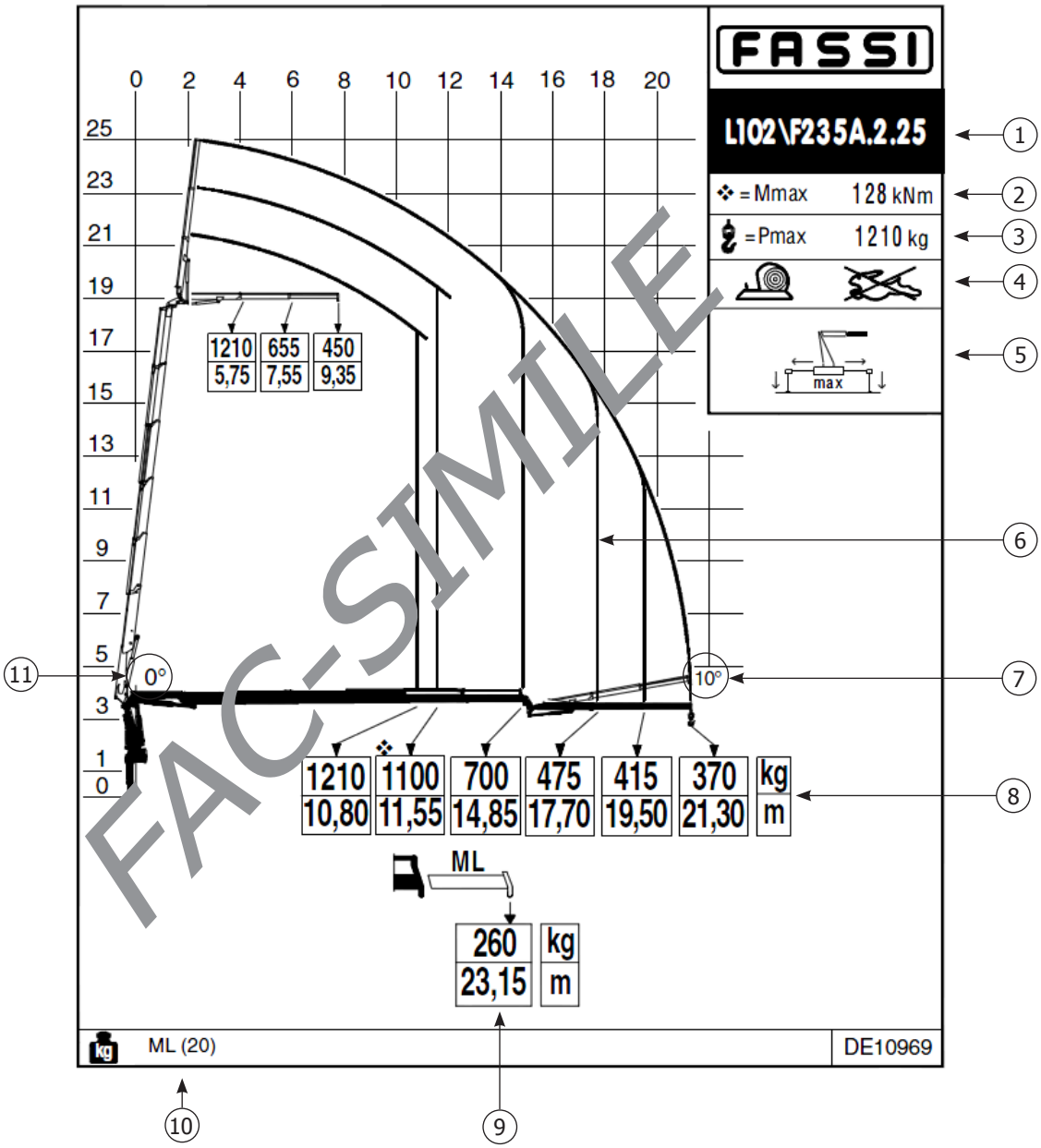
The loads represented on the capacity plates for crane with winch can be lifted only respecting the number of pulls specified in the plate.

Illustrative schematic for the capacity plate of a standard crane (fig. 2.4)



1. Crane model
2. Maximum design lifting moment ❖
3. Maximum lifting capacity of crane/manual extension according to the hook
4. The plate loads refer to crane with XP device activated
5. The crane must be completely stabilized in order to lift and handle the plate loads
6. Lifting curves according to the outreach
7. Angle increase on crane provided with PROLINK
8. Crane maximum loads according to the outreach
9. Manual extension maximum loads
10. Manual extension weight
11. Inner boom angle in the crane plate configuration
12. Maximum loads allowed in vertical configuration

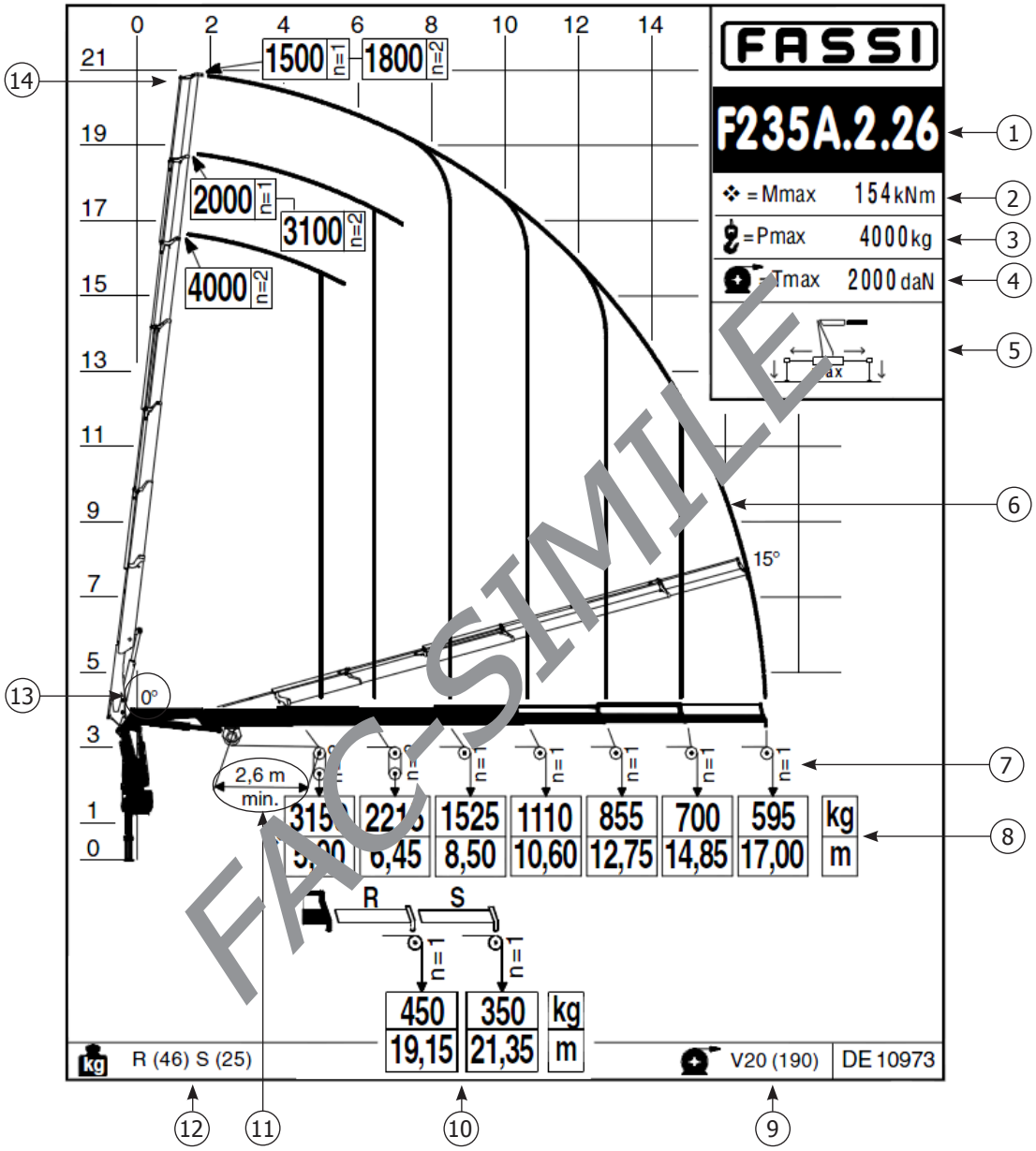
Illustrative schematic for the capacity plate of a crane with hydraulic extension



FAC-SIMILE

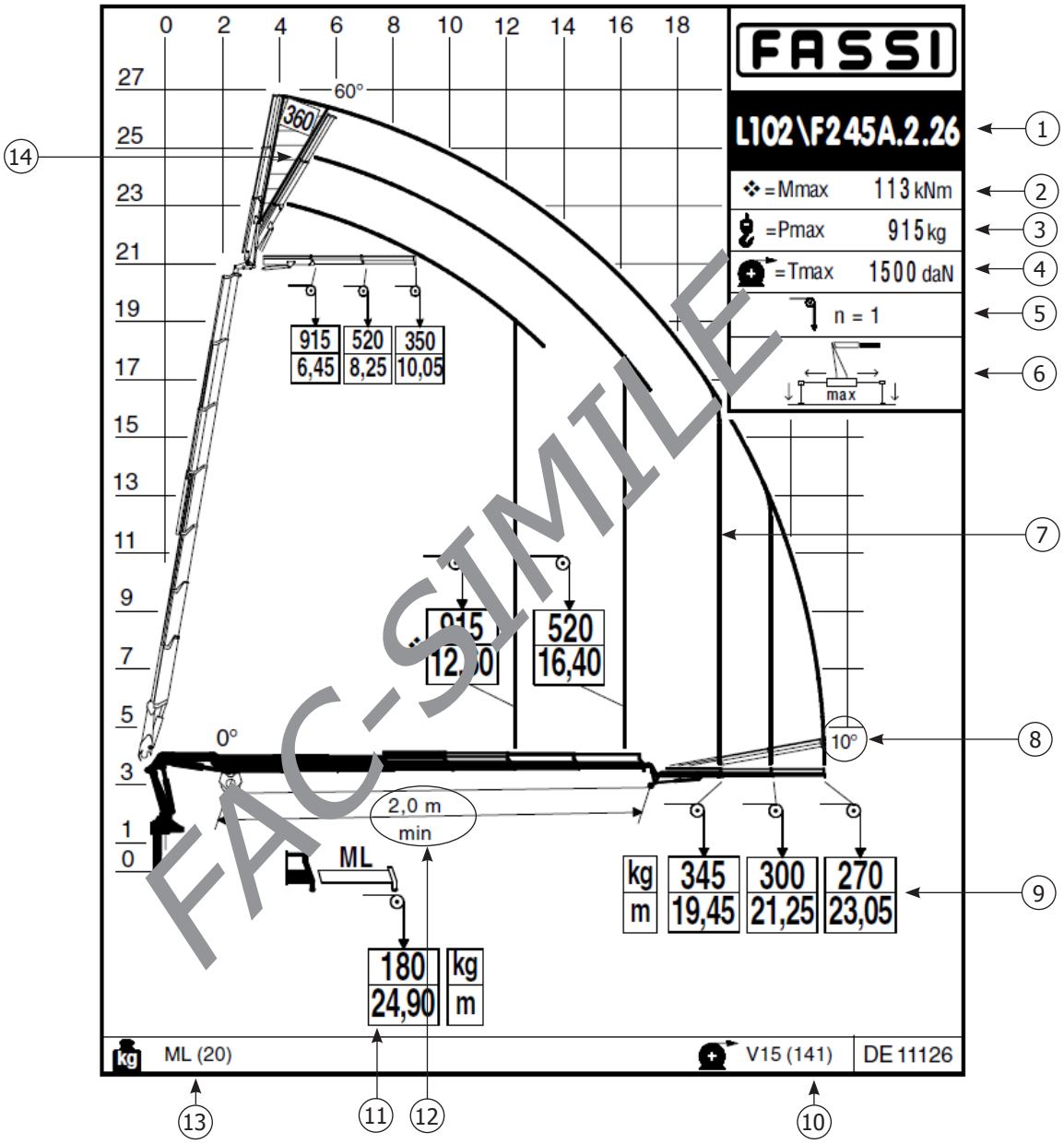
1. Hydraulic extension-crane combination
2. Maximum design lifting moment ❖
3. Maximum lifting capacity of the crane with hydraulic extension or of the jib manual extension according to the hook
4. The plate loads refer to crane with XP device activated
5. The crane must be completely stabilized in order to lift and handle the plate loads
6. Lifting curves according to the outreach
7. Angle increase on hydraulic extension provided with PROLINK
8. Hydraulic extension maximum loads according to the outreach
9. Maximum loads of jib manual extensions
10. Jib manual extension weight
11. Inner boom angle in the crane plate configuration

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/manual extension with winch according to the hook
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 (n=1 single, n=2 double, n=3 triple, n=4 quadruple, ...)
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
13. Inner boom angle in the crane plate configuration
14. Maximum loads in vertical configuration, in compliance with the number of pulls specified on the plate

Illustrative schematic for the capacity plate of a crane with hydraulic extension and winch



FAC-SIMILE

1. Hydraulic extension-crane combination
2. Maximum design lifting moment ❖
3. Maximum lifting capacity of crane with winch
4. Winch maximum pull
5. Number of winch pulls
6. The crane must be completely stabilized in order to lift and handle the plate loads
7. Lifting curves according to the outreach
8. Angle increase on hydraulic extension provided with PROLINK
9. Maximum loads of hydraulic extension with winch according to the outreach
10. Winch weight
11. Maximum loads of jib manual extensions with winch
12. Minimum distance between winch and first pulley
13. Manual extension weight
14. Maximum loads that can be reached in the marked working areas

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.

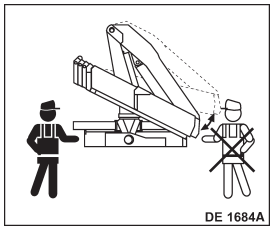
It is compulsory to enclose the working area. No one shall stop or pass in the crane working area. In this area it is forbidden to carry out other tasks.

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

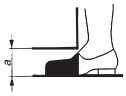
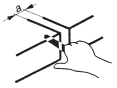
In areas concerning:

- outriggers moving to transport position;
- stand-up control station (if fitted) and rotating column;
- top seat control station (if fitted) and inner boom movement;
- rest positioning points of the boom system moving to transport position

it is not possible to mount protections, so follow the adhesive plates for shearing, trapping and crushing danger that are placed in the vicinity.

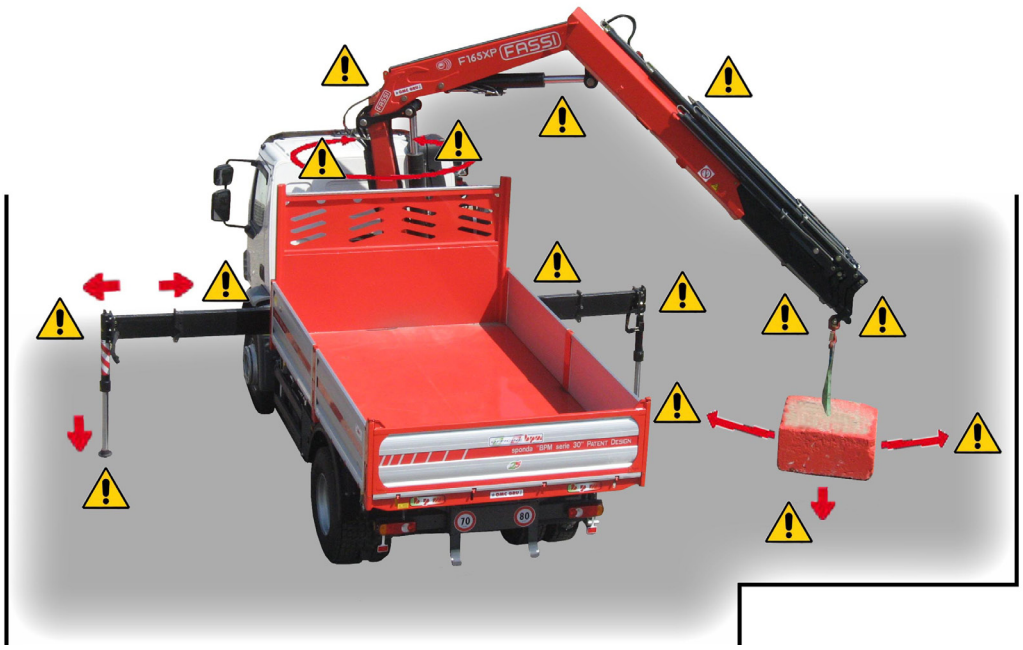


The minimum safety gaps related to parts of the human body are indicated in the following table. The figures represent not dangerous situations if the minimum gaps are observed. In case of crushing danger for different parts of the human body, consider the minimum gap requested for the bigger part.

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 and shearing danger



The image above represents the zones subjected to crushing, trapping and 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.

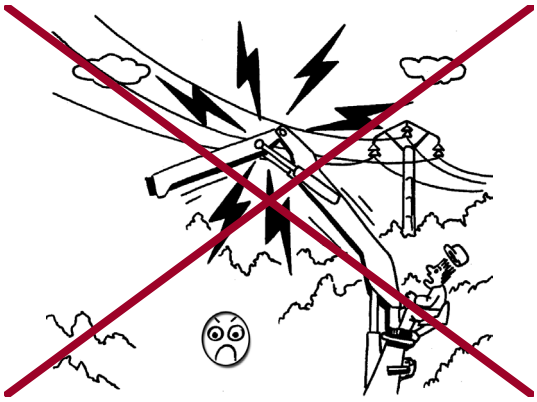
It is absolutely prohibited to work under high-voltage lines. The crane is not insulated from electric contacts and thus is not equipped for working under high-voltage lines, not even for accidental contact.

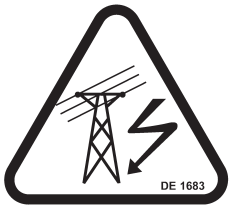
It is absolutely prohibited to operate the crane during thunderstorms.

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.

Where it is not possible to mount protections, follow the adhesive plates of burn danger placed near the dangerous zones.

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.

It is forbidden to stand on the device (in case of stand-up or top seat control station) while the vehicle is moving.

To access the stand-up or top seat control station (if fitted), always use the dedicated ladder. Pay attention in order to avoid hitting the controls while ascending and descending. The ladder must be fitted and correctly mounted by the installer, as per the current regulations.

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 to access the stand-up or top seat control station (if fitted) 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;
- 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.

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 lifting moment limiting device (if fitted) only under the conditions 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.

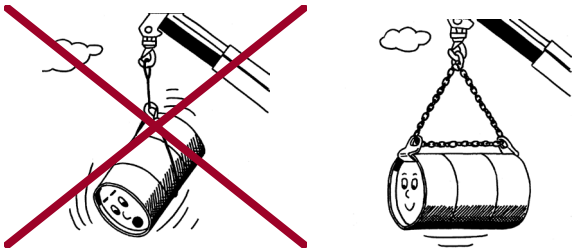
Correctly insert the fixing devices during operation and transport.

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. Check also that the crane is correctly placed in the rest locating pins in order to avoid outer boom fall and crane rotation.

In case of fittings where the crane lays in transport position inside the vehicle body or on the load, it is compulsory to properly block possible movements of the boom system and crane rotation.

High risk of accidents (even serious) occurs if crane and implements aren't secured against lateral movements and rotation.

Implements can be kept mounted on the extension boom sections of the crane (or of the hydraulic extension) 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).

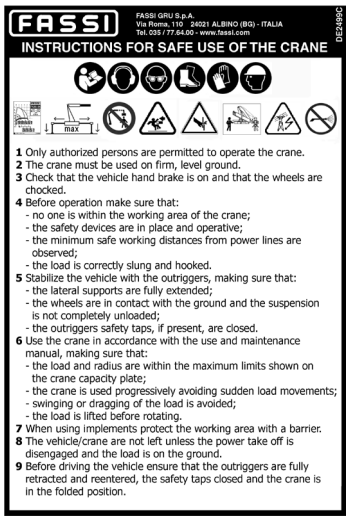
FASSI declines any responsibility for ruptures or damages to product, persons or things due to a lack of maintenance.

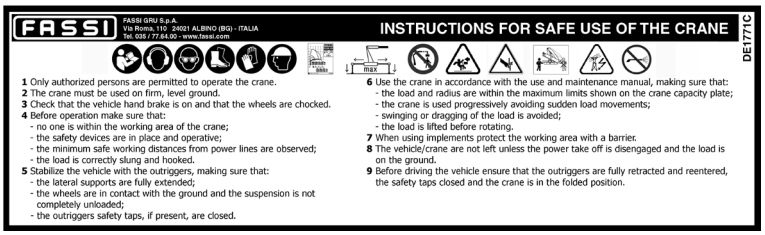
3.21 – Danger due to special working conditions

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.

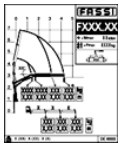
7. When using implements protect the working area with a barrier.

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

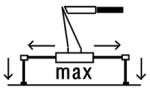
9. Before driving the vehicle ensure that the outriggers are fully retracted and reentered, the safety taps closed and the crane is in the folded position.

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.

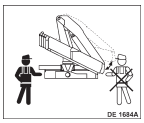


The crane must be completely stabilized in order to lift and handle the loads indicated on the plate.

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 as per crane equipment

Safety devices as per crane equipment

	Active[1]	Active[2]	E-active	Dynamic	E-dynamic Xe-dynamic	T range	NO CE[3]
STOP button (paragraph 4.2.1)		●	●	●	●	◍	
Immediate stop device and pressure gauge (paragraph 4.2.2)	●	● 4					
Load limiting device (paragraph 4.2.3)	●						●
HO hydraulic lifting moment limiting device (paragraph 4.2.4)		● 5					
FX500 lifting moment limiting device (paragraph 4.2.5)		● 5	●	●	●	◍	
Visual indicator (paragraph 4.2.6)	● 6	● 6	●	● 6	●	◍ 6	
Rated capacity acoustic indicator (paragraph 4.2.7)	● 6	● 6	●	● 6	●	◍ 6	
Acoustic warning (paragraph 4.2.8)	● 6	● 6	●	● 6	●	◍ 6	
Angle control device for PROLINK (paragraph 4.2.9)				●	●		
Mechanical rotation lock (paragraph 4.2.10)	○						
Rotation arc limiter (paragraph 4.2.11)		○ 7	○ 7	○ 7	○ 7	○ 7	
Lifting moment limiting device for 2 working zones (paragraph 4.2.12)		◍ 8	◍ 8	◍ 8	◍ 8	◍ 8	
FSC (Fassi Stability Control) (paragraph 4.2.13)		◍ 9	◍ 9	◍ 9	◍ 9	◍ 9	
MOL (Manual Outrigger Lock) (paragraph 4.2.14)	● 10	◍ 10	◍ 10	◍ 10	◍ 10	◍ 10	
Inner boom horizontal position indicator (paragraph 4.2.15)	●	◍ 11	◍ 11	◍ 11	◍ 11	◍ 11	
CPM (Crane Position Monitoring) (paragraph 4.2.16)		◍ 12	◍ 12	◍ 12	◍ 12	◍ 12	

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

1 = for crane having capacity under 1000 kg or lifting moment under 4 tm
2 = for crane having a minimum capacity of 1000 kg or a minimum lifting moment of 4 tm
3 = crane without EC safety devices
4 = for crane with HO hydraulic lifting moment limiting device
5 = optionally for some crane models: HO hydraulic lifting moment limiting device or FX500 electronic lifting moment limiting device; standard for the other crane models: FX500 electronic lifting moment limiting device
6 = compulsory for crane with radio remote control or reaching at least 12 m

7 = for crane with HO hydraulic lifting moment limiting device or with FX500 and FSC/L
8 = for crane with FSC/M, FSC/H or FSC/S
9 = for crane with outriggers
10 = for crane with manually extendable outrigger supports
11 = 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)
12 = with FSC

Special functions as per crane equipment

	Active	E-active	Dynamic	E-dynamic Xe-dynamic	T range	NO CE[1]
XP (Extra Power) (paragraph 4.3.1)		● [2]		● [2]	● [2]	
PROLINK (Progressive Link) (paragraph 4.3.2)			●	●		
FL (Full Lift) (paragraph 4.3.3)	○	○	○	● [2]		
Oil cooler (heat exchanger) (paragraph 4.3.4)	○	○	○	○	○	○

○ = optional
● = standard

1 = crane without EC safety devices
2 = standard according to the crane model

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.

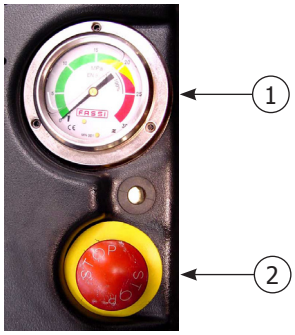
If you push the STOP button and the crane doesn't stop or other functions are still active, high risk of accidents (even serious) occurs for the operator and other persons: do not operate the crane and immediately contact an authorised FASSI service centre.

In conformity with standard EN 12999, it is not compulsory to fit the STOP button on the control stations that are solely used for outrigger operation. In this case, by operating the STOP button only crane and implements are affected, while outrigger manoeuvres remain active: therefore it is necessary to pay special attention and make sure nobody stops or passes in proximity of the outrigger ram working area.

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 or HO hydraulic lifting moment 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 (or hydraulic extension, if fitted) capacity, the load limiting device automatically starts, involving the slow reentering of one of the crane lifting rams, or both (or of the hydraulic extension lifting ram). In this way, it signals to the operator the exceeding of the maximum limit.

This reentry occurs through the opening of special valves placed on the crane inner and outer rams (and eventually on the hydraulic extension ram). So, at certain values of pressure induced by overload, the valves open and cause the slow reentering of rams.
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 valves by reentering the extension boom sections and by lifting the booms, 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 - HO hydraulic lifting moment limiting device

Generality

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

The HO hydraulic lifting moment limiting device is composed of a hydraulic system which blocks any operation increasing the pressure induced by load in the crane lifting rams, over critical values that cannot be exceeded.

The pressure values in the lifting rams are detected by the hydraulic lifting moment limiting device, which enables or blocks the control operation.

The HO hydraulic lifting moment limiting device is combined with a STOP button and a safety gauge (for their operation refer to paragraph "Immediate stop device and safety gauge").

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

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.

Block due to crane overload

When the activation level is reached, the device blocks the distributor levers, except for those controlling rotation and reentering of extension boom sections. In order to exit from the block condition and to restart all the crane functions (system reactivation), it is necessary to reenter the boom extension rams.

In case of overload with extension boom sections completely in (because of maximum load or pressure induced by rams at their stroke end), to exit from the block condition it is necessary to operate for some seconds the lever for the extension boom section reentering and, while still holding the lever, activate the outer boom descent.

4.2.5 - FX500 electronic lifting moment limiting device

Generality

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

The FX500 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 (in the crane inner and outer rams, and, if fitted, in the hydraulic extension ram), 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 with crane or hydraulic extension 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 any not-allowed control of crane and hydraulic extension (if fitted), according to the working logic described in the following paragraphs; for winch, refer to the corresponding paragraph in chapter 9 "Use of implements".

The ADC system (Automatic Dynamic Control) - if fitted, only in combination with radio remote control - manages dynamics by limiting the stroke of the distributor control levers, according to the pressure of lifting rams, while they are in operation. So, the load handling speed decreases while approaching the activation level of the lifting moment limiting device.
By using manual controls (ADC system not active), the pump flow is automatically reduced, in order to prevent excessive dynamic stresses.

The ADC system is not active on controls for winch or implements other than hydraulic extensions.

The ADC system manages an automatic variation in the crane movement speed, even holding the radio remote control levers in the same position.

Block due to overload

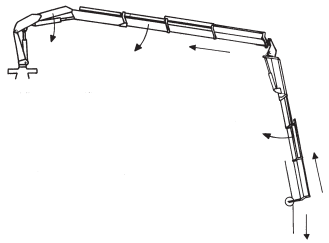
According to the crane configuration, the safety device allows (🟢) and forbids (🔴) the following manoeuvres:

	Inner boom lift	Inner boom descent	Outer boom lift	Outer boom descent	Exit of crane extension booms	Reentry of crane extension booms	Jib lift	Jib descent	Exit of jib extension booms	Reentry of jib extension booms	Winch lift	Winch descent	Hydraulic implement operation
Configuration A	🔴	🟢	🔴	🟢	🔴 1	🟢	🔴	🟢	🔴	🟢	🔴	🟢	🔴
Configuration B	🔴	🟢	🔴	🟢	🔴 1	🟢	🟢	🟢	🔴	🟢	🔴	🟢	🔴
Configuration C	🔴	🟢	🔴	🟢	🔴 1	🟢	🟢	🔴	🔴	🟢	🔴	🟢	🔴
Configuration D	🔴 2	🟢	🔴 2	🟢	🔴 1	🟢	🔴	🟢	🔴	🟢	🔴	🟢	🔴
Configuration E	🟢	🟢	🟢	🟢	🔴 1	🟢	🟢	🟢	🔴	🟢	🔴	🟢	🔴
Configuration F	🟢	🟢	🟢	🟢	🔴 1	🟢	🟢	🔴	🔴	🟢	🔴	🟢	🔴
Configuration G	🔴 2	🔴	🔴 2	🔴	🔴 1	🟢	🔴	🟢	🔴	🟢	🔴	🟢	🔴
Configuration H	🟢	🔴	🟢	🔴	🔴 1	🟢	🟢	🟢	🔴	🟢	🔴	🟢	🔴
Configuration I	🟢	🔴	🟢	🔴	🔴 1	🟢	🟢	🔴	🔴	🟢	🔴	🟢	🔴

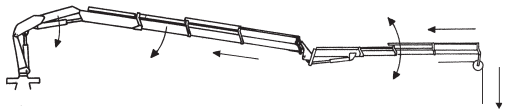
Note: configurations are represented on the following page

1 = forbidden manoeuvre, unless only the hydraulic extension is blocked
2 = forbidden manoeuvre, if the hydraulic extension is blocked

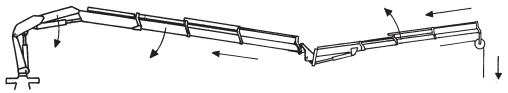
Allowed manoeuvres, according to the crane configuration:



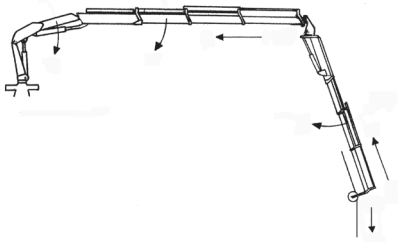
Configuration A



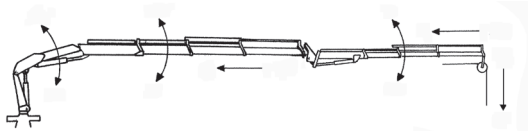
Configuration B



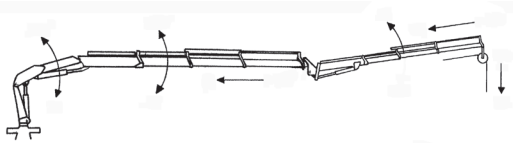
Configuration C



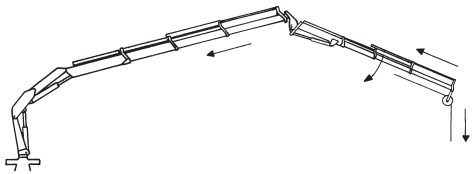
Configuration D



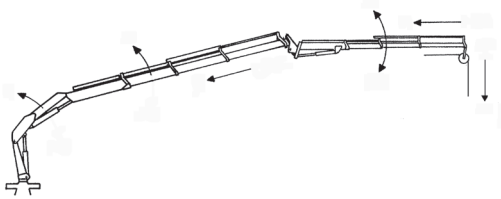
Configuration E



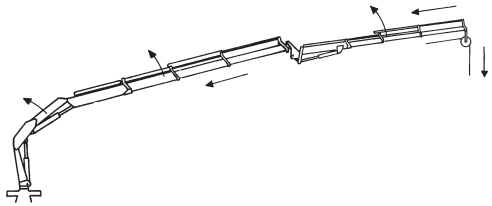
Configuration F



Configuration G



Configuration H



Configuration I

In case of resettable alarm on sensors TI1 and TI2 (tilting sensors on outer and hydraulic extension boom), manoeuvres are blocked, both above and under the horizontal line.

Lifting block (Angle control device for PROLINK)

Refer to paragraph "Angle control device for PROLINK".

Rotation block

According to the crane fitting, refer to paragraphs "Rotation arc limiter", "Lifting moment limiting device for two working zones" or those concerning FSC/M, FSC/H or FSC/S.

Crane block by the attainment of the mechanical stroke end of the lifting ram

During load-less crane operations, the activation of the electronic lifting moment limiting device may occur (blocking the crane) because of a pressure peak, due to the attainment at high speed of the stroke end of the lifting ram.

In normal conditions, the crane can be reactivated by operating a manoeuvre which is allowed by the system.

If the crane stops with extension boom sections completely in and inner and/or outer ram extended at its stroke end, all crane movements are prevented.
In this configuration, the system still allows to operate descents, but immediately checks if these manoeuvres cause a further increase of the lifting ram pressure induced by load; in this case, the crane is definitively blocked.

Crane folded in transport position

If the crane is folded in transport position, all its movements are blocked, except for the outer boom folding.
Therefore, when you turn on the crane, it is in block condition; on the main unit the message `CRANE FOLDED` is displayed.
In order to solve this block condition and enable the crane unfolding, it is necessary to fold the outer boom (as described in chapter 6 "Setting up for crane operation"): if the pressure in the outer ram remains in a determined range for at least 2 seconds, the crane is effectively considered at rest, the message `CRANE FOLDED` disappears and all the crane manoeuvres are allowed.

Temporary exclusion of the lifting moment limiting device

In this condition:

- pressure induced by load close to the activation level of the lifting moment limiting device;
- extension boom sections completely reentered

while you lower the load with boom over the horizontal line, the effect due to the consequent dynamic increase of pressure may activate the lifting moment limiting device. In this way, the descent is blocked and it is impossible to place the load to the ground.

For this reason, a special function for the temporary exclusion of the lifting moment limiting device is provided to complete the load lowering operation (as foreseen in the standard EN 12999).

In particular, with crane in block condition, it is necessary to maintain the reentry of its extension boom sections until stroke end (operating from radio remote control: maintain the manoeuvre till the message LMI and the icon flag appear on the display).

Then release the control lever for the extension boom section reentry and select the icon/ button LMI for the temporary exclusion of the lifting moment limiting device (operating from radio remote control: if the procedure is correctly performed, the message ELMI and the icon flag LMI appear on the display).

