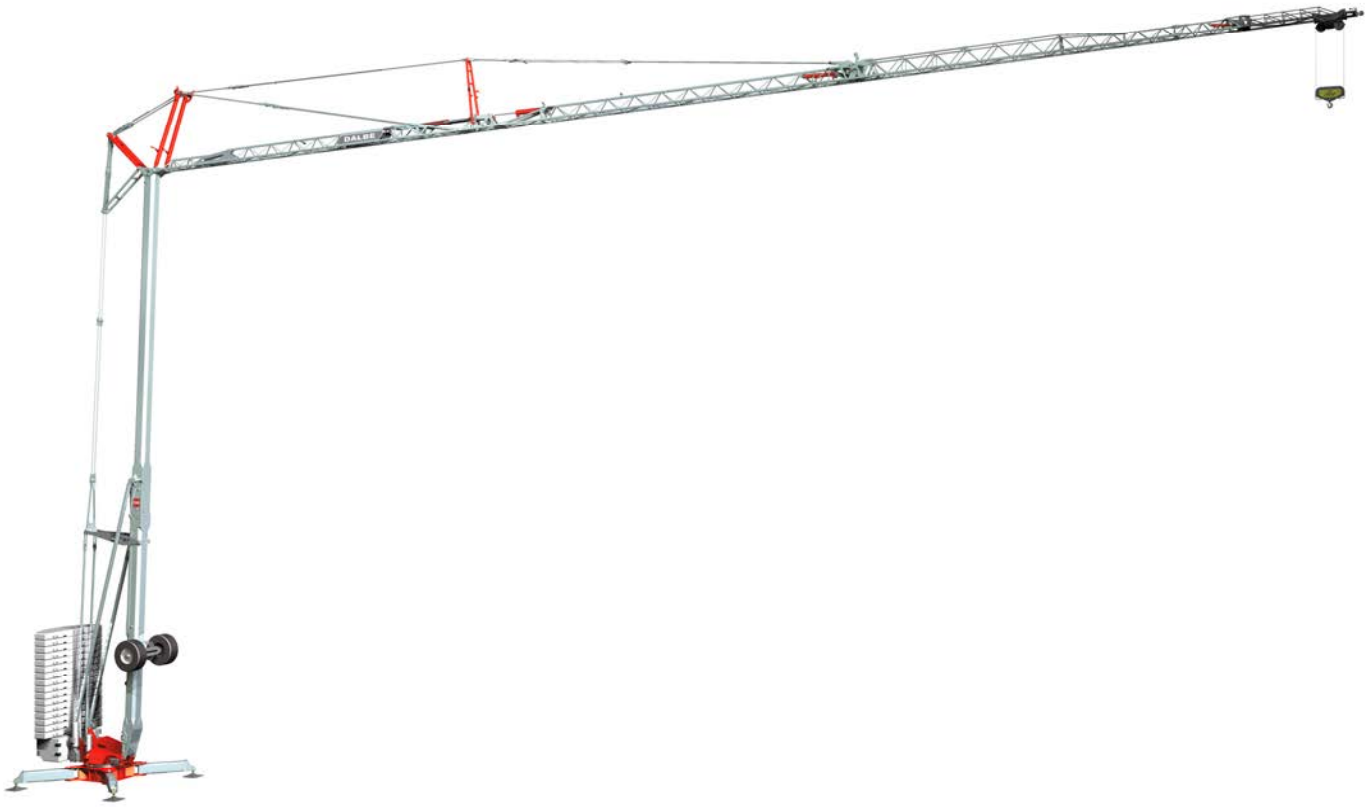
DB747
CRANE MANUAL

R / V / T type



DB747

GRU DALBE DB747

" V " - " R " - " T " type VERSION

S. No. _____

CONTENTS

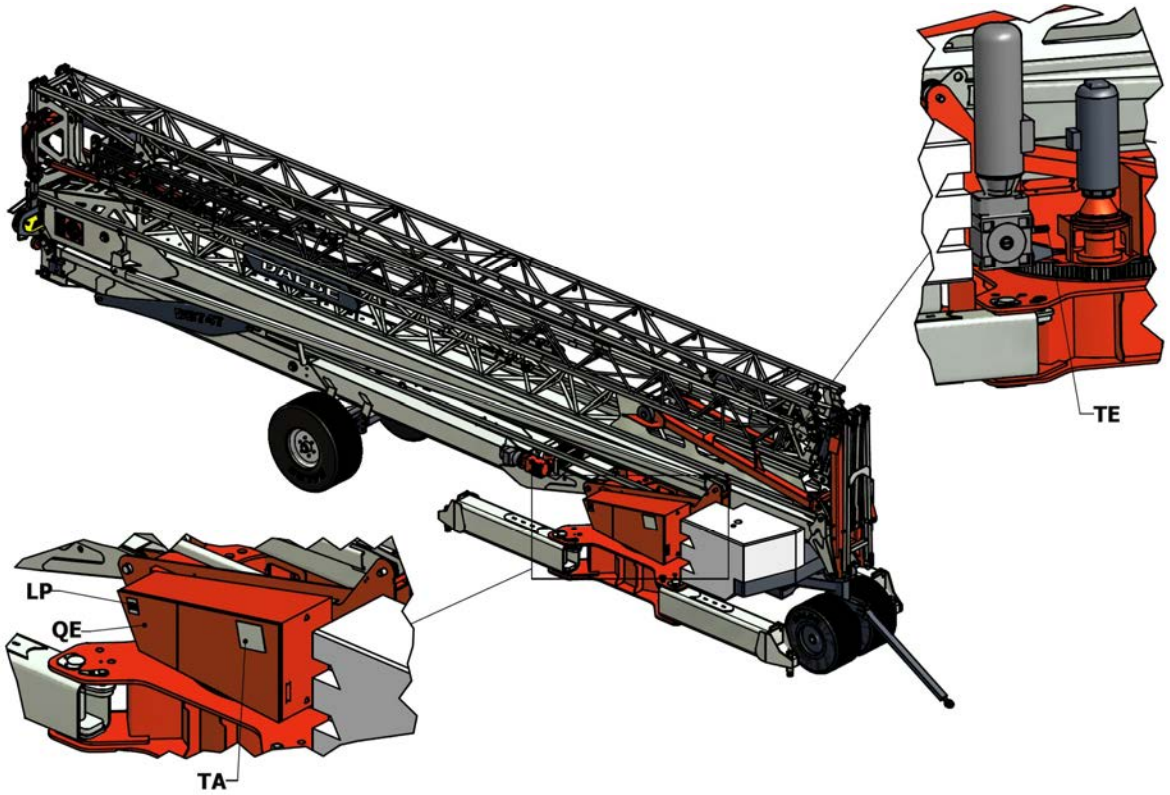
NOTE :

AT THE BOTTOM OF EACH PAGE, THERE IS THE TITLE WITH THE REVISION NUMBER AND THE YEAR OF REFERENCE.
IF NECESSARY, THE RELATED VALIDITY APPEARS WITH THE ITEM: " OF THE S. No ....."

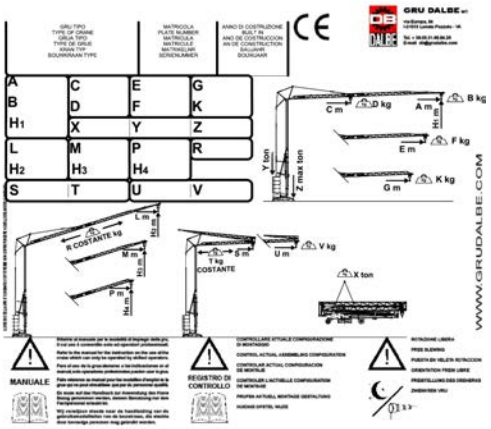
1 – MARKING

The building tower crane, in compliance with UNI-ISO 4306/1, is a discontinuous-use device intended to hoist from a rigid surface and handle in the space a unitary load, not driven, directly hung on the hook or with the interposition of the hoisting and/or sling accessories allowed.

The CE marking and the indication of the sound power are located at the top on the right side of the crane nameplate and is riveted outside the door of the electrical cabinet (see picture).



Picture 1



"TA" NAMEPLATE

"LP" INDICATION

KEY:

" LP " = SOUND POWER LEVEL
" QE " = ELECTRICAL CABINET
" TA" = NAMEPLATE
" TE" = SERIAL NUMBER INDICATION

2 - PRELIMINARY REMARKS

WARNING

2.1) USES, FUNCTIONS AND LIMITS OF THE USE MANUAL

THIS MANUAL IS ADDRESSED TO THE MACHINE OWNER AND USER AND SHALL BE ASSIGNED TO THE PERSON IN CHARGE OF THE BUILDING YARD, WHO, IN HIS TURN, WILL PLACE IT AT THE DISPOSAL OF QUALIFIED OPERATORS, IN CHARGE OF HANDLING, INSTALLATION, USE, SUPERVISION, MAINTENANCE, FINAL DISMANTLING ETC.

THE MAIN PURPOSE OF THIS MANUAL IS TO SUPPLY THE PROFESSIONAL OPERATORS WITH IMPORTANT INFORMATION ABOUT:

- EXPECTED USE CONDITIONS : CHAPTER 3
- BUILDING YARD PREPARATION: CHAPTER 5
- POSITIONING AND ERECTION: CHAPTER 8
- SAFETY AND CALIBRATION DEVICES: CHAPTER 9
- MACHINE ADJUSTMENT: CHAPTER 11
- CRANE DISASSEMBLY: CHAPTER 12
- ROUTINE MAINTENANCE : CHAPTER 13
- PERSONNEL'S TRAINING : CHAPTER 16
- AVAILABILITY OF SPARE PARTS : CHAPTER 18

CHAPTERS **8** AND **12** SHOW THE DESCRIPTIONS OF THE INSTALLATION, ERECTION AND DISASSEMBLY OPERATIONS, WHICH SHALL BE ASSIGNED TO PROFESSIONAL OPERATORS SPECIFICALLY EXPERIENCED.

THE GENERAL USE STANDARDS AND THE NATIONAL DIRECTIVES ARE NOT INDICATED SINCE THEY ARE ALREADY KNOWN TO THE PROFESSIONAL OPERATORS.

CONSEQUENTLY, THIS MANUAL CANNOT REPLACE COMPETENT AND SKILLED PROFESSIONAL OPERATORS.

DANGER

2.2) MANUAL PRESERVATION

THE MANUAL IS AN INTEGRAL PART OF THE MACHINE AND MUST BE KEPT BY THE PERSON IN CHARGE OF THE BUILDING YARD IN A SUITABLY PROTECTED PLACE, ALWAYS AT THE USER'S DISPOSAL FOR ANY CONSULTATION.

SHOULD THE MANUAL DETERIORATE, THUS HINDERING ITS CORRECT CONSULTATION, IMMEDIATELY ASK FOR A NEW COPY.

2.3) MANUAL UPDATING

THIS MANUAL REFERS TO THE STATE OF THE TECHNIQUE AT THE TIME OF THE CRANE MARKETING.

IT CANNOT BE CONSIDERED AS INADEQUATE ONLY BECAUSE IT HAS BEEN UPDATED ACCORDING TO NEW EXPERIENCES.
GRU DALBE RESERVES THE RIGHT TO UPDATE THE PRODUCTION AND THE MANUALS WITHOUT THE OBLIGATION TO UPDATE THE PREVIOUS PRODUCTION AND MANUALS, EVEN IF THE COMPANY RESERVES THE RIGHT TO CHANGE AND/OR INTEGRATE THE MANUALS RELATIVE TO CRANES PREVIOUSLY MARKETED.

IN THIS CASE, THE INTEGRATIONS SHALL BE SENT TO THE FIRST OWNERS, WHO SHALL ADD THEM TO THE ORIGINAL MANUAL AS AN INTEGRAL PART OF IT, OR SEND THEM TO THE NEW OWNERS IN CASE OF SALE OF THE CRANE.

WARNING

2.4) EXCLUSION OF RESPONSIBILITIES

THE MANUFACTURER REJECTS ALL RESPONSIBILITY FOR:

-IMPROPER USE OF THE CRANE

-IMPROPER USE OF THE CRANE PARTS

-USE OF THE CRANE WITH UNSKILLED PERSONNEL

-USE NOT IN ACCORDANCE WITH THE SPECIFIC NATIONAL STANDARDS

-USE NOT IN ACCORDANCE WITH THE SAFETY RULES IN FORCE

-EVEN PARTIAL INOBSERVANCE OF THE INSTRUCTIONS

-INADEQUATE PREPARATION OF THE BUILDING YARD

-INADEQUATE CHARACTERISTICS OF THE SOIL

-DEFECTS OF ELECTRIC POWER SUPPLY

-TAMPERING OF MACHINE PARTS

-UNAUTHORISED CHANGES AND/OR REPAIRS

-POOR MAINTENANCE

-USE OF NON-ORIGINAL SPARE PARTS

-USE OF SPARE PARTS NOT SPECIFIC FOR THE MACHINE

-EXCEPTIONAL EVENTS

2.5) COOPERATION WITH THE USER

THE USER CAN ASK OUR ASSISTANCE SERVICE FOR ANY OTHER EXPLANATION EVEN FOR THE UPDATING OF THE INSTRUCTION MANUAL.
IN CASE OF SALE OF THE CRANE TO THIRD PARTIES, THE USER IS INVITED TO NOTIFY "GRU DALBE" THE ADDRESS OF THE NEW OWNER IN ORDER TO ALLOW THE TRANSFER OF ANY INTEGRATION OF THE MANUAL

2.6) GENERAL SAFETY RULES

THE USER SHALL INSTRUCT THE PERSONNEL ON THE RISKS DERIVING FROM ACCIDENTS, THE SAFETY DEVICES AND ON THE SAFETY RULES PROVIDED BY THE DIRECTIVES AND LAWS OF THE COUNTRY WHERE THE MACHINE AND ITS ACCESSORIES ARE USED.

ANY DISTRACTION, NEGLIGENCE OR EXCESSIVE CONFIDENCE, AS WELL AS TIREDNESS AND SLEEPINESS, OFTEN CAUSE ACCIDENTS.

IT IS THEREFORE COMPULSORY TO READ THIS MANUAL VERY CAREFULLY AND UNDERSTAND ALL INSTRUCTIONS.

PAY ATTENTION TO THIS SYMBOL. IT REFERS TO A POTENTIAL DANGEROUS SITUATION

DANGERS CAN BE OF THREE LEVELS:

DANGER

THE SIGNAL OF "DANGER" IS THE SIGNAL OF MAXIMUM DANGER LEVEL AND WARNS THE USER THAT, IF THE OPERATIONS ARE NOT CORRECTLY CARRIED OUT, THEY MAY CAUSE SERIOUS WOUNDS, DEATH OR LONG-TERM RISKS FOR HEALTH.

WARNING

THE SIGNAL OF "WARNING" WARNS THE USER THAT, IF THE OPERATIONS ARE NOT CORRECTLY CARRIED OUT, THEY MAY CAUSE SERIOUS WOUNDS, DEATH OR LONG-TERM RISKS FOR HEALTH.

CAUTION

THE SIGNAL OF "CAUTION" WARNS THE USER THAT, IF THE OPERATIONS ARE NOT CORRECTLY CARRIED OUT, THEY MAY CAUSE DAMAGES TO MACHINE AND/OR PEOPLE.

THE MANUFACTURER REJECTS ANY RESPONSIBILITY FOR THE INOBSERVANCE OF THE SAFETY RULES PROVIDED BY THE LAWS OF THE COUNTRY WHERE THE MACHINE IS USED AND OF THE PRESCRIPTIONS INCLUDED IN THIS MANUAL.

2.7) TERMS ADOPTED

THE FOLLOWING PARAGRAPH DESCRIBES THE PERSONS AND SPECIFIC SITUATIONS THAT MAY DIRECTLY INVOLVE THE EQUIPMENT AND/OR THE PEOPLE INTO DIRECT CONTACT WITH THE MACHINE.

-USER: THE USER IS THE PERSON OR THE COMPANY THAT BOUGHT OR HIRED THE EQUIPMENT AND ITS ACCESSORIES AND THAT INTENDS TO USE THEM IN ACCORDANCE WITH THE PRESCRIBED USES. HE IS RESPONSIBLE FOR THE EQUIPMENT AND TRAINING OF THE OPERATORS WORKING AROUND THE MACHINE.

-DANGEROUS AREA: ANY AREA INSIDE AND/OR CLOSE TO THE MACHINE WHERE THE PRESENCE OF AN EXPOSED PERSON IS A RISK FOR THE SAFETY AND HEALTH OF THE ABOVE PERSON.

-EXPOSED PERSON: ANY PERSON WHOLLY OR PARTIALLY IN A DANGEROUS AREA.

-OPERATOR: PERSON OR PERSONS IN CHARGE OF INSTALLATION, OPERATION, ADJUSTMENT, MAINTENANCE, CLEANING, REPAIR OR TRANSPORT OF THE MACHINE.

-SPECIALIZED PERSONNEL: PERSONS SUITABLY TRAINED TO CARRY OUT MAINTENANCE AND REPAIR OPERATIONS THAT REQUIRE A SPECIFIC KNOWLEDGE OF THE EQUIPMENT, ITS WORKING, SAFETY DEVICES AND WHO ARE ABLE TO IDENTIFY THE DANGERS DERIVING FROM THE USE OF THE EQUIPMENT AND TO CONSEQUENTLY AVOID THEM.

-AUTHORIZED SERVICE CENTRE: THE AUTHORIZED SERVICE CENTRE IS THE STRUCTURE, LEGALLY AUTHORIZED BY THE MANUFACTURER, THAT IS PROVIDED WITH SPECIALIZED AND SKILLED PERSONNEL ABLE TO CARRY OUT ALL ASSISTANCE, MAINTENANCE AND REPAIR OPERATIONS, WHICH ARE NECESSARY IN ORDER TO KEEP THE MACHINE PERFECTLY WORKING

3 – USE CONDITIONS

THE TOWER CRANE IS A DEVICE INTENDED FOR PROFESSIONAL USE FOR HOISTING AND TRANSPORTING MATERIALS.

THE FOLLOWING TERMS ARE ADDRESSED ONLY TO QUALIFIED PERSONNEL.

THEREFORE, IT IS FORBIDDEN TO ASSIGN THE INSTALLATION, ASSEMBLY, DISASSEMBLY, USE AND MAINTENANCE TO PEOPLE AND/OR COMPANIES OF WHICH THE NECESSARY ABILITIES ARE NOT PROVED.

3.1) MACHINE DESCRIPTION

THE BOTTOM-SLEWING CRANE IS COMPOSED OF THE FOLLOWING MAIN PARTS:

- UNDERCARRIAGE OF ELECTRO-WELDED SHEET, TO WHICH THE 4 MOVABLE ARMS ARE CONNECTED; SUCH ARMS INCORPORATE THE SCREW JACKS (THREADED STABILIZERS) THAT ACT ON STEEL SUPPORTS HAVING A PROPER SEAT.

- SLEWING RING PLATE, WHICH PERMANENTLY CONNECTS, BY MEANS OF SPECIAL SCREWS, THE FIXED BASE OF THE CRANE, OR UNDERCARRIAGE, TO THE SLEWING PART.

- SLEWING PLATFORM, MADE UP OF ELECTRO-WELDED SECTION BARS, WHICH SUPPORTS THE HOISTING WINCH (CONSISTING OF THREADED DRUM, SHAFT, SHAFT-MOUNTED BEVEL GEAR MOTOR, ELECTRIC MOTOR, SWINGING SUPPORTS AND LIMIT SWITCHES), THE SLEWING GEAR MOTOR, THE ELECTRIC EQUIPMENT, THE HYDRAULIC CENTRAL UNIT (COMPOSED OF MOTOR, GEAR PUMP, SOLENOID VALVES, TANK), THE ERECTION BALLAST. THE FRONT STEERING AXLE IS CONNECTED TO THE SLEWING PLATFORM BY MEANS OF A CONNECTING ELEMENT (ADAPTER) FOR THE TOWING ON RUBBER WHEELS.

- LOWER MAST, MADE UP OF CARPENTRY, WITH VARIABLE SECTION, OF ELECTRO-WELDED BENT SHEET, TO WHICH THE HYDRAULIC CYLINDER OF THE MAST USED FOR THE ERECTION IS HINGED AND FASTENED TO CONNECTING RODS. THE LOWER MAST HOUSES THE TROLLEY TRANSLATION WINCH (COMPOSED OF THREADED DRUM, GEAR MOTOR, MOTOR, SUPPORTS, LIMIT SWITCHES)
THE LOWER PART OF THE MAST HOUSES THE CONNECTIONS FOR THE REAR RUBBER AXLE (AVAILABLE ALSO IN DIFFERENT VERSIONS).

- UPPER MAST, MADE UP OF CARPENTRY, WITH OCTAGONAL SECTION OF ELECTRO-WELDED BENT SHEET, WITH THE CONNECTIONS FOR THE JIB AND FOR THE UPPER CONNECTING ROD FASTENED TO THE HYDRAULIC CYLINDER USED FOR THE CRANE ERECTION AND MAST ALIGNMENT.

-JIB: TRESTLE FRAME, BENT SHEET, COMPOSED OF FIVE JIB ELEMENTS; THE MAIN ELEMENTS ARE FIXED BY MEANS OF HINGES. THE JIB IS FASTENED TO THE BEARING TIE RODS HINGED TO THE SCREW DOWN JACKS WHICH REST ON THE MAST HEAD AND ON THE ADAPTER, OF ELECTRO-WELDED SHEET, CONNECTED TO ELEMENTS 1 AND 2 OF THE JIB, UNDER WHICH THE TROLLEY IS POSITIONED IN THE ERECTION/TRANSPORT PHASE OF THE CRANE. THE JIB HOUSES FOUR HYDRAULIC CYLINDERS FOR ITS OVERHEAD OPENING AND CLOSING THROUGH HYDRAULIC OPERATION.