Once the temporary exclusion of the lifting moment limiting device is activated, the operator has 5 seconds at his disposal to complete the outer boom descent (operating from radio remote control: as soon as the crane is out of the block condition, or once 5 seconds have passed, the message ELMI and the icon flag LMI disappear).

After the temporary exclusion of the lifting moment limiting device has been carried out, it is necessary to wait at least one minute before repeating it.

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.

Icon list

Icons displayed on control panel and radio remote control		
ENG ON	Engine start-up	
ENG OFF	Engine turning off	
+ RPM	Increase of engine r.p.m.	
− RPM	Decrease of engine r.p.m.	
XP	Activation/Deactivation of XP device or ICC function	
	Selection of outrigger/crane	
LMI	Activation of the temporary exclusion of the LMLD (when possible) or crane reactivation (in case of WARNING; in case of ALARM only after the failure has been solved)	
	Activation/Deactivation of recycling valve	
	Selection of the decreasing level of the general speed	
	Activation/Deactivation of work lights	
	Activation/Deactivation of the function switch	
	Manual extension menu	
	Access to the timer menu or timer scrolling	
	Deactivation of electrovalve EV1	
	Icon flag scroll	
	Grab Automatic Shake	
DV	Activation of DV output	
1	Activation of supplementary output 1	
...		
9	Activation of supplementary output 9	
LCD	Display test	(Control panel)
	Radio remote control test	(RCS radio remote control)
	Pixel test for the display	(RCH radio remote control)

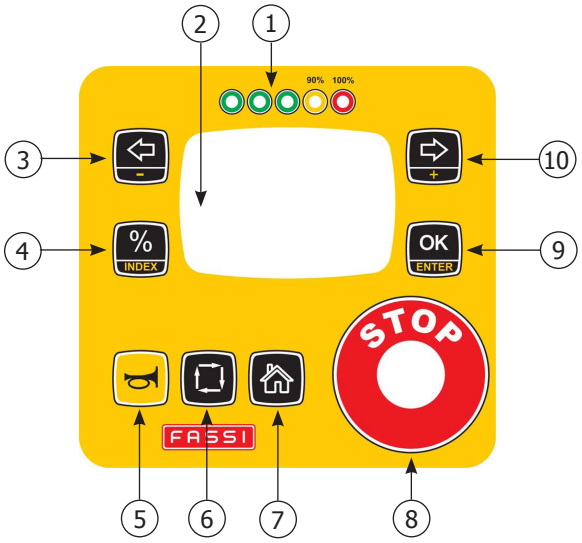
Icons displayed only on control panel	
	Selection of radio remote or manual control
	Activation/Deactivation of the display backlight mode

Icons displayed only on radio remote control		
	Selection of the unit of measurement (bar, daPSI) or the percentage (%) of the lifting capacity	
	Access to the user menu and confirmation (ENTER) in menus and selections	
	Value increase or scrolling onwards in the menus	
	Value decrease or scrolling backwards in the menus	
	Activation/Deactivation of the display backlight mode	(RCS)
	Adjustment of display contrast	
	Activation of the display backlight mode	(RCH)

Icon flag list

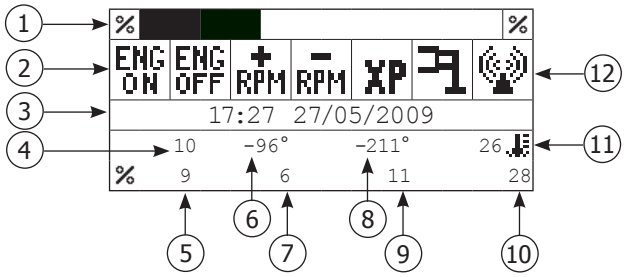
Icon flags	
	The temporary exclusion of the LMLD can be activated: select the icon/button LMI
	Temporary exclusion of the LMLD activated
	Photocell on the stand-up control station activated (operator's detection)
	The oil cooler (heat exchanger) is working
	Function switch activated
	Manoeuvres activated with EV1 forced open or recycling valve activated
	Maximum slope reached (with FSC/S stability control system)
	Manual control mode activated
	Radio remote control mode activated
	Outrigger rams not in contact with the ground - L0 level (with FSC stability control system)
	Work platform detection (WP)
	XP activated

Main panel



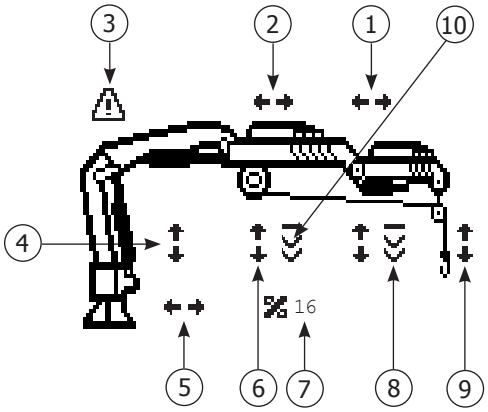
1. 5-LED-band signalling the loading condition (green LED: capacity under 90%; orange LED: capacity between 90% and 99%; red LED: 100% of the crane/hydraulic extension/ winch capacity in the working configuration)
2. Graphic display
3. "-" button: movement to the left during icon selection, value decrease or scrolling backwards in the menus
4. "%/INDEX" button: used to select the unit of measurement (bar, daPSI) or the percentage (%) of the lifting capacity, to display FSC levels, to go back to the previous menu from the submenus (prolonged pressure), to move the cursor when entering a value in the menu
5. Button for acoustic warning activation (for cranes with radio remote control or reaching more than 12 m)
6. Button for the selection of data and operating pages
7. Button to return to the main screen
8. STOP button (refer to paragraph 4.2.1)
9. "OK/ENTER" button: icon selection, access to the user menu or confirmation in menus or selections
10. "+" button: movement to the right during icon selection, value increase or scrolling backwards in the menus

Main screen



1. Graphic bar signalling the loading condition
2. Icon bar
3. Display of working timers, date and time, or operating messages (`WARNING`, `ALARM`, etc.)
4. Working pressure in the distributor bank
5. Pressure level or capacity percentage on inner boom
6. Crane angle
7. Pressure level or capacity percentage on outer boom
8. Hydraulic extension angle
9. Pressure level or capacity percentage on hydraulic extension
10. Capacity percentage on winch
11. Oil temperature
12. Icon flag

Crane operation display



1. Hydraulic extension movement
2. Movement of crane extension boom sections
3. Alarm signal
4. Inner boom movement
5. Rotation
6. Outer boom movement
7. Capacity percentage
8. Hydraulic extension position (above or under the horizontal line)
9. Winch movement
10. Outer boom position (above or under the horizontal line)

You can enter this screen through prolonged pressure of the button .

The arrows indicating movement are highlighted on the display when the corresponding operation is being carried out.

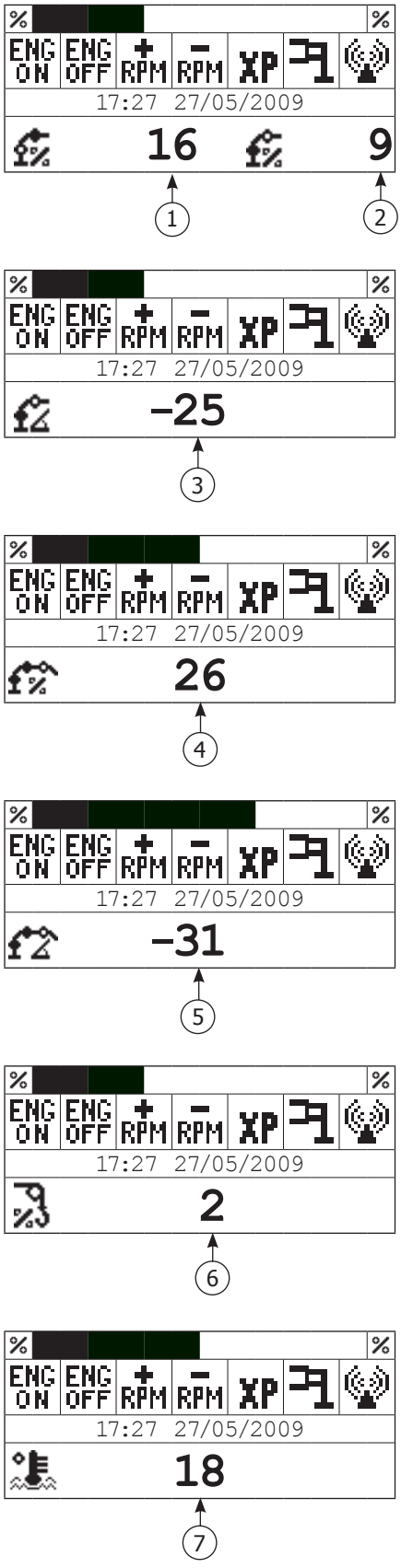
In case of overload or block in general, the forbidden manoeuvre is highlighted and flashing.

The display shows the highest capacity percentage between inner boom, outer boom, hydraulic extension and winch; in case of block, it is highlighted and flashing.

If an alarm is detected, the danger sign appears in the upper left space of the display.

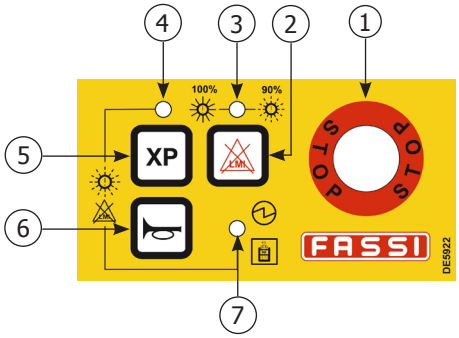
Scroll of displays

By pressing the button , it is possible to scroll the displays, as indicated in the following figures.



1. Capacity percentage on inner boom
2. Capacity percentage on outer boom
3. Outer boom angle
4. Capacity percentage on hydraulic extension
5. Hydraulic extension angle
6. Capacity percentage on winch
7. Oil temperature

Basic user panel



1. STOP button (refer to paragraph 4.2.1)
2. Button for the activation of the temporary exclusion of the LMLD (when possible) or for the crane reactivation (in case of WARNING; in case of ALARM only after the failure has been solved)
3. Red LED signalling the loading condition:
   - turned off - capacity under 90%;
   - turned on and flashing - capacity between 90% and 99%;
   - turned on and permanent - 100% of the crane/hydraulic extension/winch capacity in the working configuration.

   The red LED is also used to signal WARNING messages (if flashing) or ALARM messages (if permanent).
4. Orange LED signalling XP is activated
5. Button for XP activation
6. Button for acoustic warning activation (for cranes with radio remote control or reaching more than 12 m)
7. Green LED signalling the panel is powered; if flashing, it signals the operator is in the stand-up control station

   LEDs 4 and 7 flash during the temporary exclusion of the lifting moment limiting device and during the passage from radio remote to manual control mode.

Timer menu

By selecting the icon and holding the confirmation button pressed (from radio remote control or from control panel), it is possible to enter the timer menu and display:

`Total` and `Partial` - total / partial time the crane has been on (hours/minutes);
`Work` - crane working time from the lever operation (hours/minutes).

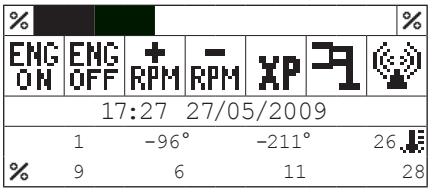
UTILIZATION TIME	
Total	9:14
Partial	1:38
Work	0:08
Reset Partial	

Timer menu

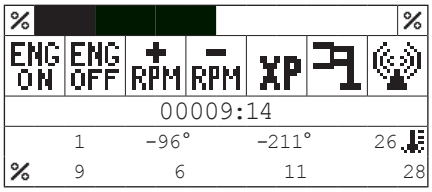
To reset the partial time:

1. press/select "+" and "-" buttons/icons to run the menu and select `Reset Partial`;
2. hold "OK/ENTER" button pressed (from the control panel) or select the icon (from the radio remote control);
3. when the confirmation message `Enter to Confirm` appears, press the "OK/ENTER" button (from the control panel) or select the icon (from the radio remote control);
4. The message `DONE!` appears and signals the timer is reset.

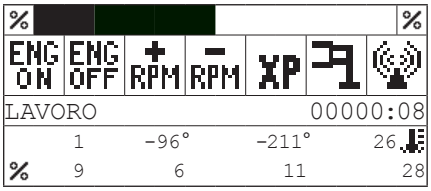
By selecting the icon and pressing (through simple pressure) the confirmation button (from radio remote control or from control panel), it is possible to scroll timers on the control panel, as represented in the following figures.



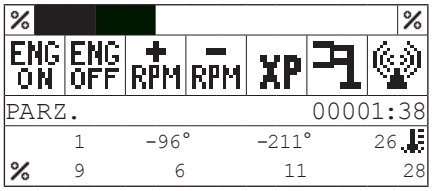
Time and date



Total activation time of the crane



Working time of the crane



Partial activation time of the crane

User menu

To enter the user menu, hold "OK/ENTER" button pressed (from the control panel) or select the icon ↵ (from the radio remote control). Then select the desired menu through "+" and "-" buttons and confirm through the "OK/ENTER" button or the icon ↵.

In the "Checking" menu you can find the submenus related to the different electronic units installed in the circuit.

In the "Setting Menu" it is possible to open the submenus for the setting and/or modification of program parameters, only after entering the access passwords (operation reserved to the authorised FASSI service centre).

In the "Language" menu you can select the language to be used in the menu navigation.

In the "Press. Unit" menu you can choose the unit of measurement for pressure (bar or daPSI).

In the "Temp. Unit" menu you can choose the unit of measurement for temperature (°C or °F).

In the "Contrast" menu you can adjust the display brightness.

GAS (Grab Automatic Shake)

It is possible to use the Grab Automatic Shake function (only if the installer has activated it and if you operate by radio remote control), by selecting the icon and at the same time operating the lever for the grab opening.

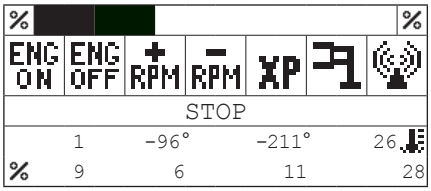
This function involves quick adjustable movements, in order to gradually release the grab content.

To stop movements, release the radio remote control lever or deselect the icon.

Procedure to pass from radio remote to manual control mode (and vice versa)

If you turn on the crane in radio mode and the radio remote control is turned off, the STOP sign appears on the control panel display and crane operations are blocked.

If you press and hold the "OK/ENTER" button, the STOP sign disappears and the word STOP appears on the operating message line.



By turning on the radio remote control, the word STOP disappears and radio remote control mode is enabled.

In order to pass from radio remote to manual control mode (crane operation through the distributor levers), turn off the radio remote control handle and select the icon R/M from the control panel.

Instead, in order to pass from manual (crane operation through the distributor levers) to radio remote control mode, turn on the radio remote control handle (the word STOP appears on the operating message line) and select the icon R/M from the control panel.

Once the icon R/M is selected, choose the radio or manual control mode by using the buttons "+" and "-"; then confirm by pressing (within 10 seconds) the"OK/ENTER" button.

Radio remote control mode

Manual control mode

According to the control mode you have selected, one of the following screens appears: you must confirm it by pressing (within 10 seconds) the "OK/ENTER" button.

Radio remote control mode

Manual control mode

If confirmations don't occur within 10 seconds, procedures are cancelled.

Warnings and alarms

The diagnostic of FASSI electronic system detects and signals to the operator possible failure conditions through numeric codes (which are shown on the radio or the control panel display) and determines also the immediate block of the machine.

Failures are divided into two groups:

WARNING (W): warning, that can be reset
ALARM (A): alarm, that cannot be reset

In case of resettable warning, if you select the icon/button LMI, the electronic system reactivates the crane operation, as the failure condition doesn't affect the machine safety (as a matter of fact, by selecting the icon/button LMI, the operator is aware of the failure on the crane and shall contact as soon as possible an authorised FASSI service centre).
In addition to the numeric code on the display, the WARNING condition is also signalled by the flashing red LED on the control panel, that remains flashing even after the selection of the icon/button LMI.
In case of crane block due to overload, the resettable WARNING becomes non-resettable and the message ALARM appears.

In case of non-resettable ALARM, the crane operation can be reactivated (by selecting the icon/button LMI), only if the failure has been solved, as the present condition affects the machine safety.
In addition to the numeric code on the display, the ALARM condition is also signalled by the permanent red LED on the control panel.

On the main panel, the red LED is the last of the 5-LED-band signalling the loading condition, while on the basic user panel and the radio remote control handle, the red LED (if fitted) is the one signalling 100% of the capacity.

Any operation on the crane must be carried out in compliance with health and safety requirements and by taking proper technical and organisational measures.

In case of emergency, refer to chapter 11 "Failure conditions" for the necessary instructions to complete crane operations, before you go to an authorised FASSI service centre.

	FX500		
Code	**Description**	**Type**	**Possible solutions**
01	Corrupt data in EEPROM memory (parameters).	A	Turn off the power and turn on the crane again.
02	Pressure transducer value on inner ram out of range.	A	Check the transducer connector is correctly inserted.
04	Pressure transducer value on outer ram out of range.	A	
06	Pressure transducer value on jib out of range.	A	
11	Angular sensor value on outer boom out of range.	A	Check the angular sensor connector is correctly inserted.
12	Value of the winch load cell out of range.	A	Check the load cell connector is correctly inserted.

FX500			
Code	**Description**	**Type**	**Possible solutions**
25	Angular sensor value on jib out of range.	A	Check the angular sensor connector is correctly inserted.
26	Feeding tension value of the vehicle battery below the minimum required.	A	Recharge or replace the vehicle battery.
30	Inconsistency between the radio lever control and the reading of the micro switch on the rotation distributor segment.	A	Wait for some minutes, so that hydraulic oil can reach its working temperature. Check that nobody in proximity has activated manual levers during operation with radio remote control.
31	Inconsistency between the radio lever control and the reading of the micro switch on the inner boom distributor segment.	A	
32	Inconsistency between the radio lever control and the reading of the micro switch on the outer boom distributor segment.	A	
33	Inconsistency between the radio lever control and the reading of the micro switch on the distributor segment for the crane extension boom sections.	A	
34	Inconsistency between the radio lever control and the reading of the micro switch on the jib boom distributor segment.	A	
35	Inconsistency between the radio lever control and the reading of the micro switch on the distributor segment for the jib extension boom sections.	A	
36	Inconsistency between the radio lever control and the reading of the micro switch on the winch distributor segment.	A	
41	Failure of slave unit FX504A. During crane working, the damage on the slave unit FX504A is indicated as WARNING. If you use radio options, the failure is indicated as ALARM.	W/A	Check that the unit connectors are correctly inserted. Turn off the power and turn on the crane again.
43	Failure of slave unit FX504B. During crane working, the damage on the slave unit FX504B is indicated as WARNING. If you pass to outrigger operation, the failure is indicated as ALARM.	W/A	Check that the unit connectors are correctly inserted. Turn off the power and turn on the crane again.
44	Failure of slave unit FX504C. During crane working, the damage on the slave unit FX504C is indicated as WARNING. If you pass to outrigger operation, the failure is indicated as ALARM.	W/A	
45	Failure of slave unit FX450 (column)	A	
60	WDO relay on FX500/FX450 (base) controlled closed with tension in but not out.	A	Turn off the power and turn on the crane again.
61	WDO relay on FX500/FX450 (base) controlled open with tension in and out.	A	
62	Output feeding tension under WDO on FX500/FX450 (base) detected also if there is a lack of main feeding tension of the WDO circuit.	A	
63	Lack of the main feeding tension of the WDO circuit on FX500/FX450 (base).	A	

FX500			
Code	**Description**	**Type**	**Possible solutions**
70	Timeout of Can messages reception from digital tilting sensor.	A/W	Contact an authorised FASSI service centre.
71	Timeout of Can message reception from encoder of the outrigger 1.	W	If you deactivate the WARNING by selecting the icon/button LMI, the system considers the outrigger supports as completely reentered and activates the lower activation level of the limiting device.
72	Timeout of Can message reception from encoder of the outrigger 2.	W	
73	Timeout of Can message reception from encoder of the outrigger 3.	W	
74	Timeout of Can message reception from encoder of the outrigger 4.	W	Contact an authorised FASSI service centre.
90	Value of pressure transducer TP0 out of range.	W	Check the transducer connector is correctly inserted.
91	Value of temperature sensor TT out of range.	W	Check the sensor connector is correctly inserted.
99	Warning of stability danger: crane not in transport position or not along the vehicle body.	W	Place the crane into transport position or along the vehicle body and stabilize again.
200	Inner alarm of the FX504A optional unit.	A	Turn off the power and turn on the crane again.
217	WDO relay on FX504A controlled closed with tension in but not out.	A	Turn off the power and turn on the crane again.
218	WDO relay on FX504A controlled open with tension in and out.	A	
219	Output feeding tension under WDO on FX504A detected also if there is a lack of main feeding tension of the WDO circuit.	A	
220	Lack of the main feeding tension of the WDO circuit on FX504A.	A	
230	Inner alarm of the FX504B optional unit.	A	Turn off the power and turn on the crane again.
247	WDO relay on FX504B controlled closed with tension in but not out.	A	Turn off the power and turn on the crane again.
248	WDO relay on FX504B controlled open with tension in and out.	A	
249	Output feeding tension under WDO on FX504B detected also if there is a lack of main feeding tension of the WDO circuit.	A	
250	Lack of the main feeding tension of the WDO circuit on FX504B.	A	
260	Inner alarm of the FX504C optional unit.	A	Turn off the power and turn on the crane again.
277	WDO relay on FX504C controlled closed with tension in but not out.	A	Turn off the power and turn on the crane again.
278	WDO relay on FX504C controlled open with tension in and out.	A	
279	Output feeding tension under WDO on FX504C detected also if there is a lack of main feeding tension of the WDO circuit.	A	
280	Lack of the main feeding tension of the WDO circuit on FX504C.	A	

FX500			
Code	**Description**	**Type**	**Possible solutions**
310	WDO relay on FX450 (column) controlled closed with tension in but not out.	A	Turn off the power and turn on the crane again.
311	WDO relay on FX450 (column) controlled open with tension in and out.	A	
312	Output feeding tension under WDO on FX450 (column) detected also if there is a lack of main feeding tension of the WDO circuit.	A	
313	Lack of the main feeding tension of the WDO circuit on FX450 (column).	A	
316	Feeding tension value of the vehicle battery below the minimum required.	A	Recharge or replace the vehicle battery.
320	Failure of rotation encoder.	A	Turn off the power and turn on the crane again.

Messages

DANGER!

It signals pressure detection in the transducer TP0 with electrovalve EV1 de-energized.
If the message remains, contact an authorised FASSI service centre.

It is forbidden to operate crane and implements if the limiting device is faulty or tampered with.

WINCH OFF!

It signals the winch block caused by the rope being completely unwound.
Release the winch control lever.

WINCH CAL. ERROR

It signals (through a 1-minute-flashing every 10 minutes) the exceeding of the maximum setting limit of the winch load cell.
Contact an authorised FASSI service centre.

STOP BOOM OUT

The exit of extension boom sections is not allowed because of the activation of the winch mechanical stroke end.
Release the control lever for the exit of extension boom sections and then operate it to partially reenter the extension boom sections.

WARNING ROTATION

It warns against the dangerous rotation near the stand-up control station (if fitted).
Press the LMI button.

STOP ROTATION

It signals the rotation block.
Operate rotation in the direction opposite to the one that caused the block.

STOP

It signals the STOP button has been pressed.

JIB OFF!

It appears if you operate the hydraulic extension control lever and its pressure transducer and angular sensor are not connected.
Release the control levers and connect the pressure transducer and the angular sensor of the hydraulic extension.

WARNING ANGLE!

It appears when you reach the vertical warning value of a crane or hydraulic extension provided with PROLINK function.
Release the control levers.

MAX ANGLE CRANE!

It appears when you reach the maximum vertical value of a crane provided with PROLINK function.
Release the control levers.

MAX ANGLE JIB!

It appears when you reach the maximum vertical value of a hydraulic extension provided

with PROLINK function.
Release the control levers.

CRANE FOLDED

It signals the crane folded in transport position. The only allowed operation is the outer boom folding, until the message disappears.

NOT ALLOWED

It appears when XP is activated and you operate different levers at the same time.
Release the levers and then operate one lever at a time.
It appears also when you operate a manoeuvre which is not allowed.
Release the levers.

NO FEEDBACK SIGNAL

It may indicate a missing radio signal, problems in the transmission between unit and antenna, or lack of crane feeding.

NO CODE!

It appears when you activate the ME icon without authorization, in order to start the special procedure to check the load handled by manual extensions.
Press the INDEX button.

STABILITY STOP

It appears when you reach the maximum slope value of the crane during operation.
Approach the load to the column.
If this message appears immediately after the stabilization has been performed, crane operation is not allowed: adjust the stabilization set-up by decreasing the slope.

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

In compliance with safety regulations in force in EC countries, cranes with radio remote control or reaching at least 12 m are equipped with a visual indicator (2 high-visibility flashing yellow lights) that warns persons in the vicinity that the crane is in operation.

4.2.7 - Rated capacity acoustic indicator

In compliance with safety regulations in force in EC countries, cranes with radio remote control or reaching at least 12 m 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/hydraulic extension/winch capacity in the working configuration. When it reaches 100% of the capacity, the sound becomes continuous.

4.2.8 - Acoustic warning

In compliance with safety regulations in force in EC countries, cranes with radio remote control or reaching at least 12 m are equipped with an acoustic warning that enables the operator to warn persons in the vicinity against dangerous situations.

4.2.9 - Angle control device for PROLINK

If PROLINK function is available (see the corresponding paragraph), the crane is equipped with an angle control device that prevents its outer boom and/or the hydraulic extension boom from exceeding the maximum vertical value. The control is performed thanks to angle sensors placed on the crane outer boom and the hydraulic extension boom (if fitted).

In case of manual control, when the vertical warning value is reached, the control device temporarily blocks every movement and activates the flashing red LED (if fitted) on the control panel/radio remote control, together with the message `WARNING ANGLE!` on the display. In order to reactivate all the crane functions (except for the inner boom lift, that is definitively blocked), it is sufficient to take back all the levers to neutral position. The message `WARNING ANGLE!` disappears by lowering the boom under the warning value or by pressing the LMI button.
In case of control by radio, when the vertical warning value is reached, the control device slows down the action of lifting rams.

When the maximum vertical value is reached (both with manual and radio remote control), the control device activates the permanent red LED and the message `MAX ANGLE CRANE!` or `MAX ANGLE JIB!`, according to the boom that has reached the limit.

Moreover, if the maximum vertical value is reached by the crane outer boom, the control device blocks:

- the crane inner boom lift;
- the crane outer boom lift.

If the maximum vertical value is reached by the hydraulic extension boom, the control system blocks:

- the crane inner boom lift;
- the crane outer boom lift;
- the hydraulic extension boom lift;
- the winch lift.

On cranes and hydraulic extensions fitted with PROLINK, the maximum vertical value might not correspond to the lifting ram stroke end.

4.2.10 - 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.

4.2.11 - Rotation arc limiter

If stability is not sufficient in a working sector (for instance in front of the vehicle cab), the rotation arc is limited by means of an adjustable electrohydraulic device, which enables to operate only in the "stable" zone.
When the crane reaches the limit of the "stable" zone, the rotation arc limiter blocks its rotation and enables:

- the crane rotation in the opposite direction, towards the "stable" zone (reactivation manoeuvre);
- the manoeuvres allowed by the lifting moment limiting device.

Carefully check the vehicle stability in the whole working area, paying special attention to the zone in front of the vehicle cab, as it is usually less stable.

4.2.12 - Lifting moment limiting device for two working zones

If stability is reduced in a working sector (for instance in front of the vehicle cab), the lifting moment limiting device for two working zones still enables to operate in that sector, but with a reduced activation level, which is defined during the stability test of the vehicle.
Therefore, the working area is divided into two sectors: in one sector (e.g. vehicle body side), the crane operates as per the capacity plate values; in the other sector (e.g. vehicle cab side), it operates with derated capacity values.
So, the limiting device manages two activation levels (according to the working sector where the crane operates) and the vehicle stability is always guaranteed.

In these conditions:

- manoeuvre of a bigger load than the one allowed in the derated load sector,
- lifting ram reaching its stroke end ([1])

while the crane is passing from the working sector where it can operate with capacity plate values to the sector where it can operate with derated capacity, the rotation is blocked and the allowed operations are the following:

- crane rotation in the opposite direction;
- manoeuvres allowed by the electronic lifting moment limiting device.

([1]) In case of block due to lifting ram reaching its stroke end, it is necessary to operate the ram in block (signalled by the limiting device) in the opposite direction, so that the pressure is discharged and it is possible to operate in the working sector with reduced activation level.

In case of overload with crane in "unstable" zone, the block of operations (except for rotation, that isn't stopped) occurs according to the working parameters of the electronic lifting moment limiting device.

When the system starts and the crane is in "unstable" zone, rotation is blocked in both directions if the pressure induced by the load is higher than the determined block pressure.

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 provided by the installer and defined after the final stability test.

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

During load handling with crane or hydraulic extension 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.

4.2.13 - 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

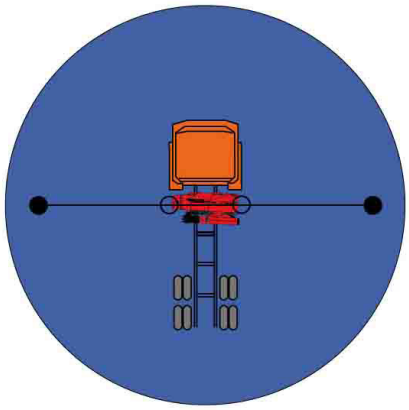
The FSC/L system allows crane operation only when all the outrigger supports (the ones on the crane and the supplementary ones, if fitted) are completely extended and all the outrigger rams are placed in working position touching the ground.

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

FSC/M

The FSC/M system is available only on cranes provided with electronic lifting moment limiting device. It allows crane operation only when all the outrigger rams are placed in working position touching the ground.

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.

The system detects the left and right working areas of the vehicle body (1-4 and 2-3 - fig. 4.1) and manages the lifting moment limiting device for two working zones: "above body" (A) and "above cab" (B) - fig. 4.2 (See paragraph "Lifting moment limiting device for two working zones").

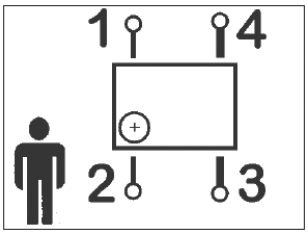


Fig. 4.1

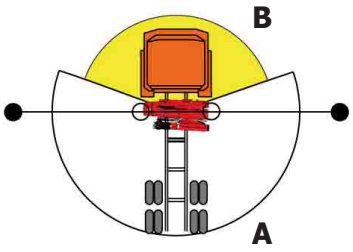


Fig. 4.2

During the passage from working zone "above body" to working zone "above cab", the rotation is blocked if the pressure induced by load is higher than the derated pressure for the activation of the lifting moment limiting device.

The rotation block occurs also passing from a body side to the opposite one, where the pressure for the activation of the lifting moment limiting device is lower than the pressure induced by load. Rotation in the opposite direction is allowed, as well as all the manoeuvres that are permitted by the electronic lifting moment limiting device.

FSC/M1

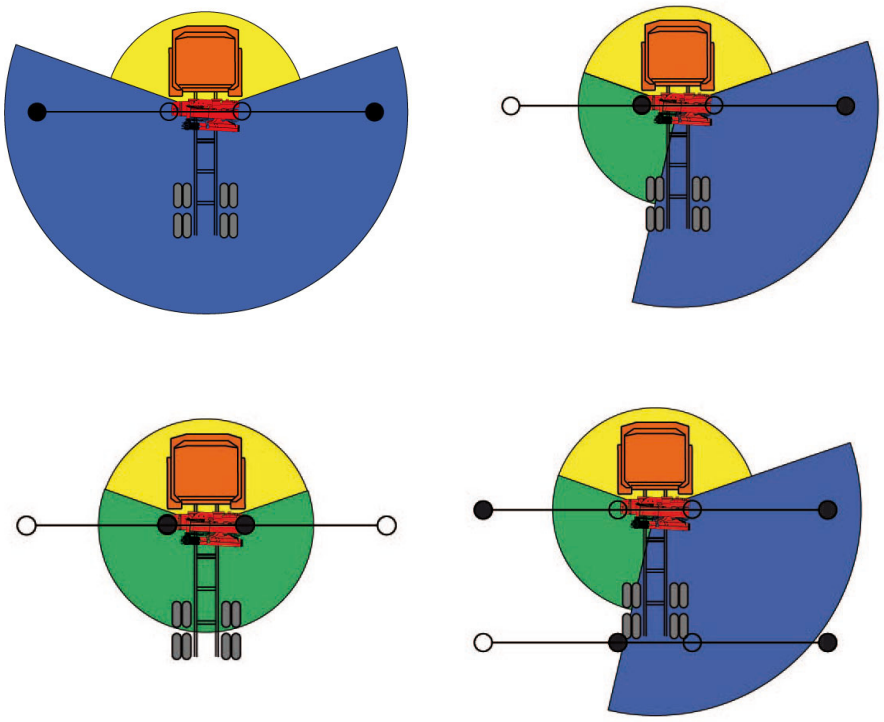
With FSC/M1 system, two working levels are available above the vehicle body: L1 and L3.

In L1 working level: the pressure for the activation of the lifting moment limiting device is derated (according to the stability test results); outrigger supports are completely reentered or partially extended; outrigger rams are placed in working position in contact with the ground.

For crane use in L3 level, refer to the corresponding section in FSC/L paragraph.

On both sides (right or left) of the working zone "above body", the working level is determined according to the less extended outrigger support (crane or supplementary outrigger).

If outrigger supports are completely extended on one side and completely or partially reentered on the other, you can handle rated loads only where supports are completely extended.



FSC/M2

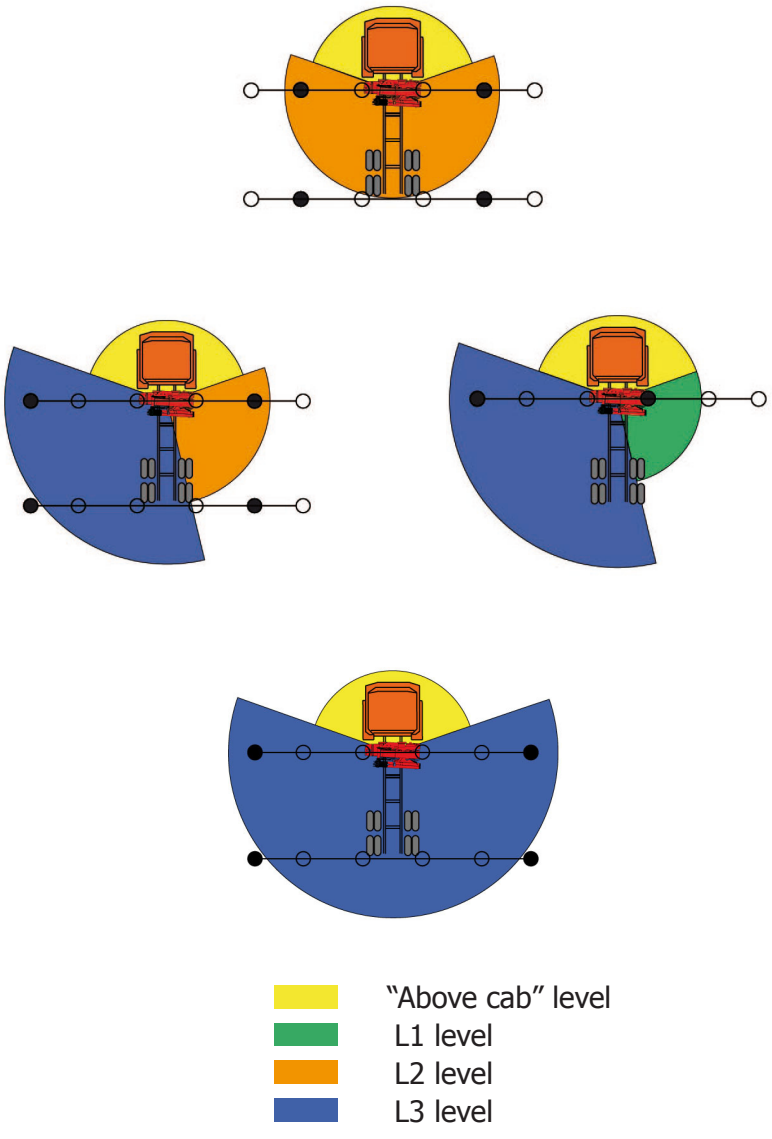
With FSC/M2 system (provided only on cranes equipped with double supports), three working levels are available above the vehicle body: L1, L2 and L3.

In L1 working level: the pressure for the activation of the lifting moment limiting device is derated (according to the stability test results); the first outrigger support is completely reentered or partially extended; outrigger rams are placed in working position in contact with the ground.

In L2 working level: the pressure for the activation of the lifting moment limiting device is derated (according to the stability test results); the first outrigger support is completely extended; the second outrigger support is completely reentered or partially extended; outrigger rams are placed in working position in contact with the ground.

For crane use in L3 level, refer to the corresponding section in FSC/L paragraph.

On both sides (right or left) of the working zone "above body", the working level is determined according to the less extended outrigger support (crane or supplementary outrigger).



Crane use with outrigger rams not touching the ground (L0 level)

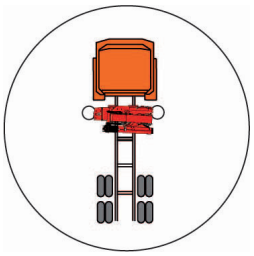
The crane use with outrigger rams not touching the ground is intended only for maintenance or load-less operations: it is prohibited to lift and handle loads with outriggers in level L0.

Generally, the crane is prevented from operation if its outrigger rams are not in contact with the ground (level L0). In this condition, only the supplementary functions are active and the icon flag LØ is flashing.

Anyway, according to the crane mounting, it may be possible to set the L0 level through a dedicated procedure to be carried out by an authorised FASSI service centre. In this way, some manoeuvres can be activated even with outrigger rams not touching the ground.

According to the crane mounting, two different setting conditions can be defined by the authorised FASSI service centre:

- for crane functionality limited to the vehicle body sector;
- for complete crane functionality (360°).

	Functionality over the vehicle body		***Complete functionality (360°)***	
				
	L0 enabled* (icon flag LØ: permanent)	**L0 not enabled* - no load can be lifted** (icon flag LØ: flashing)	**L0 enabled*** (icon flag LØ: permanent)	**L0 not enabled* - no load can be lifted** (icon flag LØ: flashing)
Allowed manoeuvres	All, limited to the vehicle body sector	• Reentry of crane extension boom sections • Reentry of jib extension boom sections • Supplementary functions • Lift of the crane inner or outer boom • Descent of the crane inner or outer boom	All, except for the exit of extension boom sections, that is allowed only over the vehicle body.	• Reentry of crane extension boom sections • Reentry of jib extension boom sections • Supplementary functions • Lift of the crane inner or outer boom • Descent of the crane inner or outer boom

If you operate a forbidden manoeuvre, the message NOT ALLOWED appears.

*Enabling procedure for L0 level

Once the setting procedure has been carried out by an authorised FASSI service centre, the operator can enable the L0 working level, by following this procedure:

• if the hydraulic extension is fitted, completely reenter its extension boom sections and hold the control lever (2 seconds);	
• completely reenter (within 5 seconds) the crane extension boom sections and hold the control lever (2 seconds);	
• the crane functionality in L0 level is activated, when the icon flag L0 is permanently displayed.	

The pressure limits for the activation of the lifting moment limiting device in L0 level are defined by the installer during the setting procedure. When you reach those limits, the system blocks rotation in both directions, as well as every operation increasing the outreach. If the block occurs with crane or hydraulic extension above the horizontal line, the lifting manoeuvres are prevented too.

FSC/H

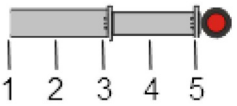
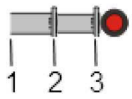
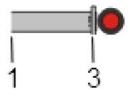
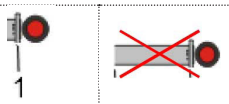
The FSC/H system is available only with hydraulically extendable crane outrigger supports and electronic lifting moment limiting device. It allows crane operation only when all the outrigger rams are placed in working position touching the ground.

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.

Setting levels

The system detects the left and right working areas of the vehicle body (1-4 and 2-3 - fig. 4.1) and manages the lifting moment limiting device for two working zones: "above body" (A) and "above cab" (B) - fig. 4.2 (See paragraph "Lifting moment limiting device for two working zones").

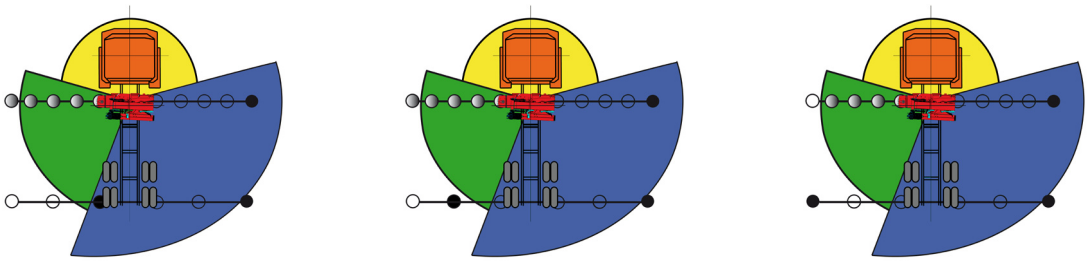
The FSC/H system manages also 5 positions for the crane outrigger supports and up to 3 positions for the supplementary outriggers. Different intermediate settings of limiting device activation are obtained from the combination between the positions (see the following figure). These settings are defined during the crane mounting on the vehicle.

			Crane outrigger supports				
							
			1	**2**	**3**	**4**	**5**
Supplementary outriggers		**1**	1_1	2_1	3_1	4_1	5_1
		2			3_2	4_2	5_2
		3				4_3	Plate
		**1**	1_1	2_1	3_1	4_1	5_1
		3				4_3	Plate
		**Fixed or not fitted**	1_1	2_1	3_1	4_1	Plate

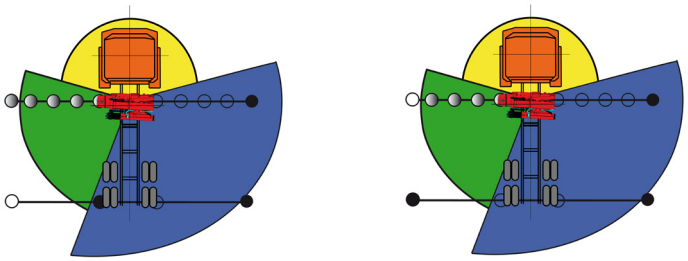
Examples

- If the crane outrigger support is in position 2 and the supplementary one is in position 1, 2_1 is the derated level for the limiting device activation;
- If the crane outrigger support is in position 2 and the supplementary one is in position 3, 2_1 is still the derated level for the limiting device activation;
- If the crane outrigger support is in position 5 and the supplementary one is in position 3, the crane works in the plate level.

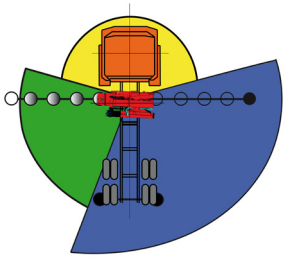
Supplementary outriggers with double hydraulically extendable supports



Supplementary outriggers with one hydraulically or manually extendable support



Fixed or not fitted supplementary outriggers



Over cab level
Intermediate derated level
Plate level

● = real position (*)
◍ = possible positions(*)
(*) = with outriggers on the ground

Crane use with outrigger rams not touching the ground (L0 level)

For crane use with outrigger rams not touching the ground (L0 level), refer to the corresponding section in FSC/M paragraph.

Rotation management

If the system starts and the crane is in block condition with a different level than the plate one, rotation is prevented in both directions.
Rotation is blocked also during the passage from working zone "above body" to working zone "above cab", if the pressure induced by load is higher than the derated pressure for the activation of the lifting moment limiting device.
The rotation block occurs also passing from a body side to the opposite one, where the pressure for the activation of the lifting moment limiting device is lower than the pressure induced by load. Rotation in the opposite direction is allowed, as well as all the manoeuvres that are permitted by the electronic lifting moment limiting device.
Lastly, rotation is prevented if you reach or exceed the block value with intermediate derated levels; it is allowed if the block value is exceeded in the plate level.

FSC/S

The FSC/S system is available only on cranes provided with digital radio remote control, hydraulically extendable outrigger supports and electronic lifting moment limiting device. It allows crane operation only when all the outrigger rams are placed in working position in contact with the ground.

The activation of the lifting moment limiting device occurs according to outrigger support position and vehicle slope.

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.

The system detects the left and right working areas of the vehicle body (1-4 and 2-3 - fig. 4.1) and manages the lifting moment limiting device for two working zones: "above body" (A) and "above cab" (B) - fig. 4.2 (See paragraph "Lifting moment limiting device for two working zones").

During the passage from working zone "above body" to working zone "above cab", the rotation is blocked if the pressure induced by load is higher than the derated pressure for the activation of the lifting moment limiting device.

The rotation block occurs also passing from a body side to the opposite one, where the pressure for the activation of the lifting moment limiting device is lower than the pressure induced by load. Rotation in the opposite direction is allowed, as well as all the manoeuvres that are permitted by the electronic lifting moment limiting device.

If, after the execution of the stabilization, you start to control the crane and the lateral slope is out of the limit, it isn't possible to use the crane and the message `STABILITY STOP` appears on the radio remote control and the main panel display. In order to continue working, it is necessary to adjust the stabilization set-up by decreasing the slope angle and re-entering within the intended parameters of operation.

With FSC/S system, three working levels are available above the vehicle body: L1, "proportional" L2 and L3.

In L1 working level: the pressure for the activation of the lifting moment limiting device is derated (according to the stability test results); outrigger supports are completely reentered or partially extended (less than half of their stroke); outrigger rams are placed in working position in contact with the ground. The vehicle slope is not considered.

With **FSC/SII**, the crane works in L1 level with derated pressure when outrigger supports are extended up to 25% of their maximum stroke.

In "proportional" L2 level, the activation of the lifting moment limiting device occurs when the maximum intended slope is reached. The angle creating the block comes from a linear calculation between minimum and maximum limit, according to the position of outrigger supports. In this level, the outrigger supports are partially extended (at least half of their stroke) and the outrigger rams are placed in working position in contact with the ground.

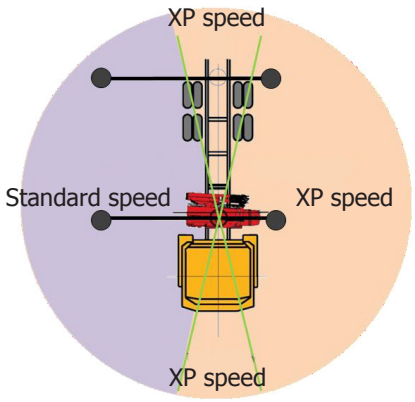
With **FSC/SII**, the crane works in "proportional" L2 level when outrigger supports are partially extended from 25% to 99% of their maximum stroke.

If crane operation is carried out on a plane with downward slope (descent) and under one of the following conditions:

- outrigger supports extended from 25% to 50% of their maximum stroke and ground slope ≥ 2°
- outrigger supports extended from 50% to 99% of their maximum stroke and ground slope ≥ 3°

a reduction of the crane movement speed occurs. This reduction is equal to the one related to XP working (even for cranes without XP device).

If working conditions between downward and upward side are different, in the zone "above body" the crane works as per the slowest condition.



In L3 working level, the activation of the lifting moment limiting device occurs when the maximum intended slope is reached. In this level, the pressure for the activation of the lifting moment limiting device is the rated one, the outrigger supports are completely extended; the outrigger rams are placed in working position in contact with the ground.

The slope check is never active with crane above body; in this configuration the full capacity of the crane is allowed.

When 80% of the maximum permitted slope is reached, the flashing icon flag appears on the display and the rated capacity acoustic indicator emits an intermittent sound.

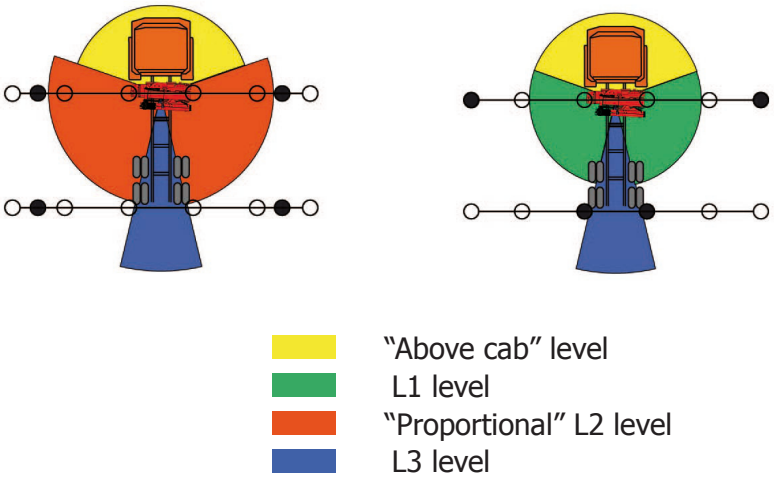
When you exceed 100% of the maximum allowed slope: the icon flag is permanent, the permanent red LED (if fitted) on the control panel/radio remote control turns on, the rated capacity acoustic indicator emits a continuous sound, the message `STABILITY STOP` appears on the display and the crane is blocked.

In working levels L2 and L3, if the block occurs during rotation, the crane is still allowed to rotate in the opposite direction.

During crane reactivation, the red LED is on until the exit from the block condition and the icon flag starts flashing as soon as the slope goes under 100%.
Depending on the crane configuration, the reactivation occurs as per the electronic lifting moment limiting device working (see paragraph "Block due to overload").

If you operate the crane by manual controls and lateral outriggers supports are not completely extended, only L1 working level is available.

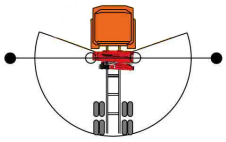
On both sides (right or left) of the working zone "above body", the working level is determined according to the less extended outrigger support (crane or supplementary outrigger).

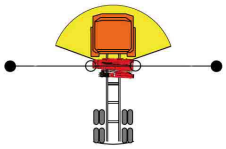


Crane use with outrigger rams not touching the ground (L0 level)

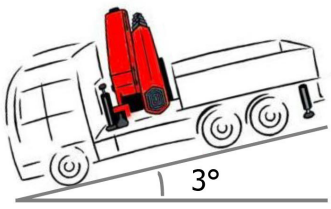
For crane use with outrigger rams not touching the ground (L0 level), refer to the corresponding section in FSC/M paragraph.

ICC (Integrated Counter-weight Control)

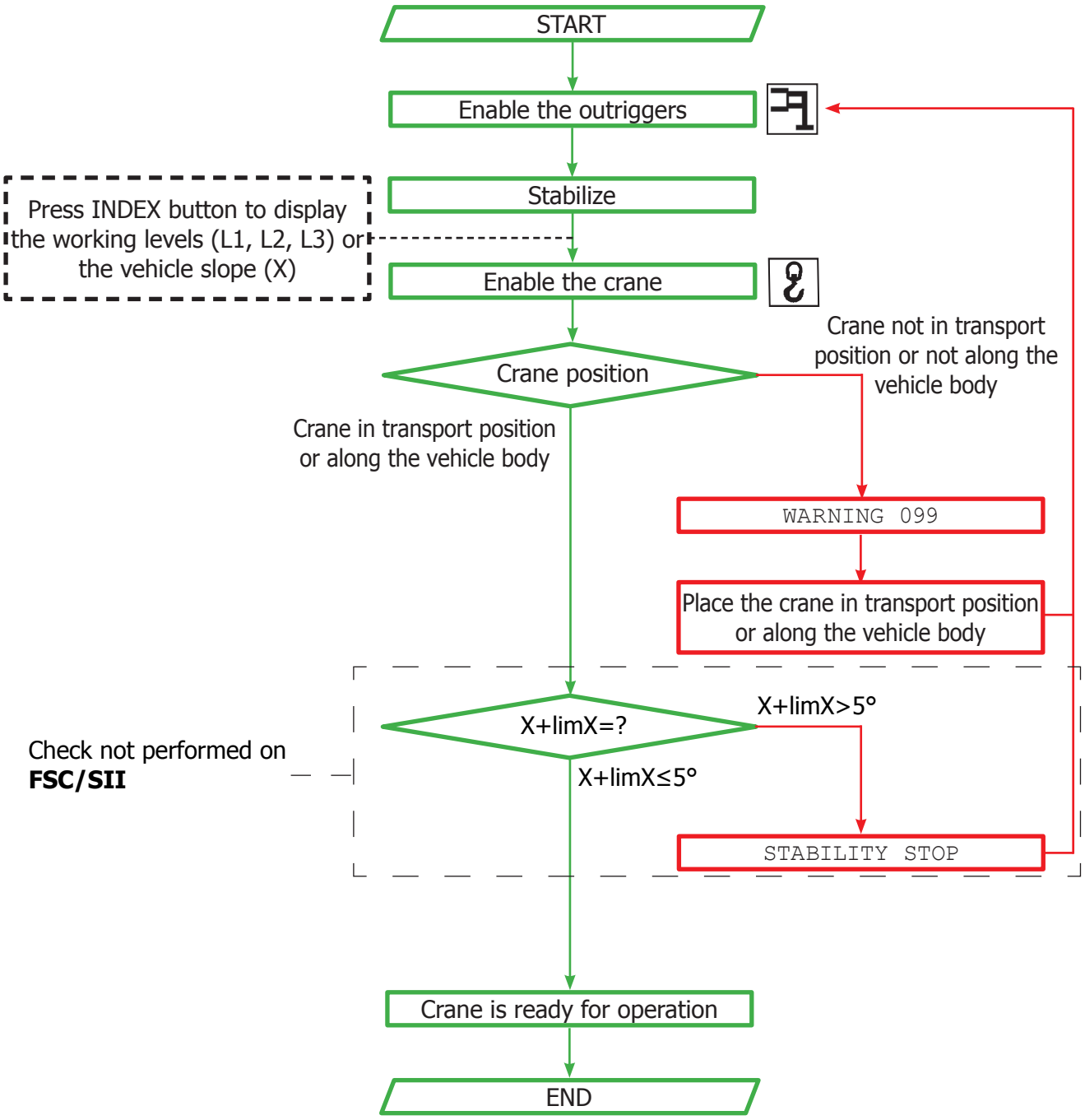
"Stable" zone (e.g. over the vehicle body)

While working from L2 to L3 level, this function controls the vehicle slope according to the load variation on the body and adjusts the crane performances accordingly (up to the reaching of the maximum angle or the block pressure of the lifting moment limiting device).

"Unstable" zone (e.g. over vehicle cab)	
	
Angle of the crane outer boom/ hydraulic extension	By selecting the XP icon from the radio remote control:
under 35°	• the message XP is shown on the display • the working speed decreases • the slope control is activated • the lifting capacity is adapted to the one allowed in the "stable" zone
above 35°	• the message XP is shown on the display (actually, ICC function is not active but it is automatically activated when the boom goes under 35°) • the working speed decreases

The ICC function can be activated and work in "unstable" zone, only if the crane/ supplementary outriggers operate from L2 to L3 level and if the starting slope towards the "unstable" zone is under 3°.



Stabilization procedure with FSC/S

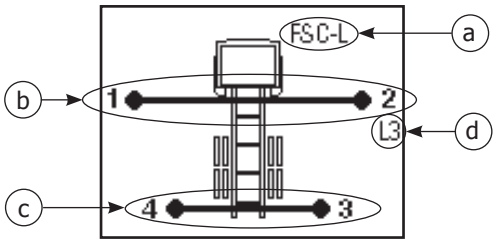


X: actual slope of the vehicle
limX: angle value defined during the FSC/S setting, according to the installation.

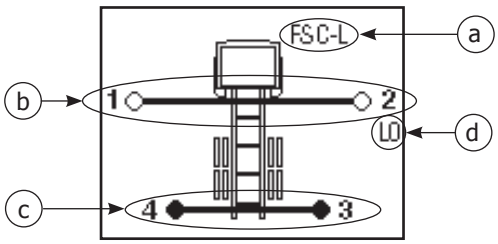
FSC system display

On control panel ("outrigger" mode)

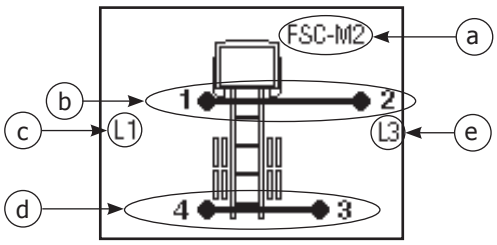
Once outriggers have been enabled (see chapter 6 "Setting up for crane operation"), any information about FSC system is displayed on the control panel.
For example:



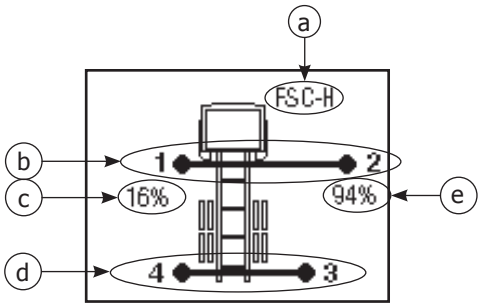
a. Type of FSC fitted on the crane
b. Outrigger rams 1-2 touching the ground (●)
c. Outrigger rams 3-4 touching the ground (●)
d. Working level (L3 on sides 1-4 and 2-3)



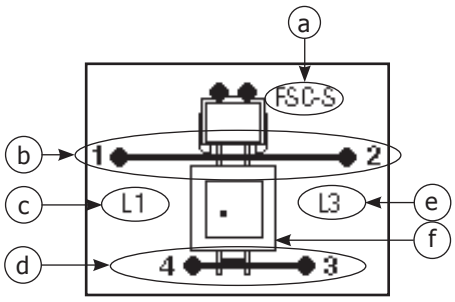
a. Type of FSC fitted on the crane
b. Outrigger rams 1-2 not touching the ground (○)
c. Outrigger rams 3-4 touching the ground (●)
d. Working level (L0 on sides 1-4 and 2-3; the crane cannot work)



a. Type of FSC fitted on the crane
b. Outrigger rams 1-2 touching the ground (●)
c. Working level (L1 on side 1-4)
d. Outrigger rams 3-4 touching the ground (●)
e. Working level (L3 on side 2-3)



a. Type of FSC fitted on the crane
b. Outrigger rams 1-2 touching the ground (●)
c. Lifting capacity on side 1-4 = 16% of the plate value
d. Outrigger rams 3-4 touching the ground (●)
e. Lifting capacity on side 2-3 = 94% of the plate value



a. Type of FSC fitted on the crane
b. Outrigger rams 1-2 touching the ground (●)
c. Working level (L1 on side 1-4)
d. Outrigger rams 3-4 touching the ground (●)
e. Working level (L3 on side 2-3)
f. Level indicator: for the correct machine set-up the pointer must be inside the inner rectangle

On control panel ("crane" mode) and radio remote control ("outrigger" and "crane" mode)

FSC/L

On a crane (equipped with electronic lifting moment limiting device) that is not completely stabilized, the lifting ram pressures blink on the control panel / radio remote control display and operation is not allowed. Once the crane is completely stabilized, the values of the lifting ram pressures stop blinking on the display and operation is allowed.

On a crane that is not equipped with electronic lifting moment limiting device, operation is allowed under this condition:

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

FSC/M and S

By pressing the INDEX button on the radio remote control or control panel, it is possible to display the working levels.

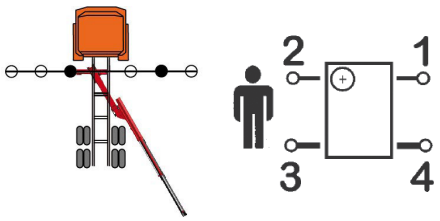
	1	-	4		L	1		*	2	-	3		L	3

The above display shows that side 1-4 is in L1 level, while side 2-3 is in L3 level. The star indicates the side where the crane is placed (2-3). The absence of the star on both sides means that the crane is on the vehicle body.

Sides 1-4 and 2-3 are represented on the plate placed near the outrigger controls (fig. 4.1).

For instance, in the following figure the crane is working in zone 1-4 and level L2. Zone 2-3 is set for the working level L1.

*1-4	L2	2-3	L1		



In case of FSC/S system, by pressing the INDEX button it is possible to alternatively activate the working level display and the one concerning the angle values of the vehicle.

X	-	0	.	4	0			Y	1	.	2	5		

FSC/H

By holding the INDEX button pressed on the radio remote control or control panel, it is possible to display the real capacity percentages of the crane.

*	1	_	4	1	0	0	%		2	_	3		8	0	%

The above display shows that side 1-4 is in "plate" level (lifting capacity = 100% of the plate value), while side 2-3 is in an intermediate derated level (lifting capacity = 80% of the plate value). The star indicates the side where the crane is placed (1-4). The absence of the star on both sides means that the crane is on the vehicle body

The pressure for the activation of the lifting moment limiting device is automatically displayed during stabilization; in any case, it can also be displayed holding the button "INDEX" pressed.

4.2.14 - 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 crane and supplementary 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. 4.3) placed by the installer inside the vehicle cab.

4.2.15 - 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. 4.3) 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.

4.2.16 - 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. 4.3) placed by the installer inside the vehicle cab.

Fig. 4.3

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.

4.3 – Special functions

4.3.1 - XP (Extra Power)

On certain models, maximum performances are reached by activating the XP device, that ensures safe operations by working on dynamic performances.

In order to activate/deactivate the XP device, select the icon XP or push the dedicated button from the control station.

The successful activation of the XP device is signalled by the message XP on the display or by the warning light above the XP button on the basic user panel.

In order to make the XP device deactivation effective, the crane control levers shall be in neutral position.

On capacity plates graphically marked with , loads pertain to XP device activated.

In case of cranes with free rotation, rotation arc limiter or lifting moment limiting device for two working sectors in "stable" zone, the activation of XP device involves:

- a reduction of the lifting and lowering speed of inner boom, outer boom and hydraulic extension (if fitted). This enables to reach the maximum lifting capacity;
- a reduction of the rotation speed, without increasing the torque;
- a normal speed of hydraulic extension booms, bucket and rotator;
- normal speed and lifting capacity of winch.

On cranes fitted with lifting moment limiting device for two working sectors in "unstable" zone, the activation of XP device involves only a speed reduction (in case of FSC/S, refer to paragraph "ICC (Integrated Counterweight Control)").

In case of XP device not activated and orange LED on the main panel turned on: if you activate the device, the LED may turn off. If you insist in the manoeuvres increasing the lifting moment, the lighting of orange (and eventually red) LED might occur again.

In case of XP device not activated and red LED on the main panel turned on (block condition): if you activate the XP device, the block may continue (in this case it is necessary to reactivate the crane), or the red LED may turn off and the orange one may stay turned on (in this case the crane controls are enabled). If you insist in the manoeuvres increasing the lifting moment, the lighting of orange and red LED might occur again.

Orange and red LED signal respectively 90% and 100% of the crane/hydraulic extension/ winch capacity in the working configuration.

If the crane is equipped with FSC stability control system, you can activate the XP device:

- in working levels L2, L3 or working "above body" (FSC/L, /M, /S);
- with completely extended outrigger supports or working "above body" (FSC/H).

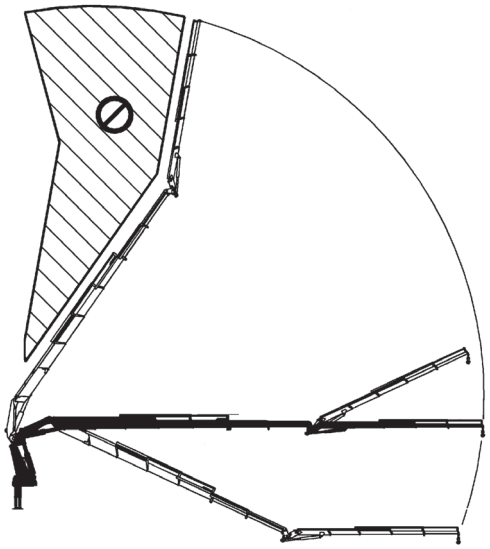
4.3.2 - PROLINK (Progressive Link)

Cranes provided with PROLINK can operate the outer boom and/or the hydraulic extension with an increased angle upwards.

The tilt angle value of the outer boom and/or the hydraulic extension is represented on the capacity plates.

In order to avoid the exceeding of the maximum vertical value, the crane is fitted with an angle control device for PROLINK. While operating the crane or the hydraulic extension, if you reach the maximum value vertical up, the device blocks every dangerous movement.

The following figure shows the possible configurations of a crane fitted with hydraulic extension and PROLINK function.



4.3.3 - FL (Full Lift)

The FL (Full Lift) system enables a "FAST" or "POWER" mode for operating the crane extension boom sections.

The "POWER" mode (regenerative valve deactivated) enables to lift the maximum capacity loads in the crane vertical configuration, by reducing the exit speed of the crane extension boom sections.

The "FAST" mode (regenerative valve activated) enables to reach the maximum exit speed of the extension boom sections.

On "medium-heavy" range cranes, it is possible to pass from "POWER" to "FAST" mode (and vice versa) by selecting the icon from the control panel or the radio remote control.

On "small" range cranes, when you turn on the crane, the default working mode is "FAST"; it is possible to pass to "POWER" mode by selecting the icon and holding pressed the enter key. Anyway, this is possible only if the crane outer boom is over 45° on the horizontal line (otherwise the icon flag ! appears, signalling the operation failure).

4.3.4 - Oil cooler (heat exchanger)

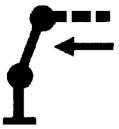
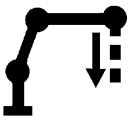
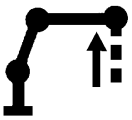
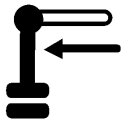
The oil cooler (air-oil heat exchanger) prevents the damaging effects caused by an excessive rise of oil temperature.

The oil cooler is equipped of brush-less motor with integrated electronic management programme and soft-start function, thanks to which the fan reaches its maximum speed slowly. In this way, power peaks during start up and damages to the vehicle battery are prevented.
The fan speed is directly proportional to the temperature variation. Thus, at low oil temperatures the fan runs slowly and saves energy. The start-up temperature can be set through the system parameters, anyway the oil cooler doesn't start with oil temperature lower than 20° C.
The oil cooler is also equipped with a self-cleaning automatic function, that enables the inversion of the motor movement during operation. In particular, at the end of the working cycle of the oil cooler, FASSI electronics sends a signal to the system and the fan inverts its rotation direction, creating an outbound air flow, which removes dust from the radiant element.

Always assure the inbound/outbound air flow in/from the oil cooler.

Chapter 5 – Control systems

5.1 – Pictograms for crane and implement control

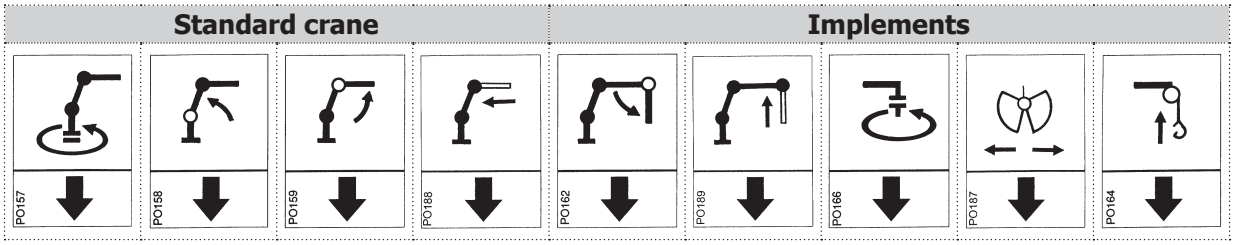
Pictograms for crane and implement control			
Column rotation (clockwise)	Column rotation (anti-clockwise)	Inner boom movement (lift)	Inner boom movement (descent)
Outer boom movement (lift)	Outer boom movement (descent)	Jib movement (lift)	Jib movement (descent)
			
Crane extension boom movement (exit)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

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.

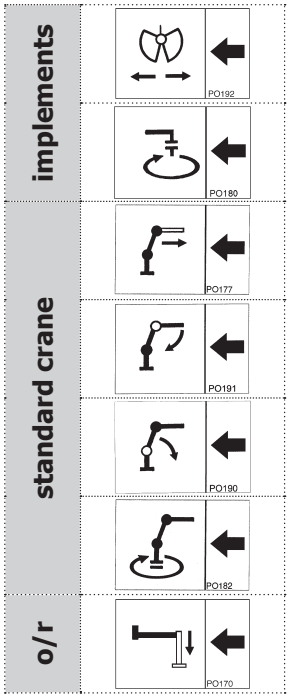
5.2.1 - Horizontal layout order

The following sequence refers to articulated cranes and 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.