-VERTICAL TIE RODS, PARTIALLY COMPOSED OF ROPES AND CONNECTED TO THE SLEWING PLATFORM ON ONE END AND ON THE OTHER END TO THE SCREW DOWN JACKS AND TIE RODS ON THE UPPER MAST HEAD.

-SAFETY DEVICES COMPOSED OF STATIC AND DYNAMIC MOMENT LIMITING DEVICE (QMS SYSTEM), LOAD LIMITING DEVICE (QLS SYSTEM), HOISTING, SLEWING AND TROLLEY LIMIT SWITCHES INTEGRATED INTO THE “E-TROLLEY” SYSTEM.

- DISTRIBUTOR TROLLEY GROUP, TRAVELLING ON THE LOWER LONGITUDINAL MEMBERS OF THE JIB, ON WHICH THE BLOCK AND THE PICK-UP MEMBER ARE HUNG.

NOTE: THE HOISTING ACCESSORIES USED (LOAD SLING SYSTEM, ELECTRIC POWER SUPPLY) DO NOT BELONG TO THE CRANE.

ANY SPECIFIC RESPONSIBILITY ARISING FROM THEIR USE ARE AT THE USER'S CHARGE.

3.2) CLASSIFICATION OF THE EQUIPMENT IN ACCORDANCE WITH CALCULATION RULE

THE TOWER CRANE IS DIMENSIONED ACCORDING TO DIN 15018 RULES, H1 CLASS, B2/B3 STRESS GROUP.

3.3) FORESEEN CONFIGURATIONS

THE FORESEEN CONFIGURATIONS FOR THE OPERATING MACHINE ARE:

– **EXTENDED HORIZONTAL JIB** (JIB 40m)

– **EXTENDED HORIZONTAL JIB** (JIB 45m)

– **INTERMEDIATE LUFFING JIB** (ONLY HOISTING WITH TWO-FALL ROPE - JIB 40m)

– **INTERMEDIATE LUFFING JIB** (ONLY HOISTING WITH TWO-FALL ROPE - JIB 45m)

– **MAXIMUM LUFFING JIB** (ONLY HOISTING WITH TWO-FALL ROPE - JIB 40m)

– **MAXIMUM LUFFING JIB** (ONLY HOISTING WITH TWO-FALL ROPE - JIB 45m)

– **JIB WITH FOLDED NOSE** (ONLY FOR CRANES WITH JIB 45m)

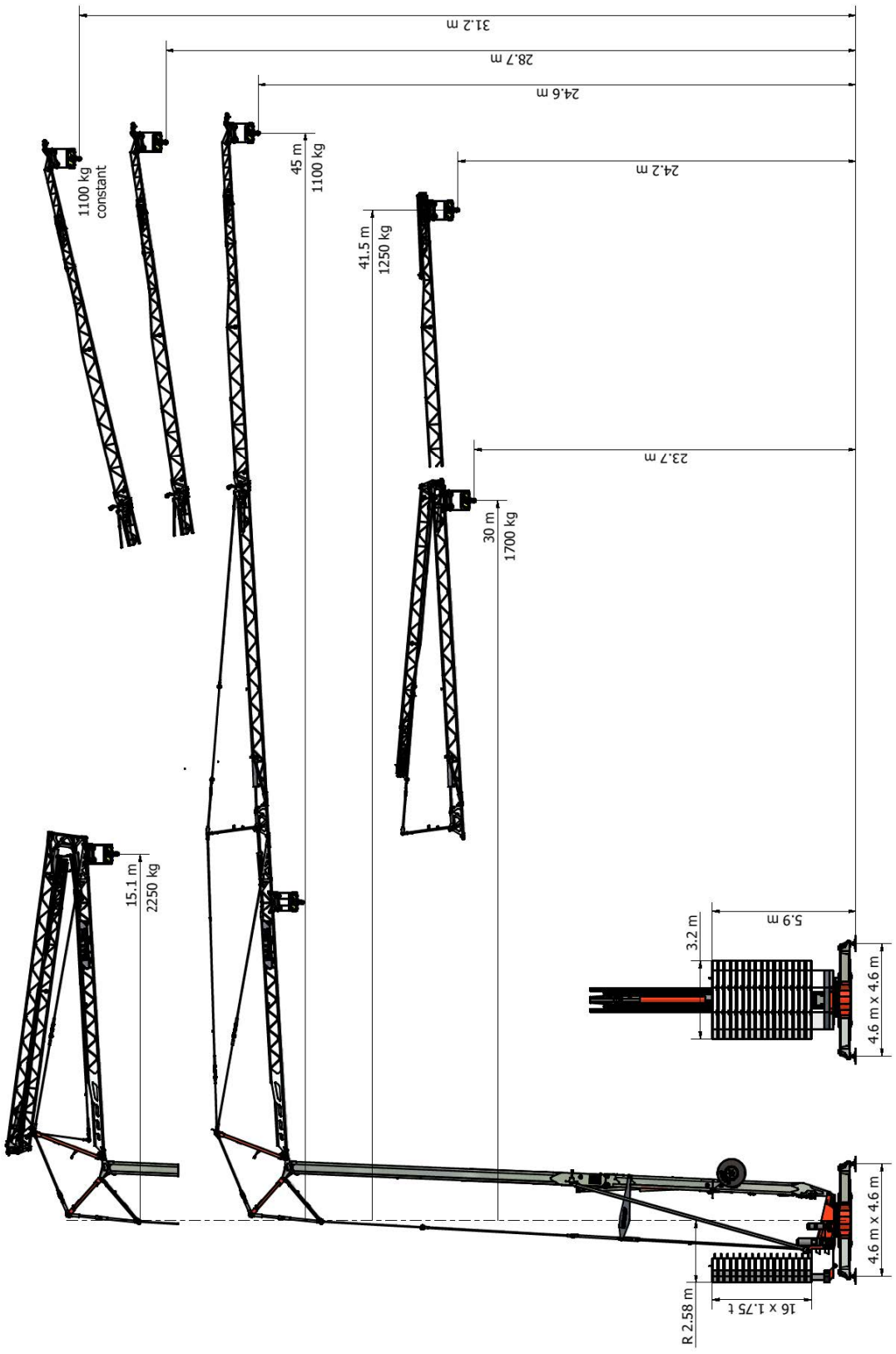
– **JIB WITH THIRD ELEMENT FOLDED** (CRANE WITH JIB 40m)

– **JIB WITH THIRD ELEMENT FOLDED** (CRANE WITH JIB 45m)

– **WHOLLY FOLDED JIB**

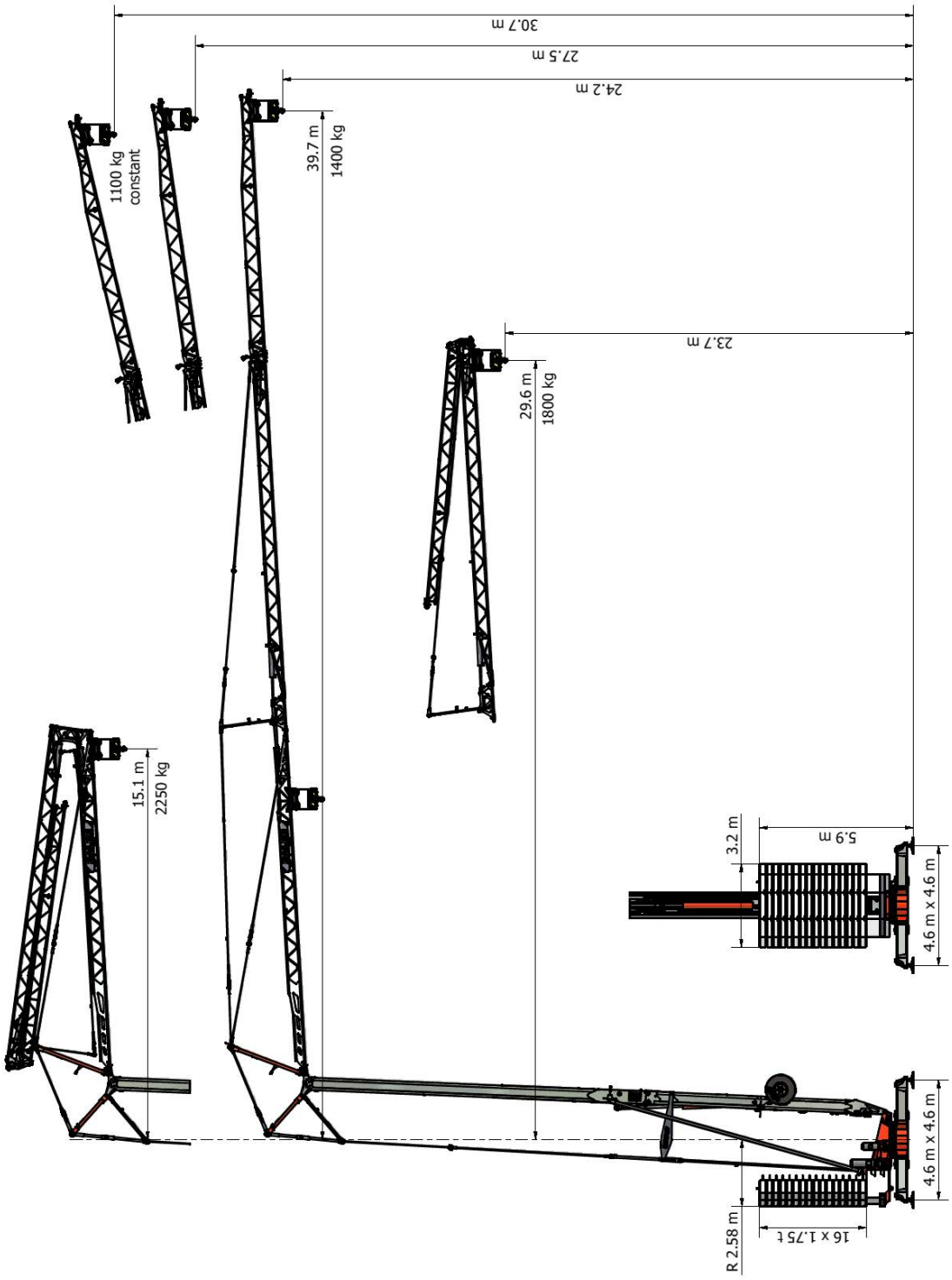
3.3.1) CONFIGURATION DIAGRAM

JIB 45m



Picture 1

JIB 40m



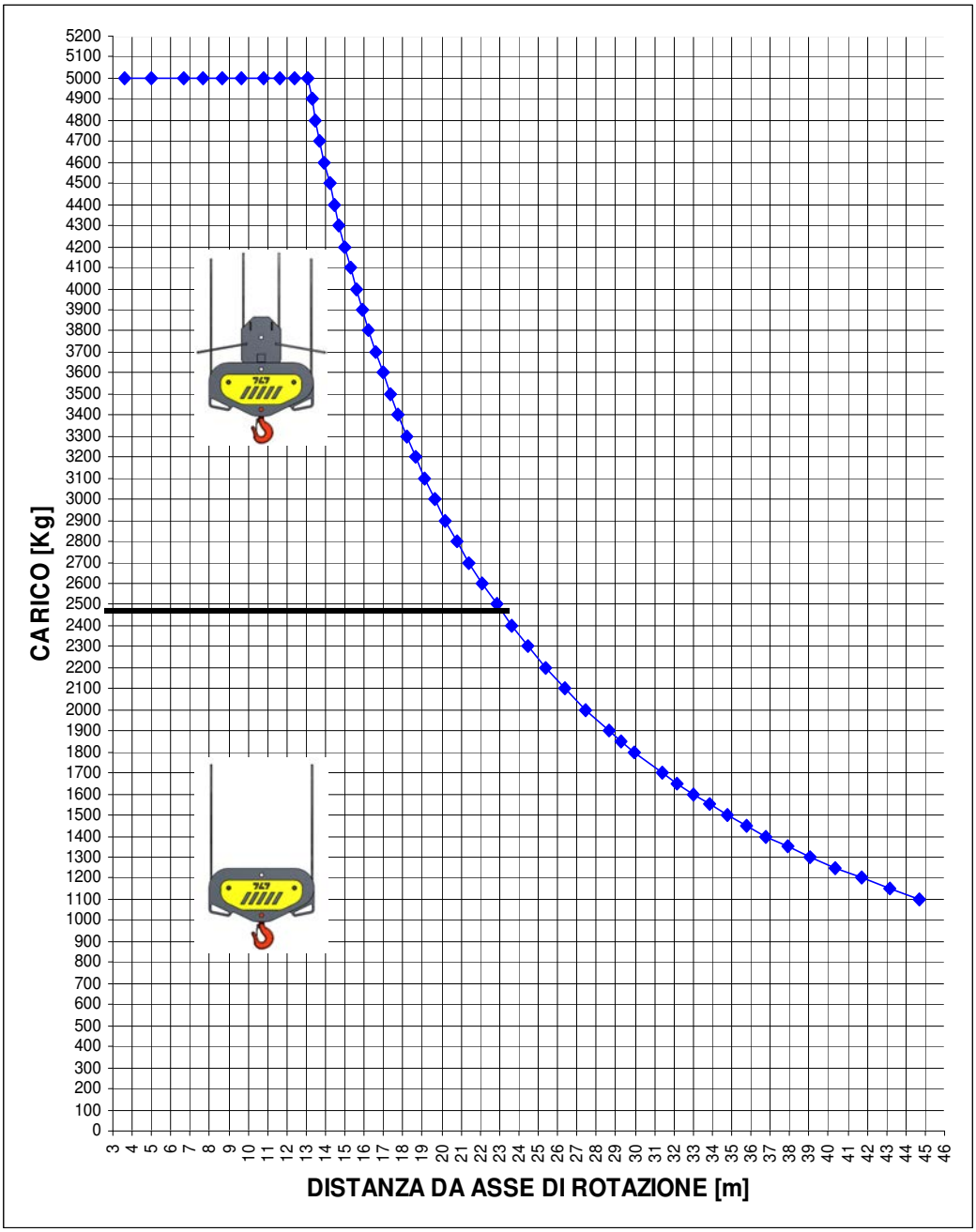
Picture 2

3.3.2) LOAD DIAGRAM

3.3.2.1) LOAD DIAGRAM - CRANE WITH HORIZONTAL JIB 45m - (V VERS.)

Kg	m.
1100	44,7
1150	43,1
1200	41,7
1250	40,3
1300	39,1
1350	37,9
1400	36,8
1450	35,8
1500	34,8
1550	33,9
1600	33,0
1650	32,2
1700	31,4
1800	29,9
1850	29,3
1900	28,6
2000	27,5
2100	26,4
2200	25,4
2300	24,5
2400	23,6
2500	22,8
2600	22,1
2700	21,4
2800	20,8
2900	20,2
3000	19,7
3100	19,1
3200	18,7
3300	18,2
3400	17,8
3500	17,3
3600	17,0
3700	16,6
3800	16,2
3900	15,9
4000	15,6
4100	15,3
4200	15,0
4300	14,7
4400	14,5
4500	14,2
4600	14,0
4700	13,7
4800	13,5
4900	13,3
5000	13,1
5000	3,6

LOAD (Kg)



DISTANCE FROM SLEWING AXIS [m]

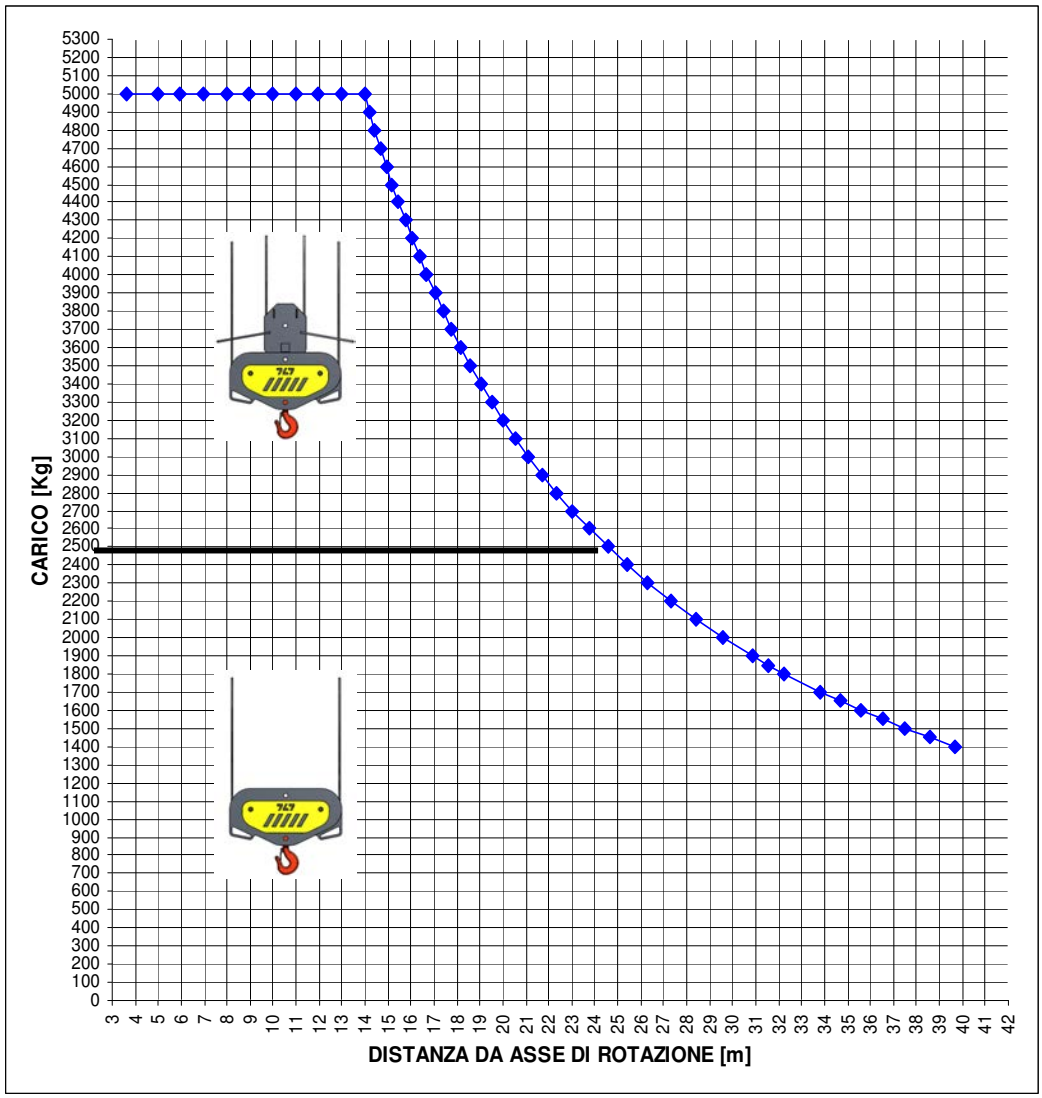
TWO-FALL ROPE

FOUR-FALL ROPE

3.3.2.2) LOAD DIAGRAM - CRANE WITH HORIZONTAL JIB 40m - (V VERS.)