5.2.2 - Vertical layout order

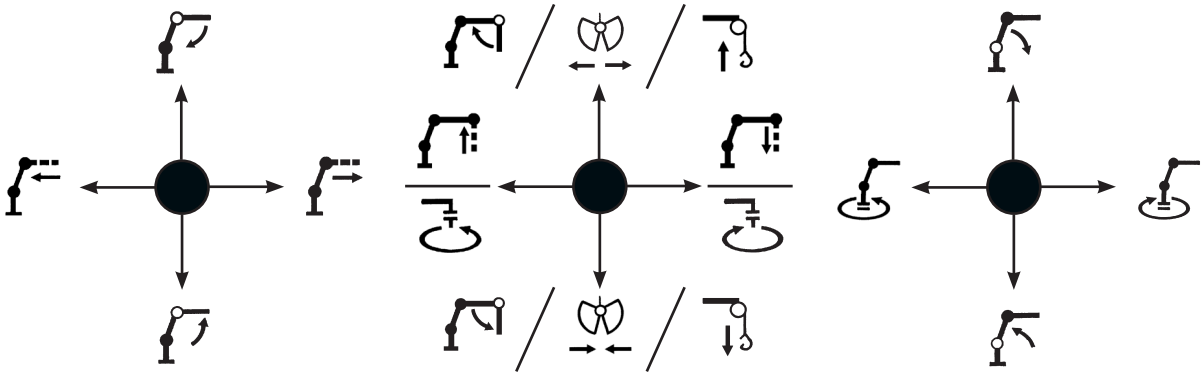
The following sequence refers to articulated cranes. The pictograms referring to implements are to be considered according to what is fitted on the crane.



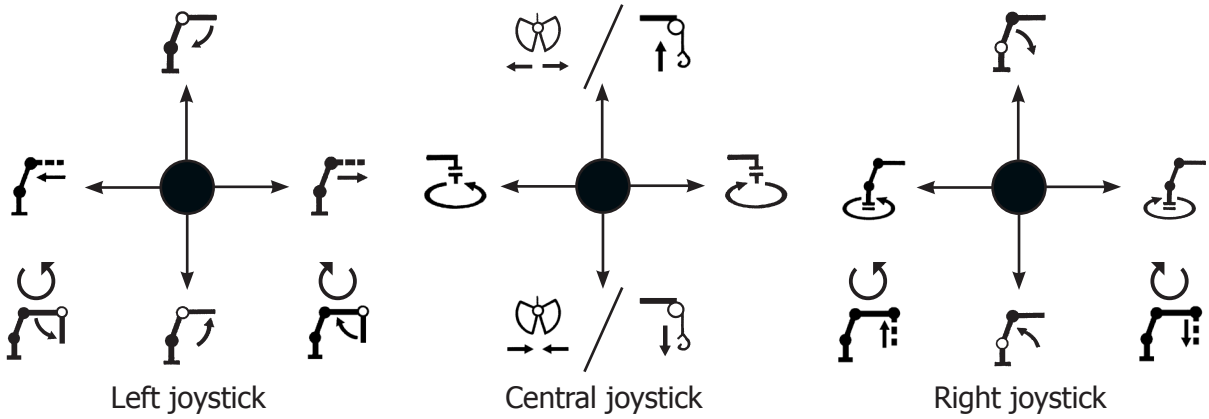
5.2.3 - Layout order for radio remote control with joystick

The following sequences refer to articulated cranes. The pictograms referring to implements are to be considered according to what is fitted on the crane.

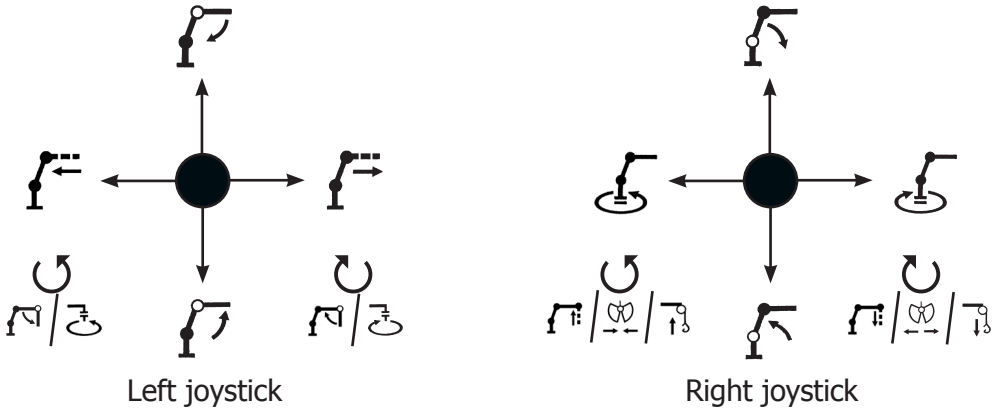
Radio remote control - 6 functions with 3 joysticks



Radio remote control - 8 functions with 3 joysticks



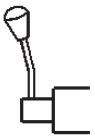
Radio remote control - 6 functions with 2 joysticks



5.3 – Ground control station

5.3.1 - Enabling outriggers and crane

With reference to fig. 5.1, 5.2 and 5.3 (according to the crane model), in order to enable the outriggers move the lever placed in their proximity in the direction indicated by the symbol **E-S** and follow the instructions given in chapter 6 "Setting up for crane operation".
In order to enable the crane, move that lever in the direction indicated by the symbol and follow the instructions given in chapter 6 "Setting up for crane operation".



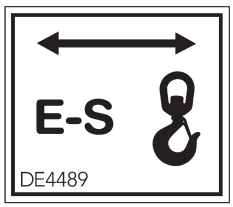


Fig. 5.1

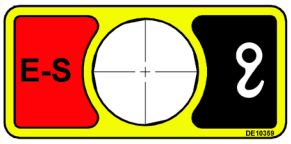


Fig. 5.2

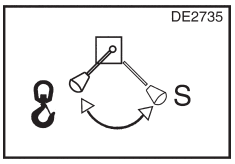


Fig. 5.3

5.3.2 - Controlling the outriggers

Outriggers are numbered from 1 to 4, as shown for example in figure 5.4.

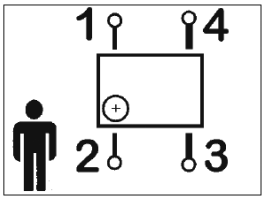
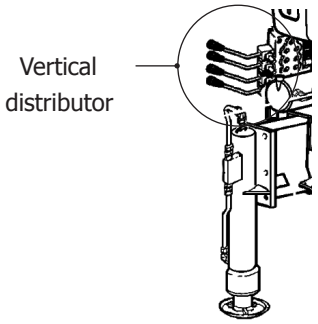


Fig. 5.4

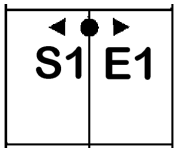
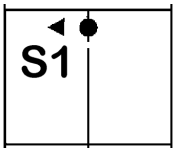
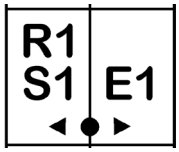
On the outrigger controls (selection and control) letter **E** indicates hydraulically extendable outrigger supports, letter **S** hydraulic outrigger rams and letter **R** the pivoting of the hydraulically tiltable outrigger rams.

Refer to paragraph 6.3.1 "Outrigger nomenclature" for any explanation concerning nomenclature.

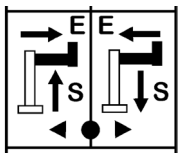
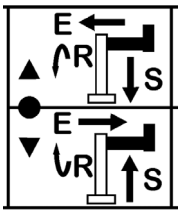
Outrigger control by means of 5-function-distributor



In order to operate the outrigger, select the element you want to activate and at the same time operate the control lever.

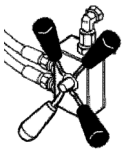
Outrigger selection (position 1): examples of lever labels		
		
1	**2**	**3**

1. Lever movement to the left: selection of outrigger ram (**S**);
   lever movement to the right: selection of outrigger support (**E**).
2. Lever movement to the left: selection of outrigger ram (**S**).
3. Lever movement to the left: selection of outrigger ram (**S**) or tilting of outrigger ram (**R**); lever movement to the right: selection of outrigger support (**E**).

Outrigger control: examples of lever labels	
	
1	**2**

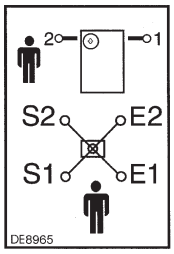
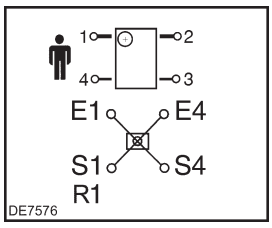
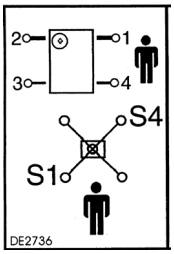
1. Lever movement to the left: reentry of outrigger rams (**S**) or supports (**E**);
   lever movement to the right: exit of outrigger rams (**S**) or supports (**E**).
2. Lever movement upwards: exit of outrigger rams (**S**), exit of outrigger supports (**E**) or tilting of outrigger rams into working position (**R**);
   lever movement downwards: reentry of outrigger rams (**S**), reentry of outrigger supports (**E**) or tilting of outrigger rams into transport position (**R**).

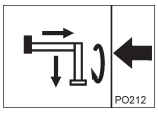
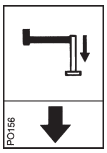
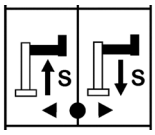
Outrigger control by means of 2-function-distributor and deviator



Deviator

In order to operate the outrigger, select the element you want to activate by using the deviator; then operate the control lever.

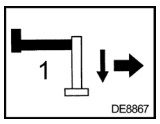
Outrigger selection: examples of lever labels		
		
It is possible to select the desired element by operating the deviator: **S** (outrigger ram), **R** (tilting of outrigger ram), **E** (outrigger support) (e.g. **E1**: outrigger support - position 1).		

Outrigger control: examples of lever labels		
		
1	**2**	**3**

1. Lever movement to the left: exit of outrigger rams, exit of outrigger supports or tilting of outrigger rams into working position;
   lever movement to the right: reentry of outrigger rams, reentry of outrigger supports or tilting of outrigger rams into transport position.
2. Lever movement downwards: exit of outrigger rams;
   lever movement upwards: reentry of outrigger rams.
3. Lever movement to the right: exit of outrigger rams;
   lever movement to the left: reentry of outrigger rams.

Outrigger control by means of 2-function-distributor without deviator

If the crane is provided with separate 2-function-distributor without deviator, operate directly the control lever of the element you want to activate.

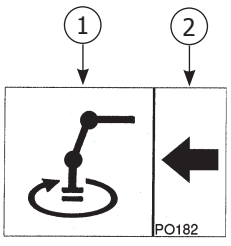
Outrigger control (position 1): examples of lever labels

1. Lever movement to the right: exit of outrigger ram; lever movement to the left: reentry of outrigger ram.

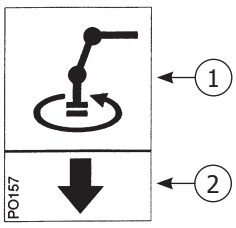
5.3.3 - Controlling the crane

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 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").

The labels are for example as the ones shown in the following figures (on horizontal or vertical distributor): 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 labels.

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

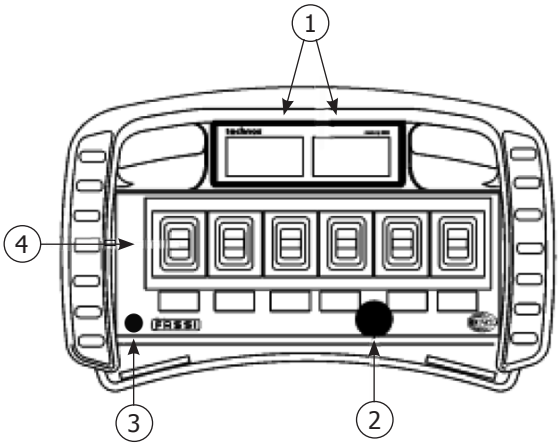
5.4 – Radio remote control

5.4.1 - RCH digital radio remote control

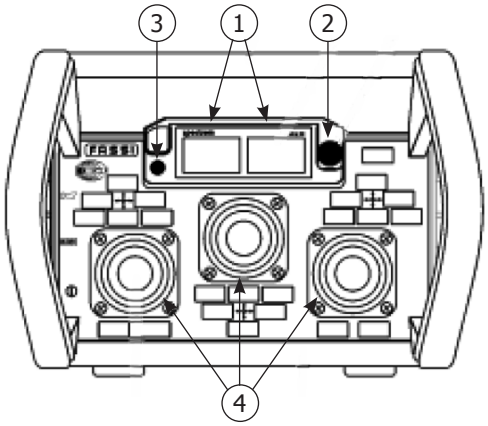
Radio remote control components

The control handle of RCH radio remote control is provided with a minimum of 6 and a maximum of 8 linear levers. It is also supplied with a display to show information about crane operation.

The control handle can also be equipped with joystick controls for 6 or 8 functions. The 8-function-control handle has two lateral 3-function-joysticks; the third function can be operated by rotating the joystick knob.

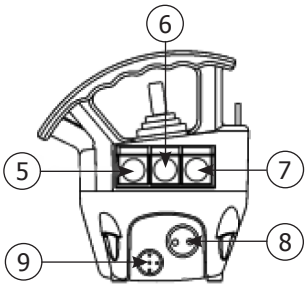


Linear control handle

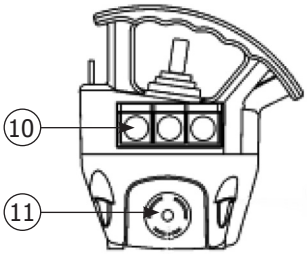


Joystick control handle

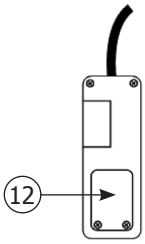
1. Double display;
2. "RX" rotary function selector. It allows to select the icons displayed on the screen and to activate/deactivate the crane functions. If you rotate it clockwise, you scroll the icons left to right; anti-clockwise right to left. The icon selection is confirmed by pressing the selector;
3. Battery status LED indicator: green flashing indicates the battery is charged; red flashing (together with an acoustic signal) indicates the battery is almost empty and you need to replace it (recharge the empty battery in the respective charger);
4. Levers/joysticks to control crane or outrigger functions;



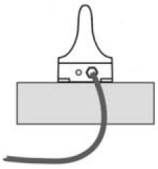
Left side



Right side



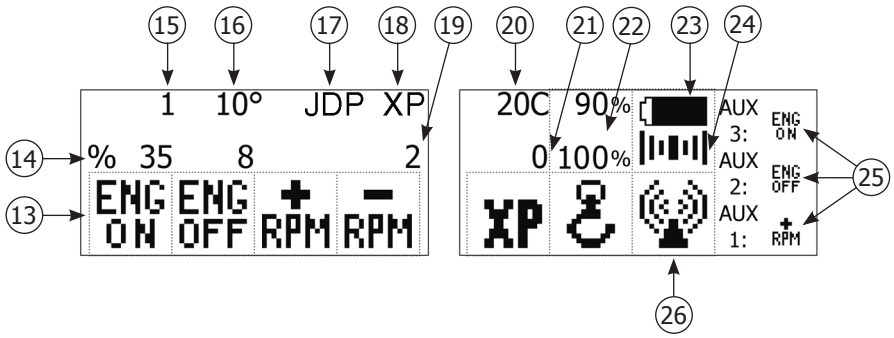
Battery charger



Receiver

5. Button for acoustic warning activation ⊏▱;
6. "INDEX" button, used to display FSC levels, to go back to the previous menu from the submenus (prolonged pressure), to move the cursor when entering a value in the menu and to activate the display backlight mode;
7. Radio remote control start button ⏻;

8. Identification key for the connection of control handle and antenna;
9. Socket for the connection of radio remote control serial cable (standard supplied: 10 m long);
10. Quick select buttons for supplementary functions;
11. STOP button (refer to paragraph 4.2.1 "STOP button");
12. Battery compartment;



Double display

When 90% of crane/hydraulic extension/winch capacity is reached, the widescreen message "90%" appears for 5 seconds on the left display; then it disappears and appears again in position 22.

When 100% of crane/hydraulic extension/winch capacity is reached, the widescreen message "100%" appears for 5 seconds on the right display; then it disappears and appears again in position 22.

13. Icons (for the icon list refer to chapter 4 "Safety devices and special functions");
14. Capacity on inner ram, outer ram and hydraulic extension ram (if fitted);
15. Angular position of crane outer boom;
16. Angular position of hydraulic extension (if fitted);
17. JDP activated (if fitted);
18. XP or ICC activated (if fitted);
19. Capacity on the winch (if fitted);
20. Input oil temperature of the heat exchanger;
21. Working pressure in the distributor bank;
22. Indication that 90% and 100% of crane/hydraulic extension/winch capacity are reached;
23. Battery status indicator;
24. Radio signal quality indicator;
25. Icons related to the configurable quick select buttons for supplementary functions (placed on the control handle right side);
26. Icon flag.

The second line on the display can also show particular crane conditions through messages such as `WARNING`, `ALARM`, `STOP ROTATION`, etc.. In this case, all the data on the second line momentarily disappear, till the crane control is restarted and they automatically appear again.

Radio remote control activation

- Insert a charged battery into the battery compartment.
- Unlock the STOP button on radio remote control.
- Press the radio remote control start button ⏻.

The radio remote control is ready for operation when the green LED in position 3 flashes.

Before starting work, always press the acoustic warning in order to warn the persons in the vicinity.

Automatic frequency selection

RCH radio remote control is equipped with AFS (Automatic Frequency Selection) technology, which provides many frequency ranges. When you turn on the radio remote control, the system checks if the frequency used during last operation is available; if it is busy, the system automatically finds an available one and saves it.

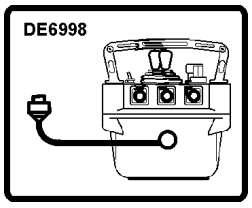
Configuration of quick select buttons for supplementary functions

- Press at least 2 of the supplementary function buttons and at the same time turn on the control handle.
- Release the buttons.
- Turn the "RX" rotary function selector and choose the desired icon; press the quick select button you want to combine with the selected icon.
- Repeat the previous operation to combine the other two buttons.
- At the end of the selection, turn off the control handle by pushing the STOP button.

Cable connection

In case of empty battery, interferences in the radio transmission or crane operation in situations where the radio transmission is forbidden, the radio remote control can be easily transformed into remote control via cable.

- Push the STOP button on radio remote control.
- Remove the protective coverings of sockets (indicated in the figure below) on radio remote control and crane.
- Connect radio remote control and the receiver through the serial cable by using the screw connector.
- Unlock the STOP button on radio remote control.
- Press the radio remote control start button ⏻.



Radio remote control automatic switch-off

RCH radio remote control is equipped with automatic switch-off and it turns off about 15 minutes after entering the last command. This automatic switch-off is due to safety reasons and it also lengthens the battery life.

Radio remote control switch-off

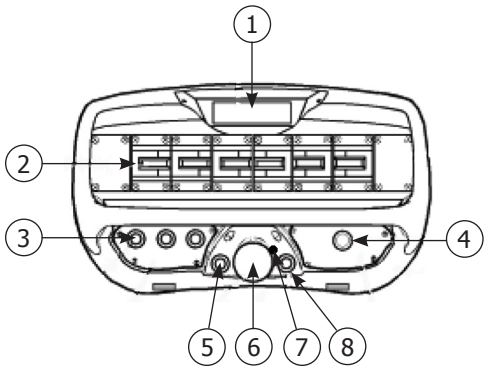
Push the STOP button.

5.4.2 - RCS digital radio remote control

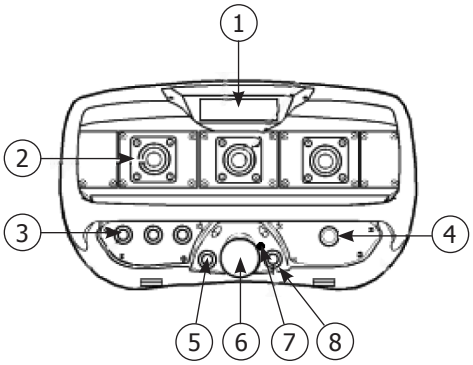
Radio remote control components

The control handle of RCS radio remote control can be provided in "mini" version with 6 linear levers or in "maxi" version with 6 or 8 levers. It is also supplied with a display to show information about crane operation.

As further option, the control handle can be equipped with joystick controls for 6 or 8 functions. The 8-function-control handle has two lateral 3-function-joysticks; the third function can be operated by rotating the joystick knob.

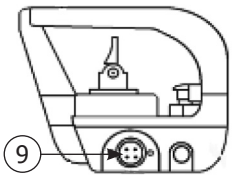


Linear control handle



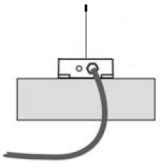
Joystick control handle

1. Display;
2. Levers/joysticks to control crane or outrigger functions;
3. Quick select buttons for supplementary functions;
4. "RX" rotary function selector. It allows to select the icons displayed on the screen and to activate/deactivate the crane functions. If you rotate it clockwise, you scroll the icons left to right; anti-clockwise right to left. The icon selection is confirmed by pressing the selector;
5. "INDEX" button, used to display FSC levels, to go back to the previous menu from the submenus (prolonged pressure), to move the cursor when entering a value in the menu and to activate the display backlight mode;
6. STOP button (refer to paragraph 4.2.1 "STOP button");
7. Battery status LED indicator: green permanent LED indicates the battery is charged; red flashing (together with an acoustic signal) indicates the battery is almost empty and you need to replace it (recharge the empty battery in the respective charger);
8. Radio remote control start button ◇ / Acoustic warning activation button;

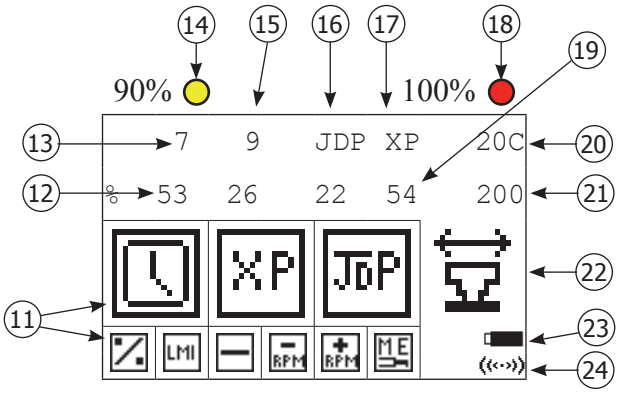


Left side

Battery charger


Receiver

9. Socket for the connection of radio remote control serial cable (standard supplied: 10 m long);
10. Battery compartment;



Display

11. Icons (for the icon list refer to chapter 4 "Safety devices and special functions");
12. Capacity on inner ram, outer ram and hydraulic extension ram (if fitted);
13. Angular position of crane outer boom;
14. Orange light indicating that 90% of crane/hydraulic extension/winch capacity has been reached;
15. Angular position of hydraulic extension (if fitted);
16. JDP activated (if fitted);
17. XP or ICC activated (if fitted);
18. Red light indicating that 100% of crane/hydraulic extension/winch capacity has been reached; it can also signal alarms, warnings or particular crane conditions;
19. Capacity on the winch (if fitted);
20. Input oil temperature of the heat exchanger;
21. Working pressure in the distributor bank;
22. Icon flag;
23. Battery status indicator;
24. Radio signal quality indicator.

Radio remote control activation

- Insert a charged battery into the battery compartment.
- Unlock the STOP button on radio remote control.
- Press the radio remote control start button ◇.

The radio remote control is ready for operation when green LED in position 7 is permanent on.

Before starting work, always press the acoustic warning button in order to warn the persons in the vicinity.

Automatic frequency selection

RCS radio remote control is equipped with a special technology that provides many frequency ranges. When you turn on the control handle, the system places itself on the frequency used during last operation; if it is busy, the system automatically selects the next available one.

Configuration of quick select buttons for supplementary functions

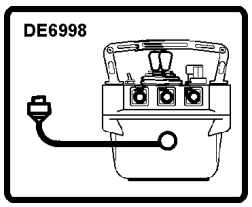
- Press at least 2 of the supplementary function buttons and at the same time turn on the control handle.
- Release the buttons. The message "FAVOURITE CONFIGURATION" appears and confirms the access to the button configuration menu.

- Turn the "RX" rotary function selector and choose the desired icon; press the quick select button you want to combine with the selected icon.
- Repeat the previous operation to combine the other two buttons.
- At the end of the selection, turn off the control handle by pushing the STOP button.

Cable connection

In case of empty battery, interferences in the radio transmission or crane operation in situations where the radio transmission is forbidden, the radio remote control can be easily transformed into remote control via cable.

- Push the STOP button on radio remote control.
- Remove the protective coverings of sockets (indicated in the figure below) on radio remote control and crane.
- Connect radio remote control and the receiver through the serial cable by using the screw connector.
- Unlock the STOP button on radio remote control.
- Press the radio remote control start button ⏀.



Radio remote control automatic switch-off

RCS radio remote control is equipped with automatic switch-off and it turns off about 5 minutes after entering the last command. This automatic switch-off is due to safety reasons and it also lengthens the battery life.

Radio remote control switch-off

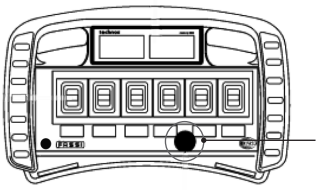
Push the STOP button.

5.4.3 - 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.

5.4.4 - Enabling outriggers and crane by digital radio remote control

In order to enable the outriggers, operate the rotary selector placed on the radio remote control and select the icon .



The message OUTRIGGERS? appears on the display.

Confirm the selection by pressing simultaneously:

- (acoustic warning) and "INDEX" buttons (in case of RCH control handle);
- (start) and "INDEX" buttons (in case of RCS control handle).

The message OUTRIGGERS appears on the display.

In order to enable the crane, operate the rotary selector placed on the radio remote control and select the icon .

The message CRANE? appears on the display.

Confirm the selection by pressing simultaneously:

- (acoustic warning) and "INDEX" buttons (in case of RCH control handle);
- (start) and "INDEX" buttons (in case of RCS control handle).

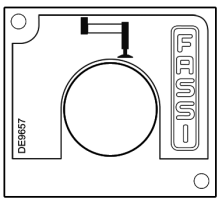
The message CRANE appears on the display.

5.4.5 - Controlling the outriggers by digital radio remote control

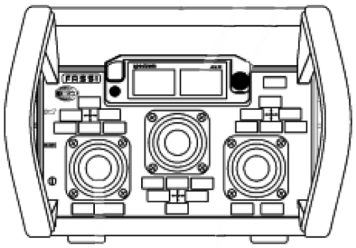
Outriggers are numbered from 1 to 4, as shown for example in figure 5.4.

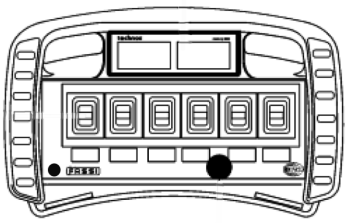
On the selection controls of the outriggers letter **E** indicates hydraulically extendable outrigger supports, letter **S** hydraulic outrigger rams and letter **R** the pivoting of the hydraulically tiltable outrigger rams.

In compliance with safety regulations in force in EC countries, the crane shall be equipped on both sides with a consent button (represented in the following figure). When you stabilize by radio remote control and you select the button, only the exit of the outrigger support associated to that side is allowed, while the one on the opposite side (not visible) is blocked.



Operate the selection lever or joystick, keep it into position and at the same time operate the control.





Outrigger selection: examples of lever or joystick labels	
1	**2**

1. Lever movement upwards: selection of outrigger support (**E**) - position 1; lever movement downwards: selection of outrigger ram (**S**) - position 1.
2. Lever movement to the left: selection of outrigger support (**E**) - position 2; lever movement to the right: selection of outrigger ram (**S**) - position 2.

Outrigger control: examples of lever or joystick labels
Lever movement upwards: exit of outrigger rams, exit of outrigger supports or tilting of outrigger rams into working position; lever movement downwards: reentry of outrigger rams, reentry of outrigger supports or tilting of outrigger rams into transport position.

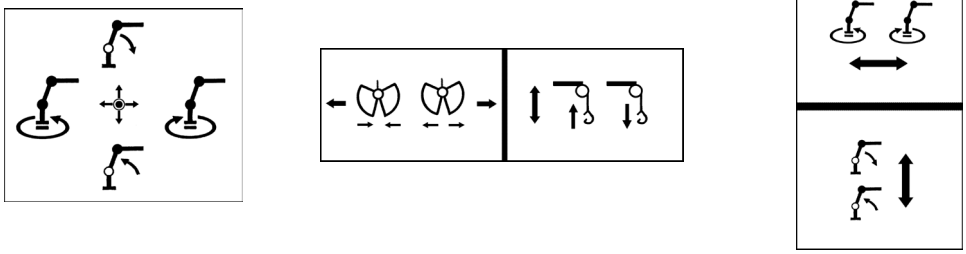
5.4.6 - Controlling the crane by radio remote control

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").

These pictograms are placed on different type labels, such as:

With linear-levers



With joystick

In case of third function operated by rotating the joystick knob

On the radio remote control it is possible to set up double function levers. In this case their labels show double symbol.

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.

5.5 – Stand-up control station

This special fitting allows the operator to control the crane whilst standing in a higher position, in order to have a better view of the working area.

The stand-up control station is composed of a platform fixed to the crane base and of a control panel. It allows the operation of crane controls through rod controls or radio remote control (in this case, the control panel is fitted also with a supplementary STOP button).

For crane operation refer to paragraph 5.3 "Ground control station" or 5.4 "Radio remote control".

To access the stand-up control station, always use the dedicated ladder. Pay attention in order to avoid hitting the controls while ascending and descending. The ladder must be fitted and correctly mounted by the installer, as per the current regulations.

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.

The access side of the stand-up control station is protected by a safety side-guard: after the access to the control station, check the correct securing of the side-guard to the platform structure.

The operator's presence in the stand-up control station is detected by a photocell, that automatically prevents the crane from rotating above the station and activates the icon flag on the display, as well as the flashing of the green light on the different control panels (position 1 of fig. 5.5 near the plate DE5775 of fig. 5.6).

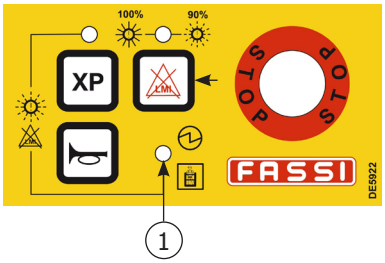


Fig. 5.5

Fig. 5.6

Before accessing the stand-up control station, make sure that the photocell pilot-light is turned on and green. Then check its correct functioning, putting your hand in front of the photocell: the pilot-light shall turn yellow. Finally, when entering the stand-up control station before crane operation, check that the rotation block is active (flashing green light-position 1 of fig. 5.5).

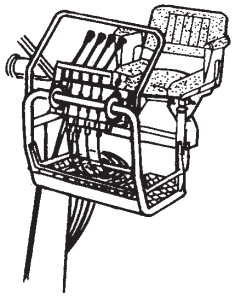
The operator's presence in the stand-up control station involves a reduced crane rotation, as the crane is prevented from passing above the control station.

On the contrary, when the operator is not working in the stand-up control station, the crane is allowed to operate at its maximum rotation arc. While lowering the inner boom and rotating the

crane near the stand-up control station, it is necessary to pay attention, in order to avoid possible impacts between the booms and the structure of the stand-up control station (during crane rotation over the stand-up control station the warning message `WARNING ROTATION` appears).

5.6 – Top seat control station

This special fitting allows the operator to control the crane whilst sitting in a higher position, in order to have a better view of the working area.



The top seat control station allows the operation of crane controls through levers or radio remote control.

For crane operation refer to paragraph 5.3 "Ground control station" or 5.4 "Radio remote control".

To access the top seat control station, always use the dedicated ladder. Pay attention in order to avoid hitting the controls while ascending and descending. The ladder must be fitted and correctly mounted by the installer, as per the current regulations.

The operator's presence on the top seat control station is detected by a sensor that automatically activates the lever working.

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.

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.

In conformity with standard EN 12999, it is not compulsory to fit the STOP button on the control stations that are solely used for outrigger operation. In this case, by operating the STOP button only crane and implements are affected, while outrigger manoeuvres remain active: therefore it is necessary to pay special attention and make sure nobody stops or passes in proximity of the outrigger ram working area.

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 to access the stand-up or top seat control station (if fitted) 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.

If the crane is equipped with stand-up or top seat control station, make sure the necessary access ladder is fitted. Pay attention in order to avoid hitting the controls while ascending and descending.
The ladder must be fitted and correctly mounted by the installer, as per the current regulations.

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.

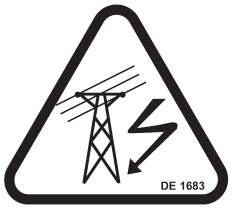
The working area must be properly enlightened, in order to guarantee the safe working of the crane.

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.

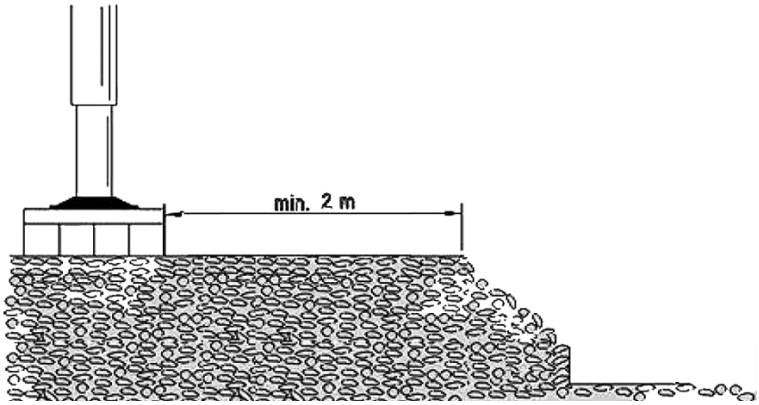
The value of the pressure exercised on the ground by the outriggers is indicated in the schedule "Crane technical data" in Appendix A of the present manual ("Max. working pressure on the outrigger Ø ... ") and has to be compared with the below table.

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.

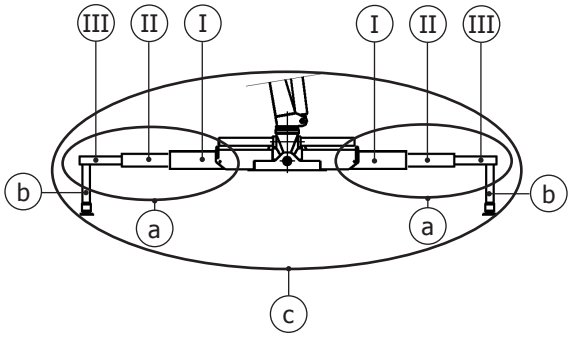
6.3 – Stabilizing the vehicle

6.3.1 - Outrigger nomenclature

Crane and supplementary outriggers (if fitted) may be composed of:

the following types of supports
- not extendable;
- manually extendable;
- hydraulically extendable

the following types of rams
- not tiltable;
- manually tiltable;
- hydraulically tiltable.



a. outrigger supports
   I. first outrigger supports
   II. second outrigger support (if fitted)
   III. third outrigger support (if fitted)
b. outrigger rams
c. outriggers

Outriggers are numbered from 1 to 4, as shown for example in figure 6.1: outriggers 1 and 2 are mounted on the crane, outriggers 3 and 4 indicate the supplementary outriggers.

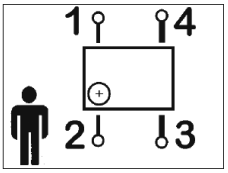


Fig. 6.1

On the outrigger controls (selection and control) letter **E** indicates hydraulically extendable outrigger supports, letter **S** hydraulic outrigger rams and letter **R** the pivoting of the hydraulically tiltable outrigger rams.

Refer to the following paragraphs for details on the specific types of outrigger supports and rams.

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.

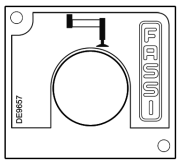
Pay special attention during stabilization and make sure there are no obstacles and that nobody stops or passes in proximity of the outrigger ram working area. Ensure a full view of outrigger movements, especially while working from the opposite side.

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.

In compliance with safety regulations in force in EC countries, the crane shall be equipped on both sides with a consent button (represented in the following figure). When you stabilize by radio remote control and you select the button, only the exit of the outrigger support associated to that side is allowed, while the one on the opposite side (not visible) is blocked.



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

If the crane is fitted with removable outrigger plates, place the outrigger rams into working position (vertical downwards), then mount the plate (fig. 6.2 - position 1) by securing it with the locking pin (fig. 6.2 - position 2) and the check pin (fig. 6.2 - position 3).

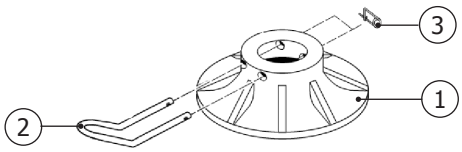


Fig. 6.2

Check the outrigger plates are in contact with the ground.

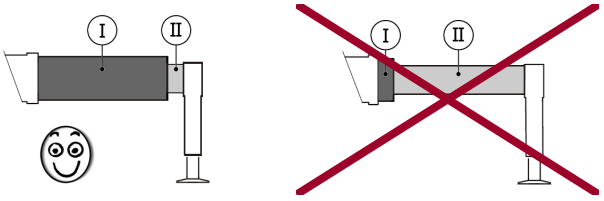
Make sure outrigger supports are well-greased, in order to ensure their correct working.

In order to place double or triple hydraulic outrigger supports from fully extended to partially extended position, follow this procedure:

- completely reenter all the supports;
- partially extend the supports.

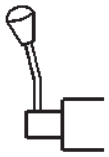
If double manual outrigger supports are fitted on the crane, it is forbidden to operate with the second support extended while the first one is reentered.

If the crane is equipped with the check system for the exit and reentry of outrigger supports, make sure the sequence is carried out properly: it cannot happen that only the second outrigger support is extended.



6.3.3 - Enabling the outriggers

Move the lever placed near the outriggers in the direction indicated by the symbol **E-S** (e.g. fig. 6.3, 6.4 and 6.5).



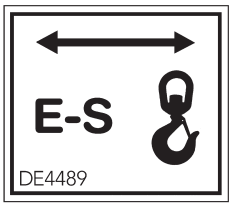


Fig. 6.3

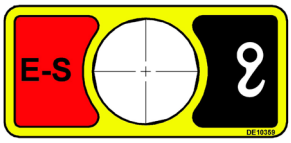


Fig. 6.4

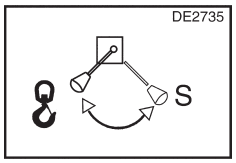


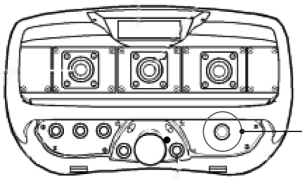
Fig. 6.5

On cranes fitted with FX500 electronic lifting moment limiting device and with a single distributor both for crane and outrigger control, it is necessary to confirm the outrigger enabling procedure from control panels or digital radio remote control (if fitted), as per the following procedures:

- (from main panel) select the icon and press the "OK/ENTER" button;
- (from basic user panel) press simultaneously the buttons for activation of acoustic alarm and temporised exclusion device of the lifting moment limiting device (LEDs signalling XP activation and load percentage start flashing);
- (from digital radio remote control) see the following paragraph.

By digital radio remote control

Operate the rotary selector placed on the radio remote control and select the icon .



The message `OUTRIGGERS?` appears on the display.

Confirm the selection by pressing simultaneously:

- (acoustic warning) and "INDEX" buttons (in case of RCH control handle);
- (start) and "INDEX" buttons (in case of RCS control handle).

The message `OUTRIGGERS` appears on the display.

Other enabling procedures

On T range cranes with FX500 electronic lifting moment limiting device and no radio remote control, in order to enable the outriggers it is necessary to follow these procedures:

- (from main panel) select the icon and press the "OK/ENTER" button;
- (from basic user panel) press simultaneously the buttons for activation of acoustic alarm and temporised exclusion device of the lifting moment limiting device (LEDs signalling XP activation and load percentage start flashing).

6.3.4 - Controlling the outriggers

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

Outriggers are numbered from 1 to 4, as shown for example in figure 6.6.

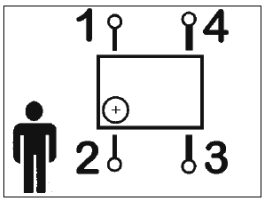
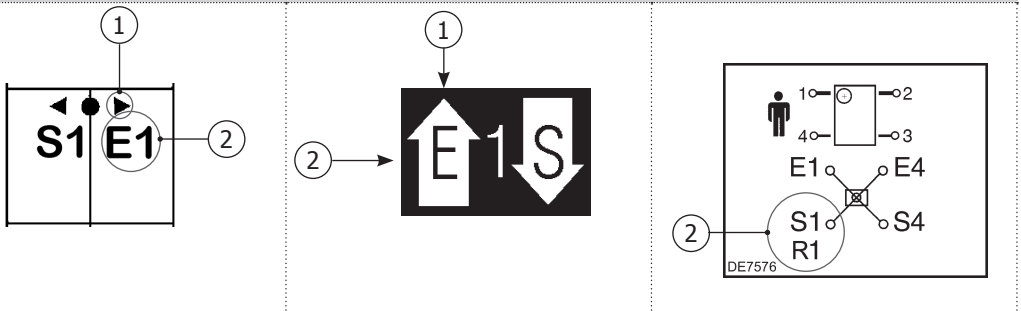


Fig. 6.6

On the outrigger controls (selection and control) letter **E** indicates hydraulically extendable outrigger supports, letter **S** hydraulic outrigger rams and letter **R** the pivoting of the hydraulically tiltable outrigger rams.

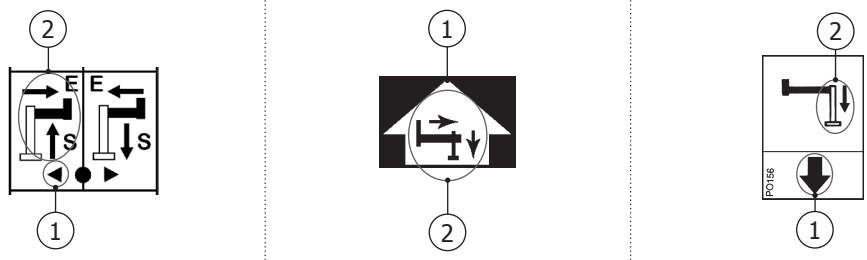
In order to operate the outrigger, in case of 5-function-distributor select the element you want to activate and at the same time operate the control lever.
In case of 2-function-distributor with deviator, select the element you want to activate and afterwards operate the control lever.
In case of 2-function-distributor without deviator, it is sufficient to operate the control lever.

Outrigger selection: examples of lever labels



1. Lever movement
2. Selected element as per the lever movement: **S** (outrigger ram), **R** (tilting of outrigger ram), **E** (outrigger support)
   (e.g.: **E1**: outrigger support - position 1)

Outrigger control: examples of lever labels



1. Lever movement
2. Activation of the selected element as per the lever movement

Refer to the relevant paragraphs of chapter 5 "Control systems" for the technical specifications related to the different control systems.

The complete extension of outrigger supports is visually indicated by yellow triangles near the edge of the beam (fig. 6.7) and the edge of supports (if they are multi-extendable - fig. 6.8).

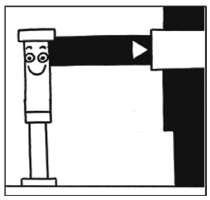


Fig. 6.7

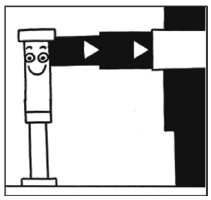
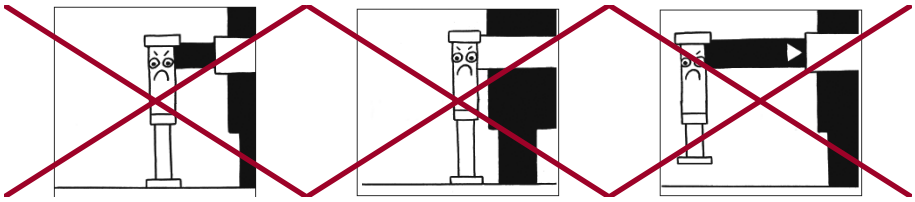
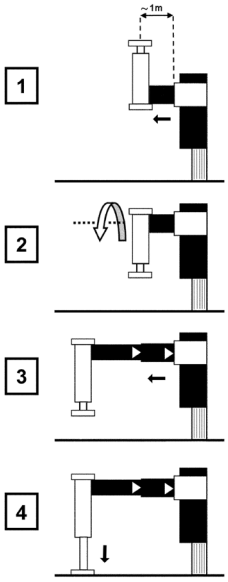


Fig. 6.8



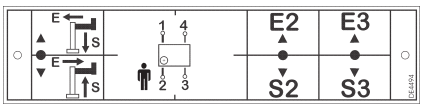
If the crane is fitted with tiltable outrigger rams, follow this operating procedure for every outrigger.

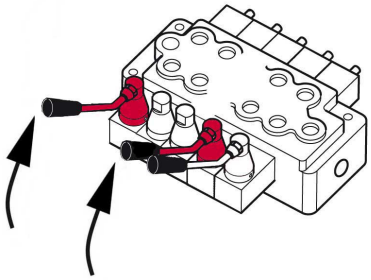


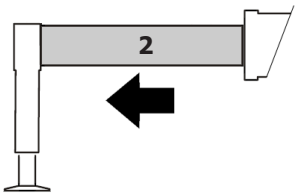
1. Extend the outrigger support for about 1 meter
2. Place the tiltable outrigger ram into working position (vertically towards the ground)
3. Extend the outrigger support completely
4. Extend the outrigger ram till it is solidly placed on the ground

Examples of outrigger operation

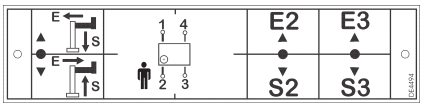
- Extension of outrigger support - position 2 (**E2**)

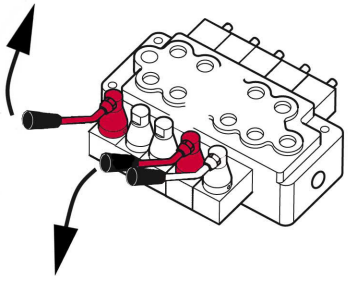


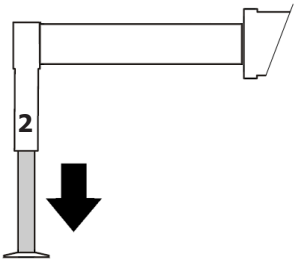


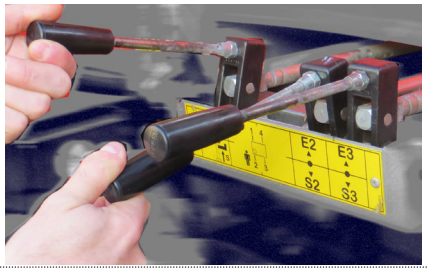


- Exit of outrigger ram - position 2 (**S2**)





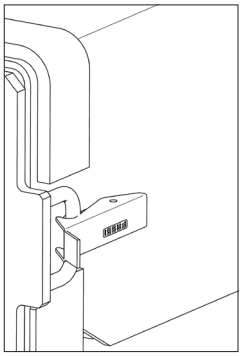




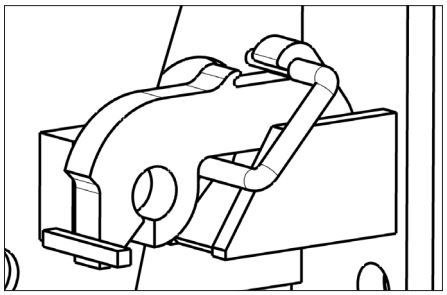
Manually extendable outrigger supports

If the crane is fitted with manually extendable outrigger supports, follow this procedure.

- Unlock the locking device placed on the beam (version A and version B).

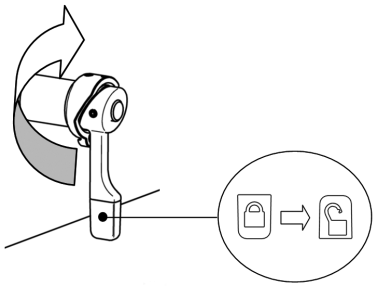


Version A

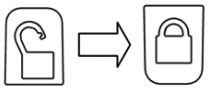


Version B

- Rotate the safety lever placed on the 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. 6.7) and the edge of supports (if they are multi-extendable - fig. 6.8).

Manually tiltable outrigger rams

If the crane is fitted with manually tiltable outrigger rams, follow this procedure to place them into working position.

- Manually support the outrigger ram (if OET is fitted this operation is not necessary), remove the check pin (fig. 6.9 - position 1) and then the locking pin (fig. 6.9 - position 2) from the seat.

  Once the locking pin (fig. 6.9 - position 2) is removed, the outrigger ram may fall down (if OET is not fitted), 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.

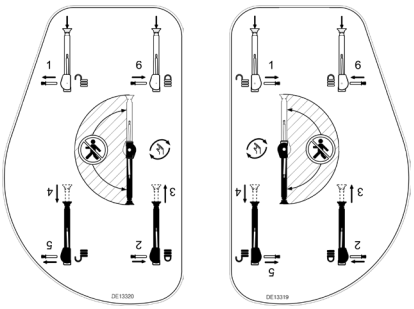
Fig. 6.9

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.

The OET (Outrigger Easy Tilt) system enables an easy tilt of manually tiltable outrigger rams thanks to a specific gas spring. To operate the rams properly, follow the above procedure, which is also represented on the plates DE13319 - DE13320 here below.
To tilt the outrigger rams, use the dedicated handle.



Hydraulically tiltable outrigger rams

If the crane is fitted with hydraulically tiltable outrigger rams, follow this procedure to place them into working position.

- Close the tap of fig. 6.10 to prevent the outrigger ram exit.

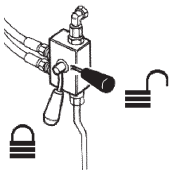
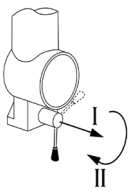
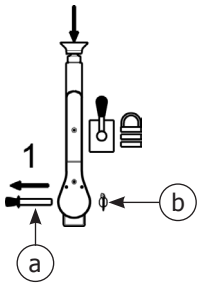


Fig. 6.10

- Operate the control lever to tilt the ram into transport position, in order to pressurize the system (with lateral pin: to check the pressurisation is fulfilled, ensure that the pin in the ram fork can be seen from the hole).

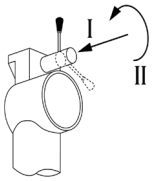
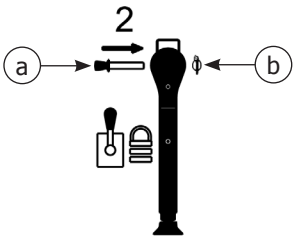
- Unlock the pivoting of the tiltable ram following this procedure (according to the locking system):

With front pin	With lateral pin
◇ turn the lever clockwise while slightly pulling it outwards. 	◇ remove the check pin (position b) and then the locking pin (position a). 

In both versions (with front and lateral pin), it is forbidden to unlock the pivoting of the tiltable ram without operating first the control lever for its rest positioning.

- Select the outrigger ram and operate the control lever to tilt the ram into its working position (vertical towards the ground).

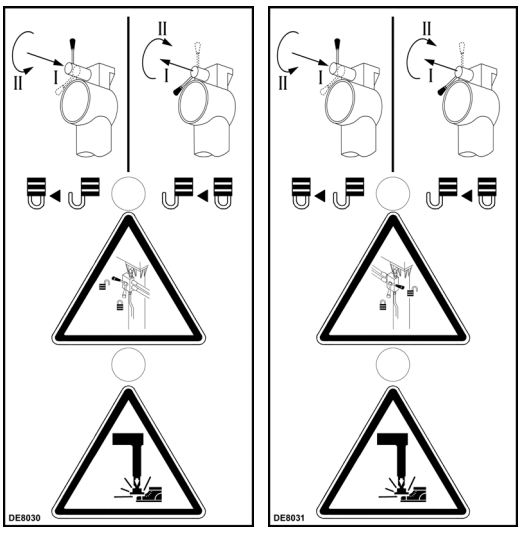
- Lock again the pivoting of the tiltable ram following this procedure (according to the locking system):

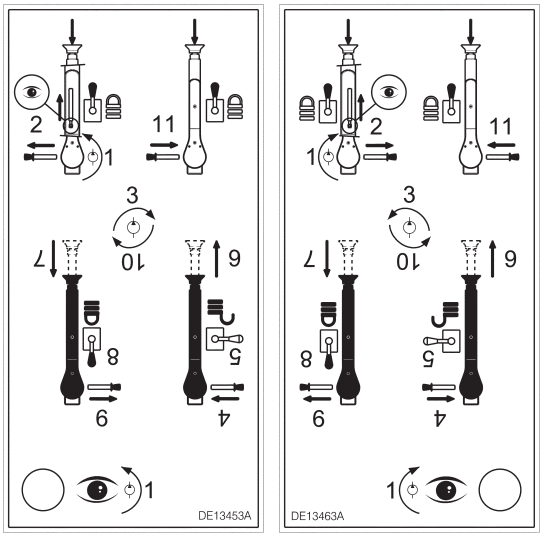
With front pin	With lateral pin
◇ turn the lever anti-clockwise while slightly pushing it inwards.	◇ insert the locking pin (position a) and secure it with its check pin (position b).
	

Check the pivoting of the tiltable ram is properly locked.

- Open the tap of fig. 6.10 to enable the outrigger ram exit.

The previous procedure is described on the plates DE8030-DE8031 or DE13453-DE13463 here below (according to the locking system).





6.3.5 - 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.

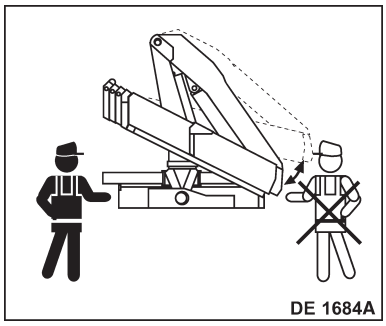
6.4 – Unfolding the crane into working position

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 moving booms, 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 and manual/hydraulic extensions 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 - Enabling the crane

Move the lever (placed near the outriggers) in the direction indicated by the symbol (e.g.: fig. 6.3, fig. 6.4 and fig. 6.5).

On cranes fitted with FX500 electronic lifting moment limiting device and with a single distributor both for crane and outrigger control, it is necessary to confirm the crane enabling procedure from control panels or digital radio remote control (if fitted), as per the following procedures:

- (from main panel) select the icon and press the "OK/ENTER" button;
- (from basic user panel) press simultaneously the buttons for activation of acoustic alarm and temporised exclusion device of the lifting moment limiting device;
- (from digital radio remote control) see the following paragraph.

By digital radio remote control

Operate the rotary selector placed on the radio remote control and select the icon .

The message CRANE? appears on the display.

Confirm the selection by pressing simultaneously:

- (acoustic warning) and "INDEX" buttons (in case of RCH control handle);
- (start) and "INDEX" buttons (in case of RCS control handle).

The message CRANE appears on the display.

Other enabling procedures

On T range cranes with FX500 electronic lifting moment limiting device and no radio remote control, in order to enable the crane it is necessary to follow these procedures:

- (from main panel) select the icon and press the "OK/ENTER" button;
- (from basic user panel) press simultaneously the buttons for activation of acoustic alarm and temporised exclusion device of the lifting moment limiting device.

6.4.3 - Unfolding the crane into working position

Articulated folding crane

The sequence of operations to unfold (first line) and fold the crane (second line) is represented on plates DE4452 (fig. 6.11) and DE13749 (with hydraulic extension fitted on the crane, see chapter 9 "Use of implements").

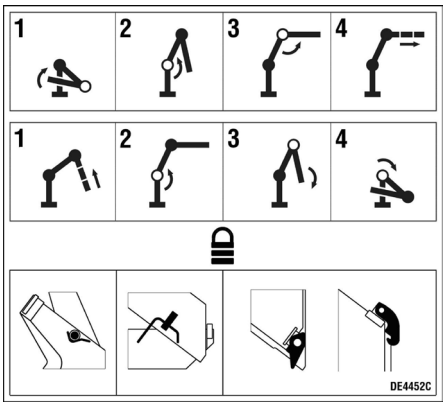


Fig. 6.11

To unfold the crane follow this procedure:

• fold the outer boom, making sure that extension boom sections are reentered;		
• lift the inner boom over the horizontal position;		
• lift the outer boom to the horizontal position;		
• exit the extension boom sections and position the hook on the vertical line above the load.		

The procedure here above is not necessary to unfold into working position a crane laid in transport configuration inside the vehicle body.

The hook of the locking device against the reentry of extension boom sections in transport position (if fitted) unlocks automatically when you exit the extension boom sections.

Mono-boom folding crane

To unfold mono-boom cranes into working position, follow this procedure:

• make sure extension boom sections are reentered;		
• lift the inner 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 or reaching 12 m or more) 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. In order to exploit the full lifting capacity of the crane, it is necessary to position the inner boom at the angle represented on the capacity plate (fig. 2.4 - position 11).

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.

Pay attention in order to avoid hitting the stand-up control station (if fitted) during crane operations.

Shearing and trapping risk remains in areas concerning stand-up control station (if fitted) and rotating column, as well as top seat control station (if fitted) and inner boom movement.

When you operate from stand-up or top seat control station, you must keep all the body parts inside the control station.

It is forbidden to leave the stand-up or top seat control station while operating the crane.

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

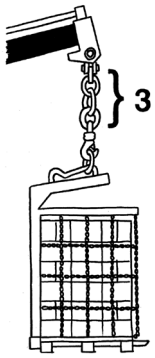
Carefully evaluate the load and its characteristics in order to choose the proper lifting devices. You must know the precise weight to lift. Correctly sling the load and check the proper working of lifting devices.

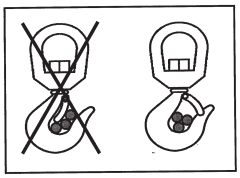
Make sure the hook is always unrestrained to pivot and vertically work.

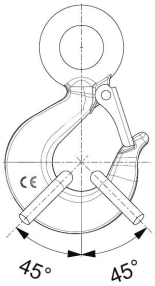
Check the efficiency of the hook safety catch.

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.

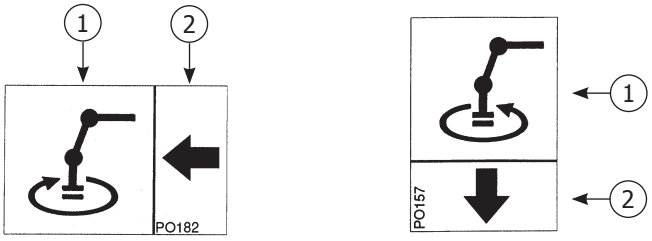
7.4 – Handling the load

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

- by radio remote control;
- by ground controls;
- by top seat control station;
- by stand-up control station.

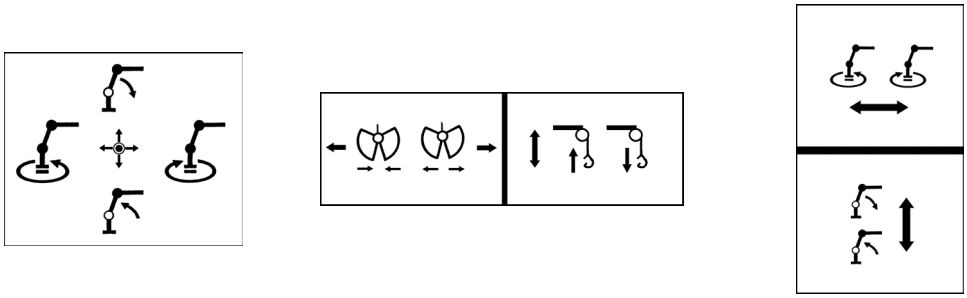
The pictograms placed near the levers indicate their operating direction in relation to the controls you want to perform (refer to paragraph 5.1 "Pictograms for crane and implement control").

The labels are for example as the ones shown in the following figures:

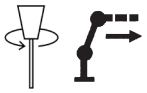


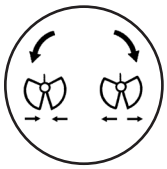
On horizontal or vertical distributor

On linear-lever radio remote control



On joystick controls

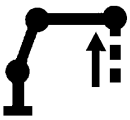




In case of third function operated by rotating the joystick knob

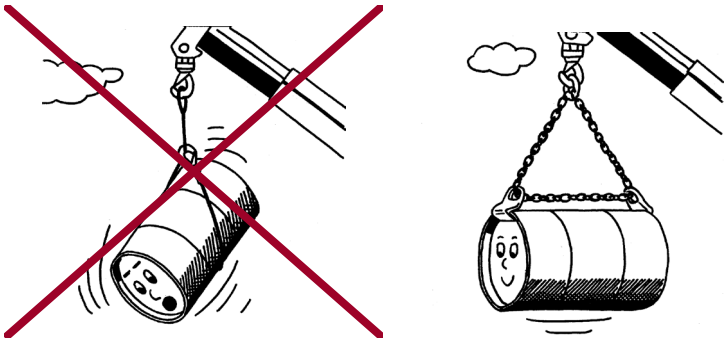
Position 1 represents the crane operation which is associated to the lever movement indicated in position 2.

On the radio remote control it is possible to set up double function levers. In this case their labels show double symbol.

Examples of pictograms for crane and implement control			
Column rotation (clockwise)	Inner boom movement (lift)	Outer boom movement (lift)	Jib movement (lift)
Extension boom movement (exit)	Implement rotation (clockwise)	Winch movement (descent)	Bucket movement (open)
			
Jib extension boom movement (reentry)	Column rotation for mono-boom cranes (clockwise)	Inner boom movement for mono-boom cranes (descent)	Extension boom movement for mono-boom cranes (exit)

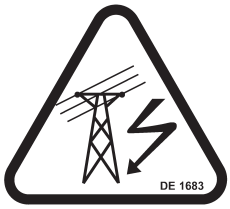
Do not rotate the crane before the hooked load is lifted. Rotate slowly and carefully, paying attention to the stability of vehicle and load.

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 booms is prohibited.

With vertical lift, especially with hydraulic and 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 booms positioned over the vehicle body.

7.5 – Laying down the load

Lower the load without increasing the outreach, especially if the crane is not fitted with lifting moment limiting device.

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").

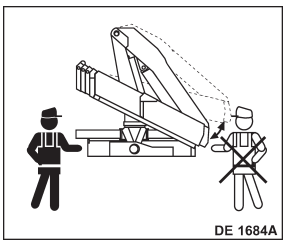
In case of emergency, it's under the operator's responsibility to evaluate if it is necessary to stop crane and implement operations or if it is better to lay down the load and guarantee the safety.

Chapter 8 – Folding the crane

8.1 – Instructions

It is forbidden to operate near the overall dimensions of moving booms, 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.

8.2.1 - Articulated folding crane

The sequence of operations to fold the crane (second line) is represented on plates DE4452 (fig. 8.1) and DE13749 (with hydraulic extension fitted on the crane, see chapter 9 "Use of implements").

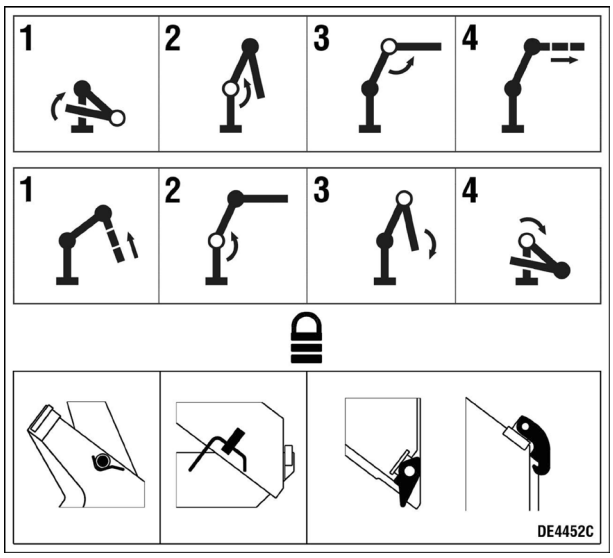


Fig. 8.1

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

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

The plate of fig. 8.1 in the third line (first two frames) shows the checks to carry out while folding the crane. According to the securing devices fitted on the crane, the operator must check:

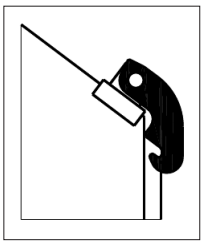
• if the outer boom is locked on the column;	
• if the inner boom is inserted in its seat on the base.	

With crane in transport position, make sure the hook is within the vehicle overall dimensions.

8.2.2 - Articulated folding crane fitted with locking device against the reentry of extension boom sections in transport position

On some cranes a device is mounted on the outer boom in order to lock the reentry of the extension boom sections and ensure they are kept within the vehicle overall dimension with crane in transport position. There are two possible versions for this device: version A and version B.

Locking device version A

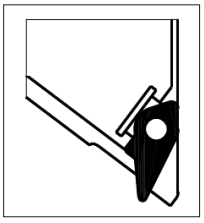


Version A

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

• completely reenter the extension boom sections;		
• lift the inner boom almost to its stroke end;		
• fold the outer boom to its stroke end;		
• lower the inner boom until the hook of the locking device rests on the extension boom sections;		
• exit the extension boom sections until the locking device is correctly positioned to hook them up;		
• reenter the extension boom sections so that the device can hook them up and keep them locked; do not insist on the control;		
• rotate the crane until the reference indicators on column and base coincide;		
• fold the inner boom to its stroke end;		
• reenter the outriggers as described in paragraph 8.3 "Reentering the outriggers".		

Locking device version B



Version B

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

• completely reenter the extension boom sections;		
• lift the inner boom almost to its stroke end;		
• fold the outer boom to its stroke end;		
• rotate the crane until the reference indicators on column and base coincide;		
• lower the inner boom until the outer boom is in horizontal position;		
• exit the extension boom sections until the locking device oversteps the seat fitted on the outer boom;		
• reenter the extension boom sections until the locking device slots in its seat; do not insist on the control;		
• fold the inner boom to its stroke end;		
• reenter the outriggers as described in paragraph 8.3 "Reentering the outriggers".		

The plate of fig. 8.1 in the third line shows the checks to carry out while folding the crane. The operator must check:

• if the outer boom is locked on the column;		
• if the inner (or outer) boom is inserted in its seat on the base;		
• if the extension boom sections are secured to the outer boom (versions A and B).		

With crane in transport position, make sure the hook is within the vehicle overall dimensions.

8.2.3 - Mono-boom folding crane

After unhooking the load, follow this procedure to fold mono-boom cranes into transport position:

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

8.2.4 - Crane laid in transport position inside the vehicle body

In case of fittings where the crane lays in transport position inside the vehicle body or on the load, it is compulsory to properly block possible movements of the boom system and crane rotation.

High risk of accidents (even serious) occurs if crane and implements aren't secured against lateral movements and rotation.

The installer must equip the vehicle with rest locating pins and eventually provide operative specifications for placing the crane in transport position.

8.3 – Reentering the outriggers

8.3.1 - Outrigger nomenclature

Refer to paragraph 6.3.1 "Outrigger nomenclature" for any explanation concerning nomenclature.

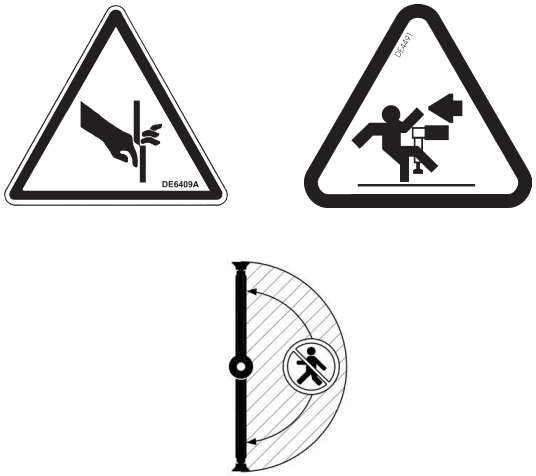
8.3.2 - Instructions

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.

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

On cranes fitted with in-line (aligned) outrigger supports, it is first necessary to reenter the one placed on the distributor 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").



Remove the removable outrigger plates (if fitted) before reentering the outrigger rams to transport position.

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

8.3.3 - Enabling the outriggers

Enable the outriggers following the instructions indicated in paragraph 6.3.3 "Enabling the outriggers".

8.3.4 - Controlling the outriggers

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

Outriggers are numbered from 1 to 4, as shown for example in figure 8.2.