LOAD (Kg)

[Kg]	m.
1400	39,7
1450	38,6
1500	37,5
1550	36,5
1600	35,6
1650	34,7
1700	33,8
1800	32,3
1850	31,5
1900	30,9
2000	29,6
2100	28,4
2200	27,3
2300	26,3
2400	25,4
2500	24,6
2600	23,8
2700	23,0
2800	22,4
2900	21,7
3000	21,1
3100	20,6
3200	20,0
3300	19,5
3400	19,1
3500	18,6
3600	18,2
3700	17,8
3800	17,4
3900	17,0
4000	16,7
4100	16,4
4200	16,0
4300	15,7
4400	15,5
4500	15,2
4600	14,9
4700	14,7
4800	14,4
4900	14,2
5000	14,0
5000	13,0
5000	12,0
5000	11,0
5000	9,0
5000	7,0
5000	3,6



DISTANCE FROM SLEWING AXIS [m]

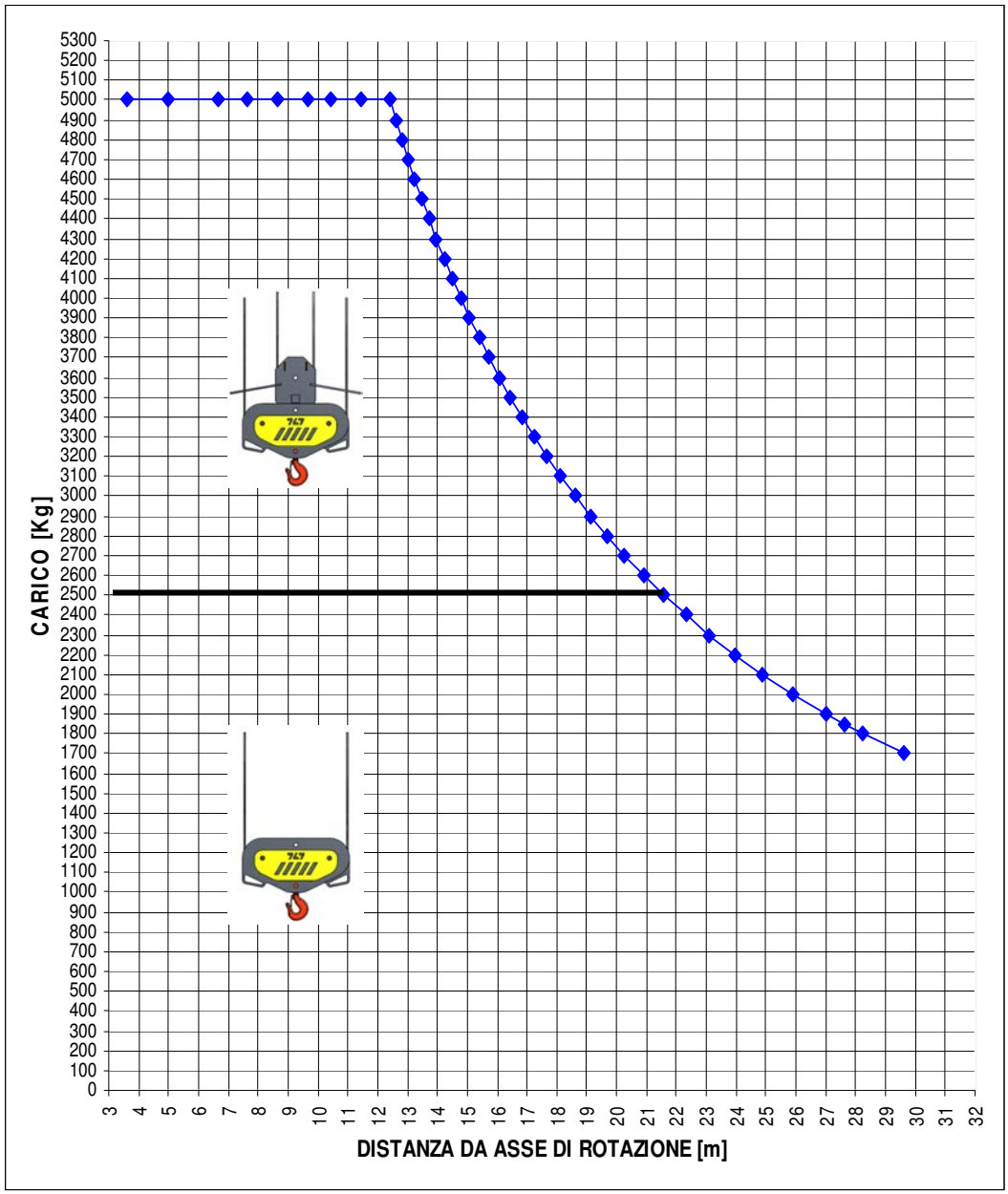
TWO-FALL ROPE

FOUR-FALL ROPE

3.3.2.3) LOAD DIAGRAM - CRANE WITH HORIZONTAL JIB 45m THIRD ELEMENT FOLDED - (V VERS.)

LOAD [Kg]

[Kg]	m.
1700	29,6
1800	28,2
1850	27,6
1900	27,0
2000	25,9
2100	24,9
2200	24,0
2300	23,1
2400	22,3
2500	21,6
2600	20,9
2700	20,3
2800	19,7
2900	19,1
3000	18,6
3100	18,1
3200	17,7
3300	17,2
3400	16,8
3500	16,4
3600	16,1
3700	15,7
3800	15,4
3900	15,1
4000	14,8
4100	14,5
4200	14,2
4300	14,0
4400	13,7
4500	13,5
4600	13,2
4700	13,0
4800	12,8
4900	12,6
5000	12,4
5000	11,4
5000	10,4
5000	9,7
5000	8,7
5000	7,7
5000	6,7
5000	5,7
5000	3,6



DISTANCE FROM SLEWING AXIS [m]

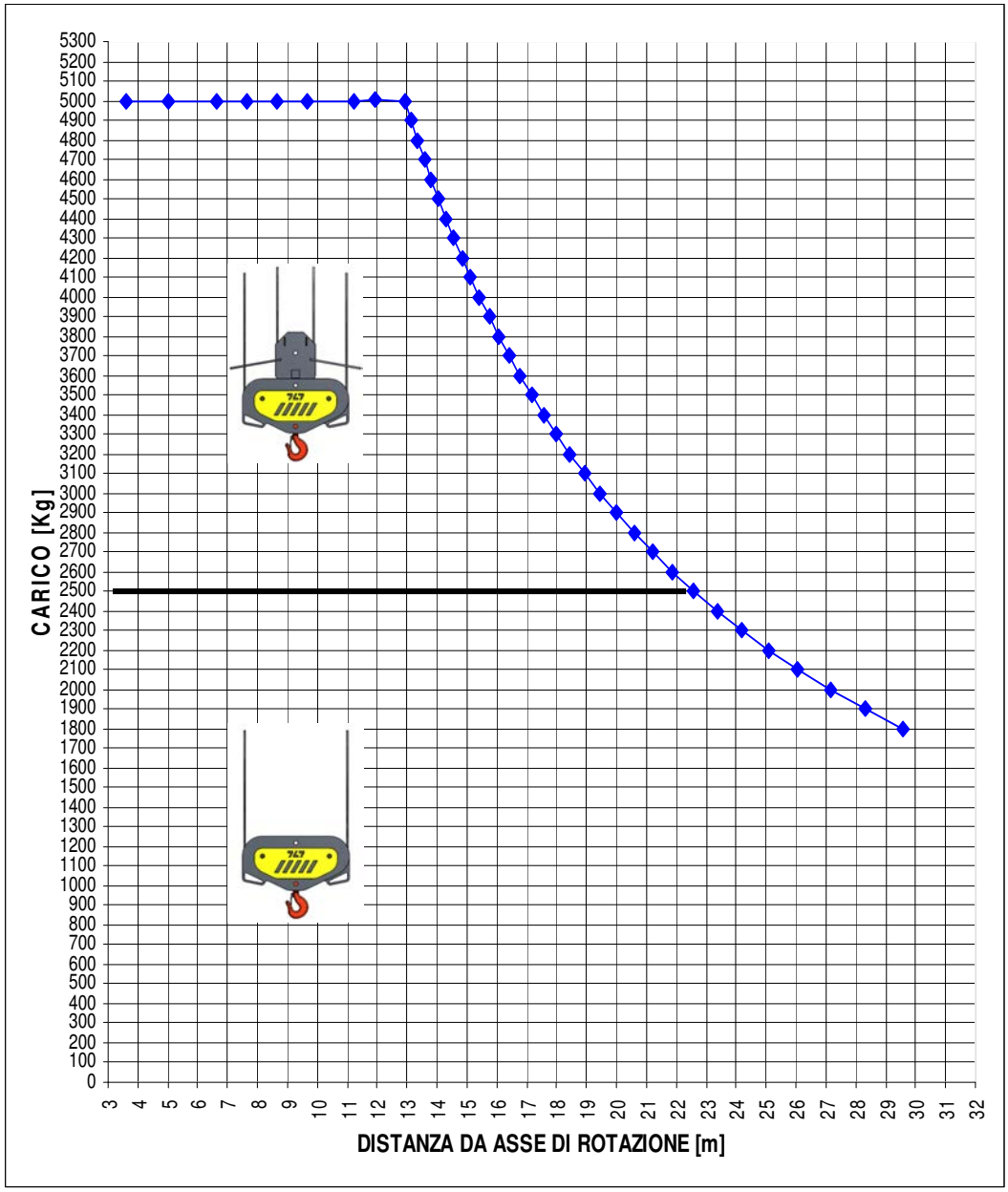
TWO-FALL ROPE

FOUR-FALL ROPE

3.3.2.4) LOAD DIAGRAM - CRANE WITH HORIZONTAL JIB 40m THIRD ELEMENT FOLDED - (V VERS.)

[Kg]	m.
1800	29,6
1900	28,3
2000	27,1
2100	26,1
2200	25,1
2300	24,2
2400	23,4
2500	22,6
2600	21,9
2700	21,2
2800	20,6
2900	20,0
3000	19,5
3100	18,9
3200	18,5
3300	18,0
3400	17,6
3500	17,2
3600	16,8
3700	16,4
3800	16,1
3900	15,7
4000	15,4
4100	15,1
4200	14,8
4300	14,6
4400	14,3
4500	14,1
4600	13,8
4700	13,6
4800	13,4
4900	13,1
5000	12,9
5001	11,9
5000	11,2
5000	9,7
5000	8,7
5000	7,7
5000	6,7
5000	5,7
5000	3,6

LOAD [Kg]



DISTANCE FROM SLEWING AXIS [m]

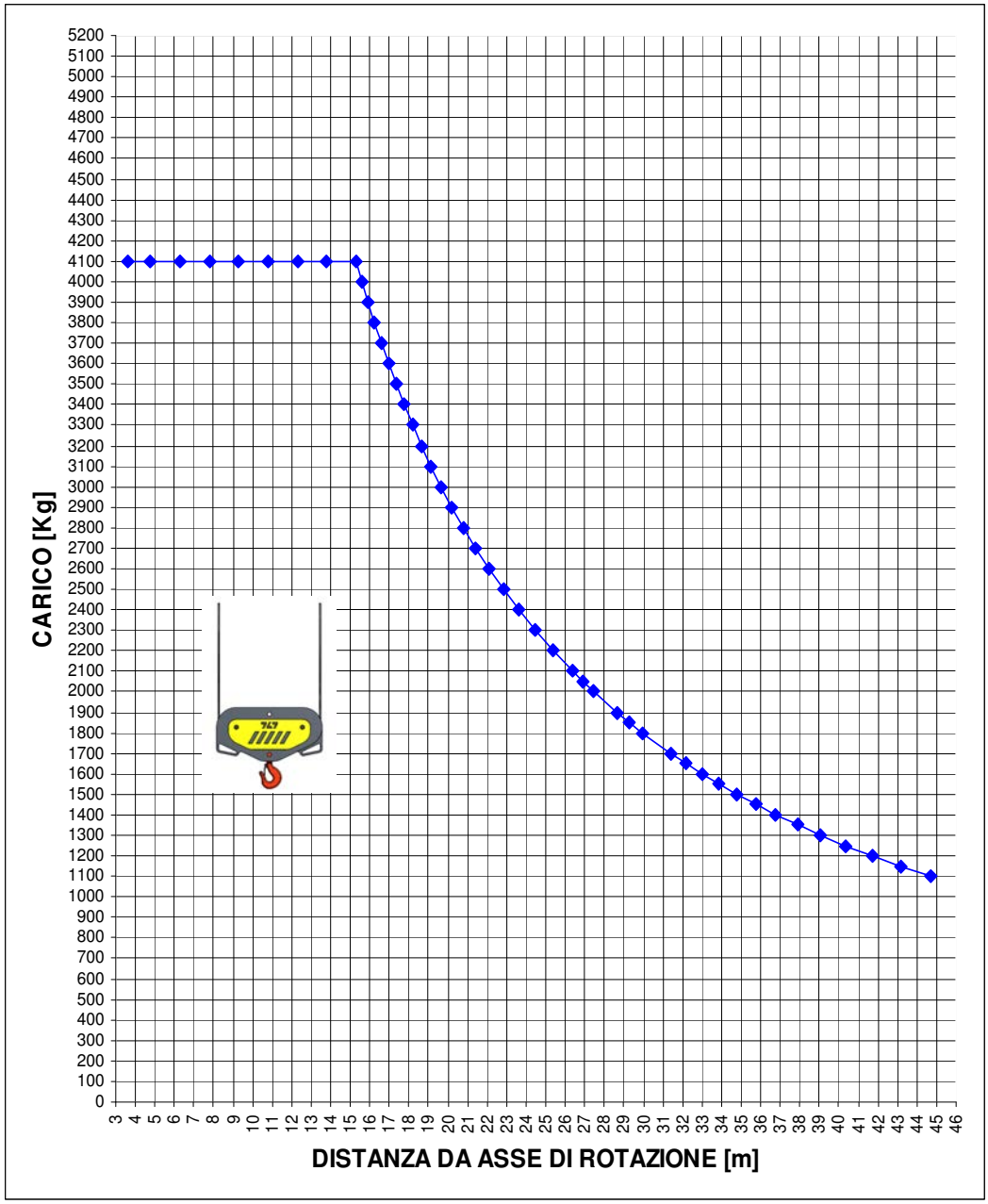
TWO-FALL ROPE

FOUR-FALL ROPE

3.3.2.5) LOAD DIAGRAM - CRANE WITH HORIZONTAL JIB 45m (T VERS.)

Kg	m.
1100	44,7
1150	43,1
1200	41,7
1250	40,3
1300	39,1
1350	37,9
1400	36,8
1450	35,8
1500	34,8
1550	33,9
1600	33,0
1650	32,2
1700	31,4
1800	29,9
1850	29,3
1900	28,6
2000	27,5
2050	26,9
2100	26,4
2200	25,4
2300	24,5
2400	23,6
2500	22,8
2600	22,1
2700	21,4
2800	20,8
2900	20,2
3000	19,7
3100	19,1
3200	18,7
3300	18,2
3400	17,8
3500	17,3
3600	17,0
3700	16,6
3800	16,2
3900	15,9
4000	15,6
4100	15,3
4100	13,8
4100	12,3
4100	10,8
4100	9,3
4100	7,8
4100	6,3
4100	4,8
4100	3,6

LOAD [Kg]



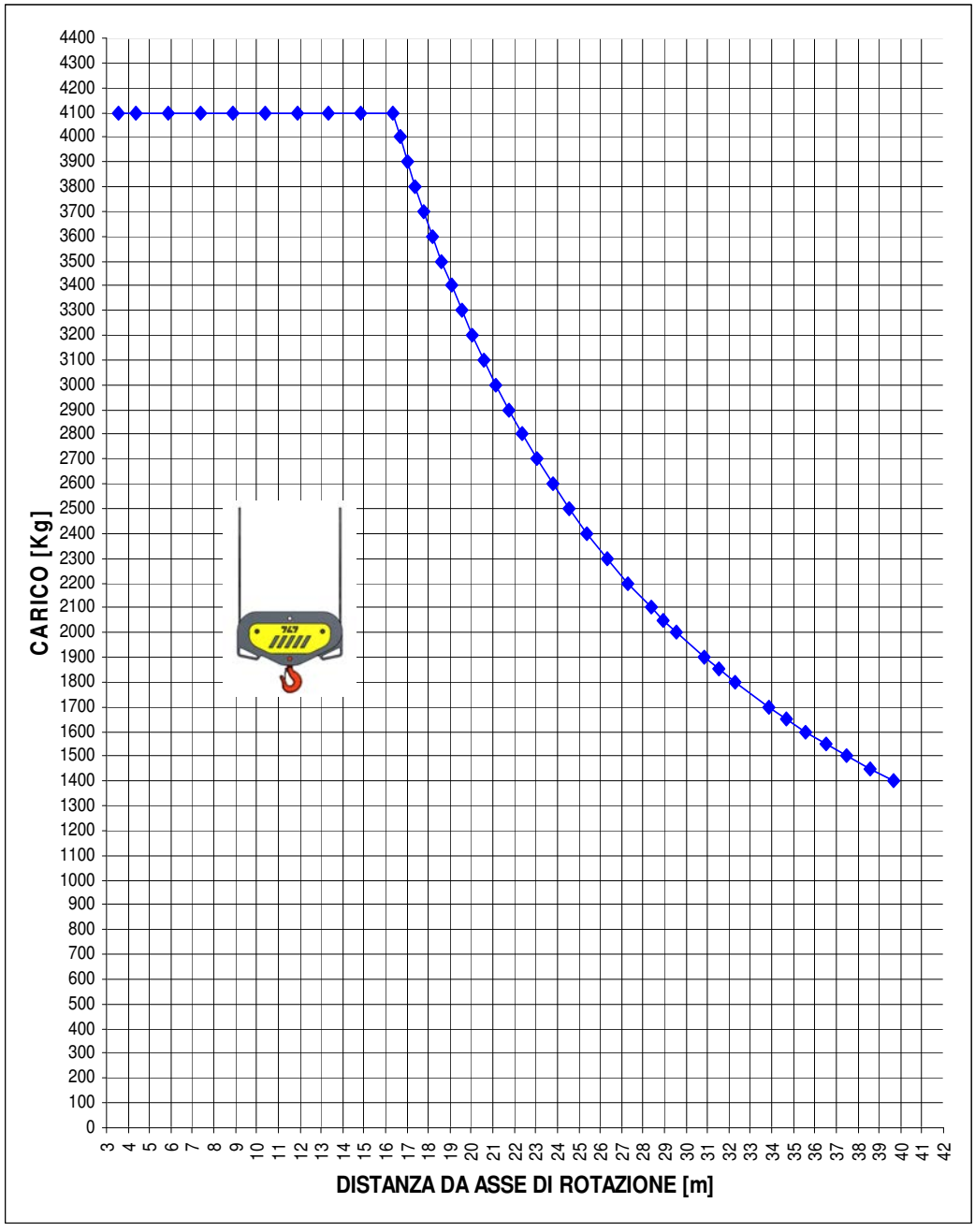
DISTANCE FROM SLEWING AXIS [m]

TWO-FALL ROPE

3.3.2.6) LOAD DIAGRAM - CRANE WITH HORIZONTAL JIB 40m - (T VERS.)

LOAD [Kg]

[Kg]	m.
1400	39,7
1450	38,6
1500	37,5
1550	36,5
1600	35,6
1650	34,7
1700	33,8
1800	32,3
1850	31,5
1900	30,9
2000	29,6
2050	29,0
2100	28,4
2200	27,3
2300	26,3
2400	25,4
2500	24,6
2600	23,8
2700	23,0
2800	22,4
2900	21,7
3000	21,1
3100	20,6
3200	20,0
3300	19,5
3400	19,1
3500	18,6
3600	18,2
3700	17,8
3800	17,4
3900	17,0
4000	16,7
4100	16,4
4100	14,9
4100	13,4
4100	11,9
4100	10,4
4100	8,9
4100	7,4
4100	5,9
4100	4,4
4100	3,6



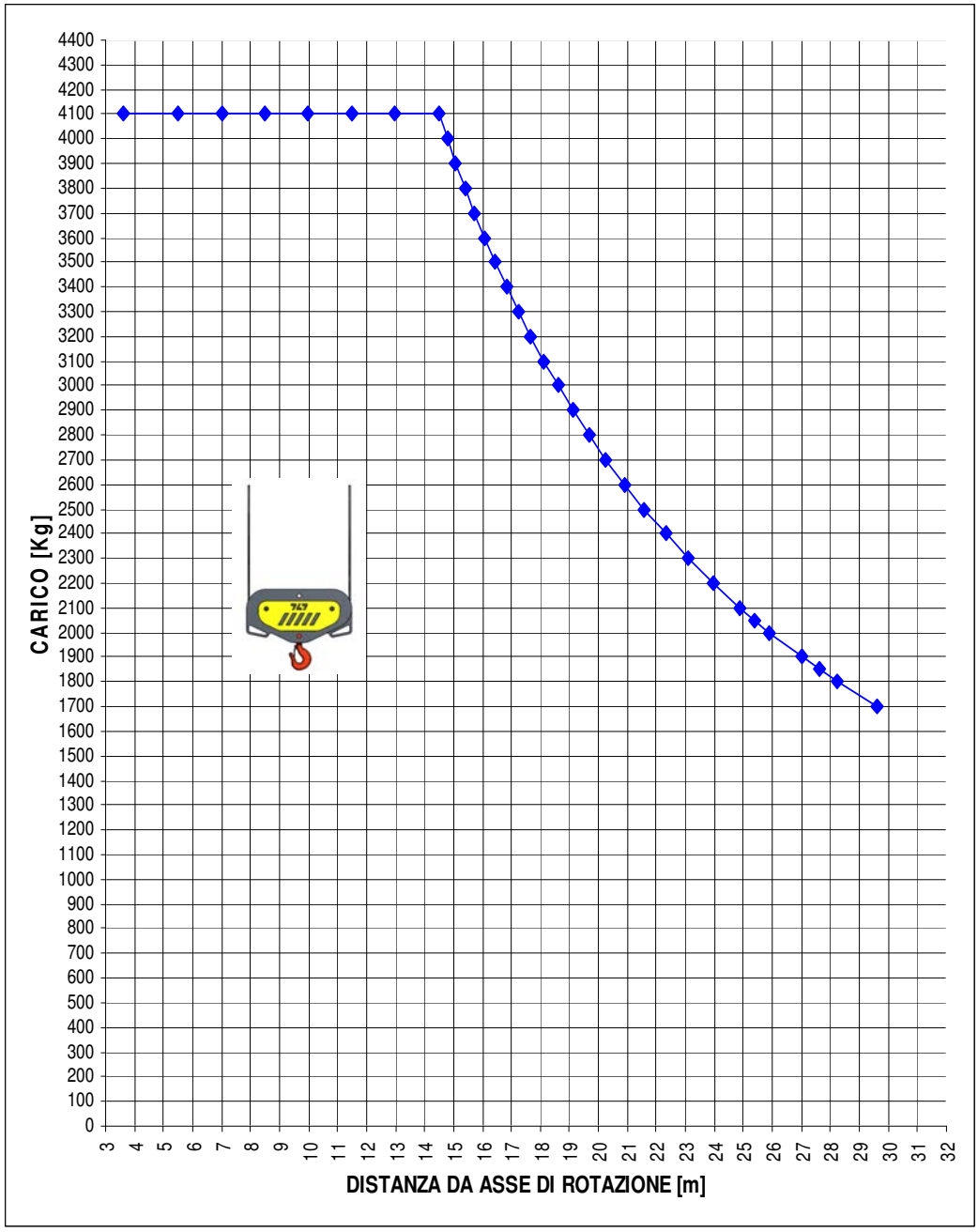
DISTANCE FROM SLEWING AXIS [m]

TWO-FALL ROPE

3.3.2.7) LOAD DIAGRAM - CRANE WITH HORIZONTAL JIB 45m THIRD ELEMENT FOLDED - (T VERS.)

LOAD [Kg]

[Kg]	m.
1700	29,6
1800	28,2
1850	27,6
1900	27,0
2000	25,9
2050	25,4
2100	24,9
2200	24,0
2300	23,1
2400	22,3
2500	21,6
2600	20,9
2700	20,3
2800	19,7
2900	19,1
3000	18,6
3100	18,1
3200	17,7
3300	17,2
3400	16,8
3500	16,4
3600	16,1
3700	15,7
3800	15,4
3900	15,1
4000	14,8
4100	14,5
4100	13,0
4100	11,5
4100	10,0
4100	8,5
4100	7,0
4100	5,5
4100	3,6



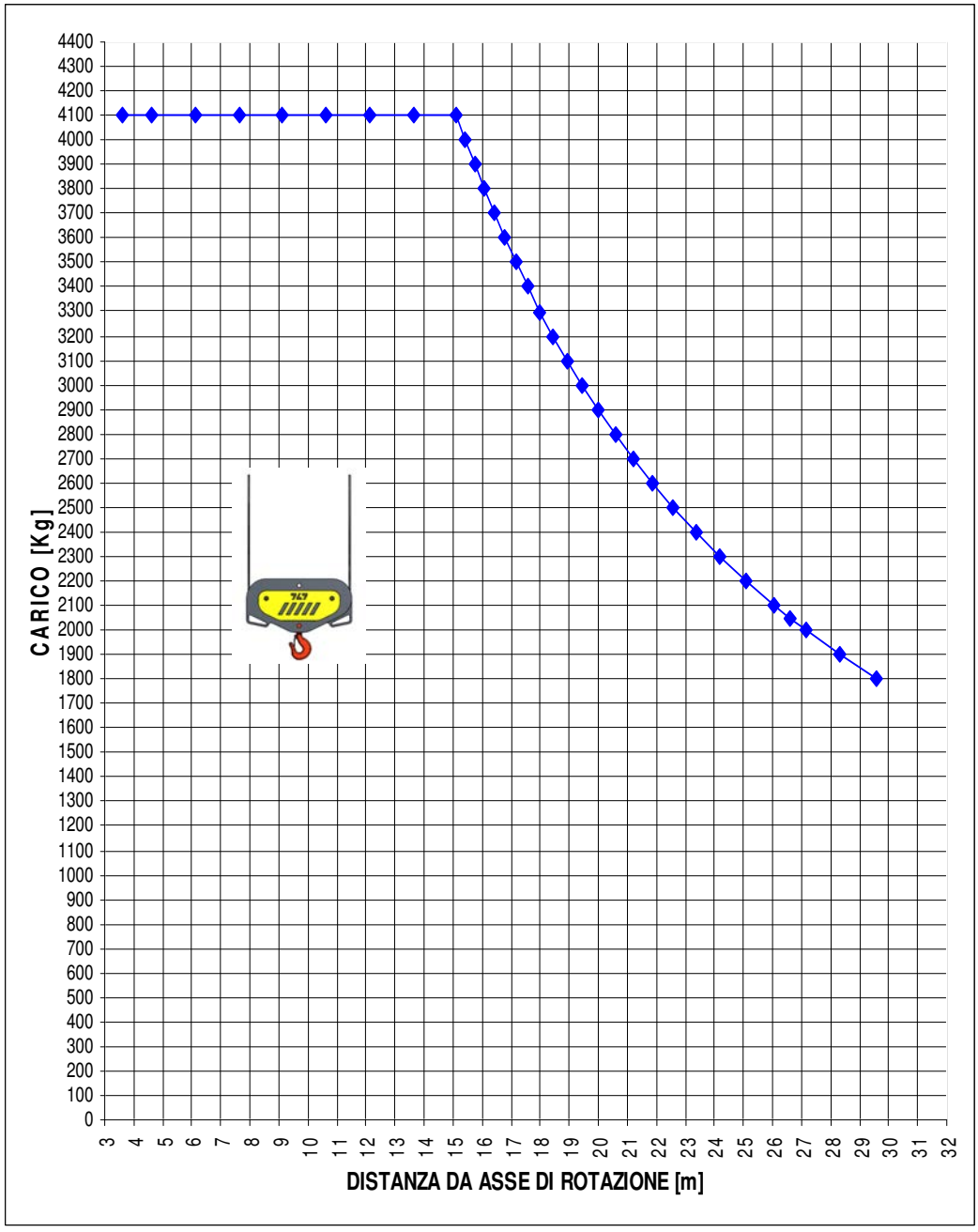
DISTANCE FROM SLEWING AXIS [m]

TWO-FALL ROPE

3.3.2.8) LOAD DIAGRAM - CRANE WITH HORIZONTAL JIB 40m THIRD ELEMENT FOLDED - (T VERS.)

LOAD [Kg]

[Kg]	m.
1800	29,6
1900	28,3
2000	27,1
2050	26,6
2100	26,1
2200	25,1
2300	24,2
2400	23,4
2500	22,6
2600	21,9
2700	21,2
2800	20,6
2900	20,0
3000	19,5
3100	18,9
3200	18,5
3300	18,0
3400	17,6
3500	17,2
3600	16,8
3700	16,4
3800	16,1
3900	15,7
4000	15,4
4100	15,1
4100	13,6
4100	12,1
4100	10,6
4100	9,1
4100	7,6
4100	6,1
4100	4,6
4100	3,6



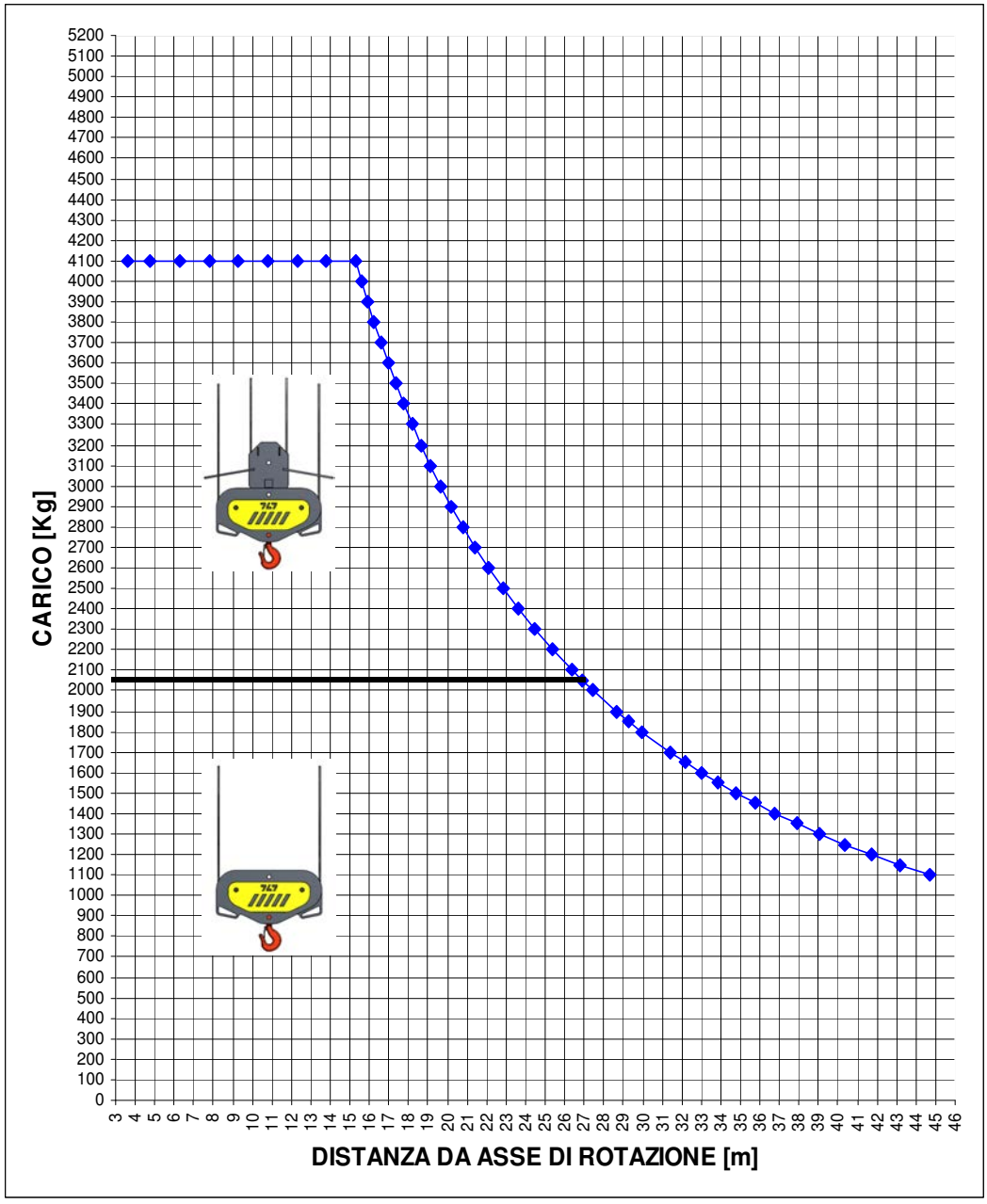
DISTANCE FROM SLEWING AXIS [m]

TWO-FALL ROPE

3.3.2.9) LOAD DIAGRAM - CRANE WITH HORIZONTAL JIB 45m (R VERS.)

Kg	m.
1100	44,7
1150	43,1
1200	41,7
1250	40,3
1300	39,1
1350	37,9
1400	36,8
1450	35,8
1500	34,8
1550	33,9
1600	33,0
1650	32,2
1700	31,4
1800	29,9
1850	29,3
1900	28,6
2000	27,5
2050	26,9
2100	26,4
2200	25,4
2300	24,5
2400	23,6
2500	22,8
2600	22,1
2700	21,4
2800	20,8
2900	20,2
3000	19,7
3100	19,1
3200	18,7
3300	18,2
3400	17,8
3500	17,3
3600	17,0
3700	16,6
3800	16,2
3900	15,9
4000	15,6
4100	15,3
4100	13,8
4100	12,3
4100	10,8
4100	9,3
4100	7,8
4100	6,3
4100	4,8
4100	3,6

LOAD [Kg]



DISTANCE FROM SLEWING AXIS [m]

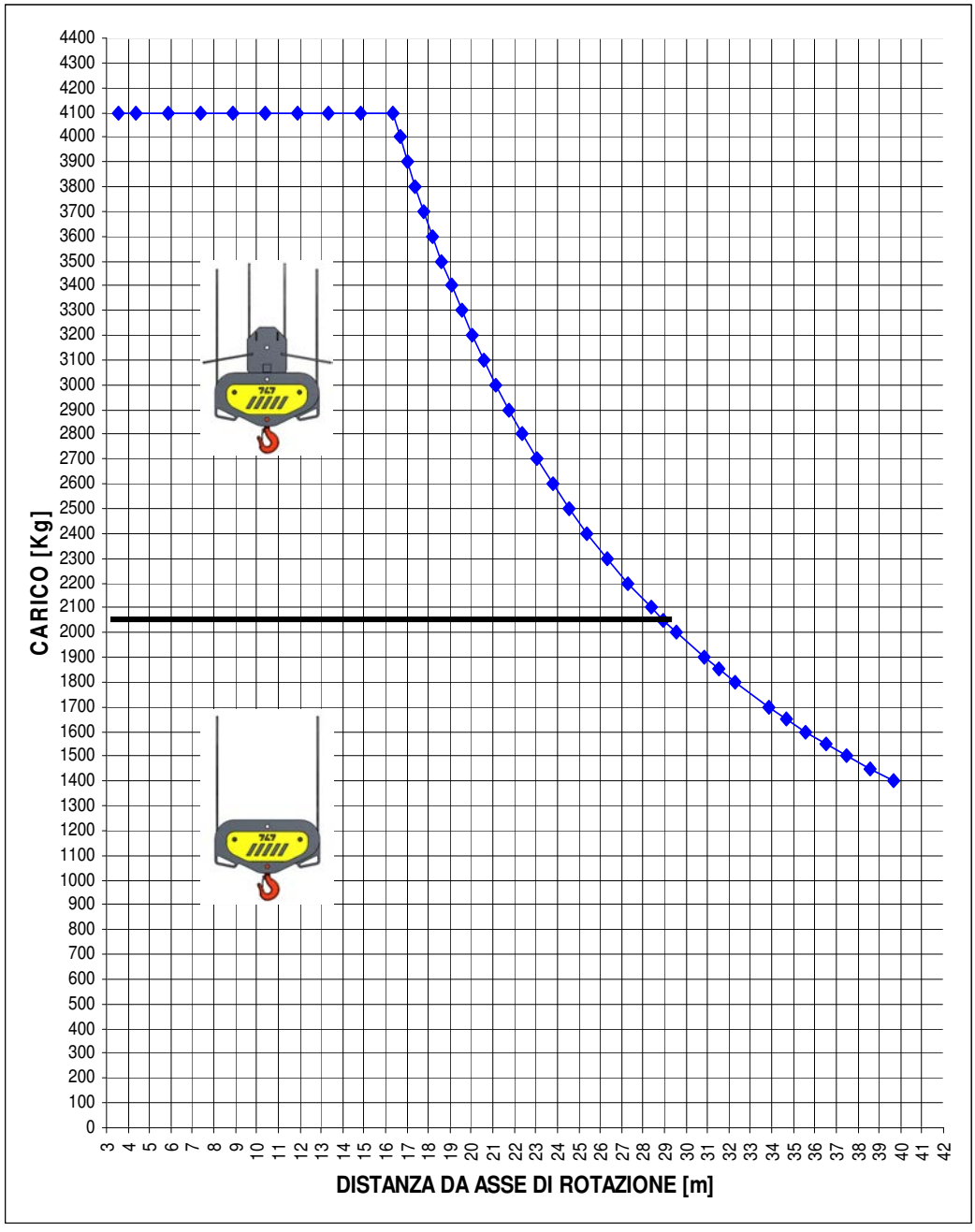
TWO-FALL ROPE

FOUR-FALL ROPE

3.3.2.10) LOAD DIAGRAM - CRANE WITH HORIZONTAL JIB 40m - (R VERS.)

LOAD [Kg]

[Kg]	m.
1400	39,7
1450	38,6
1500	37,5
1550	36,5
1600	35,6
1650	34,7
1700	33,8
1800	32,3
1850	31,5
1900	30,9
2000	29,6
2050	29,0
2100	28,4
2200	27,3
2300	26,3
2400	25,4
2500	24,6
2600	23,8
2700	23,0
2800	22,4
2900	21,7
3000	21,1
3100	20,6
3200	20,0
3300	19,5
3400	19,1
3500	18,6
3600	18,2
3700	17,8
3800	17,4
3900	17,0
4000	16,7
4100	16,4
4100	14,9
4100	13,4
4100	11,9
4100	10,4
4100	8,9
4100	7,4
4100	5,9
4100	4,4
4100	3,6



DISTANCE FROM SLEWING AXIS [m]

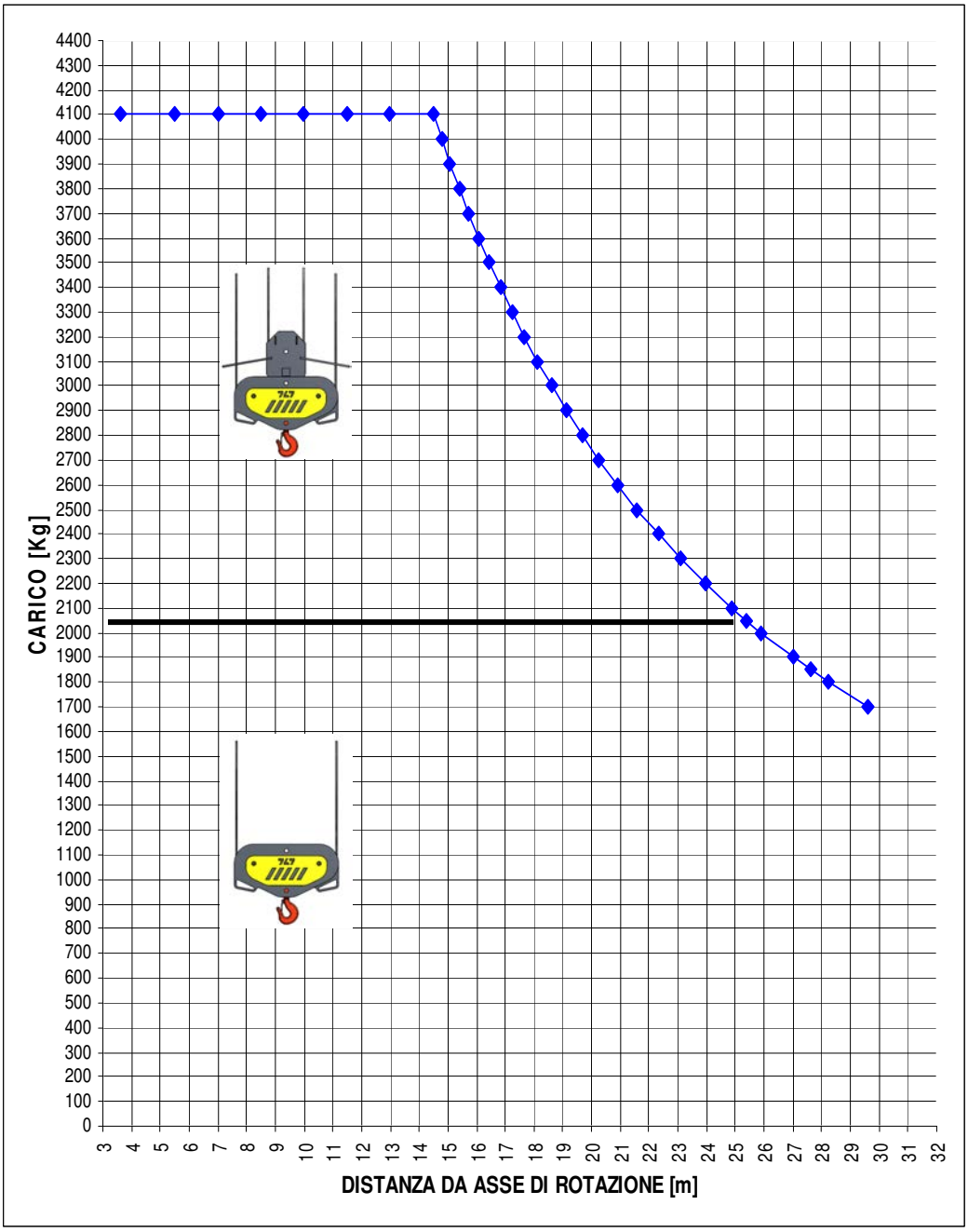
TWO-FALL ROPE

FOUR-FALL ROPE

3.3.2.11) LOAD DIAGRAM - CRANE WITH HORIZONTAL JIB 45m THIRD ELEMENT FOLDED - (R VERSION)

LOAD [Kg]

[Kg]	m.
1700	29,6
1800	28,2
1850	27,6
1900	27,0
2000	25,9
2050	25,4
2100	24,9
2200	24,0
2300	23,1
2400	22,3
2500	21,6
2600	20,9
2700	20,3
2800	19,7
2900	19,1
3000	18,6
3100	18,1
3200	17,7
3300	17,2
3400	16,8
3500	16,4
3600	16,1
3700	15,7
3800	15,4
3900	15,1
4000	14,8
4100	14,5
4100	13,0
4100	11,5
4100	10,0
4100	8,5
4100	7,0
4100	5,5
4100	3,6



DISTANCE FROM SLEWING AXIS [m]

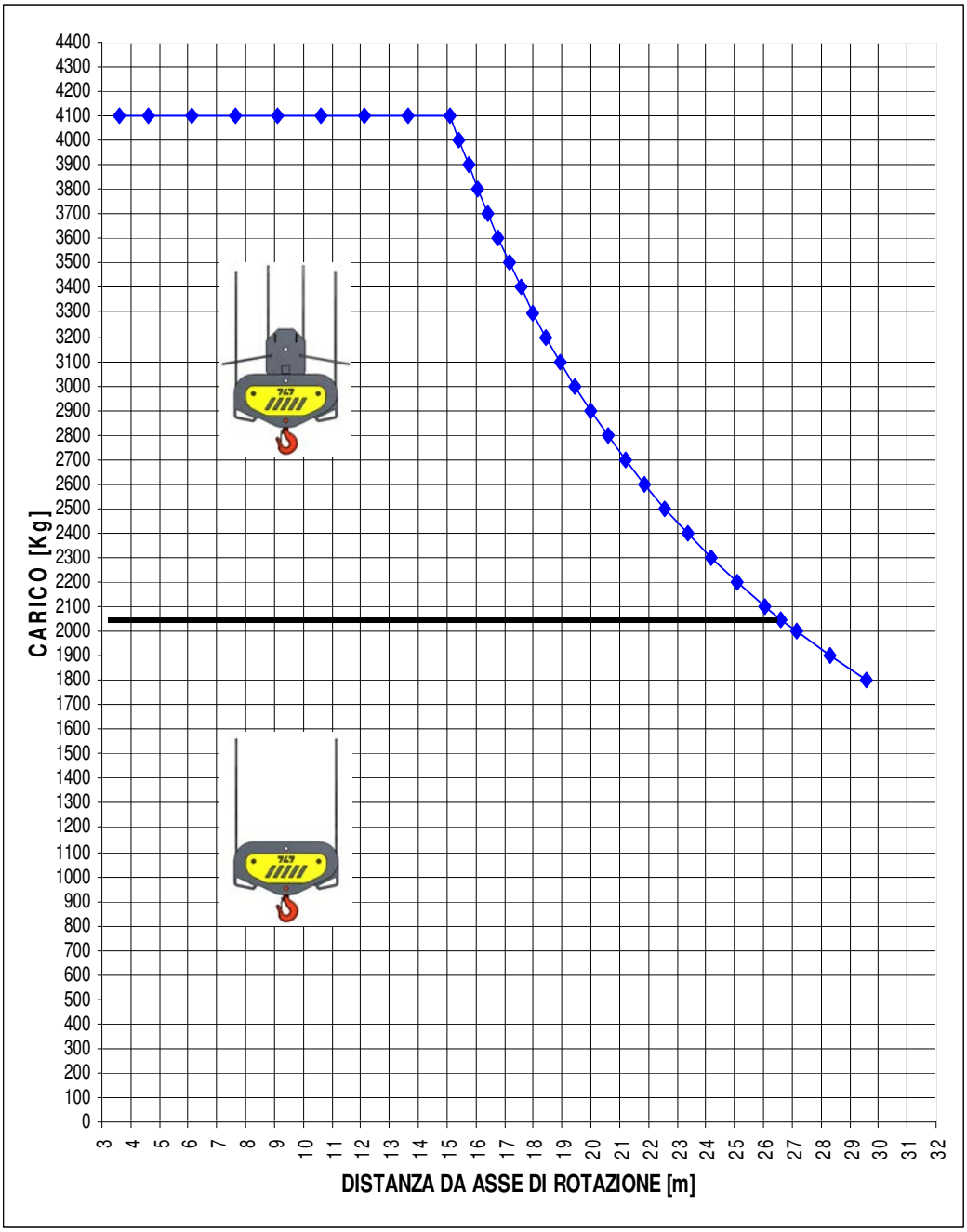
TWO-FALL ROPE

FOUR-FALL ROPE

3.3.2.12) LOAD DIAGRAM - CRANE WITH HORIZONTAL JIB 40m THIRD ELEMENT FOLDED - (R VERS.)