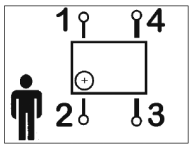
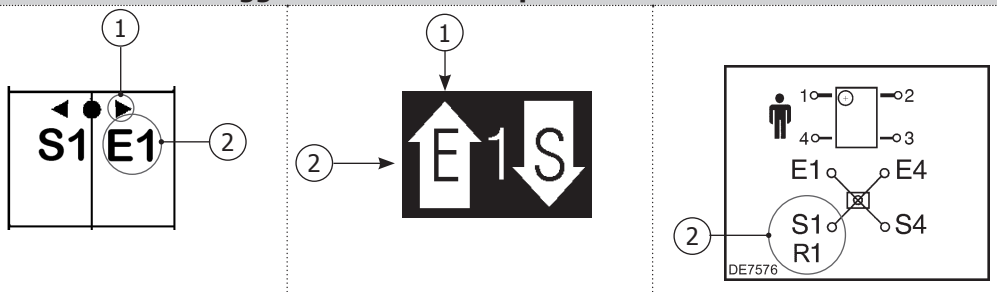


Fig. 8.2

On the outrigger controls (selection and control) letter **E** indicates hydraulically extendable outrigger supports, letter **S** hydraulic outrigger rams and letter **R** the pivoting of the hydraulically tiltable outrigger rams.

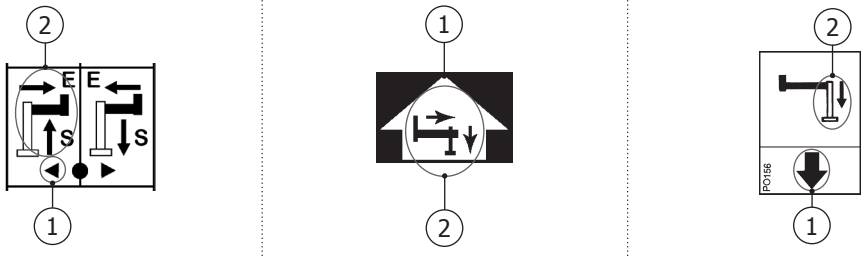
In order to operate the outrigger, in case of 5-function-distributor select the element you want to activate and at the same time operate the control lever.
In case of 2-function-distributor with deviator, select the element you want to activate and afterwards operate the control lever.
In case of 2-function-distributor without deviator, it is sufficient to operate the control lever.

Outrigger selection: examples of lever labels



1. Lever movement
2. Selected element as per the lever movement: **S** (outrigger ram), **R** (tilting of outrigger ram), **E** (outrigger support)
   (e.g.: **E1**: outrigger support - position 1)

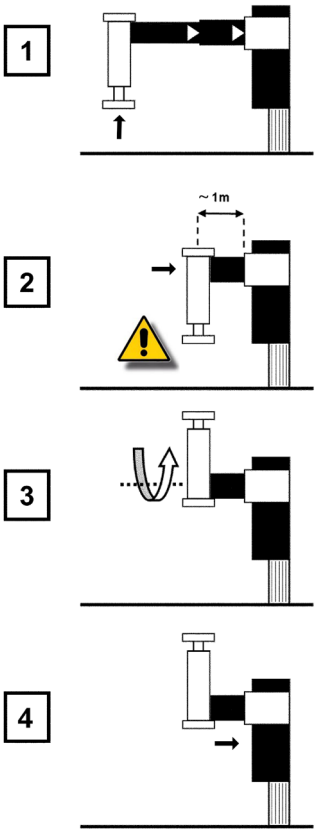
Outrigger control: examples of lever labels



1. Lever movement
2. Activation of the selected element as per the lever movement

Refer to the relevant paragraphs of chapter 5 "Control systems" for the technical specifications related to the different control systems.

If the crane is fitted with tiltable outrigger rams, follow this operating procedure for every outrigger.



1. Reenter the outrigger ram completely

2. Reenter the outrigger support partially, as indicated in phase 2 of the illustrative scheme

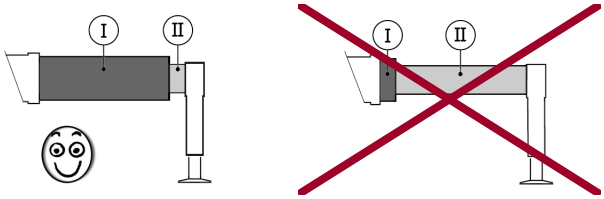
3. Place the tiltable outrigger ram into transport position (vertical upwards or inclined)

4. Reenter the outrigger support completely

If the crane is fitted with hydraulically extendable outrigger supports, make sure they reenter in this sequence: THIRD - SECOND - FIRST, in order to avoid any damage to the internal chain system.

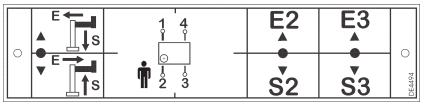
Make sure outrigger supports are well-greased, in order to ensure their correct reentering sequence.

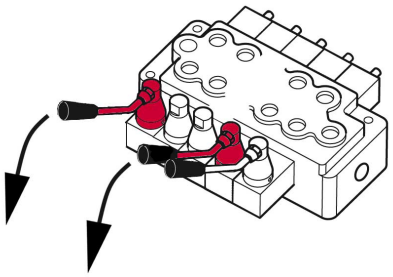
If the crane is equipped with the check system for the exit and reentry of outrigger supports, make sure the sequence is carried out properly: it cannot happen that only the second outrigger support is extended.

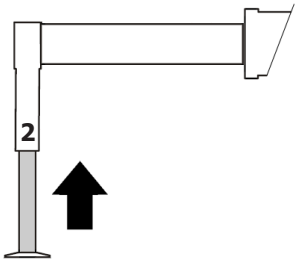


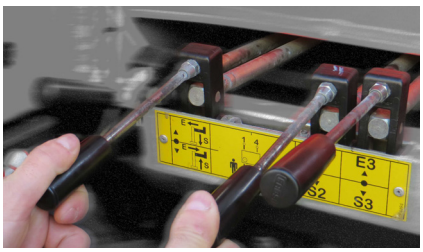
Examples of outrigger operation

- Reentry of outrigger ram - position 2 (**S2**)

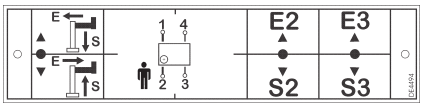


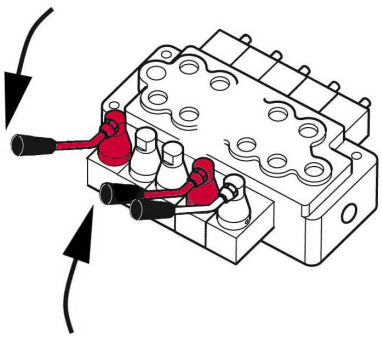


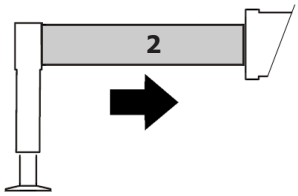


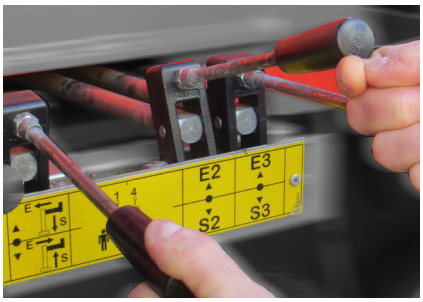


- Reentry of outrigger support - position 2 (**E2**)





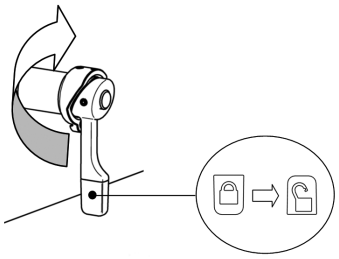




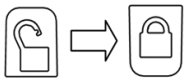
Manually extendable outrigger supports

If the crane is fitted with manually extendable outrigger supports, follow this procedure.

- Rotate the safety lever placed on the 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°).

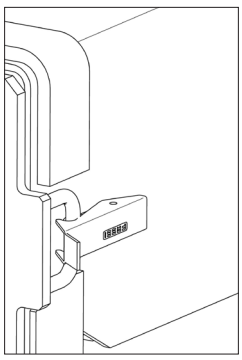


While operating outrigger supports, grab only the dedicated handles.

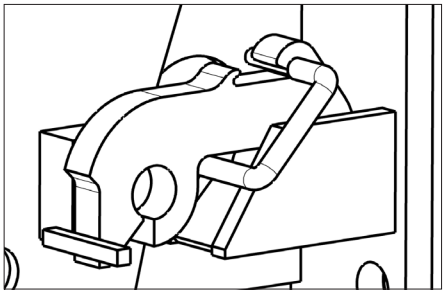
Above operations must be carried out for every locking device that is fitted on manually extendable supports.

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 (version A and version B) is automatic: don't put your hands on it.



Version A



Version B

Manually tiltable outrigger rams

If the crane is fitted with manually tiltable outrigger rams, follow this procedure to place them into transport position.

- Remove the check pin (fig. 8.3 - position 1) and then the locking pin (fig. 8.3 - position 2) from the seat.
- Carefully place the outrigger ram into transport position (vertical upwards or inclined). Manually support the outrigger ram (if OET is fitted this operation is not necessary), insert the locking pin in its new seat and secure it with the check pin.

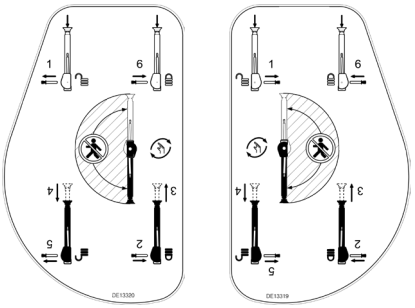
Fig. 8.3

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.

The OET (Outrigger Easy Tilt) system enables an easy tilt of manually tiltable outrigger rams thanks to a specific gas spring. To operate the rams properly, follow the above procedure, which is also represented on the plates DE13319 - DE13320 here below.
To tilt the outrigger rams, use the dedicated handle.



Hydraulically tiltable outrigger rams

If the crane is fitted with hydraulically tiltable outrigger rams, follow this procedure to place them into transport position.

- Open the tap of fig. 8.4 to enable the outrigger ram reentry.

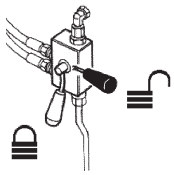
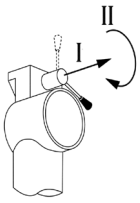
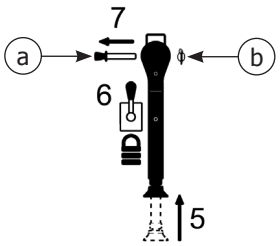


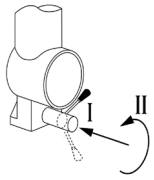
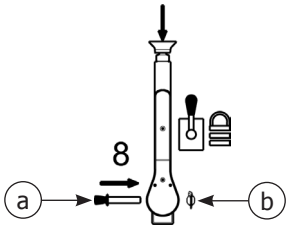
Fig. 8.4

- Select the outrigger ram and operate the control lever to reenter the ram into transport position.
- Close the tap of fig. 8.4.
- Partially reenter the outrigger support.
- Unlock the pivoting of the tiltable ram following this procedure (according to the locking system):

With front pin	With lateral pin
◇ turn the lever clockwise while slightly pulling it outwards. 	◇ operate the control lever to tilt the ram into working position, in order to loosen the driving belt tension; ◇ remove the check pin (position b) and then the locking pin (position a). 

- Select the outrigger ram and operate the control lever to tilt the ram into transport position (vertical upwards or inclined).

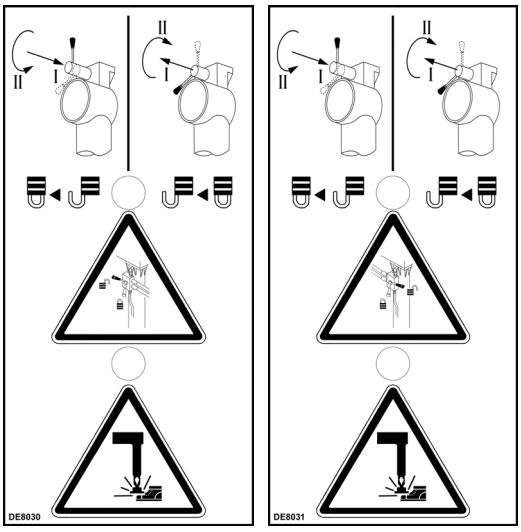
- Lock again the pivoting of the tiltable ram following this procedure (according to the locking system):

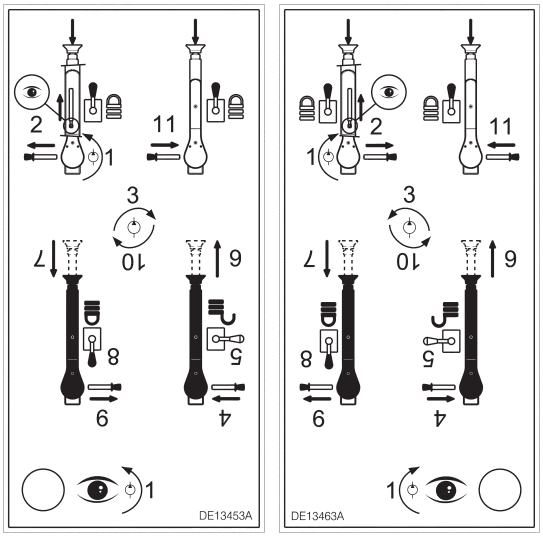
With front pin	With lateral pin
◊ turn the lever anti-clockwise while slightly pushing it inwards. 	◊ insert the locking pin (position a) and secure it with its check pin (position b). 

Check the pivoting of the tiltable ram is properly locked.

- Completely reenter the outrigger support.

The previous procedure is described on the plates DE8030-DE8031 or DE13453-DE13463 here below (according to the locking system).





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, outer boom fall and crane rotation.

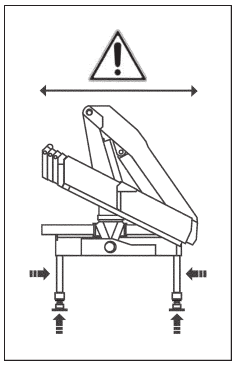
In case of fittings where the crane lays in transport position inside the vehicle body or on the load, it is compulsory to properly block possible movements of the boom system and crane rotation.

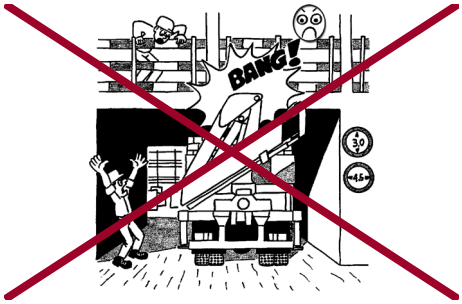
High risk of accidents (even serious) occurs if crane and implements aren't secured against lateral movements and rotation.

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 (or of the hydraulic extension) 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 model and HC1/S2 (ex H1/B3) classification, the crane may be provided with the following implements:

- manual extensions;
- winch;
- hydraulic extension;

- 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 (or of the hydraulic extension) 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.

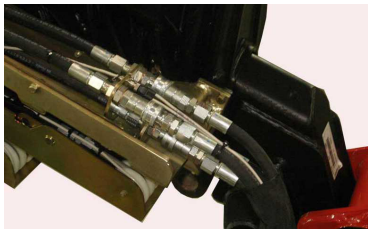
Prior to working with implements, carefully read their use and maintenance instructions.

9.2 – Hydraulic connections implements - supplementary hoses

9.2.1 - Quick coupling connectors

In case of hydraulic connections fitted with quick coupling connectors, it is necessary to check that there is no trace of soil, dirt, etc. on their surfaces and inside their seats. This prevents a possible hydraulic oil contamination and a consequent quick wear of connector sealing surfaces and ram seals.

In order to assure a correspondence between implement control and movement, hydraulic connections are provided with symmetrically mounted quick coupling connectors.
It is forbidden to invert their positions, as movement inversion as well as operating difficulties or unusual overload with implement could occur.



Before connecting/disconnecting the quick coupling connectors of the hydraulic system, take proper precautions in order to make sure there is no residual pressure (even if the feeding is deactivated).

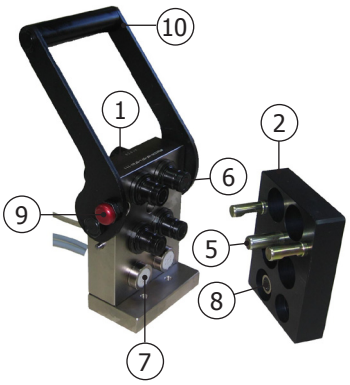
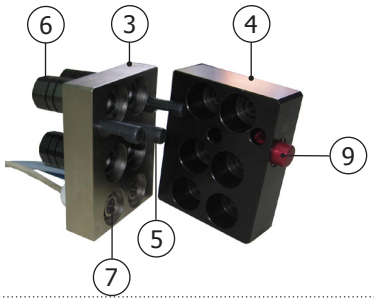
In order to depressurize the system:

- by manual control, from the control panel select and hold the icon EV1 pressed, then move the distributor levers (the ones controlling the implement);
- by radio remote control, from the control handle select and hold the icon EV1 pressed, then move the levers (the ones controlling the implement);
- otherwise, disengage the power take-off and move the distributor levers.

During crane operation, oil and all the hydraulic system components reach high temperatures.
Use the proper personal protective equipment during operations on quick coupling connectors.

9.2.2 - Quick coupling multiconnectors

Quick coupling multiconnectors ease connecting and disconnecting operations of hydraulic implements (hydraulic extension, bucket, auger, etc.) and include electric and hydraulic connections. They are also fitted with special protective caps to preserve fixed and mobile parts from impacts and dirt. In particular, the cap for the fixed part is provided with an electric termination for the hydraulic extension limiting device.

Quick coupling multiconnectors	
	
Fixed part (placed on the tip of the crane hose trays)	**Mobile part** (connected to the hydraulic implement)

1. Fixed part of the quick coupling multiconnector
2. Protective cap for the fixed part
3. Mobile part of the quick coupling multiconnector
4. Protective cap for the mobile part
5. Guide pins
6. Hydraulic connections
7. Electric connections
8. Electric termination for the hydraulic extension limiting device
9. Safety system (to avoid an accidental disconnection)
10. Handle

Before connecting/disconnecting the quick coupling connectors of the hydraulic system, it is recommended that you take proper precautions in order to make sure there is no residual pressure (even if the feeding is deactivated).

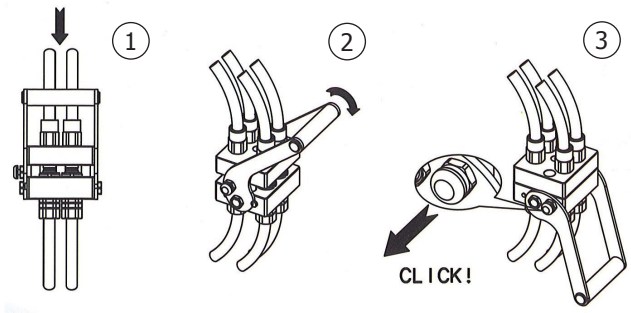
In order to depressurize the system:

- by manual control, from the control panel select and hold the icon EV1 pressed, then move the distributor levers (the ones controlling the implement);
- by radio remote control, from the control handle select and hold the icon EV1 pressed, then move the levers (the ones controlling the implement);
- otherwise, disengage the power take-off and move the distributor levers.

During crane operation, oil and all the hydraulic system components reach high temperatures.
Use the proper personal protective equipment during operations on quick coupling multiconnectors.

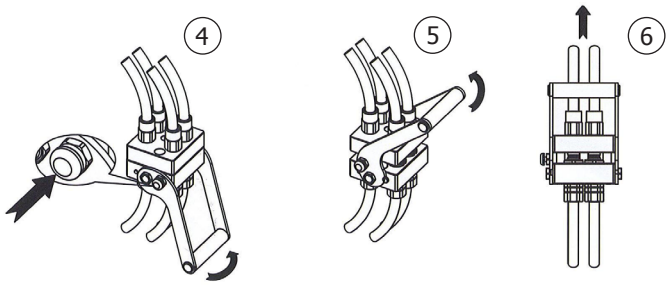
Instructions for hydraulic implement connection

Before connecting hydraulic implements, clean the coupling connector surfaces.



1. Insert the guide pins of the mobile part into the holes of the fixed part and approach the mobile part till the two surfaces come in contact.
2. Move the handle towards the fixed part.
3. Insist on the handle movement, until its safety system button automatically clicks.

Instructions for hydraulic implement disconnection



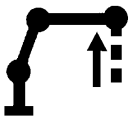
4. Push the safety system button and at the same time move the handle towards the mobile part.
5. Insist on the handle movement till its mechanical lock.
6. Exit the mobile part.

Cover fixed and mobile parts with the protective caps. For the fixed part, mount the cap by moving the handle until the safety system button automatically clicks.

9.3 – 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)
		
Jib movement (lift)	Jib extension boom movement (reentry)	

9.4 – Hydraulic extension

9.4.1 - Generality

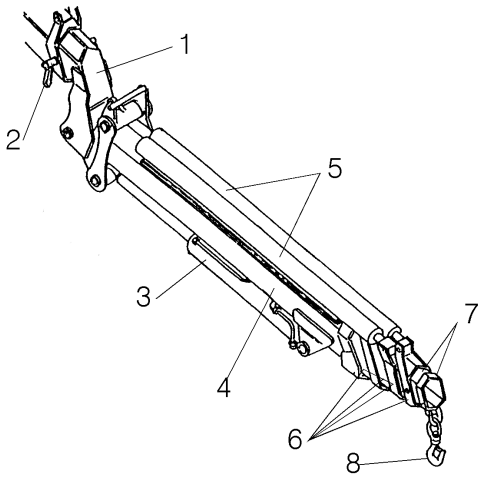
The hydraulic extension is a supplementary articulated boom that can be folded behind cab. It is provided with one or more extension boom sections and it must be applied to the last extension boom section of the crane.
On demand, manual extensions can be mounted on the hydraulic extension.

The hydraulic extension is mounted by inserting its connecting boom into the last crane extension boom section and fixing it with locking pins.
The hydraulic connection to the supplementary hoses is made through quick coupling connectors or multiconnectors.

FASSI hydraulic extensions must be used only in combination with FASSI cranes and vice versa, according to the manufacturer's specifications and the use and maintenance manual of the crane.

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

9.4.2 - General nomenclature



1. Connecting boom
2. Locking pin
3. Hydraulic extension ram
4. Hydraulic extension boom
5. Boom extension rams
6. Extension boom sections
7. Manual extensions (if fitted)
8. Lifting hook

9.4.3 - Technical specifications

Loads that can be lifted and handled by the hydraulic extension are indicated on the corresponding capacity plates for crane with hydraulic extension.

The use of manual extensions in combination with hydraulic extensions is allowed in conformity with the warnings and instructions included in paragraph "Manual extensions" of the crane use and maintenance manual.

Prior to every operation with the hydraulic extension, it is necessary to consider the weight of optional implements mounted on the crane (e.g. manual extensions) and deduct it from the load values represented on the plates.

Identification data of the hydraulic extension are indicated on the plates DE7066 (used for CE mark) and DE7067 (used for extra EC markets).

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 hydraulic extension.

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 hydraulic extension.

For information and instructions in case of quick coupling connectors and multiconnectors, refer to paragraph "Hydraulic connections implements - supplementary hoses" of the crane use and maintenance manual.

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

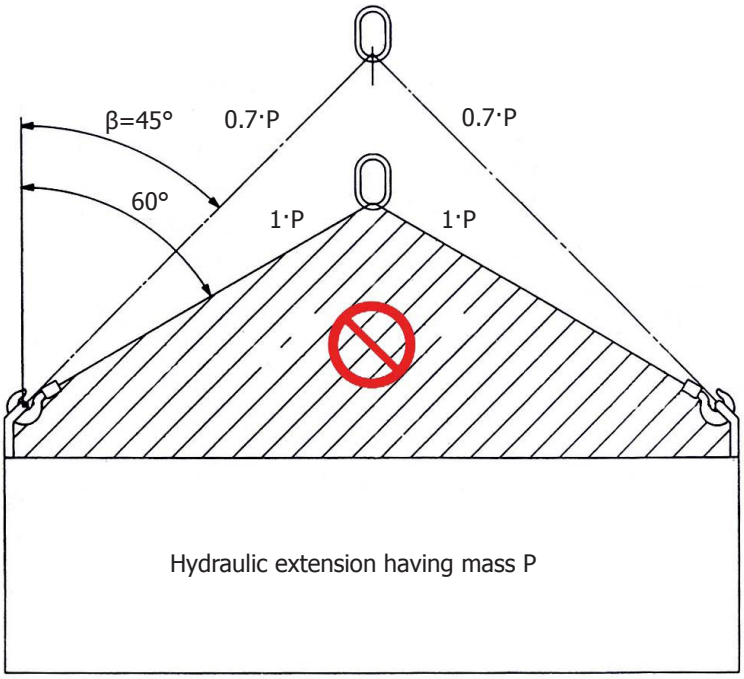
Do not touch hoses, pipes and quick coupling connectors/multiconnectors during hydraulic extension operation.

Operating the hydraulic extension, it is forbidden to lift higher loads than the allowed ones as per 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 and hydraulic extension components.

If you need to move a hydraulic extension, use suitable means according to its weight. During this operation, the operator is directly responsible for the machine and his own safety. Use hook attachment and connecting rods of the hydraulic extension as hooking points.

Follow the lifting scheme of the figure here below (ISO 3056).



Example

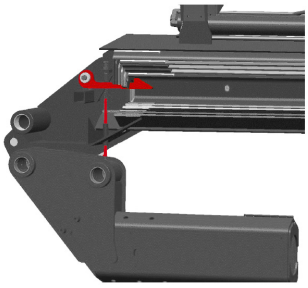
In case of mass of hydraulic extension = 1000 kg and β=60°, the pull of each rope must be higher than 1000 kg.

9.4.5 - Safety devices

Locking device against the exit of extension boom sections

Hydraulic extensions are equipped with a special automatic lock preventing their extension boom sections from accidentally exiting during transport (in case of folded cranes in transport position).

As a matter of fact, as hydraulic extensions are usually folded at rest on the crane outer boom with their extension boom sections pointed downwards, the dynamic effects due to road transport could cause their exit: the locking device solves this problem.



If it is not possible to place the hydraulic extension at rest in folded configuration, place it inside the vehicle body.

Locking system

Hydraulic extensions are provided with a locking system composed of a locking and a check pin (fig. 9.I.1 and 9.I.2). This system ensures an integral connection to the crane.

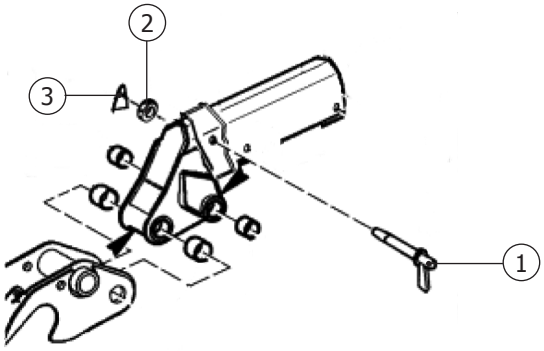


Fig. 9.I.1

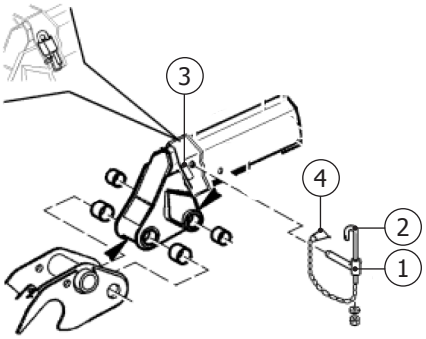


Fig. 9.I.2

Electronic lifting moment limiting device

The electronic lifting moment limiting device mounted on the crane informs the operator about the loading conditions of the hydraulic extension and manages its movements in case of overload (block due to overload) or attainment of the maximum vertical limit (lifting block).

For any information about its working, refer to chapter 4 "Safety devices and special functions" of the crane use and maintenance manual.

9.4.6 - Setting up for hydraulic extension operation

Mounting the hydraulic extension

While mounting the hydraulic extension on the crane, keep a safety distance in order to avoid a crushing danger due to a possible loss of stability.

Carry out the mounting operations slowly and make sure the connecting boom enters its seat smoothly.

By placing the hydraulic extension as showed in the figure and operating the control levers:

- place the crane extension boom sections at a proper distance from the connecting boom of the hydraulic extension, in order to enable the lining-up manoeuvres and the connection of hoses;
- if quick coupling connectors are fitted, connect the hydraulic extension hoses to the hydraulic system according to the instructions of paragraph "Quick coupling connectors" of the crane use and maintenance manual; if quick coupling multiconnectors are fitted, follow the instructions of paragraph "Quick coupling multiconnectors" of the crane use and maintenance manual;
- (on cranes equipped with FX electronic lifting moment limiting device) if quick coupling connectors are fitted, disconnect the electric cap from the socket placed on the last crane extension boom section and connect the electric cable for the pressure transducer;
- operate the rams of hydraulic extension and crane in order to line-up crane extension boom sections and connecting boom; this enables to insert the connecting boom into the last extension boom section;
- operate the crane extension boom sections (in case repeat the previous manoeuvre), until the fixing holes are lined-up;
- insert the locking pin (fig. 9.I.1 - position 1) in the holes and secure it with the nut (fig. 9.I.1- position 2) and the check pin (fig. 9.I.1 - position 3)

  or (according to the locking system version)

  insert the locking pin (fig. 9.I.2 - position 1) and the safety pin (fig. 9.I.2 - position 2) into the seat (fig. 9.I.2 - position 3), securing them with the check pin (fig. 9.I.2 - position 4).

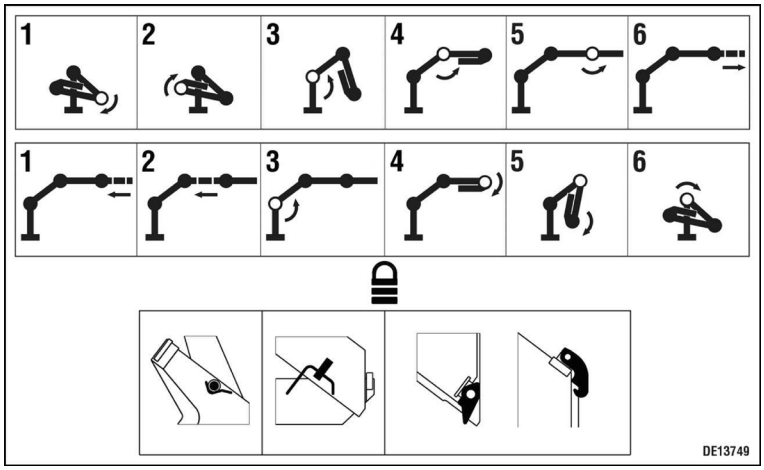
The locking pins are made of special material. Before crane and implement operation, make sure they are in a good state of repair: in case of wear or damages, replace them only with original FASSI spare parts. Your safety depends on it.

Check the locking pins are correctly inserted.

It is forbidden to operate the hydraulic extension if the locking pins are not correctly inserted.

Placing the hydraulic extension into working position

The sequence of operations to unfold (first line) and fold (second line) the crane fitted with hydraulic extension is represented on the plate DE13749.



In order to place the hydraulic extension into working position (starting from an articulated crane that is folded in transport position), follow this procedure:

• fold the crane outer boom, making sure that extension boom sections are reentered;		
• fold the hydraulic extension;		
• lift the crane inner boom over the horizontal position, in order to enable the hydraulic extension unfolding;		
• lift the crane outer boom to the horizontal position;		
• unfold the hydraulic extension;		
• exit the extension boom sections and position the hook on the vertical line above the load.		

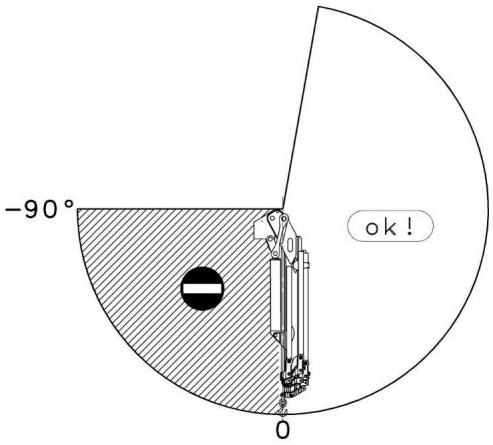
9.4.7 - Hydraulic extension operation

The pictograms placed near the levers indicate their operating direction. The following figure shows the symbols used to identify the hydraulic extension components; the arrow indicates the direction of the corresponding movement.

Pictograms for hydraulic extension control	
Jib extension boom movement (reentry)	Jib movement (lift)
Jib extension boom movement (exit)	Jib movement (descent)

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

It is forbidden to operate the hydraulic extension in the configuration represented on the left side of the following figure.



9.4.8 - After hydraulic extension operation

Placing the hydraulic extension into transport position on the crane

In order to place the hydraulic extension into transport position on the crane, follow this procedure (indicated on the plate DE13749 - second line):

• completely reenter the jib extension boom sections;		
• completely reenter the crane extension boom sections;		
• lift the crane inner boom to its stroke end;		
• fold the hydraulic extension to its stroke end;		
• fold the crane outer boom to its stroke end;		
• rotate the crane until the reference indicators on column and base coincide;		
• fold the crane inner boom to its stroke end;		
• reenter the outriggers as described in paragraph 8.3 "Reentering the outriggers" of the crane use and maintenance manual.		

Make sure that the crane equipped with hydraulic extension and placed folded behind cab doesn't exceed the maximum overall dimension and weight for road transport. If necessary, place the crane boom with hydraulic extension laid inside the vehicle body, blocking any possible uncontrolled movement.

Removing the hydraulic extension

By operating the control levers:

- place the hydraulic extension so that its two rest brackets lay on the ground or inside the vehicle body (see the following figure);

- remove the locking and check pins;
- if quick coupling connectors are fitted, disconnect the hydraulic extension hoses from the hydraulic system according to the instructions of paragraph "Quick coupling connectors" of the crane use and maintenance manual; if quick coupling multiconnectors are fitted, follow the instructions of paragraph "Quick coupling multiconnectors" of the crane use and maintenance manual;
- (on cranes equipped with FX electronic lifting moment limiting device) if quick coupling connectors are fitted, disconnect the electric cable of the pressure transducer; alarms 06 and 25 appear;
- (on cranes equipped with FX electronic lifting moment limiting device) put on the specific electric cap on the pressure transducer socket;
- (on cranes equipped with FX electronic lifting moment limiting device) select the LMI icon to reset alarms 06 and 25;
- reenter the crane extension boom sections in order to extract the connecting boom from the crane.