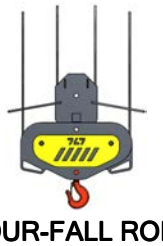
LOAD [Kg]

[Kg]	m.
1800	29,6
1900	28,3
2000	27,1
2050	26,6
2100	26,1
2200	25,1
2300	24,2
2400	23,4
2500	22,6
2600	21,9
2700	21,2
2800	20,6
2900	20,0
3000	19,5
3100	18,9
3200	18,5
3300	18,0
3400	17,6
3500	17,2
3600	16,8
3700	16,4
3800	16,1
3900	15,7
4000	15,4
4100	15,1
4100	13,6
4100	12,1
4100	10,6
4100	9,1
4100	7,6
4100	6,1
4100	4,6
4100	3,6



DISTANCE FROM SLEWING AXIS [m]

TWO-FALL ROPE



FOUR-FALL ROPE

3.3.3) CONFIGURATION SELECTION

VARIABLE ASSEMBLY ACCORDING TO THE JIB LENGTH

- CONFIGURATION WITH EXTENDED HORIZONTAL JIB: (SELECTOR ON "A" SEE PAR. 9.1.2)

LOAD DIAGRAM WITH RATED CAPACITY OF Kg 1100 ONLY CRANE WITH JIB 45m

MAXIMUM CAPACITY AS CONFIGURATION "E"

TRAVELLING TROLLEY WITH PRESELECTED SPEEDS ACCORDING TO THE LOAD

- CONFIGURATION WITH FOLDED NOSE (B45m) / CRANE WITH JIB 40m: (SELECTOR ON "B" SEE PAR. 9.1.2)

LOAD DIAGRAM WITH RATED CAPACITY OF Kg 1250 CRANE WITH JIB 45m
OF Kg 1400 CRANE WITH EXTENDED JIB 40m

MAXIMUM CAPACITY AS CONFIGURATION "E"

TRAVELLING TROLLEY WITH PRESELECTED SPEEDS ACCORDING TO THE LOAD

- CONFIGURATION WITH THIRD ELEMENT FOLDED: (SELECTOR ON "C" SEE PAR. 9.1.2)

LOAD DIAGRAM WITH RATED CAPACITY OF Kg 1700 CRANE WITH JIB 45m
OF Kg 1800 CRANE WITH JIB 40m
MAXIMUM CAPACITY AS CONFIGURATION "E"

WARNING: IN "C" THE CALIBRATION OF THE MOMENT LIMITING DEVICE IS DIFFERENT FROM THAT IN "A"
REPEAT THE CALIBRATION OF QMS SYSTEM (SEE PAR. 9.5)
TRAVELLING TROLLEY WITH PRESELECTED SPEEDS ACCORDING TO THE LOAD

- CONFIGURATION WITH JIB WHOLLY FOLDED: (SELECTOR ON "D" SEE PAR. 9.1.2)

LOAD DIAGRAM WITH OF Kg 4100 CRANE VERS. R
MAX CAPACITY OF Kg 4500 CRANE VERS. V
OF Kg 4100 CRANE VERS. T

TRAVELLING TROLLEY WITH PRESELECTED SPEEDS ACCORDING TO THE LOAD

VARIABLE ASSEMBLY ACCORDING TO THE ANGULATION DEGREES OF THE JIB

- CONFIGURATION WITH HORIZONTAL JIB : (SELECTOR ON "E" SEE PAR. 9.1.2)

LOAD DIAGRAM WITH MAX CAPACITY OF Kg 4100 CRANE VERS. R
OF Kg 5000 CRANE VERS. V
OF Kg 4100 CRANE VERS. T

TRAVELLING TROLLEY WITH PRESELECTED SPEEDS ACCORDING TO THE LOAD

- CONFIGURATION WITH INTERMEDIATE LUFFING JIB : (SELECTOR ON "F" SEE PAR. 9.1.2)

ONLY TWO-FALL ROPE
LOAD DIAGRAM WITH MAX CAPACITY LIMITED TO Kg 2050 CRANE VERS. R
Kg 2500 CRANE VERS. V
Kg 2000 CRANE VERS. T

TRAVELLING TROLLEY WITH PRESELECTED SPEEDS ACCORDING TO THE LOAD

- CONFIGURATION WITH MAX LUFFING JIB : (SELECTOR ON “G” SEE PAR. 9.1.2)

ONLY TWO-FALL ROPE

LOAD DIAGRAM WITH MAX CAPACITY LIMITED TO Kg 1100 CRANES VERS. R / V / T

TRAVELLING TROLLEY WITH PRESELECTED SPEEDS ACCORDING TO THE LOAD

3.4) LIST OF ALLOWED MOVEMENTS

THE FIXED-CONFIGURATION CRANE ALLOWS THE SIMULTANEITY OF THE FOLLOWING MOVEMENTS:
- HOISTING - TROLLEY TRANSLATION - SLEWING

NOTE: IT IS COMPULSORY TO START A NEW MOVEMENT ONLY WHEN THE FIRST AND/OR THE SECOND ONE HAS ALREADY STARTED.

3.5) WORKING ENVIRONMENT AND USE CONDITIONS

THE WORKING ENVIRONMENT IS THE FOLLOWING:

-TEMPERATURE FROM -10° TO + 40°C
-CONTINUOUS RELATIVE HUMIDITY UP TO 60%

THE CRANE IS NOT EQUIPPED WITH TROPICALIZED OR FIREPROOFING COMPONENTS; IN ADDITION, THERMAL OR SEISMIC EFFECTS HAVE NOT BEEN TAKEN INTO CONSIDERATION.

THE CRANE MUST NOT BE USED IN "ATEX" ENVIRONMENTS WITH A POTENTIALLY EXPLOSIVE ATMOSPHERE.

THE USE IN ENVIRONMENTS WITH RISKS OF EXPLOSION, CORROSION OR FIRE IS NOT EXPECTED.

THE INCLINATION OF THE BEARING SURFACE OF THE CRANE SHALL BE LOWER THAN 0,1%.

THE CRANE CLASSIFICATION REQUIRES THE FOLLOWING LIMIT CONDITIONS DURING THE USE:

-DISCONTINUOUS USE, THAT IS, WITH WORKING PERIODS ALTERNATING TO INTERRUPTION PERIODS

-INTERMITTENT WORKING, WITH INTERMITTENCE VALUE OF 40%

-AVERAGE WORKING TIME = 3 HOURS PER DAY

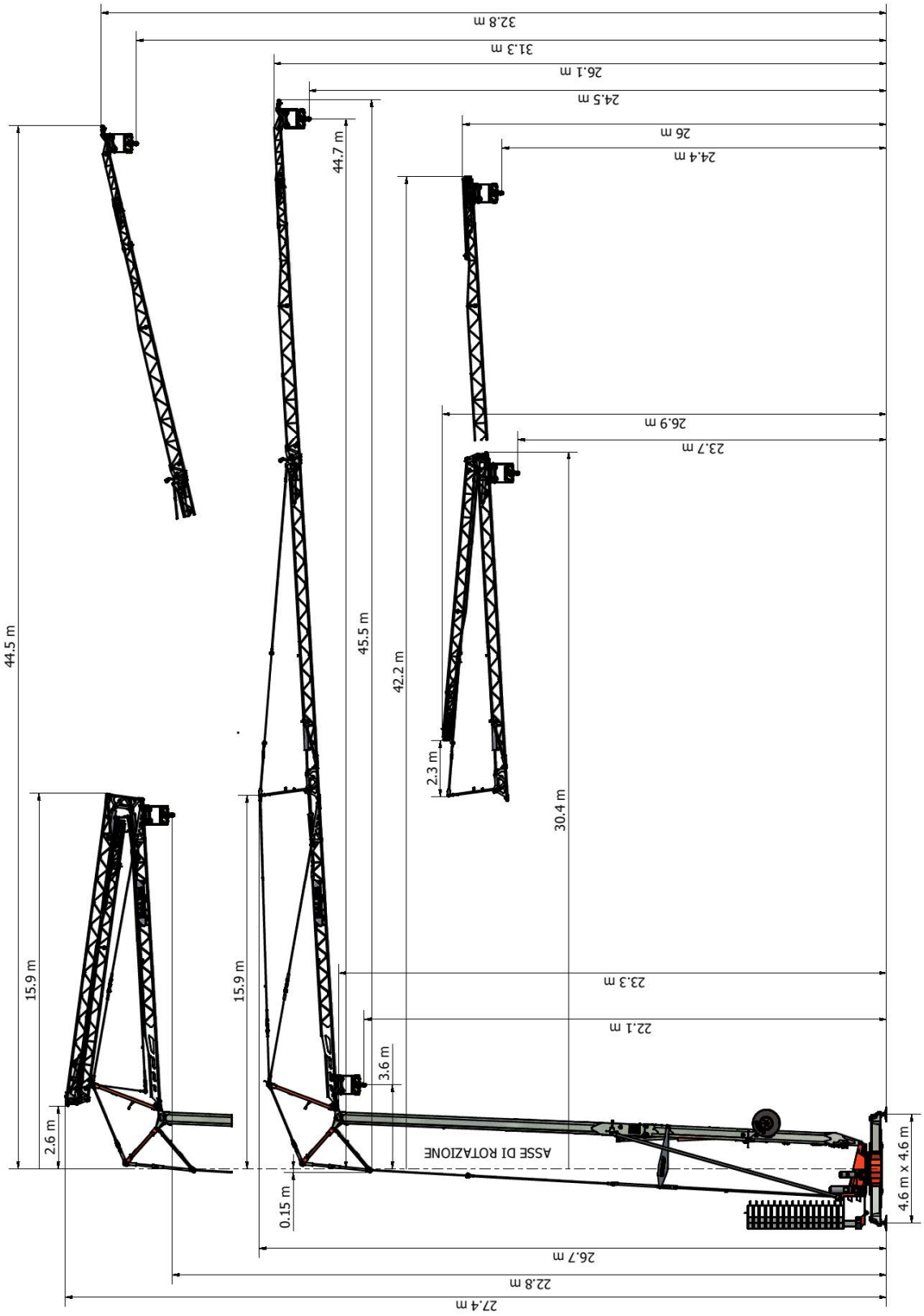
- CONVENTIONAL NUMBER OF OPERATION CYCLES EQUAL TO 250,000 ACCORDING TO ISO 4301

- LOAD CONDITIONS. THE MAXIMUM HOISTING TIMES OF THE LOADS MUST BE:

RATED LOAD :	TIMES = 10% OF THE TOTAL
67% OF THE RATED LOAD :	TIMES = 45% OF THE TOTAL
33% OF THE RATED LOAD:	TIMES = 45% OF THE TOTAL

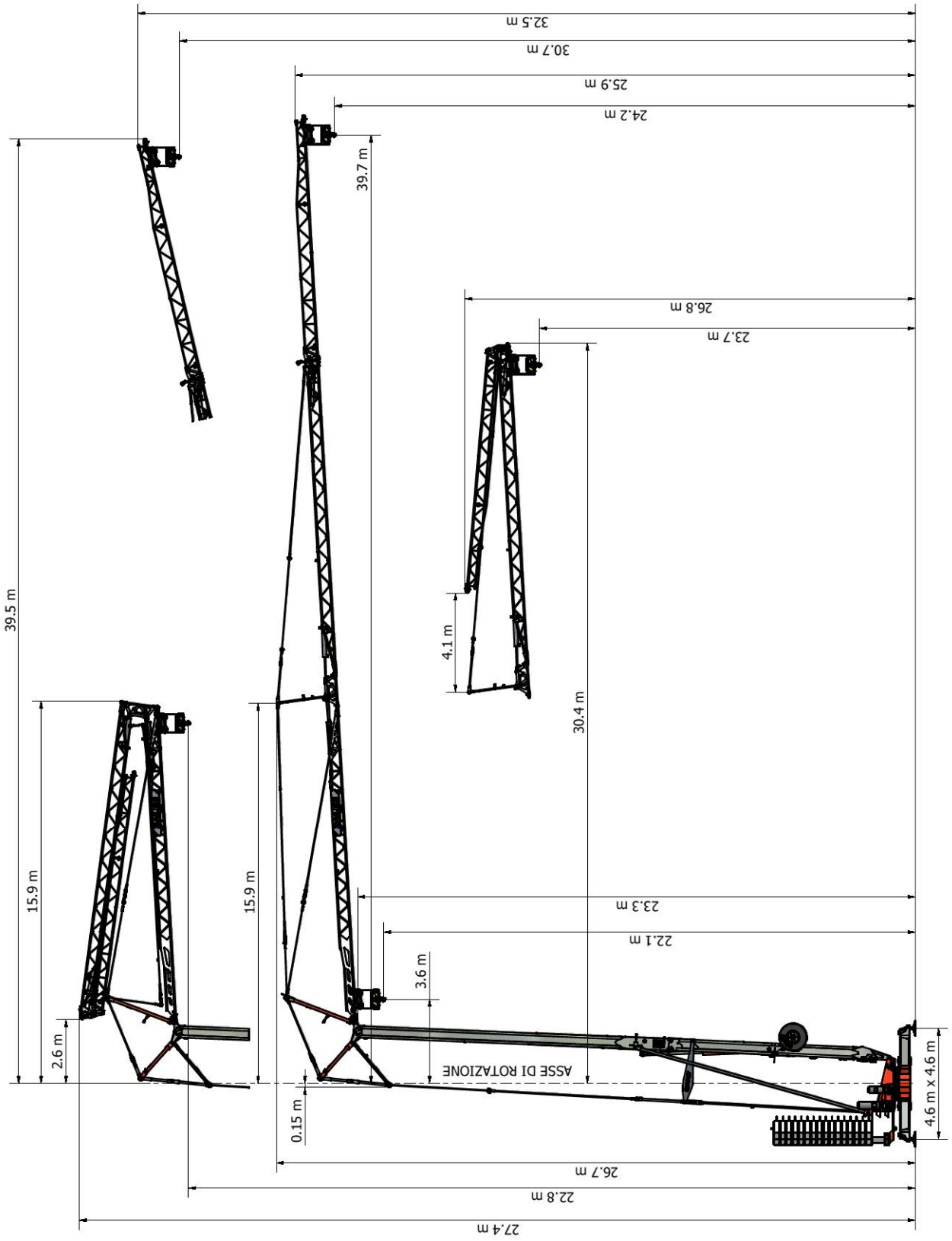
3.6) OVERALL DIMENSIONS OF THE WORKING CRANE

JIB 45m



Picture 3

JIB 40m



Picture 4

3.7) SPEED WIND CONDITIONS

– DURING ERECTION: LOWER THAN 15 Km/h

– ON DUTY: LOWER THAN 72 Km/h

– OFF DUTY : REF. EN 14439 "SAFETY REQUIREMENTS FOR TOWER CRANE"

CALCULATION ACCORDING TO FEM 1.004 / STABILITY ACCORDING TO FEM 1.005 WITH CRANE FREE TO SLEW LEEWARD **WITH RELEASED SLEWING BRAKE**

AREA C OUTDOOR, RECURRENCE INTERVAL R=25 SPEED=147 Km/h MAXIMUM HEIGHT
AREA D OUTDOOR, RECURRENCE INTERVAL R=25 SPEED=168 Km/h MAXIMUM HEIGHT

NOTE: SINCE IT IS IMPOSSIBLE TO FORESEE THE INCREASE OF THE WIND SPEED AND CALCULATE THE GUST PEAKS, IT IS ADVISABLE TO CLOSE THE JIB COMPLETELY IN ADVANCE BEFORE THE EVENT, AND LOWER THE CRANE, IF POSSIBLE, AS SOON AS THE WIND SPEED MAY EXCEED **130 Km/h.**

3.7.1) MAXIMUM LOAD SURFACE EXPOSED TO THE WIND

THE ALLOWED SURFACE EXPOSED TO THE WIND FOR THE CIRCULATING LOAD IS 1 m^2 /t.
THE CIRCULATING LOAD IS THE USEFUL LOAD HUNG ON THE HOOK INCLUDING THE BLOCK WEIGHT.

3.8) CONTROL POSTS

THE CONTROL POST OF THE CRANE IS FROM THE GROUND OR FROM THE MOST SUITABLE POSITION, BUT NOT ON BOARD THE CRANE.

IN ADDITION, IT IS FORBIDDEN FOR THE OPERATOR TO STAY INSIDE THE AREA (OBLIGATORILY DELIMITED) CONCERNED WITH THE ACTION OF THE SLEWING PLATFORM OF THE CRANE.

THE OPERATOR MUST ALWAYS HAVE THE DIRECT VIEW OF THE LOAD, OF THE SLINGING OPERATOR, OF THE PERSON IN CHARGE OF GIVING THE MANOEUVRE ORDERS AS WELL AS OF THE MOVABLE PARTS OF THE CRANE.

IF THE LOAD IS NOT COMPLETELY VISIBLE, THE OPERATOR WILL BE ASSISTED BY EXPERTS.

3.9) CONTROL DEVICES

THE INTENTIONAL-OPERATION CONTROL DEVICES OF THE CRANE ARE OF DIFFERENT TYPES:

- CONTROL PUSH-BUTTON PANEL, FOR WORKING AND ERECTION OPERATIONS. ACTIVE-CONTROL TYPE. IN CASE OF LACK OF CONTROL, THE MOVEMENT STOPS AUTOMATICALLY.

- INDUSTRIAL RADIO CONTROL (OPTIONAL)
IT IS COMPOSED OF A PORTABLE TRANSMITTING UNIT, FROM WHICH THE OPERATOR CAN CONTROL THE MACHINE FROM A REMOTE POSITION, AND A RECEIVING UNIT INSTALLED ON BOARD THE CRANE.

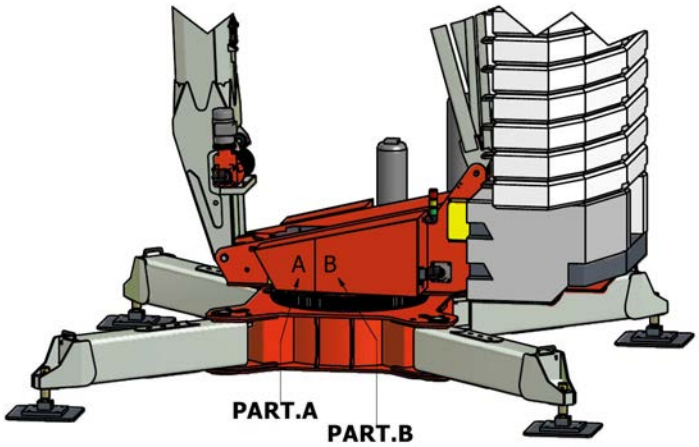
THE TRANSMITTING UNIT CAN BE WITH MANIPULATOR (JOYSTICK) OR EQUIPPED WITH PUSH-BUTTON PANEL. REFER TO THE INSTRUCTIONS GIVEN IN THE RADIO CONTROL MANUAL.

THE BUTTONS, EXCEPT FOR THE EMERGENCY STOP, ARE BUILT-IN SO AS TO AVOID THE ACCIDENTAL OPERATION AND ARE PROVIDED WITH A MECHANIC LOCK IN ORDER TO AVOID THE SIMULTANEOUS START OF TWO OPPOSITE MOVEMENTS.

- LINE SWITCH TO DISCONNECT THE MACHINE. IT IS PLACED OUTSIDE THE DOOR OF THE ELECTRICAL CABINET AND IS PROVIDED WITH A BOLT LOCK TO HINDER THE DOOR OPENING WHEN THE MACHINE IS LIVE.

ALTHOUGH THEY ARE NOT TO BE CONSIDERED AS CONTROLS, THE FOLLOWING **SELECTORS** ARE ALSO INSTALLED:

- WORK/ERECTION CONFIGURATION SELECTOR (SEE PAR.9.1.2.1).
- JIB EXTENSION CONFIGURATION SELECTOR (SEE PAR.9.1.2.2)
- JIB ASSEMBLY CONFIGURATION SELECTOR (SEE PAR.9.1.2.3).
- "QMS" SYSTEM ACTIVATION CALIBRATION SELECTOR (SEE PAR.9.1.2.4).



Picture 5

THEY ARE LOCATED INSIDE THE **ELECTRIC EQUIPMENT** ON THE LEFT (**PART. A**) AND CAN BE OPERATED ONLY WHEN THE DOOR IS OPEN (SEE FIG. 4). THE POSITIONS ARE UNEQUIVOCAL AND ARE MARKED BY A NAMEPLATE.

3.9.1) CRANE STOP MEANS AND METHODS

FOR ALL THE MOVEMENTS THE CRANE IS PROVIDED WITH ELECTRIC DEVICES FOR THE MOTION DECELERATION BEFORE THE ACTIVATION OF THE MECHANIC BRAKE, WHICH IS OPERATED IN CASE OF LACK OF ELECTRIC POWER SUPPLY IN THE SINGLE MOTORS.

THE MACHINE IS ALSO EQUIPPED WITH TWO EMERGENCY STOP DEVICES: ONE IS PLACED ON THE DOOR OF THE ELECTRIC CABINET WHILE THE OTHER ONE, A RED MUSHROOM-HEAD BUTTON WITH LOCK IN RE-ENTERING POSITION AND INTENTIONAL UNLOCK, IS PLACED IN THE PUSH-BUTTON PANEL OR ON THE TRANSMITTING UNIT OF THE RADIO CONTROL.

WARNING

SINCE THE EMERGENCY STOP MODES CAUSE A DECREASE OF THE STOP TIMES OF THE MOVEMENTS, ACTING ONLY ON THE MECHANIC BRAKES OF THE MOTORS AND DISCONNECTING ANY OTHER PROGRESSIVE DECELERATION DEVICE, THUS PRODUCING CONSIDERABLE LOAD OSCILLATIONS AND DANGEROUS STRESSES OF THE CRANE STRUCTURE, **THEY MUST NOT BE USED FOR THE MANOEUVRES, BUT ONLY IN CASE OF EMERGENCY**

3.9.2) CHECKING THE TRAJECTORIES OF THE MOVABLE ELEMENTS

FROM THE CONTROL POST THE OPERATOR SHALL CHECK THE TRAJECTORIES OF ALL THE MOVABLE ELEMENTS, SUCH AS THE OVERHUNG LOADS MANOEUVRED OR THE MOVING STRUCTURAL PARTS.

THE OPERATOR SHALL ALWAYS HAVE A DIRECT VIEW OF THE DIFFERENT MOVABLE PARTS DURING THE WHOLE WORKING CYCLE, FROM THE SLINGING AND PICK-UP OF THE LOAD TO ITS FINAL POSITIONING.

IF THE LOAD SHOULD NOT BE PERFECTLY VISIBLE, IT WOULD BE NECESSARY TO PROVIDE FOR A QUALIFIED OPERATOR EXPERIENCED IN MANOEUVRE ORDERS AND SIGNALS TO BE COMMUNICATED TO THE CRANE OPERATOR BY MEANS OF A PREFIXED CODE PERFECTLY TESTED.

THE MINIMUM LIGHT CONDITIONS CAN BE DESCRIBED AS FOLLOWS: TOTAL DEPTH PERCEPTION, DIMENSIONS, RESOLUTION, DEFINITION, DISTANCE AND COLOURS OF THE HOOK PLACED ON THE JIB NOSE.

THE ESSENTIAL CONDITION IS THE PRESENCE OF SHADOWS PRODUCED BY THE MACHINE MEMBERS OR BY THE MOVING LOADS.
THE AREA CONCERNED WITH THE SLEWING OF THE CRANE PLATFORM SHALL BE SEGREGATED BY MEANS OF SUITABLE BARRIERS.

3.10) HOISTING ACCESSORIES ALLOWED

ALL THE ACCESSORIES HAVING AN ADEQUATE CAPACITY, WHICH ARE SIMPLY INTERPOSED BETWEEN THE PICK-UP MEMBER AND THE LOAD, ARE ALLOWED.

IT IS FORBIDDEN TO USE ACCESSORIES WHICH MAY CAUSE ANOMALOUS OVERSTRESSES OR ACCIDENTAL OVERLOADS WHICH MAY ALSO LIMIT THE FREE HANDLING OF THE LOAD OR ALLOW THE IMMEDIATE RELEASE OF THE LOAD, AS WELL AS THE ACCESSORIES PROVIDED WITH THEIR OWN MOTORS OR WHICH DEPEND ON MANOEUVRE CABLES, SELF-LOADING ACCESSORIES ETC.

DANGER

NOTE: THE MASS OF THE ALLOWED ACCESSORIES SHALL BE DEDUCTED FROM THE PLATE VALUES TO DETERMINE THE USEFUL LOAD TO BE LIFTED

FURTHERMORE, THE USE MODALITIES SHALL COMPLY WITH THE MANUFACTURER'S PRESCRIPTIONS.

3.11) HOW TO LEAVE THE CRANE OFF DUTY (SEE PROCEDURE PAR.11.4)

IT IS NECESSARY TO TURN OFF THE ELECTRIC POWER SUPPLY AND UNLOCK THE SLEWING BRAKE IN ORDER TO ALLOW THE SLEWING PART OF THE CRANE TO FREELY ROTATE LEEWARD (SEE ALSO 3.3.6).

THE BLOCK SHALL BE LIFTED IN UPPER STOP POSITION AND NEAR THE MAST SO AS TO MINIMIZE THE RISK OF GETTING CAUGHT WITH THE ADJOINING BUILDINGS.
IT IS FORBIDDEN TO LEAVE ANY LOAD HUNG ON THE HOOK.

IF IT IS NOT POSSIBLE TO LOWER THE LOAD BY MEANS OF THE NORMAL CONTROLS REFER TO PAR. **9.24** "FAILURE IN THE CONTROL CIRCUIT" THAT DESCRIBES A PROCEDURE IN CASE OF MALFUNCTIONING OF THE CONTROLS.

3.12) INTERFERENCE WITH OTHER MACHINES

IF SOME MACHINES MUST WORK CLOSE TO OTHERS, IT IS NECESSARY TO ADOPT THE FOLLOWING PRECAUTIONS:

-THE VERTICAL DISTANCE BETWEEN THE LOWER PART OF THE HIGHEST CRANE AND THE UPPER PART OF THE LOWEST CRANE SHALL CORRESPOND TO AT LEAST 5 m, BOTH ON DUTY AND OFF DUTY, WHEN THE JIBS OF THE CRANES MUST HAVE THE OPPORTUNITY TO FREELY ROTATE LEEWARD.

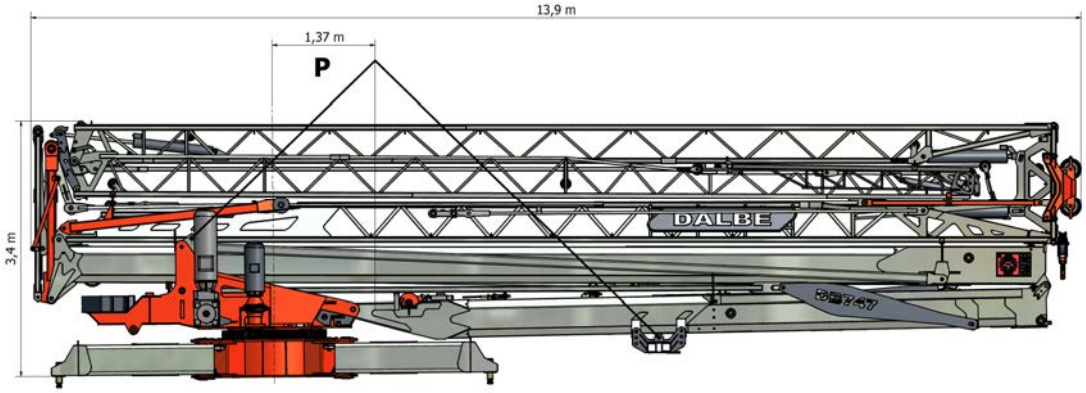
-IF THE JIB OF A CRANE IS POSITIONED ABOVE AN OTHER CRANE, SUITABLE DEVICES MUST AVOID, WITH A MINIMUM DISTANCE OF AT LEAST 5 m, THAT THE HOISTING ROPE OF THE HIGHEST CRANE INTERFERES WITH THE STRUCTURAL PARTS OF THE LOWEST CRANE IN ANY WORKING POSITION.

-CLOSE TO ELECTRIC LINES, THE MINIMUM HORIZONTAL DISTANCE BETWEEN THE MOST PROJECTING STRUCTURAL PART OF A CRANE AND THE CLOSEST ELECTRIC CABLE MUST BE AT LEAST 5 m, ACCORDING TO THE FORMULA Dmin = m 3 + 0,01 x T WHERE T IS THE LINE VOLTAGE EXPRESSED IN KILOVOLT.

3.13) CRANE MASSES

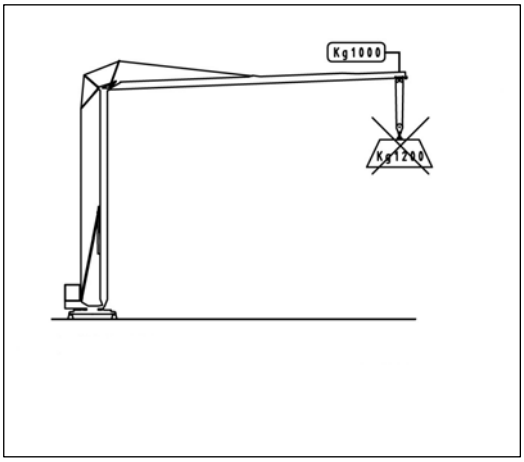
TOWING CRANE MASS WITH STD AXLES AND CENTRAL BALLAST:	**25900 Kg about**
TOWING CRANE MASS WITHOUT N2 FIXED BALLAST BLOCKS:	**21900Kg about**
TOTAL MASS OF THE ON-DUTY CRANE:	**53900 Kg**
TOTAL MASS OF THE BALLAST + MOVABLE BALLAST:	**33600 Kg**
TOTAL MASS OF THE FIXED BALLAST:	**5600 Kg**
UNITARY MASS OF THE WORK BALLAST BLOCK (x16) :	**1750 Kg**
TOTAL MASS OF THE STANDARD AXLES :	**900 Kg**
UNITARY MASS OF THE STEEL SUPPORTS(x4)	**90 Kg cad.**

SLING WITHOUT LATERAL BLOCKS OF CENTRAL BALLAST (2t each)



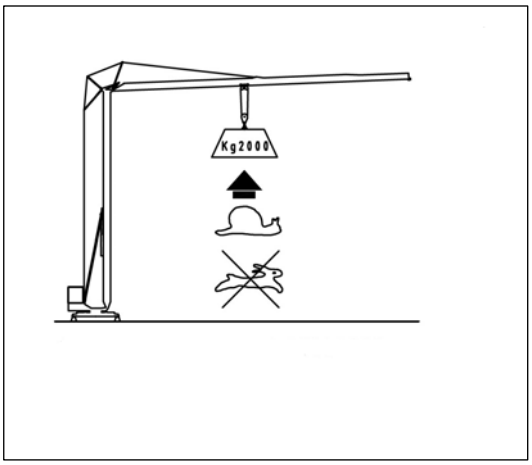
Picture 6

3.14) EXPECTED FORBIDDEN USES OF THE CRANE



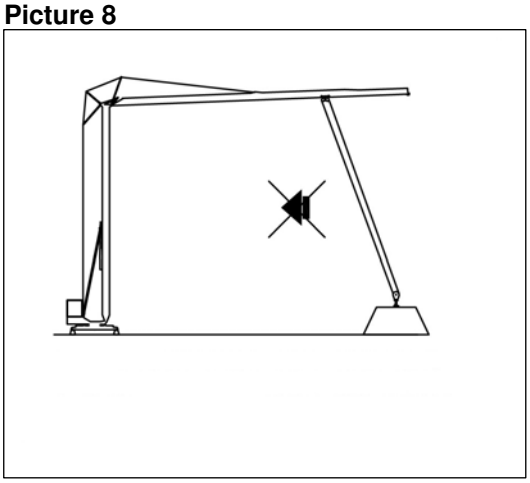
1- DO NOT LIFT LOADS EXCEEDING THE CRANE CAPACITY

Picture 7



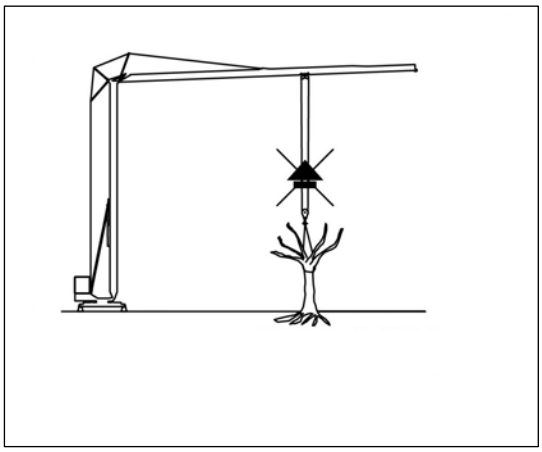
2- DO NOT LIFT IN “QUICK” MODE LOADS EXCEEDING THE VALUES PRESCRIBED

Picture 8



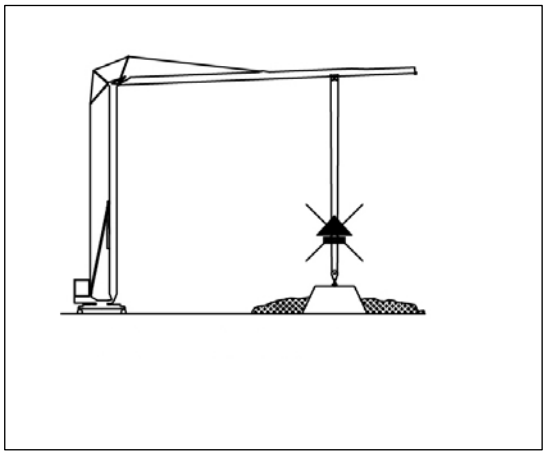
3- DO NOT PULL THE LOAD SIDELONG AND DO NOT TOW THE LOAD

Picture 9



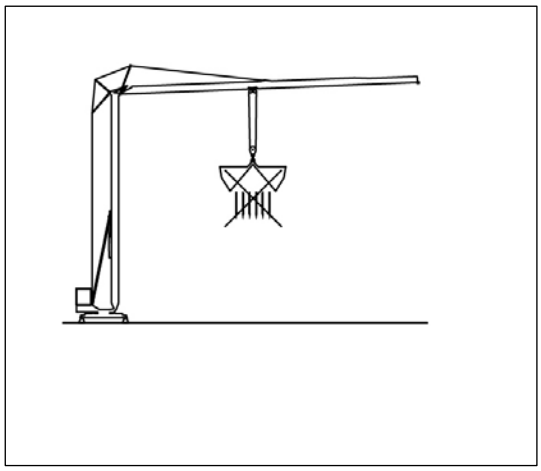
4- DO NOT LIFT LOADS FIXED TO THE SOIL (UPROOTING OF TREES, PILE SHOES, CONCRETE FALSEWORK DISMANTLING, ETC.....)

Picture 10



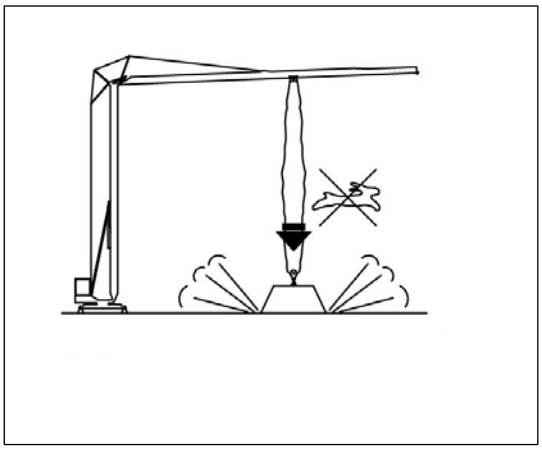
5- DO NOT LIFT LOADS BLOCKED ON THE GROUND BY SNOW OR ICE

Picture 11



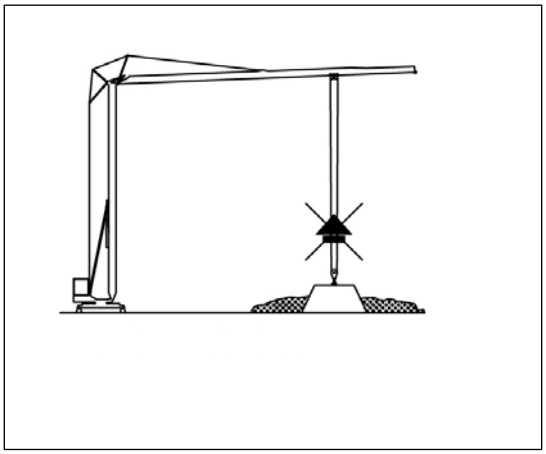
6- DO NOT POSITION THE LOAD SUDDENLY ON THE GROUND BY USING ACCESSORIES ALLOWING THE IMMEDIATE RELEASE -CUTTING OF THE SLING, ETC...

Picture 12



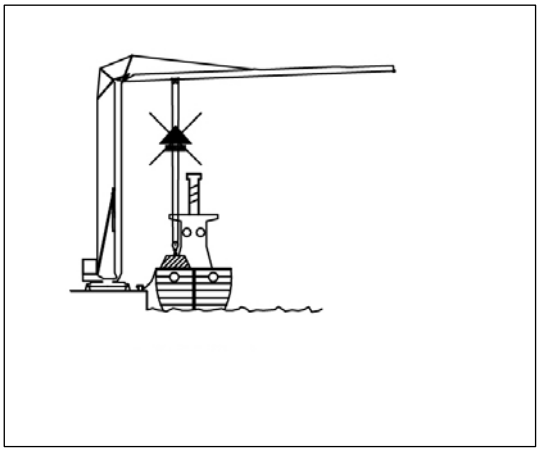
7- DO NOT POSITION THE LOAD ABRUPTLY BY USING THE HIGHEST SPEEDS

Picture 13



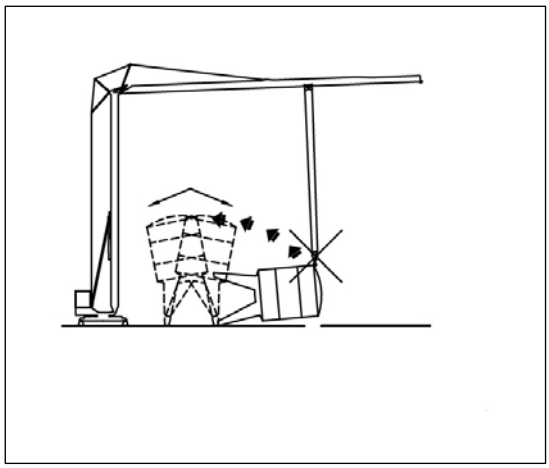
8- DO NOT LIFT THE LOAD ABRUPTLY BY USING THE HIGHEST SPEEDS

Picture 14



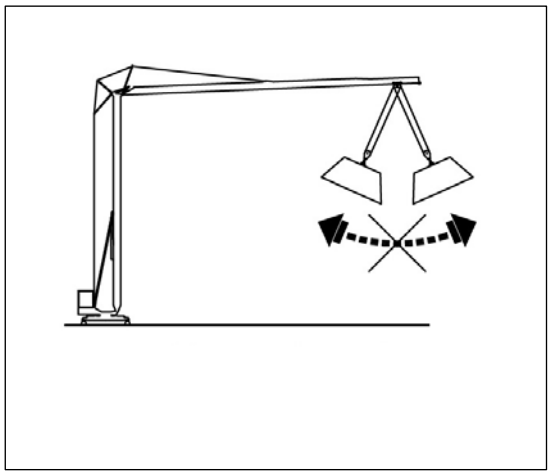
9- DO NOT LIFT THE LOAD FROM UNSTABLE SURFACES (UNSAFE FRAMES, WATER CRAFTS, ETC.)