Lay the hydraulic extension on a proper base and fix it to prevent any movement. If you lay down the hydraulic extension in an unsuitable way, damages to persons and device could occur. In case, use a pallet with closed surface.

Check the correct positioning of implements on the vehicle, in order to avoid unexpected movements.

9.4.9 - Maintenance and dismantling

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

9.5 – Manual extensions

9.5.1 - Generality

Manual extensions can be inserted in the last crane/jib 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 or hydraulic extension models. You can find the possible combinations in Appendix A of the use and maintenance manual.

9.5.2 - General nomenclature

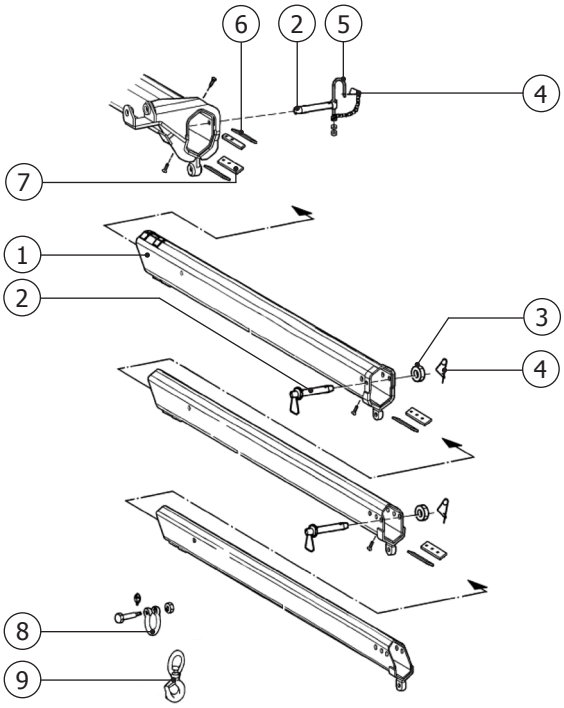


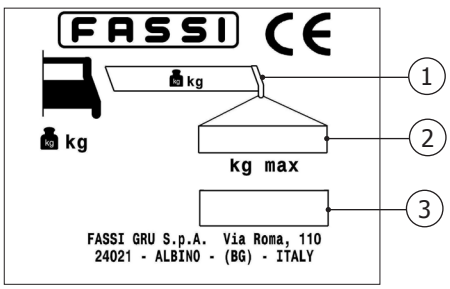
Fig. 9.M.1

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

9.5.3 - 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 crane or hydraulic extension, 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.

9.5.4 - 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.

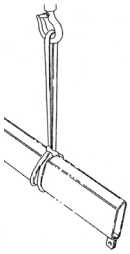
The operator must know exactly the weight he has to lift: use the electronic check system for the load hooked on manual extensions (if fitted).

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

9.5.5 - Safety devices

Mechanical stroke end

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

There are two possible versions of mechanical stroke end device, as per the following figures.

removable stroke end device

fixed 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.

There are two possible versions of locking system, as per fig. 9.M.2 and 9.M.3.

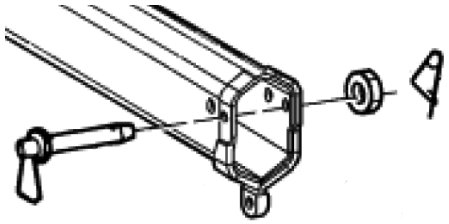


Fig. 9.M.2 - Version A

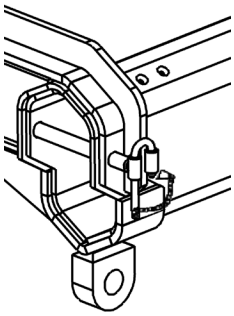


Fig. 9.M.3 - Version B

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

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.

ME
Manual Extension
control

Cranes with FX electronic lifting moment limiting device are provided with a check system for load hooked on manual extensions. Once activated, it compares the real load hooked on manual extensions (included possible implements) with the admissible load. This check only works while the operator is performing the dedicated procedure ([1]).

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

If you add or remove one or more manual extensions from the original crane installation, you must refer to an authorised FASSI service centre in order to update the system as per the new configuration.

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 on crane and/or hydraulic extension.

The procedure gives back the following information:

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

LLV
Load Limiting Verification
control

In compliance with safety regulations in force in EC countries, in case of HO hydraulic lifting moment limiting device or electronic lifting moment limiting device for Micro cranes, 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

(1) Procedure to use the check system for load hooked on manual extensions

Select the icon ME.

Manual extensions mounted both on crane and hydraulic extension

When this screen is displayed:

```
MANUAL EXTENSIONS
     Crane?
          Jib?
```

select `Crane` or `Jib` through the buttons/icons "+" and "-", depending on whether the manual extensions are mounted on crane or hydraulic extension.

Confirm the selection through the button/ icon "OK/ENTER".

Manual extensions mounted only on crane or only on hydraulic extension

When this screen is displayed:

```
MANUAL EXTENSIONS
     M1
          M2
               M3
```

select the number of extended manual extensions through the buttons/icons "+" and "-".

Confirm the selection through the button/icon "OK/ENTER".

Manual extensions mounted on crane

Manual extensions mounted on hydraulic extension

When this screen is displayed:

```
MANUAL EXTENSIONS
     Enter to confirm
```

Confirm through the button/icon "OK/ENTER".

When this screen is displayed:

```
MANUAL EXTENSIONS
      K1
            K2
                  K3
                        K4
```

select the extension boom section configuration through the buttons/icons "+" and "-":

- K1: crane extension booms reentered;
- K2: crane extension booms reentered and jib extension booms extended;
- K3: crane extension booms extended and jib extension booms reentered;
- K4: crane and jib extension booms extended.

Confirm the selection through the button/icon "OK/ENTER".

When this screen is displayed:

```
MANUAL EXTENSIONS
     Enter to confirm
```

Confirm through the button/icon "OK/ENTER".

When this screen is displayed:

```
MANUAL EXTENSIONS
     P2 STROKE END
```

in load-less condition, lift the outer boom to its stroke end (operate the control even if the ram is already at its stroke end).

Manual extensions mounted on crane

Manual extensions mounted on hydraulic extension

This screen is displayed:

```
MANUAL EXTENSIONS
   JIB STROKE END
```

in load-less condition, lift the hydraulic extension to its stroke end (operate the control even if the ram is already at its stroke end).

When this screen is displayed:

```
MANUAL EXTENSIONS
    ENTER TO START
```

Confirm through the button/icon "OK/ENTER".

When this screen is displayed:

```
MANUAL EXTENSIONS
    UP P1
```

operate the control lever to lift the inner boom, in order to eliminate any excess of pressure (the operation does not produce any crane movement). When the lever returns to neutral position, the system checks the inner ram pressure.

In case of irregularities, this screen is displayed:

```
MANUAL EXTENSIONS
    PRESSURE ERROR
```

If irregularities with the inner ram pressure are detected, it is necessary to repeat the procedure: go back to the main screen through the button/icon "OK/ENTER".

If no error is detected, the procedure continues with the request to lift the load.

```
MANUAL EXTENSIONS
     START LOAD P1

Pv Memo
P. Max
```

`Pv Memo` displays the stored pressure value
`P. Max` displays the maximum allowed pressure value

Operate the inner boom and slowly lift the load from the ground.

- If the load value is admissible, this message is displayed:

```
MANUAL EXTENSIONS
        LOAD OK

Load:
```

`Load` indicates the approximate weight in kg.

- If the load exceeds the maximum admissible value for the manual extension, this message is displayed:

```
MANUAL EXTENSIONS
     LOAD TOO HIGH

Load:
```

- If you lift the load too fast during the check procedure, this message is displayed:

```
MANUAL EXTENSIONS
     TOO FAST
```

- If the load exceeds the maximum admissible value for the crane (inner ram overload), this message is displayed:

```
MANUAL EXTENSIONS
     CRANE OVERLOAD
```

When one of the above messages is displayed, the procedure is over. You can go back to the main screen through the button “INDEX”.

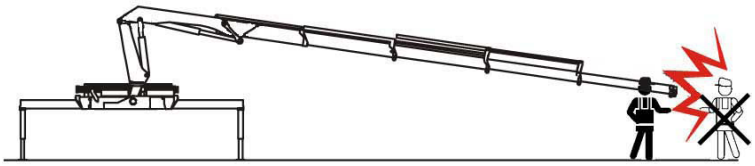
9.5.6 - Setting up for manual extension operation

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/jib extension boom section by means of suitable tools.

Mount the removable mechanical stroke end devices (if fitted) 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, according to the locking system:

   Version A (fig. 9.M.2): 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);

   Version B (fig. 9.M.3): insert the locking pin (fig. 9.M.1 - position 2) and secure it by inserting the safety pin (fig. 9.M.1 - position 5) into its seat (fig. 9.M.3); secure the safety pin with 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.

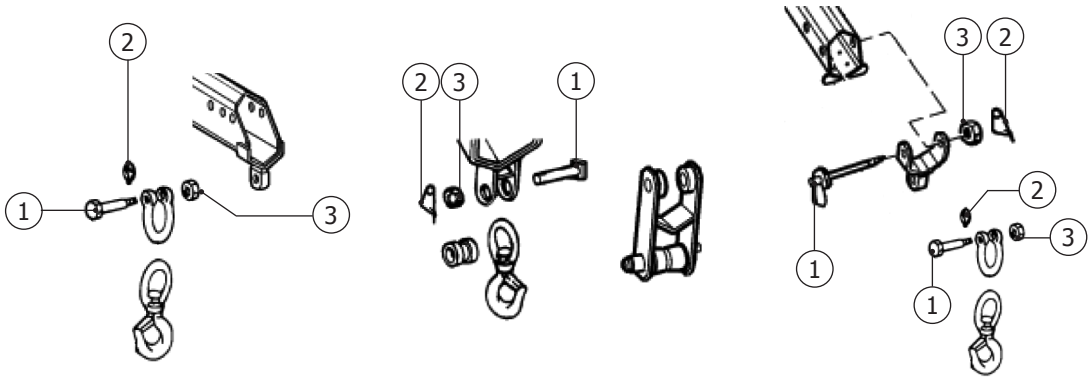
Do not try to line-up the holes/slots for the locking pin insertion with your fingers; always use a suitable tool.

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

Mounting the hook on manual extensions

There are three possible types of hook attachment on manual extensions, as per the following figures.

Mount the hook according to the type of attachment that is fitted on the manual extension.



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

9.5.7 - 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).

If the FX electronic lifting moment limiting device is fitted, it is necessary to perform the specific procedure to check the load to be lifted.

In compliance with safety regulations in force in EC countries, if HO hydraulic lifting moment limiting device or electronic lifting moment limiting device for Micro cranes are fitted, 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.

9.5.8 - 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, according to the locking system:

   Version A (fig. 9.M.2): 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);

   Version B (fig. 9.M.3): insert the locking pin (fig. 9.M.1 - position 2) and secure it by inserting the safety pin (fig. 9.M.1 - position 5) into its seat (fig. 9.M.3); secure the safety pin with 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 (if removable) and extract the manual extensions by means of proper tools.

9.5.9 - Maintenance and dismantling

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

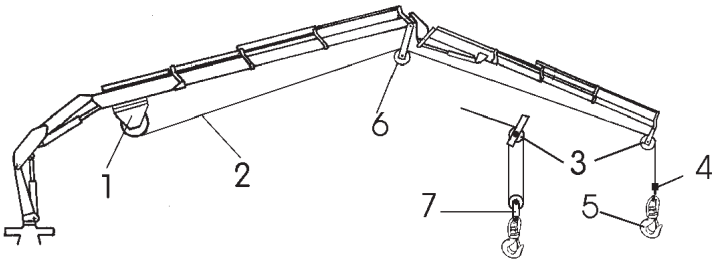
9.6 – Winch system

9.6.1 - 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.

9.6.2 - General nomenclature

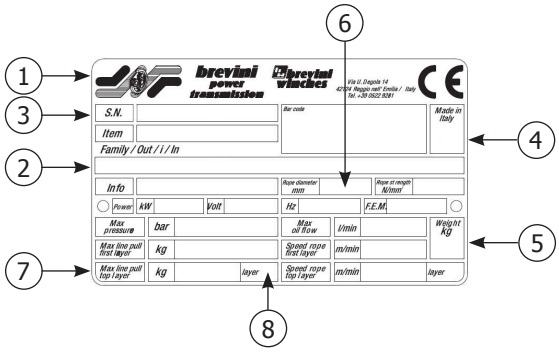


1. Winch
2. Rope
3. Fixed pulley
4. Balance weight/ Rope stretcher
5. Hook
6. Transmission pulley
7. Mobile pulley

9.6.3 - Technical specifications

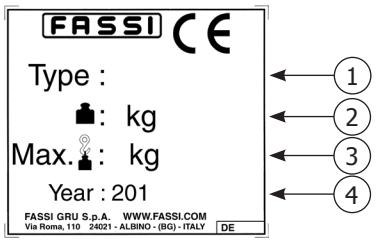
Winch identification data and technical features are indicated on a metallic plate. It is applied on the winch by its manufacturer and is used for CE mark, according to the Machinery Directive.

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.

9.6.4 - 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 (n=1 single pull, n=2 double pull, n=3 triple pull, n=4 quadruple pull).

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/jib extension boom sections when the load is lifted by the winch.

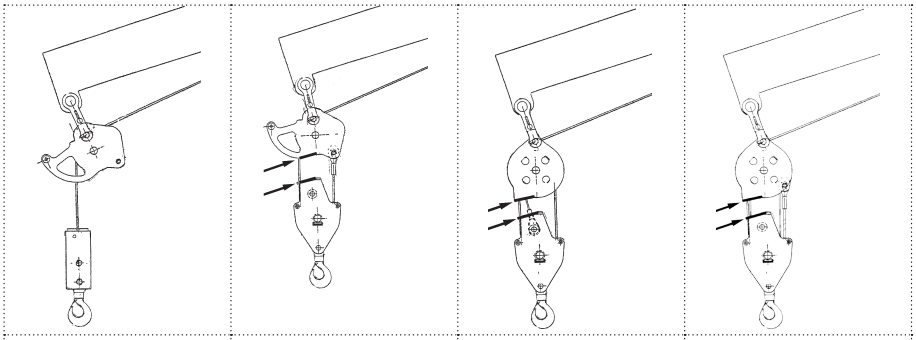
During lifting operation with balance weight or mobile pulley next to the fixed pulley, reduce the exit speed of extension boom sections in order to prevent stresses on the rope.

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

9.6.5 - 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)	Triple pull (n=3)	Quadruple pull (n=4)

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

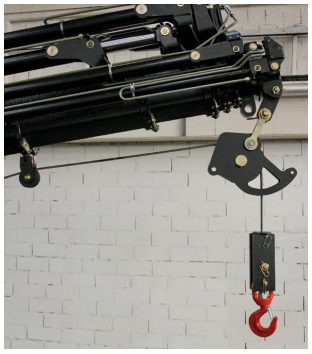


Fig. 9.V.1

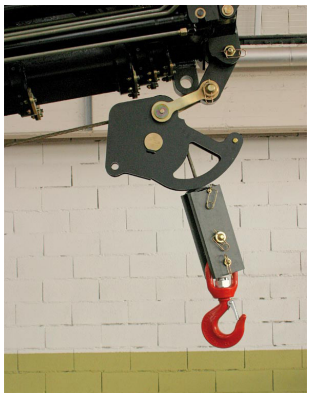


Fig. 9.V.2

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

FX500 electronic lifting moment limiting device

On cranes fitted with FX500 electronic lifting moment limiting device, the activation of the winch limiter due to overload blocks the following manoeuvres:

- inner boom lift and descent;
- outer boom lift and descent;
- hydraulic extension (if fitted) lift and descent;
- exit of crane extension boom sections;
- exit of extension boom sections of the hydraulic extension (if fitted);
- 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 and crane angle over certain parameters) prevents the following manoeuvres:

- exit of crane extension boom sections;
- exit of extension boom sections of the hydraulic extension (if fitted).

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

- hydraulic extension (if fitted) lift and descent;
- exit of crane extension boom sections;
- exit of extension boom sections of the hydraulic extension (if fitted);
- lift of the winch rope.

HO hydraulic lifting moment limiting device

On cranes fitted with HO hydraulic lifting moment limiting device, the winch block is managed by an electrohydraulic system that doesn't block the distributor levers (as it occurs in case of crane overload), but it stops operations.

If the stress applied to the winch rope reaches 90% of the setting limit value, the exit of the extension boom sections is blocked. This prevents an excessive overload of winch, rope and structure. If you still try to operate the exit of the extension boom sections, any other simultaneous manoeuvre is blocked.
If the stress applied to the rope is higher than the set limit value (100%), the crane is blocked. In order to exit from this block condition, operate the winch descent (in case, together with another manoeuvre, except for the exit of the extension boom sections).

If the rope is completely unwound, the winch descent is blocked, in order to guarantee the minimum number of turns and ensure the correct load fixing.

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 (or jib, if fitted) 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.

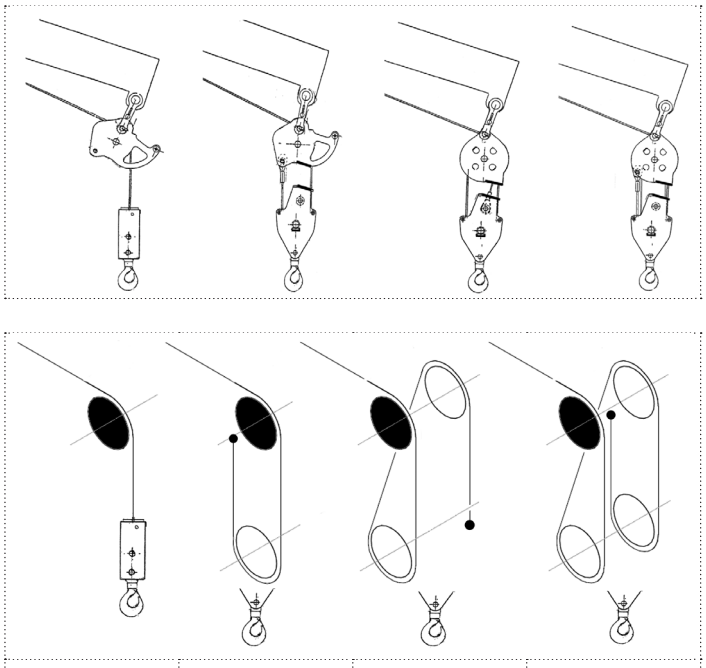
Winch fail-safe negative brake

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

9.6.6 - 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 in case of single, double, triple and quadruple pull.

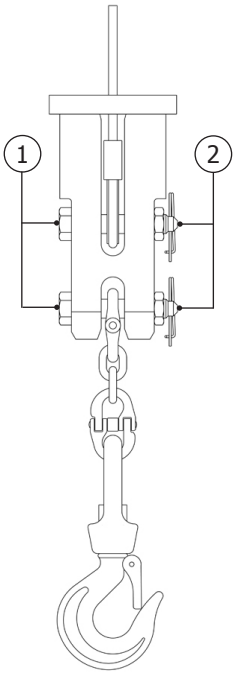


Single pull (n=1)	Double pull (n=2)	Triple pull (n=3)	Quadruple pull (n=4)

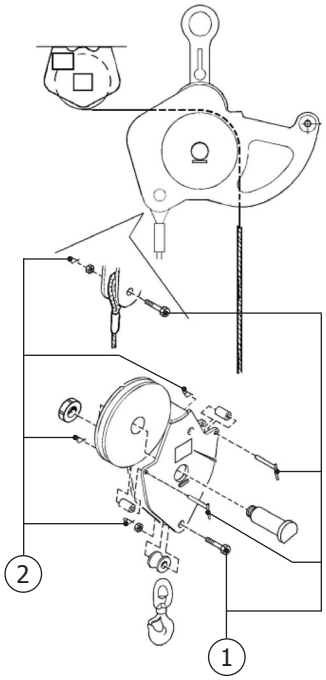
Fig. 9.V.3

Mounting mobile pulleys and balance weight

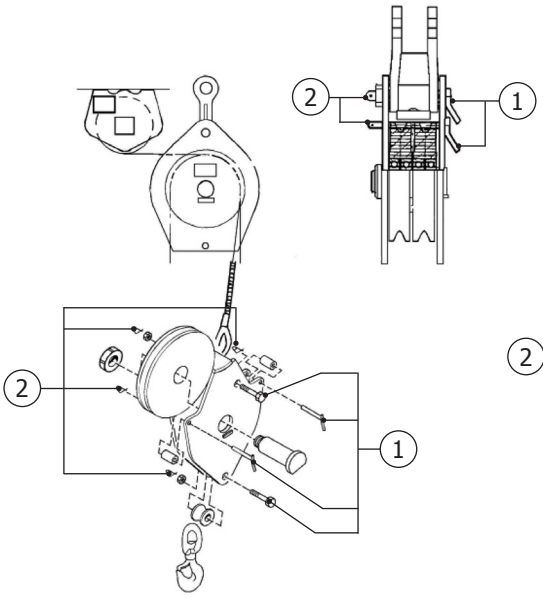
According to the working type, mount mobile pulley or balance weight as per the following figures: insert the locking pins (position 1) and secure them with nut and check pins (position 2).



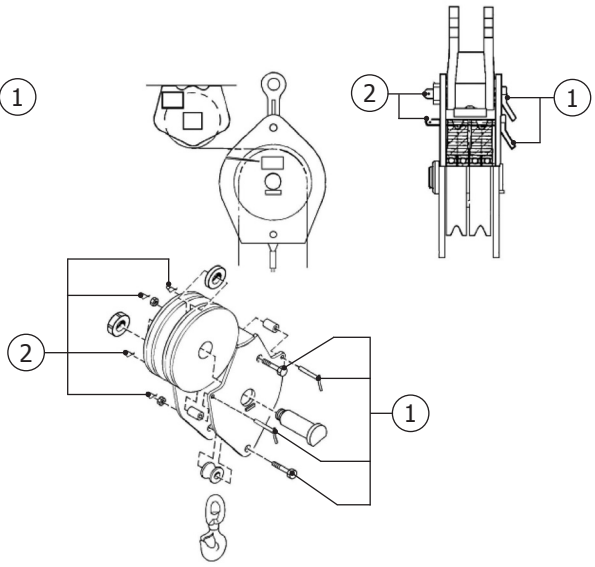
n=1



n=2



n=3



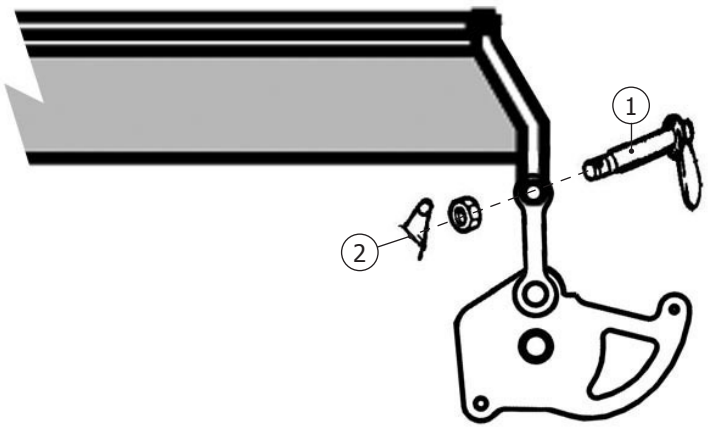
n=4

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

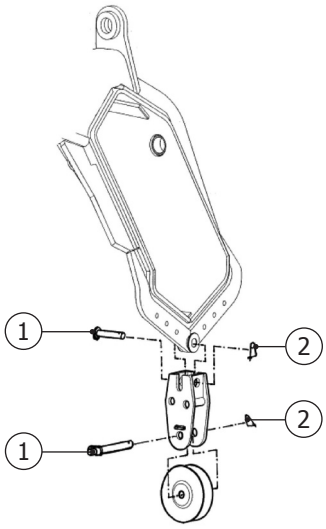
The loads represented on the capacity plates for crane with winch can be lifted only respecting the number of pulls specified in the plates.

Mounting the fixed pulleys on crane

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



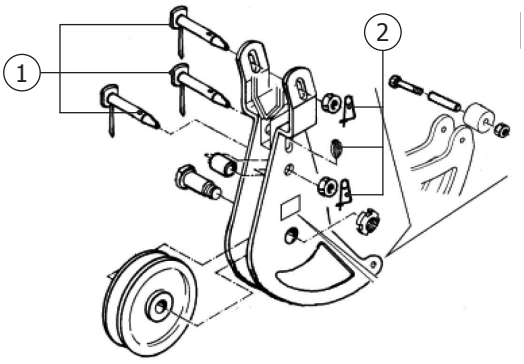
fixed pulley



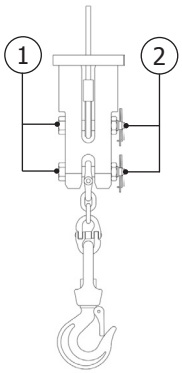
middle guide pulley

Mounting the fixed pulleys on hydraulic extension

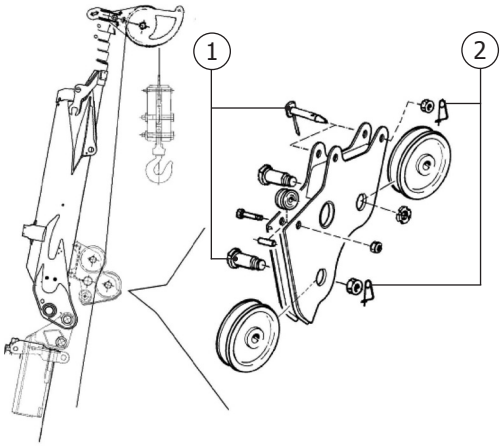
If the hydraulic extension is fitted, mount fixed pulley, transmission pulleys and balance weight as per the following figures, by inserting the locking pins (position 1) and securing them with nut and check pins (position 2).



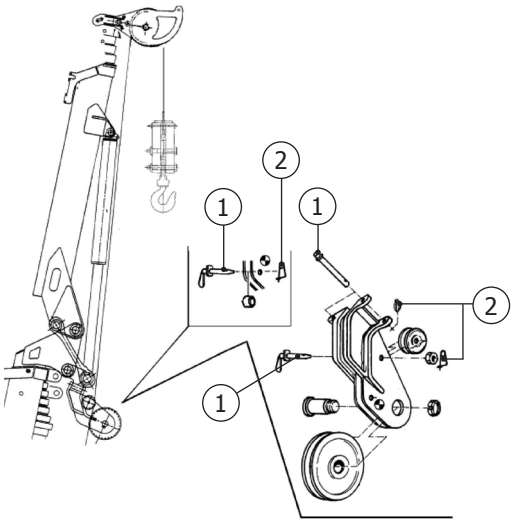
fixed pulley



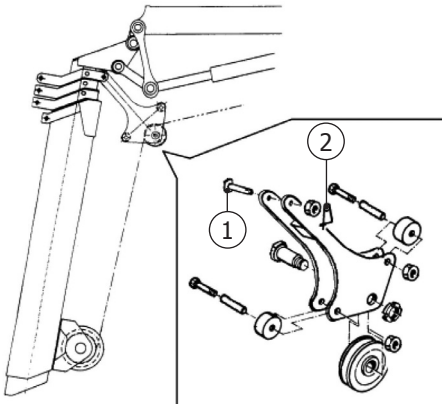
balance weight



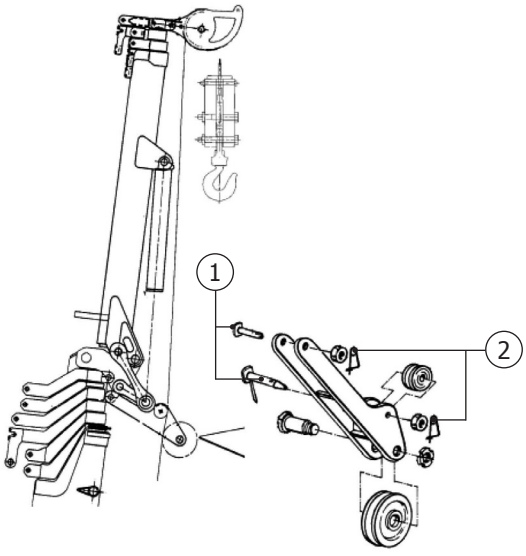
transmission pulley



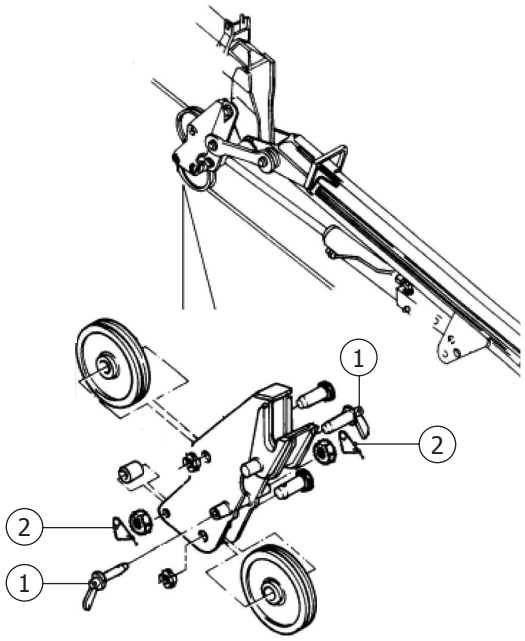
transmission pulley



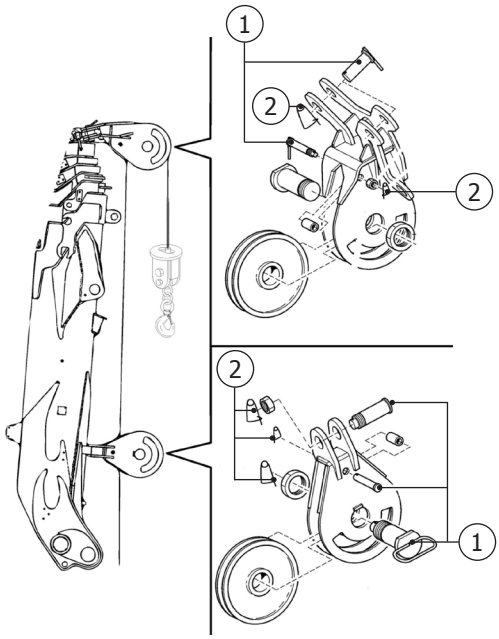
transmission pulley



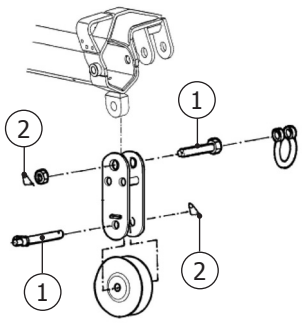
transmission pulley



transmission pulley



fixed and transmission pulleys

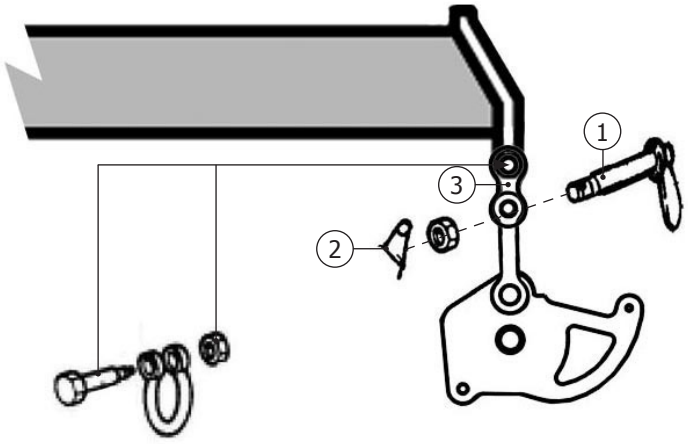


middle guide pulley
(in case of manual extensions)

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

Mounting the fixed pulleys on manual extension

A bracket adapter (position 3) is fitted on certain manual extensions: it must be mounted as per the following figure.



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

9.6.7 - 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

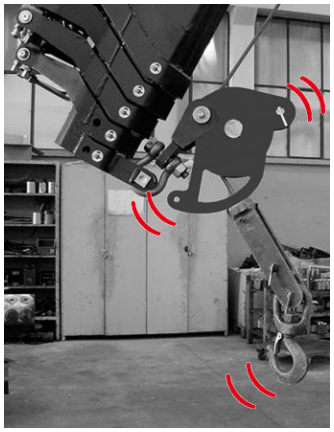


Fig. 9.V.5

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.

9.6.8 - 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.

In some cases, still observing the maximum overall dimension for transport, it is possible to fold the crane without removing the fixed pulley (fig. 9.V.6) and by fixing the winch hook to the specific outer boom bracket (fig. 9.V.6 - position 1).

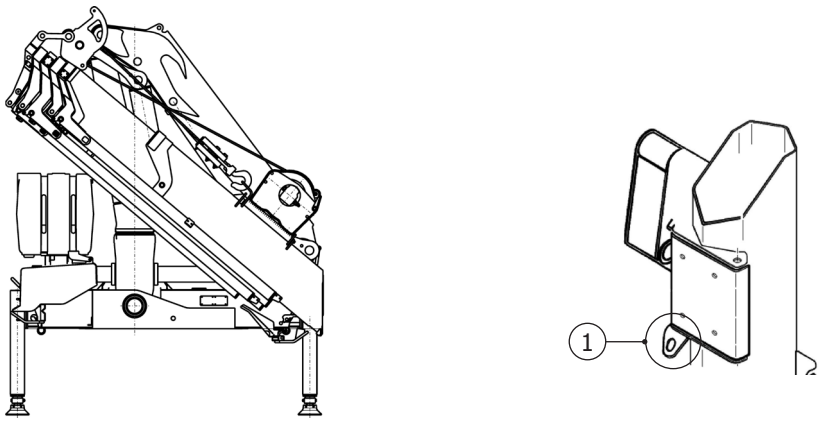


Fig. 9.V.6

9.6.9 - 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.