Picture 15



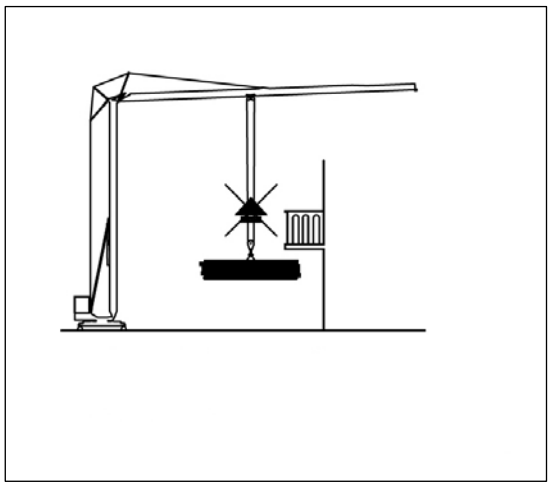
10- DO NOT LIFT LOADS HOOKED OUT OF THE BARYCENTRE IN CASE OF RISK OF TIPPING OVER AND/OR STRONG OSCILLATION OF THE LOAD

Picture 16



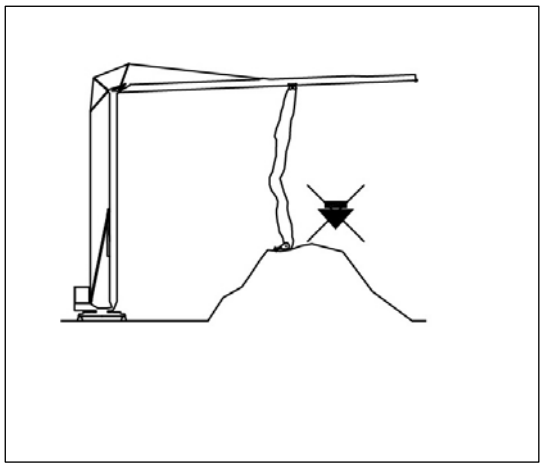
11- DO NOT SWING THE OVERHUNG LOAD TO POSITION IT OUT OF THE RANGE OF THE CRANE

Picture 17



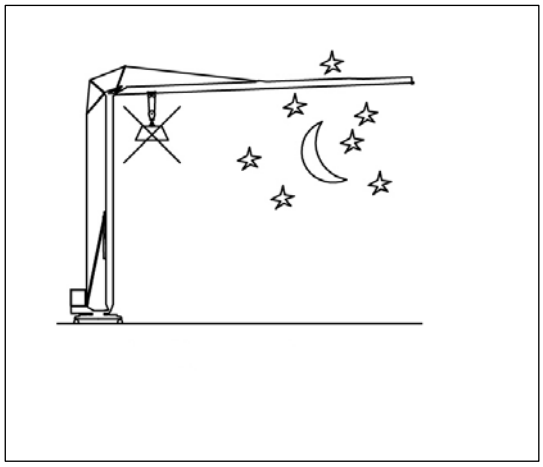
12- DO NOT CARRY OUT RISE OR DESCENT OPERATIONS IN CASE OF RISK OF ENTANGLEMENT WITH ANY KIND OF OBSTACLE

Picture 18



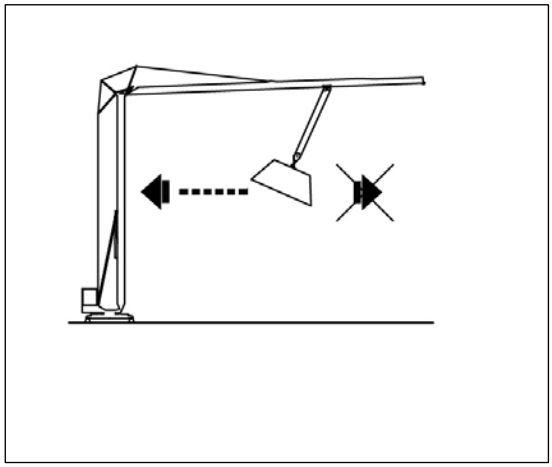
13- DO NOT PLACE THE BLOCK ON BEARING SURFACES

Picture 19



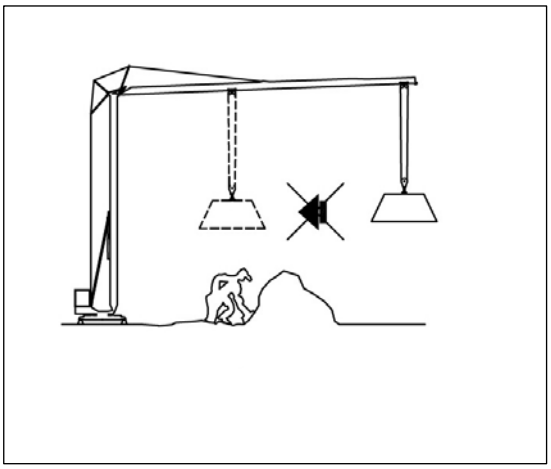
14- DO NOT LEAVE THE LOADS SUSPENDED WHEN THE CRANE IS OFF DUTY EXCEPT IF EXPRESSLY REQUIRED

Picture 20



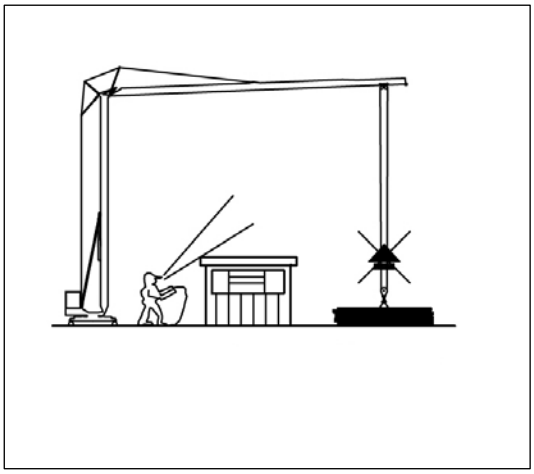
15- DO NOT USE COUNTER-MANOEUVRES (DO NOT START ANY MOVEMENT IF THE DYNAMIC EFFECTS OF THE OPPOSITE ONE ARE NOT OVER YET)

Picture 21



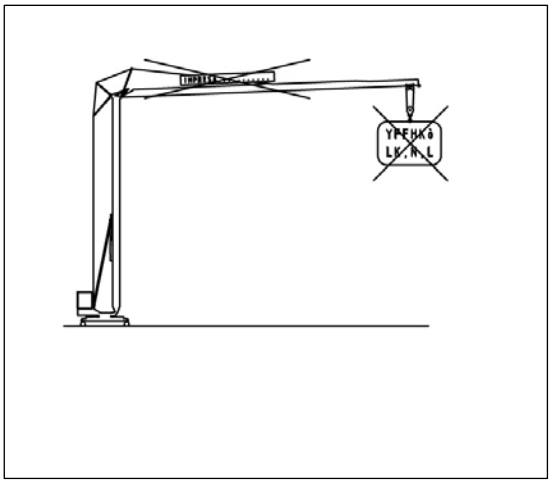
16- DO NOT MOVE THE SUSPENDED LOAD OVER PEOPLE

Picture 22



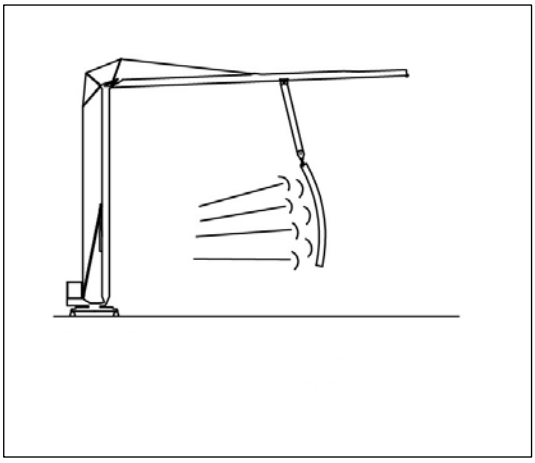
17- DO NOT CARRY OUT OPERATIONS WITH THE LOAD IN A SCARCELY VISIBLE POSITION

Picture 23



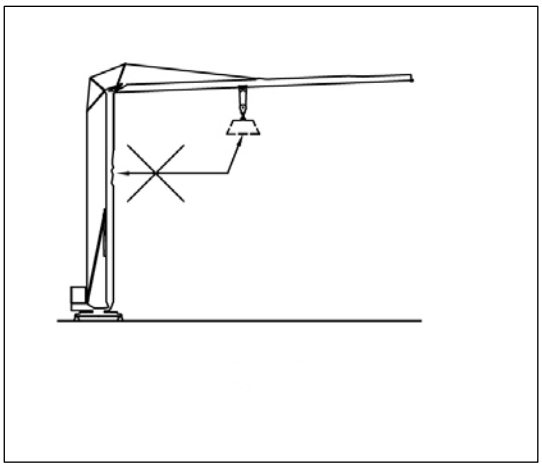
18- DO NOT PLACE ON THE CRANE ANY WARNING LABEL WHICH MAY CHANGE THE SURFACE EXPOSED TO THE WIND AND/OR THE MASSES OF THE CRANE

Picture 24



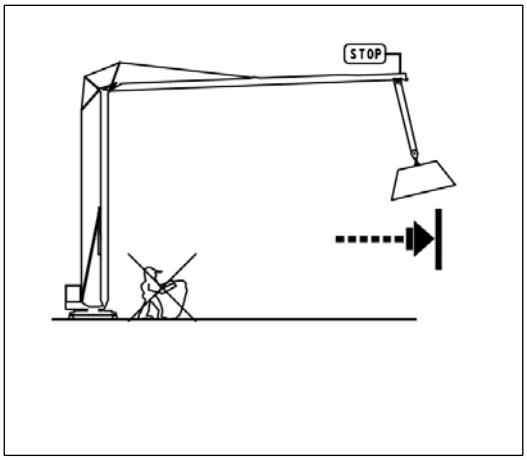
19- DO NOT LIFT THE LOADS WITH THE SURFACE EXPOSED TO THE WIND GREATER THAN THAT ALLOWED

Picture 25



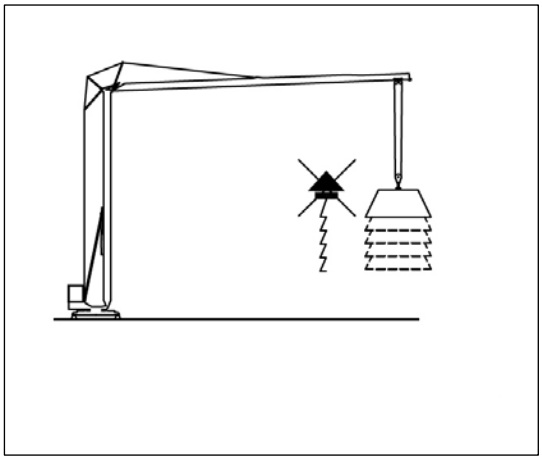
20- DO NOT USE THE MACHINE IF IT IS NOT IN PERFECT WORKING CONDITIONS

Picture 26



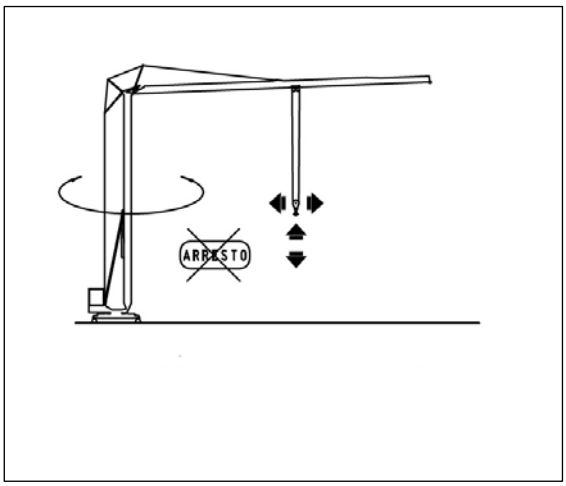
21- DO NOT USE THE LIMIT SWITCHES AS MANOEUVRING DEVICES TO STOP THE LOAD IN A PREFIXED POSITION

Picture 27



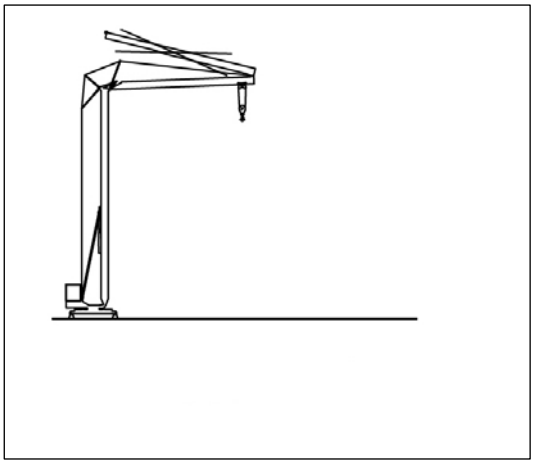
22- DO NOT INSIST ON THE LIFTING OF LOADS VERY CLOSE TO THE MAXIMUM WEIGHT ALLOWED TO AVOID OVERSTRESSES OF THE LOAD LIMITING DEVICES.

Picture 28



23- DO NOT USE THE STOP PUSH-BUTTON TO REGULARLY STOP THE MACHINE MOVEMENTS

Picture 29



24- DO NOT USE THE CRANE WITH THE FOLDED JIB IF IT IS NOT IN ITS CORRECT POSITION.

Picture 30

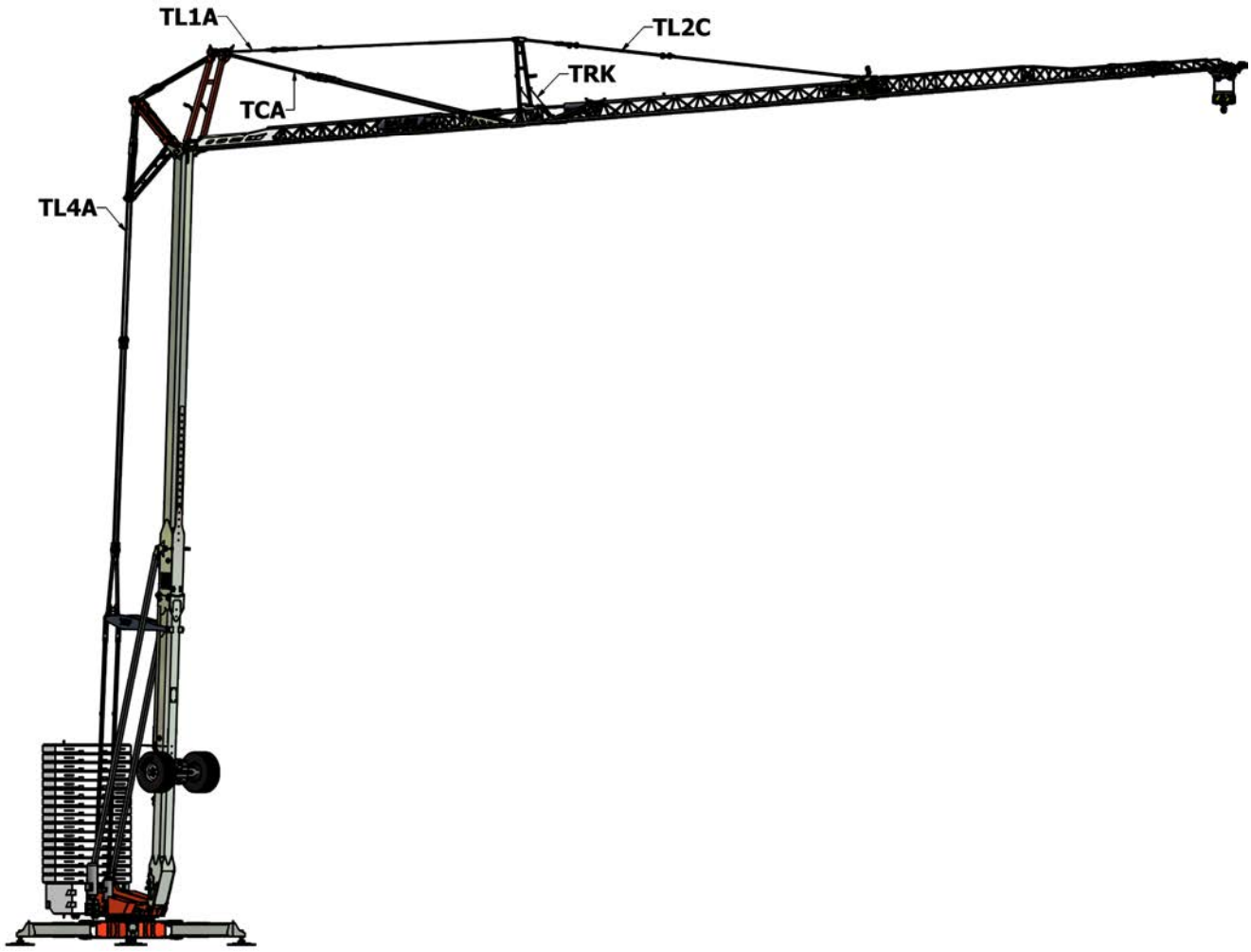
4 - TECHNICAL DESCRIPTION

4.1) STRUCTURE

THE STRUCTURE OF THE JIB IS COMPOSED OF SQUARE AND ROUND TUBES WITH VARIABLE SECTION. THE FIRST, SECOND AND FOURTH ELEMENTS OF THE JIB HAVE A TRIANGULAR SHAPE, THE THIRD AND FIFTH ELEMENTS HAVE A "U" SHAPE, THE CENTRAL ADAPTER HAS A TRAPEZOIDAL SHAPE CONSISTING OF SHEET AND ELECTRO-WELDED TUBES.
THE STRUCTURE OF THE MAST IS COMPOSED OF A SECTION BAR MADE OF BENT ELECTRO-WELDED SHEET, WHILE THE STRUCTURE OF THE SLEWING PLATFORM AND UNDERCARRIAGE CONSISTS OF SHAPED OR BENT SHEETS COMPOSED BY WELDING; THE BASE JOINTS ARE COMPOSED OF A STRUCTURAL TUBE.
THE SLEWING PLATFORM, THE UNDERCARRIAGE AND THE SCREW DOWN JACKS ARE COVERED WITH TWO PROTECTIVE COATINGS, OF WHICH THE FIRST ONE IS CORROSION PROOFING.
THE JOINTS OF BASE, JIB, ADAPTER, MAST AND TIE RODS ARE HOT GALVANIZED.

4.2) TIE RODS

THE CRANE IS EQUIPPED WITH THE FOLLOWING TIE RODS:



Picture 1

4.2.1) LIST OF ROPE TIE RODS

TL2C : 2X Ø 26 DISTANCE BETWEEN CENTRES **= 3760** mm KR = 589 KN

TL1A : 2X Ø 26 DISTANCE BETWEEN CENTRES **= 2240** mm KR = 592 KN

TCA : 2X Ø 26 DISTANCE BETWEEN CENTRES **= 3965** mm KR = 700 KN

T4A : 2X Ø 38 DISTANCE BETWEEN CENTRES **= 4120** mm KR = 1330 KN

TRK : 2X Ø 10 DISTANCE BETWEEN CENTRES **= 1210** mm + THIMBLES AT THE ENDS

4.3) ROPES

SEE **CHAP.8** POSITIONING AND ERECTION / PAR. **8.9** FOR THE HOISTING ROPE THREADING AND PAR. **8.10** FOR TROLLEY ROPE THREADING.

4.3.1) HOISTING ROPE

R VERSION CRANE

Diameter [mm]	Length [m]	Composition	Ultimate strength [kg]	Protection
rope Ø9	176	24x7 168 anti-turn wires	70	Galvanised

V VERSION CRANE

Diameter [mm]	Length [m]	Composition	Ultimate strength [kg]	Protection
rope Ø10	176	24x7 168 anti-turn wires	77	Galvanised

T VERSION CRANE

Diameter [mm]	Length [m]	Composition	Ultimate strength [kg]	Protection
rope Ø12	140	24x7 168 anti-turn wires	115,2	Galvanised

DRAWN COMPRESSED ROPE WITH METAL CORE, RIGHT LANG LAY, ANTI-TURN, FASTENED TO THE ENDS BY MEANS OF WEDGE AND SHEATH.
SUITABLE MEANS PREVENT THE ACCIDENTAL EXIT OF THE ROPE FROM THE DRUM AND PULLEYS.

4.3.2) TROLLEY TOWING ROPE

R-V-T VERSION CRANE

TROLLEY TOWING ROPE				
Diameter [mm]	Length [m]	Composition	Ultimate strength [kg]	Protection
rope Ø6	81	114 Wires +textile core	26	Galvanised
rope Ø6	121	114 Wires +textile core	26	Galvanised

ROPES WITH TEXTILE CORE FASTENED TO THE ENDS BY MEANS OF WEDGE AND SHEATH.
SUITABLE MEANS PREVENT THE ACCIDENTAL EXIT OF THE ROPE FROM THE DRUM AND PULLEYS.

4.4) PICK-UP MEMBER

V VERSION CRANE

IT IS COMPOSED OF UNI 4395 HOOK WITH A CAPACITY OF **5000 Kg**.
IT IS FASTENED TO THE EYEBOLT, INTEGRAL TO THE THRUST BEARING, BY MEANS OF DIN 5687 CHAIN LINKS.

R-T VERSION CRANE

IT IS COMPOSED OF UNI 4395 HOOK WITH A CAPACITY OF **4100 Kg**.
IT IS FASTENED TO THE EYEBOLT, INTEGRAL TO THE THRUST BEARING, BY MEANS OF DIN 5687 CHAIN LINKS.

THE THRUST BEARING IS HOUSED IN A BLOCK PIVOTED, WITH CARDAN EFFECT, TO THE WALLS/CONNECTING ROPE-GUARD OF THE PULLEY, THE SEAT OF THE WORK ROPE.

A SUITABLE SAFETY DEVICE AGAINST THE ACCIDENTAL EXIT OF THE ROPE IS PROVIDED ON THE HOOK.

4.5) MECHANISMS

THE MECHANISMS REFER ONLY TO THE HOISTING, SLEWING AND TRANSLATION MOVEMENTS OF THE DISTRIBUTOR TROLLEY.