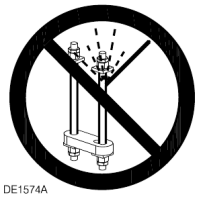
In order to depressurize the system:

- by manual control, from the control panel select and hold the icon EV1 pressed, then move the distributor levers;
- by radio remote control, from the control handle select and hold the icon EV1 pressed, then move the levers;
- otherwise, 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 (§ 10.3.7).	Replenish the lacking oil.
Filters		Check by the specific indicators that there is no obstruction in the pump high pressure filter (§ 10.3.8).	Replace the filter (§ 10.3.8).
Safety devices		Check the safety system functionality (§ 10.3.10).	Go to an authorised service centre.
		Check that protections and ladder for stand-up / top seat control station are fitted.	
		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.	Go to an authorised service centre.
		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.
Oil cooler/ heat exchanger		Visually check the cleaning conditions of the oil cooler.	Clean the oil cooler blowing air (do not disassemble).
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 (§ 10.3.9).	
Lubrication		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: 60 minutes (Before the following operations, carry out daily checks and weekly checks/preventive maintenance)		
Element	**Description**		**In case of anomalies (1)**
Column		Visually check physical integrity and wear condition of the dust cover ring on the rack.	Go to an authorised service centre.
		Visually check the physical integrity of the rotation cylinder, making sure there are no deformations.	
Slew ring		Visually check the wear conditions of slew ring seals.	
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.

	Quarterly checks and preventive maintenance Time required: 60 minutes (Before the following operations, carry out daily checks and weekly checks/preventive maintenance)		
Element	**Description**		**In case of anomalies (1)**
Seat		Visually check there are no surface damages, such as cracks, incisions, cuts or crevices, abrasions on frame, structure and seat.	
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 self-locking ring nuts (1) and snap rings (1).	
Winch		Visually check the physical integrity of winch and its components (cable gland, pulleys, etc.).	
		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.	Go to an authorised service centre.
		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 (§ 10.3.7).	Replace the cartridge (§ 10.3.7).
Grease nipples (2)		Visually check the physical integrity of greasing kit and grease nipple (§ 10.3.9).	
Electric and electronic devices (2)		Visually check the physical integrity of electric and electronic equipment.	Go to an authorised service centre.
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 (§ 10.3.9).	
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 (§ 10.3.9).	

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

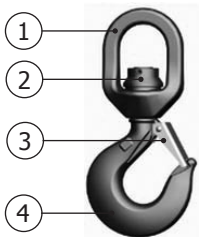
(2) See the list of components in paragraph 10.4 "Checks and maintenance by the authorised FASSI service centre".

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

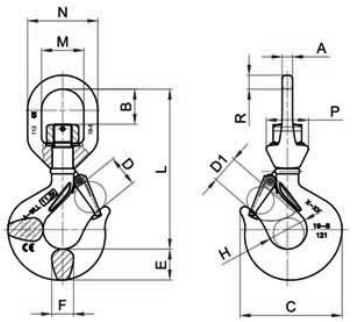


Fig. 10.2

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.

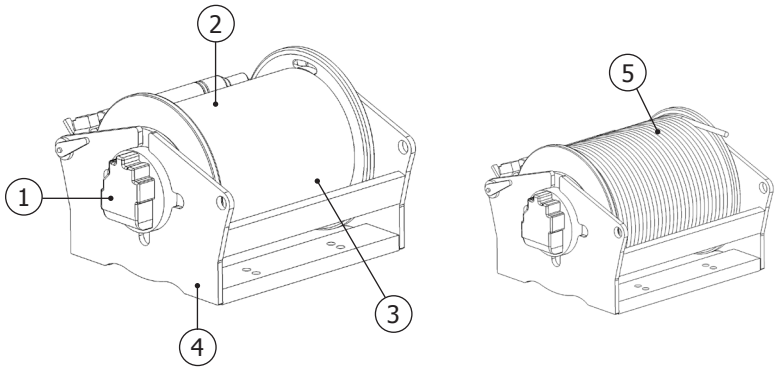
If the component is over-deformed or worn, you must demolish and scrap it.

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.

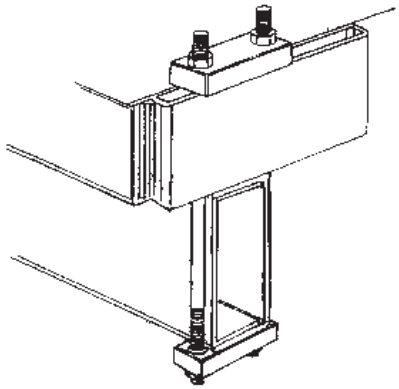
It is forbidden to use high-pressure washing on crane controls (deviators, distributors, control levers, etc.), electrical components (boxes, control panels, etc.), tanks and ram rods.

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.



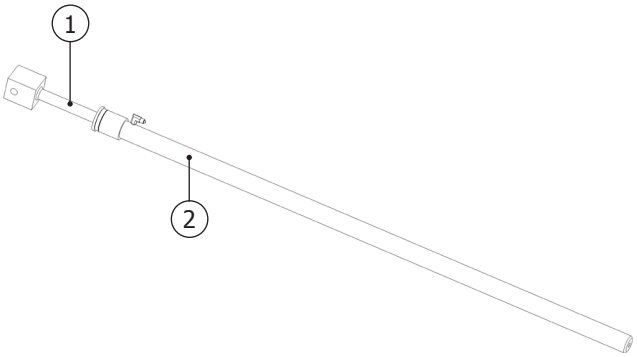
Controlling the fixing rods enables to find possible loosenings and to avoid malfunctioning and/or dangers.

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.

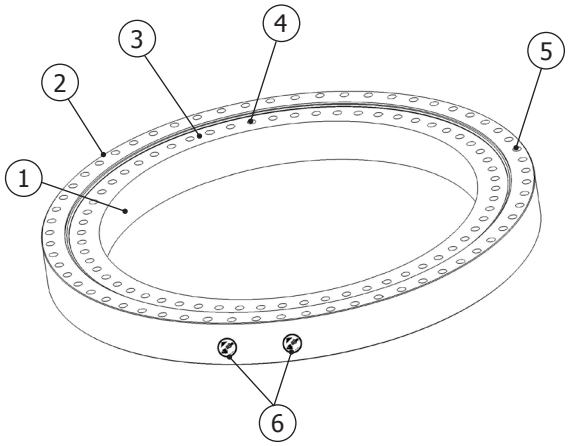
1. Dissolve and remove with clean water any remains of salt, sand and production material, as well as any other impurity on the rods.
2. Let rods dry in the open air.
3. Soak an industrial cloth (that leaves no remains) in low viscosity protective oil and rub the whole rod surface.

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

For oil characteristics, see paragraph 10.3.9.

10.3.6 - Slew ring

Nomenclature



1. Gear
2. Outer ring
3. Inner ring
4. Screws connecting slew ring and base
5. Screws connecting slew ring and column
6. Lubrication points

Bolts and Screws

Checking that bolts and screws on the slew ring are tightened avoids possible loosenings that may cause inefficiency of the rolling system and possible breaks of the tightening system.

In order to control bolts and screws:

- 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.

Rolling system

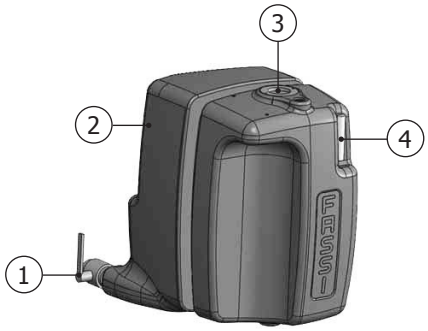
The complete lubrication of the rolling system enables to reduce friction, to seal and protect from corrosion. So, it is recommended that you lubricate every 100 working hours, using the specific points signalled on the slew ring, so that grease comes out along the whole edge of protective seals.

In order to ease grease distribution on bearings, it is suggested that you rotate the slew ring while greasing. Any grease in excess coming out must be carefully removed.

For grease characteristics, see paragraph 10.3.9.

10.3.7 - Tank

Nomenclature



1. Tap
2. Tank
3. Oil filter
4. Indicator for oil level monitoring

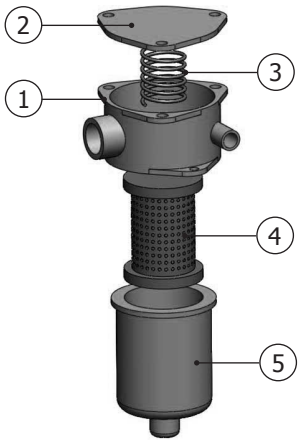
Oil level

Check the oil level in the tank using the specific indicator shown in the figure above. This check must be carried out with cold oil, crane in transport position, all outrigger rams reentered and vehicle in horizontal position: oil must remain between maximum and minimum level signs.

If oil is under the minimum level, replenish it.
If oil is above the maximum level, go to an authorised FASSI service centre.

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.

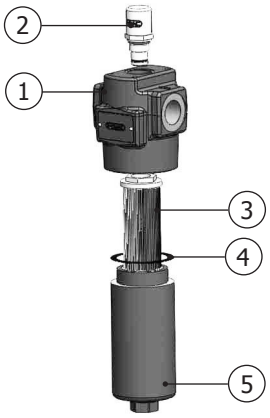
Table of hydraulic oil characteristics

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

10.3.8 - Pump high pressure 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. Obstruction indicator
3. Cartridge
4. Seal
5. Filter case

The solid particles held by the filter must be periodically removed from the cartridge in order to prevent a decrease of the machine performances.

A chromatic obstruction indicator signals when it is necessary to replace the cartridge: when from green it becomes red, open and clean the filter, then replace the cartridge following this procedure:

- unscrew the filter case from the head;
- remove the cartridge;
- clean the inner part of the filter case using a non-flammable cleaning solvent;
- insert a new cartridge;
- check the wear condition of seals (in case of excessive wear replace them) and insert again the filter case in the head;
- mount again head and filter case.

10.3.9 - 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:

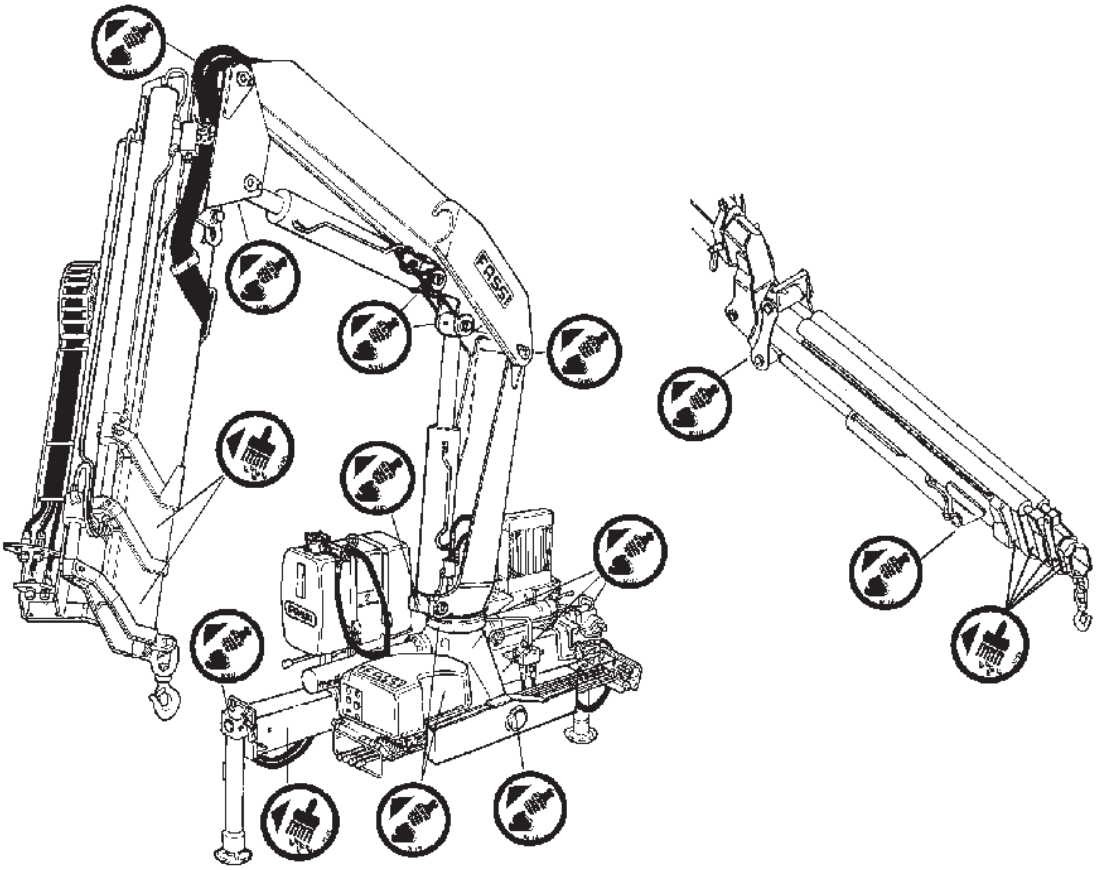
This symbol indicates that a grease nipple is fitted in order to lubricate the component. Lubrication must be carried out using a pump or a suitable grease gun.	This symbol indicates that a lubricating point is fitted. Lubrication must be carried out directly on the component, using specific instruments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

On certain crane models, a specific centralized point placed on the distributor side of the base gathers the grease nipples for:

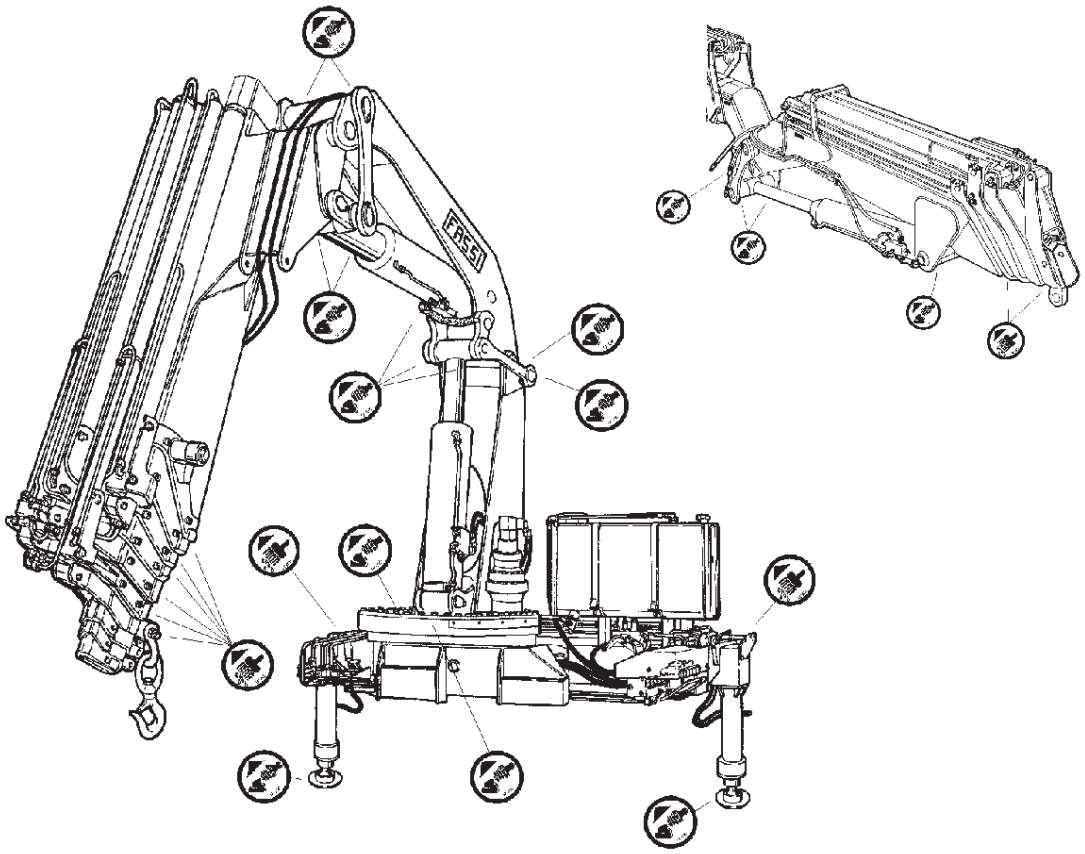
- rack group;
- column gear;
- pendulum beam.

The centralized lubrication cannot be used when temperature is under -10°C.

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.



Crane with rack



Crane with slew ring

Compulsory periodic lubrication

	Group	Subgroup	Element	Maintenance frequency
	Slew ring		Rolling system	Every 100 working hours / quarterly (§ 10.3.6)
	Rack		Rack	Every 100 working hours / quarterly
	Column		Column gear	
	Column		Bushes on column	Weekly
	Slew ring		Gear	
	Inner boom	Ram	Rod	Weekly (§ 10.3.5)
	Outer boom	Ram	Rod	
	Extension boom sections	Ram	Rod	
	Jib	Ram	Rod	
	Jib extension boom sections	Ram	Rod	
	Outrigger rams	Ram	Rod	
	Column	Pivot points	Bushes	Quarterly
	Inner boom	Linkage system	Bushes	
	Inner boom	Pivot points	Bushes	
	Inner boom	Ram	Bushes	
	Outer boom		Outer boom	
	Outer boom	Linkage system	Bushes	
	Outer boom	Pivot points	Bushes	
	Outer boom		Inner guide shoes	
	Outer boom	Ram	Bushes	
	Extension boom sections		Extension boom sections	
	Extension boom sections		Guide shoes	
	Jib		Jib	
	Jib	Linkage system	Bushes	
	Jib	Pivot points	Bushes	
	Jib		Inner guide shoes	
	Jib	Connecting boom	Guide shoes	
	Jib	Ram	Bushes	
	Jib extension boom sections		Jib extension boom sections	
	Jib extension boom sections		Guide shoes	
	Manual extensions		Guide shoes	

	Group	Subgroup	Element	Maintenance frequency
	Outrigger supports		Outrigger supports	Quarterly
	Outrigger supports		Guide shoes	
	Outrigger rams		Plate and pivot joint	
	Base		Pendulum beam	
	Winch		Fixed pulley	
	Winch		Transmission pulley	
	Winch		Winch rope	Quarterly (§ 10.3.2)

Table of lubricant/grease characteristics

Lubricating oil (for motoreducer unit)	
Classification	**Gradation**
ISO-L-CC	EP ISO-VG 150

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 grease case)
Use only NILEX EP1 grease by NILS firm

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

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

For **gears** use NILEX or 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 slew ring, extension boom sections, outrigger supports, gears, 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).

10.3.10 - 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 LEDs turned on) and it is not allowed to exit extension boom sections and lower inner/outer boom and hydraulic extension, it means that the lifting device is correctly working.
Otherwise, go to an authorised FASSI service centre.

If the electronic lifting moment limiting device is not fitted on the crane, make sure that safety devices limit crane performances according to capacity plate values.

Winch limiting devices

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

On cranes fitted with FX 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 and the oil pressure detected by TP0 shall not exceed the maximum working pressure indicated in the schedule "Crane technical data" in Appendix A. All movements of the crane / hydraulic extension (if fitted) 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.

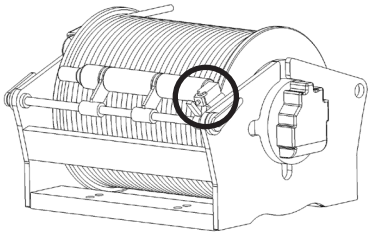
If the electronic lifting moment limiting device is not fitted on the crane, make sure that safety devices limit crane performances according to capacity plate values.

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 with outer boom in horizontal position and inner 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.

In conformity with standard EN 12999, it is not compulsory to fit the STOP button on the control stations that are solely used for outrigger operation. In this case, by operating the STOP button only crane and implements are affected, while outrigger manoeuvres remain active: therefore it is necessary to pay special attention and make sure nobody stops or passes in proximity of the outrigger ram working area.

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:

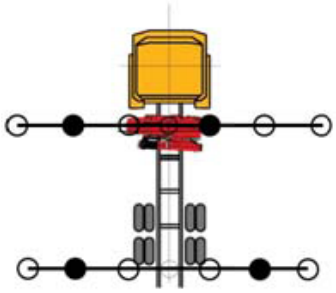
1. Transducer: tilting sensors of outer boom and hydraulic extension.
2. Transducer: Fassi Stability Control sensors.
3. Transducer: pressure transducers.
4. Pressure gauge.

1. Tilting sensors of outer boom and hydraulic extension

With reference to the crane configuration shown in the picture, the following are examples of tilting sensor inconsistency:

- angle detected by the outer boom tilting sensor: 0° or under 0°;
- angle detected by the hydraulic extension tilting sensor: 0° or above 0°.

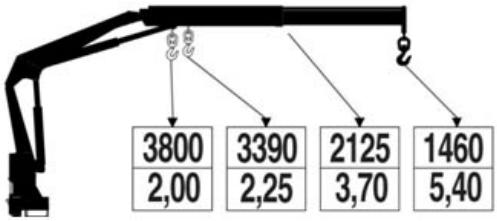
2. Fassi Stability Control sensors



In case of crane fitted with FSC/S and stabilized as shown in the figure (outrigger rams touching the ground in correspondence to the black circles), the following are examples of inconsistency:

- sensor signalling L0 working level;
- sensor signalling L3 working level on one/both side(s);
- sensor signalling L1 working level on both sides.

3. Pressure transducers



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

4. Pressure gauge

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

10.3.11 - 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

50 h	Checks and maintenance after the first 50 hours (Work time) of crane utilization		
Element	**Description**		**In case of anomalies**
Motoreducer (slew ring)		Restore the tightening torque of bolts and screws on the motoreducer according to the manufacturer's instructions and check their integrity.	
		Replace hot lubricant oil in the reduction unit.	
		Visually check the general cleaning condition of reduction unit and caps.	Clean the reduction unit.
		Clean the inner part of the reduction unit using new oil.	
		Visually check the physical integrity of bolts and screws on the motoreducer.	Replace / repair the component.
		Replace the brake oil.	
Slew ring		Restore the tightening torque according to the specific instructions (*).	
Winch		Replace the hot lubricant oil in the winch reduction unit.	
Base		Restore the tightening torque of fixing rods, according to the specific instructions (*).	

1 ... 365	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 § 10.3.11.	
		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 (*).	

	Yearly checks and maintenance / after relevant modifications, repairs or long periods of non-utilization		
Element	**Description**		**In case of anomalies**
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.	Check the valve setting.
		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.	
Motoreducer (slew ring)		Check the crane rotational power.	Replace / repair the component.
		Visually check the physical integrity of the hydraulic motor.	
Jib extension boom sections and manual extensions		Visually check the physical integrity of stroke end devices.	
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).	
Integrated assembly		Check functionality and physical integrity of the override system.	

	Yearly checks and maintenance / after relevant modifications, repairs or long periods of non-utilization	
Element	**Description**	**In case of anomalies**
Oil cooler/ heat exchanger	Clean the fan using compressed air. The jet direction must be parallel to the winglets in order to avoid possible damages.	
	Visually check the physical integrity of the fan.	Replace / repair the component.
Outrigger supports	Visually check the physical integrity of hose protection chain and its pivot joints.	Replace / repair the component.
	Visually check there is no oil leakage from the ram.	
	Visually check the surface covering of ram rods, making sure there are no deformations.	
	Restore the lubrication of ram rods.	
	Dissolve and remove impurities on ram rods. Rub the surface using an industrial oil-soaked cloth (use low viscosity protective oil).	
	Visually check the physical integrity of the ram cylinder, making sure there are no deformations.	Replace / repair the component.
	Visually check and make sure ram seals withstand the maximum working pressures.	
Crane-outrigger deviator	Manually check that the deviator switches smoothly.	
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.	
Self-locking ring nuts (2)	Restore the tightening torque of self-locking ring nuts.	
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.	
Distributors	Check that maximum working pressures are reached.	Carry out the valve setting.

	Ten-yearly checks and maintenance	
Element	**Description**	**In case of anomalies**
Base	Check that there are no excessive clearances between pendulum beam and base, using suitable methods.	Replace / repair the component.
	Check that the pendulum beam is free to move.	

	Ten-yearly checks and maintenance		
Element	**Description**		**In case of anomalies**
Column		Clean the inner part of the joint using suitable products.	
		Visually check physical integrity and wear condition of the column gear.	Replace / repair the component.
		Visually check the wear condition of bushes and the coaxiality of rotating components.	
		Visually check physical integrity and wear condition of the thrust-bearing.	
Rack		Visually check physical integrity and wear condition of the rack gear.	
Metal carpentry (2)		Check there are no deformations on metal carpentry using suitable methods.	Replace / repair the component.
		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.	Replace / repair the component.
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.	
Motoreducer (slew ring)		Visually check the general cleaning condition of reduction unit and caps.	Clean the reduction unit.
		Restore the tightening torque of bolts and screws on motoreducer according to the manufacturer's instructions.	
Slew ring		Visually check the physical integrity of bolts and screws on slew ring and restore their tightening torque according to the specific instructions (*).	Replace / repair the component.

	Every 1000 hours (Work Time) of utilization of each component / yearly		
Element	**Description**		**In case of anomalies**
Slew ring		Check the clearance between outer and inner ring according to the specific instructions (*).	Replace / repair the component.
		Visually check physical integrity and wear condition of the slew ring gear.	
Motoreducer (slew ring)		Replace the brake oil.	
		Replace hot lubricant oil in the reduction unit.	
		Clean the inner part of the reduction unit using new oil.	

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

	Every 5000 hours (Work Time) of utilization of each component / every ten years		
Element	**Description**		**In case of anomalies**
Motoreducer (slew ring)		Visually check physical integrity and wear condition of the motoreducer pinion.	Replace / repair the component.
		Replace all bearings and outer seal rings.	
		Carefully check all the reduction unit seals.	Replace / repair the component.
		Check the bearing lubrication.	Restore the lubricant.
		Check the wear condition of the reduction unit gears.	Replace / repair the component.

	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
- Pendulum beam
- Column
- Inner boom
- Linkage system on inner boom
- Outer boom
- Linkage system on outer boom
- Extension boom sections
- Jib
- Linkage system on jib
- Jib extension boom sections
- Manual extension
- Outrigger supports
- Winch and pulleys

Control levers
- Crane-outrigger deviator
- Ground control station
- Stand-up control station
- Radio remote control
- Top seat control station

Valve lead seals
- Column
- Inner boom
- Outer boom
- Extension boom sections
- Jib
- Jib extension boom sections
- Winch
- Outrigger supports
- Outrigger rams
- Motoreducer (slew ring)
- Valves
- Integrated assembly

Distributors
- Crane distributor
- Outrigger distributor

Transducers and sensors
- FSC
- MOL
- Pressure transducers
- Tilting sensor on outer boom
- Micro switch for 7th - 8th extension boom sections in
- Pressure gauge
- Inductive proximity sensors:
  - inner boom horizontal position indicator
  - rotation arc limiter
  - sensor for rams on the ground

Rams
- Inner boom
- Outer boom
- Extension boom sections
- Jib
- Jib extension boom sections
- Outrigger rams

Grease nipples
- Base
- Column
- Inner boom
- Outer boom
- Jib

Circlips, self-locking ring nuts, pivot points
- Rams
- Column
- Inner boom
- Outer boom
- Extension boom sections
- Jib
- Jib extension boom sections

Bushes
- Rams
- Inner boom
- Outer boom
- Jib

Electric/electronic devices
- FX main unit
- Radio remote control
- Radio receiver

Bolts and screws
- Column
- Inner boom
- Outer boom
- Jib
- Outrigger supports
- Outrigger rams
- Crane distributor
- Outrigger distributor
- Radio receiver antenna
- Seat
- Winch
- Slew ring (§ 10.3.6)
- Fixing rods

Valves
- Column
- Inner boom
- Outer boom
- Extension boom sections
- Jib
- Jib extension boom sections
- Outrigger rams
- Winch
- Outrigger supports
- Motoreducer (slew ring)
- Integrated assembly

Guide shoes
- Outer boom
- Extension boom sections
- Jib
- Jib connecting boom
- Jib extension boom sections
- Manual extensions
- Outrigger supports

Hydraulic system
- Hoses
- Pipes
- Rams
- Distributors
- Tank
- Valves
- Oil cooler (heat exchanger)

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 – Outrigger control by radio

In case of working anomalies of radio remote control, levers on control handle may be useless. So, it may be necessary to operate outriggers directly from their distributor.

In this emergency situation, make sure that nobody stops or passes in proximity of the outrigger ram working area, neither from the operator's side nor from the opposite one.

In order to operate the outrigger distributor, fasten the selection screw completely (fig. 11.1 - position 1).

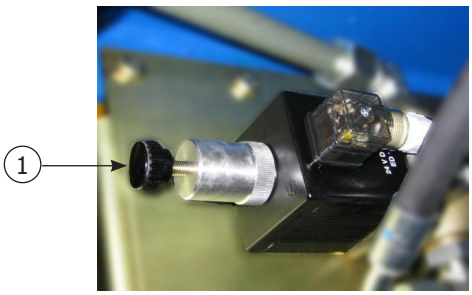


Fig. 11.1

Then control the outriggers directly from the distributor, by using the two threadless levers.

In order to reactivate the crane functions, unscrew the selection screw (fig. 11.1 - position 1).

Once the emergency operations are completed, immediately go to an authorised FASSI service centre for any necessary repair.

11.2 – Crane control by radio - Distributor on the column

In case of working anomalies of radio remote control, levers on control handle may be useless: if a ground control station is not fitted, immediately contact an authorised FASSI service centre.

If a particular danger occurs for persons or things, it is possible to carry out some emergency operations from the distributor placed on the crane column: reduce the outreach, lay down the load and, if possible, place the crane in transport position in the vehicle body. If there are not suitable safety conditions, immediately contact an authorised FASSI service centre.

In order to use the distributor on the column, it is necessary to:

- remove the carter shown in fig. 11.2 - position 1;
- enable the manual control mode by selecting the icon R/M from the control panel (refer to chapter 4, paragraph "Procedure to pass from radio remote to manual control mode (and vice versa)");
- operate the crane by using the threadless lever.

In order to control the crane from the distributor on the column, refer to paragraph 5.3 "Ground control station".

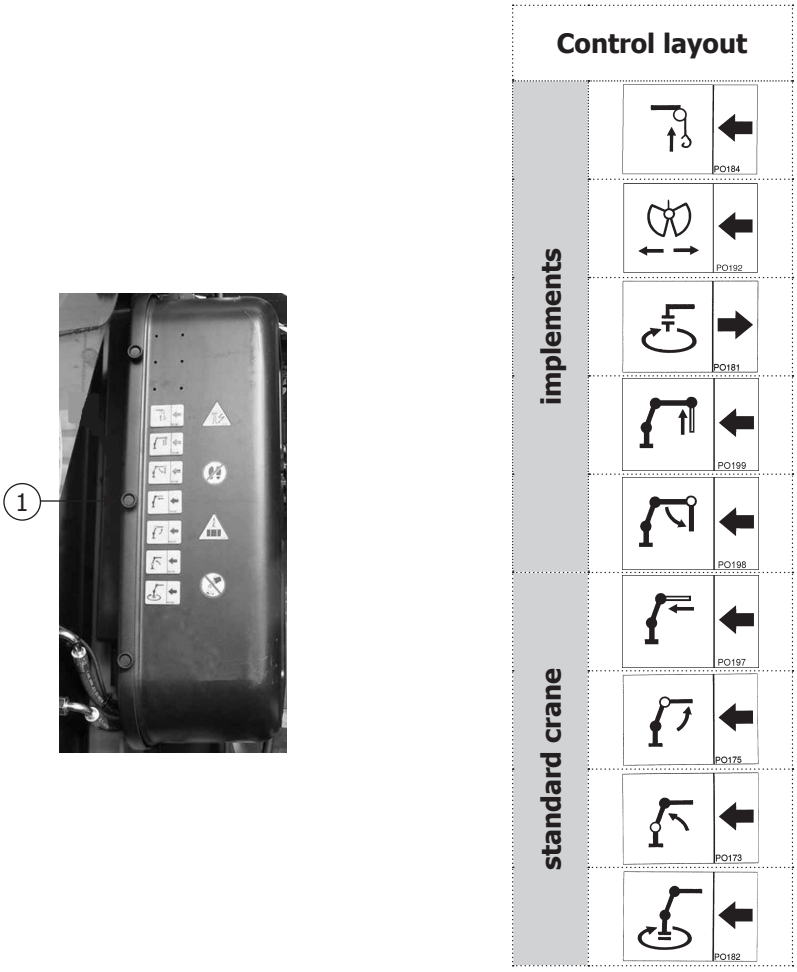


Fig. 11.2

If you use the distributor on the column, pay special attention to moving parts (such as crane booms, rams and column), where higher crushing, trapping and shearing danger occurs.

If failure occurs and you cannot reach the distributor in a safe way, it is not possible to operate an emergency control (as it occurs when the hydraulic system is broken or there is no oil feeding to the distributor). In this situation you must contact an authorised FASSI service centre.

11.3 – Temporary override of crane functions

In case of working anomalies of the lifting moment limiting device or irreversible crane block, it is necessary to deactivate all the safety devices by operating the override system:

- version A: fig. 11.3 or fig. 11.4 - position 1

  and/or

- version B: fig. 11.5 - position 1.

Version A: remove the safety seal and turn the tap (fig. 11.3 or fig. 11.4 - position 1) clockwise.

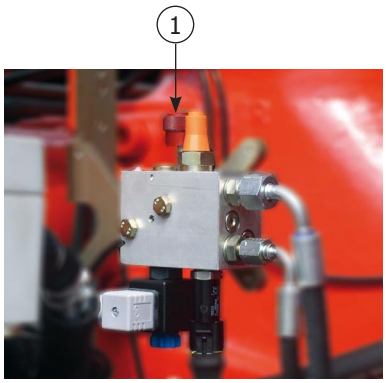


Fig. 11.3

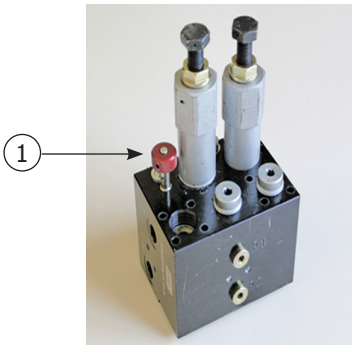


Fig. 11.4

Version B: remove the safety seal, push the tap (fig. 11.5 - position 1) and turn it clockwise (fig. 11.6).

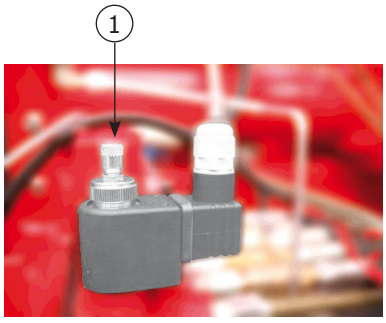


Fig. 11.5

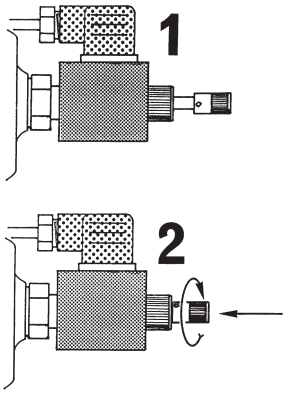


Fig. 11.6

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 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.

11.4 – 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.