4.5.1) HOISTING

PULLEYS WITH WATERPROOF BEARINGS Dp 280 mm
WITHOUT-POWER ELECTROMAGNETIC BRAKE (SEE CHAP. 10)
WORM SCREW LIMIT SWITCH E (SEE CHAP. 9)
LOAD LIMITING DEVICES: **QLS** SYSTEM (QUICK LOAD LIMITERS SETTING) (SEE CHAP. 9)
MOMENT LIMITING DEVICES: **QMS** SYSTEM (QUICK MOMENT SETTING) (SEE CHAP. 9)

R VERSION CRANE

THREE-PHASE MOTOR 400V WITH DISC BRAKE kW 11 POLES 4
INVERTER FREQUENCY VARIATOR
ORTHOGONAL REDUCTION GEAR AND BEVEL GEAR PAIR R=1/27.9
THREADED DRUM Dp 275 mm

PERFORMANCE : TWO-FALL ROPE HOISTING (2 ROPES)
1° SPEED from 0 to 5 m/min LOAD UP TO 2050 Kg
2° SPEED from 0 to 24 m/min LOAD UP TO 2050 Kg
2°+ SPEED from 0 to 28 m/min LOAD UP TO 1800 Kg
3° SPEED from 0 to 41 m/min (UP TO 55 m/min) (see VARIOMATIC SYSTEM)
LOAD UP TO 1100 Kg
FOUR-FALL ROPE HOISTING (4 ROPES)
1° SPEED from 0 to 2,5 m/min LOAD UP TO 4100 Kg
2° SPEED from 0 to 12 m/min LOAD UP TO 4100 Kg
2°+ SPEED from 0 to 14 m/min LOAD UP TO A 3600 Kg
3° SPEED from 0 to 21 m/min (UP TO 27,5 m/min) (see VARIOMATIC SYSTEM)
LOAD UP TO 2200 Kg

V VERSION CRANE

THREE-PHASE MOTOR 400V WITH DISC BRAKE kW 14,7 POLES 4
INVERTER FREQUENCY VARIATOR

ORTHOGONAL REDUCTION GEAR AND BEVEL GEAR PAIR R=1/27.9
THREADED DRUM Dp 300 mm

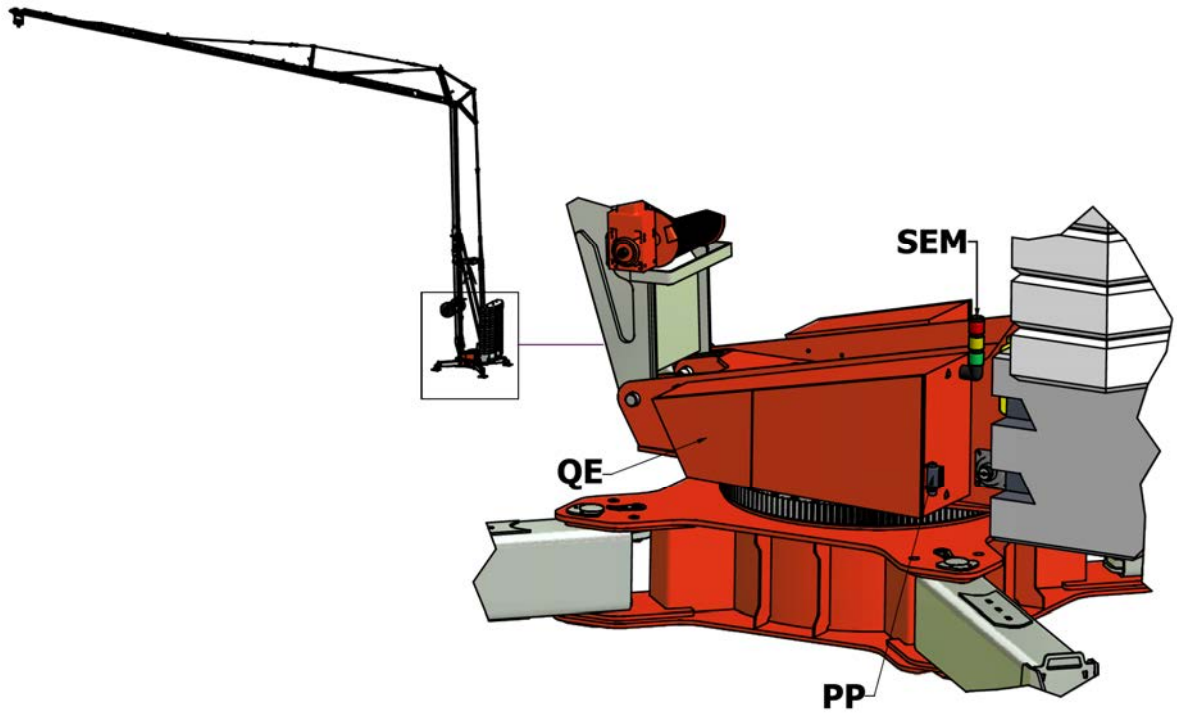
PERFORMANCE : TWO-FALL ROPE HOISTING (2 ROPES)
1° SPEED from 0 to 5 m/min LOAD UP TO 2500 Kg
2° SPEED from 0 to 26 m/min LOAD UP TO 2500 Kg
2°+ SPEED from 0 to 30 m/min LOAD UP TO 2250 Kg
3° SPEED from 0 to 44 m/min LOAD UP TO 1400 Kg
4° SPEED from 0 to 44 m/min (UP TO 60 m/min) (see VARIOMATIC SYSTEM)
LOAD UP TO 700 Kg
FOUR-FALL ROPE HOISTING (4 ROPES)
1° SPEED from 0 to 2,5 m/min LOAD UP TO 5000 Kg
2° SPEED from 0 to 13 m/min LOAD UP TO 5000 Kg
2°+ SPEED from 0 to 15 m/min LOAD UP TO 4500 Kg
3° SPEED from 0 to 22 m/min LOAD UP TO 2800 Kg
4° SPEED from 0 to 22 m/min (UP TO 30 m/min) (see VARIOMATIC SYSTEM)
LOAD UP TO 1400 Kg

T VERSION CRANE

THREE-PHASE MOTOR 400V WITH DISC BRAKE kW 18 POLES 4
INVERTER FREQUENCY VARIATOR
ORTHOGONAL REDUCTION GEAR AND BEVEL GEAR PAIR R=1/23.7
THREADED DRUM Dp 300 mm

PERFORMANCE : TWO-FALL ROPE HOISTING (2 ROPES)
1° SPEED from 0 to 6 m/min LOAD UP TO 4100 Kg
2° SPEED from 0 to 21 m/min LOAD UP TO 4100 Kg
2°+ SPEED from 0 to 26 m/min LOAD UP TO 3600 Kg
3° SPEED from 0 to 42 m/min LOAD UP TO 2000 Kg
4° SPEED from 0 to 42 m/min (UP TO 61 m/min) (see VARIOMATIC SYSTEM)
LOAD UP TO 1100 Kg

4.5.2) ELECTRIC EQUIPMENT POSITIONING AND COMPONENTS



Picture 2

KEY:

" PP " = PUSH-BUTTON PANEL SOCKET WITH CABLE (OPTIONAL: RECEIVING UNIT SOCKET OF THE RADIO CONTROL)
" QE " = ELECTRIC CABINET
" SEM " = LIGHT SIGNAL

THE ELECTRICAL EQUIPMENT IS LOCATED ON THE SLEWING BASE OF THE CRANE.
CONNECT TO THE "PP" SOCKET, LOCATED IN THE BACK OF THE EQUIPMENT, THE CONTROL DEVICE BEING USED (SEE PAR.4.9 CONTROL DEVICE).
DURING THE SLEWING OF THE CRANE, IF THE OPERATOR USES THE PUSH-BUTTON PANEL WITH CABLE, HE MUST BE CAREFUL THAT THE CABLE DOES NOT ENTANGLE WITH THE CRANE COMPONENTS OR DOES NOT BREAK (FOR EXAMPLE: FIXED BASE, SUPPORTS, STABILIZERS, ETC.).

THE LIGHT SIGNAL "SEM" ALLOWS THE OPERATOR, BY MEANS OF A LIGHT SYSTEM, TO SEE THE WORKING CONDITIONS OF THE CRANE:
- GREEN LIGHT: OPERATING CRANE;
- YELLOW LIGHT: PRE-ALARM CONDITION
- RED LIGHT: ALARM CONDITION

(SEE PAR.9.4 "QMS" SYSTEM: FUNCTIONALITY); (SEE PAR.9.7 "QLS" SYSTEM: FUNCTIONALITY).

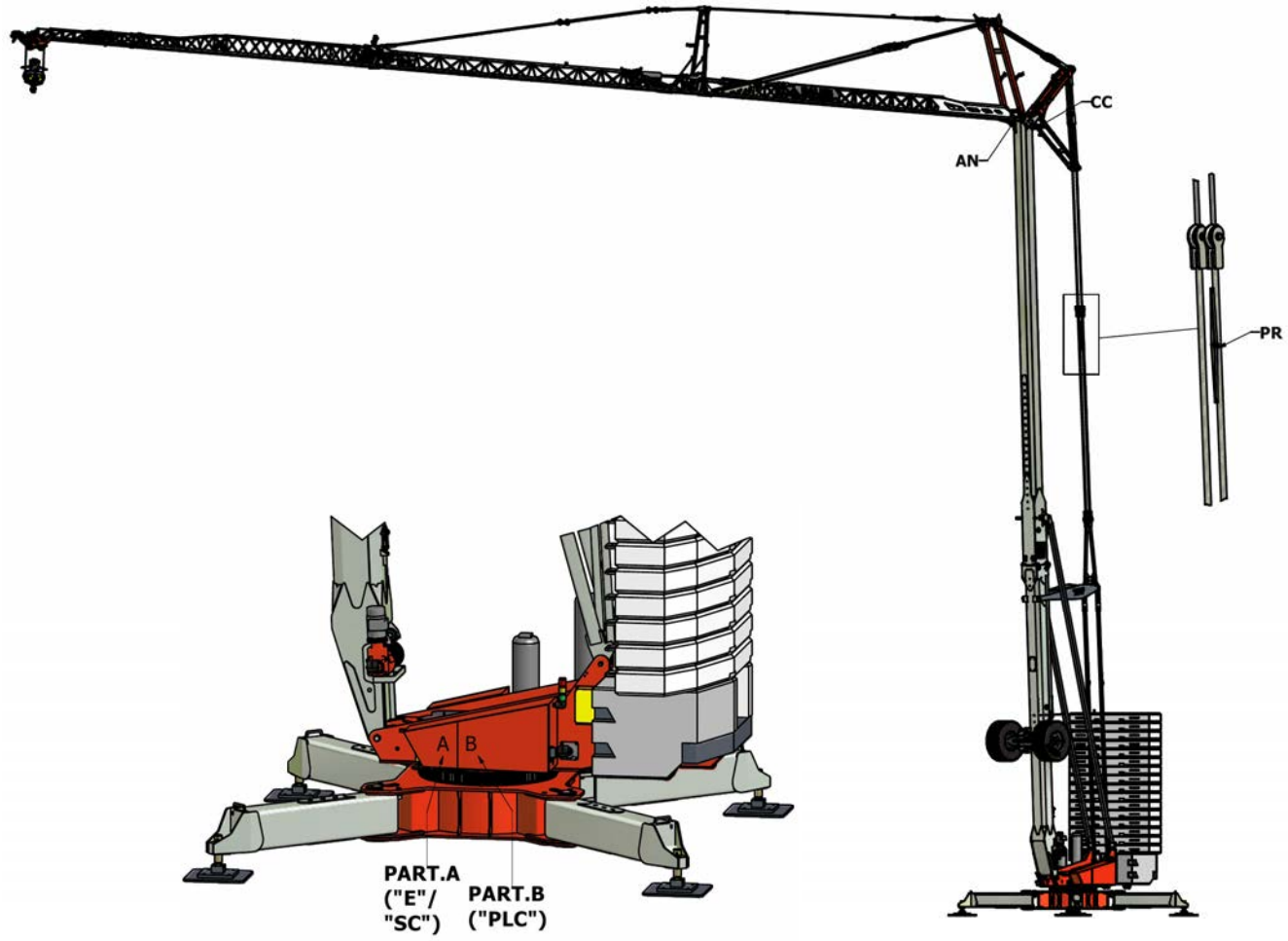
4.5.2.1) SYSTEMS FOR LOAD AND MOMENT LIMITING DEVICES

THE MACHINE IS EQUIPPED WITH ELECTRONIC SYSTEMS FOR LOAD AND MOMENT LIMITING DEVICES:

"QLS" SYSTEM: LOAD LIMITING AND DISPLAYING SYSTEM, COMPOSED OF THE FOLLOWING ELEMENTS:
- ELECTRONIC BOARD (IN THE ELECTRICAL CABINET);
- PIN LOAD CELL (SEE DIAGRAM);

"QMS" SYSTEM: LOAD MOMENT LIMITING SYSTEM ACCORDING TO THE DISTANCE FROM THE SLEWING AXIS OF THE CRANE, COMPOSED OF THE FOLLOWING ELEMENTS:
- PLC (IN THE ELECTRICAL CABINET);
- PROXIMITY SENSOR (SEE DIAGRAM);

FOR A CORRECT USE OF THE DEVICE AND FOR THE PROPER ADJUSTMENTS SEE CHAPTER 9. CALIBRATION AND SAFETY DEVICES.



Picture 3

KEY:

" AN " = ANEMOMETER
" CC " = PIN LOAD CELL
" SC " = "QLS" SYSTEM ELECTRONIC BOARD (INSIDE THE ELECTRICAL CABINET -PART. A)
" E " = DISPLAY FOR "QMS" SYSTEM (INSIDE THE ELECTRICAL CABINET -PART. A)
" PLC " = "QMS" SYSTEM PLC (INSIDE THE ELECTRICAL CABINET - PART. B)
" PR " = PROXIMITY SENSOR

THE ELECTRIC EQUIPMENT IS DIVIDED INTO TWO PARTS TO FACILITATE THE SETTING OPERATIONS OF THE VARIOUS CONFIGURATIONS.

- PART. A : IT CONTAINS SELECTORS, BOARDS, DISPLAYS, THE WHOLE PART RELATED TO THE MAN-MACHINE INTERFACE.

- PART. B: IT CONTAINS ALL THE POWER COMPONENTS (MAGNETOTHERMAL SWITCHES, REMOTE SWITCHES) AND CONTROL COMPONENTS OF THE ACTUATORS (PLC, INVERTER). NO SELECTORS ARE PRESENT.

4.5.3) SLEWING

THREE-PHASE MOTOR 230/400V POLES 4 - kW 4 - 70 Nm WITH DISC BRAKE
INVERTER FREQUENCY VARIATOR
EPICYCLIC REDUCTION GEAR, 3 STAGES, RATIO 1/148

PINION m10
WITHOUT-POWER ELECTROMAGNETIC BRAKE (SEE CHAP. 10)
WORM SCREW LIMIT SWITCH R = 1/50

PERFORMANCE:

R VERSION	From 0 to 0,25 g/min	1° SPEED
	From 0 to 0,75 g/min	2° SPEED
V - T VERSION	From 0 to 0,25 g/min	1° SPEED
	From 0 to 0,50 g/min	2° SPEED
	From 0 to 0,75 g/min	3° SPEED

4.5.4) RING PLATE

DOUBLE ROW BALL BEARING
EXTERNAL TOOTHING Dp 1360 mm
MODULE m=10
N° 36+36 SCREWS M24 CLASS 10.9
TIGHTENING TORQUE: 954 Nm
THE INITIAL CLEARANCE OF THE RING PLATE ENSURES THE CORRECT SLIDING AND SAFETY DURING THE WORKING.
THE CORRECT LUBRICATION OF THE BEARING IS VERY IMPORTANT.
APPROXIMATE DATA NOT SUFFICIENT TO SPECIFY THE TECHNICAL CHARACTERISTICS AND COMPLIANCE SPECIFICATIONS OF THE BEARING (SEE PAR. 13.3.2)

4.5.5) TROLLEY TRANSLATION

THREE-PHASE MOTOR 230/400V WITH DISC BRAKE kW 2,2 4 POLES
INVERTER FREQUENCY VARIATOR
REDUCTION GEAR R=1/43.4
THREADED DRUM Dp 245 mm
PULLEYS WITH WATERPROOF BEARINGS Dp 135 mm
SPEED WITH HORIZONTAL JIB ALIGNED ACCORDING TO LOAD AND VERSION:

PERFORMANCE:

R VERSION :	1° SPEED	From 0 to 24 m/min	LOAD UP TO 4100 Kg	
	2° SPEED	From 0 to 44 m/min	LOAD UP TO 2200 Kg	FOUR-FALL ROPE
	2° SPEED	From 0 to 52 m/min	LOAD UP TO 1400 Kg	TWO-FALL ROPE
V VERSION :	1° SPEED	From 0 to 14 m/min	LOAD UP TO 5000 Kg	
	2° SPEED	From 0 to 29 m/min	LOAD UP TO 5000 Kg	
	3° SPEED	From 0 to 44 m/min	LOAD UP TO 2200 Kg	FOUR-FALL ROPE
	3° SPEED	From 0 to 52 m/min	LOAD UP TO 1400 Kg	TWO-FALL ROPE
T VERSION:	1° SPEED	From 0 to 17 m/min	LOAD UP TO 4100 Kg	
	2° SPEED	From 0 to 34 m/min	LOAD UP TO 4100 Kg	
	3° SPEED	From 0 to 52 m/min	LOAD UP TO 1600 Kg	

WITHOUT-POWER ELECTROMAGNETIC BRAKE (SEE CHAP. 10)
WORM SCREW LIMIT SWITCH R=1/73,63 WITH 4 CONTACTS + ENCODER SENSOR (SEE CHAP. 9)

4.5.6) ERECTION MECHANISM

HYDRAULIC TYPE, COMPOSED OF:

N°1 HYDRAULIC CYLINDER FOR MAST ALIGNMENT, DOUBLE EFFECT,
WITH OVER CENTER SAFETY VALVE
N°2 HYDRAULIC CYLINDERS FOR JIB ALIGNMENT (1 AND 2), DOUBLE EFFECT,
WITH OVER CENTER SAFETY VALVE
N°2 HYDRAULIC CYLINDERS FOR JIB ALIGNMENT (3 AND 4+5), DOUBLE EFFECT,
WITH OVER CENTER SAFETY VALVE
N°1 HYDRAULIC CYLINDER FOR LOWER SCREW DOWN JACK “P3” MOVEMENT
N.1 HYDRAULIC CENTRAL UNIT, WITH MAX. PRESSURE VALVE, MAX 380 bar
UNIDIRECTIONAL HYDRAULIC GEAR PUMP, LEFT ROTATION, DISPLACEMENT 4,2 cm3
THREE-PHASE MOTOR 230V/400V kW 4 - 4 POLES
CONTROL OF THE PUMP ROTATION SPEED BY INVERTER
R7 TYPE HYDRAULIC HOSES, TESTED AT 400 bar
MAX PRESSURE VALVE ON THE PUMP
N° 4 DISTRIBUTION SOLENOID VALVES OPERATED BY THE PUSH-BUTTON PANEL

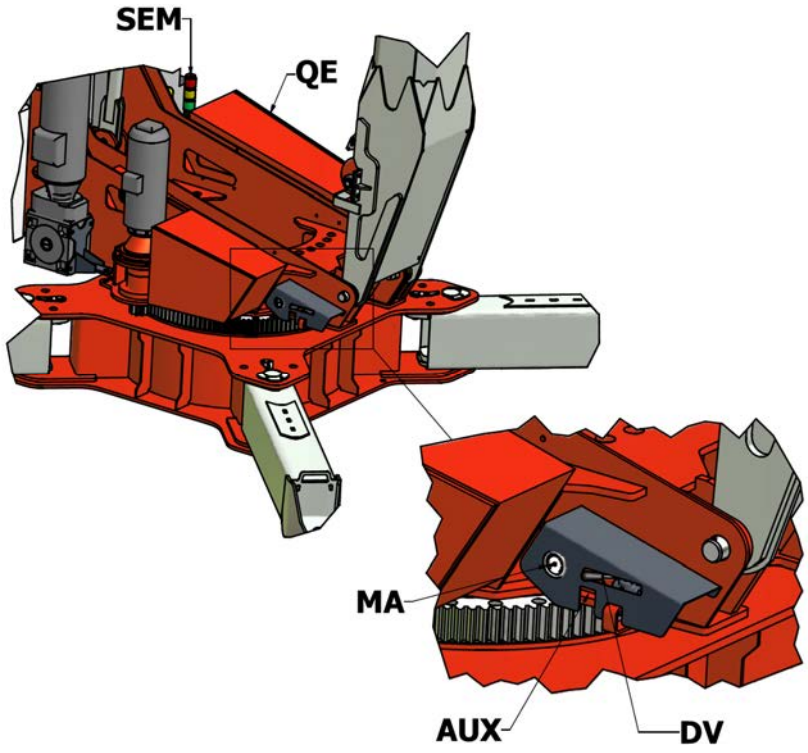
- MAST ALIGNMENT
- JIB 1 AND JIB 2 ALIGNMENT
- JIB 3 AND JIB 4+5 ALIGNMENT
- “P3” LOWER SCREW DOWN JACK MOVEMENT

4.5.7) AUXILIARY DEVICES

THE PRESSURE GAUGE ALLOWS DISPLAYING THE PRESSURE (EXPRESSED IN BAR) OF THE HYDRAULIC POWER UNIT DURING THE ERECTION AND DISASSEMBLY OF THE CRANE.

THE "AUX" HYDRAULIC CONNECTION, LOCATED ON THE "DV" DIVERTER, HAS THE FUNCTION TO ENABLE THE CONNECTION OF A HYDRAULIC DEVICE TO BE USED IN THE CRANE ERECTION PHASE (FOR EXAMPLE, OF A JACK TO LEVEL THE BASE)

THE DIVERTER LEVER ALLOWS THE OPERATOR TO CHOOSE BETWEEN THE OPERATION OF THE HYDRAULIC SYSTEM OF THE CRANE AND THE OPERATION OF THE "AUX" CONNECTION.



Picture 4

KEY:

" AUX" = AUXILIARY CONNECTION
" DV " = DIVERTER
" MA " = PRESSURE GAUGE

4.5.8) BRAKES OF ELECTRIC MOTORS

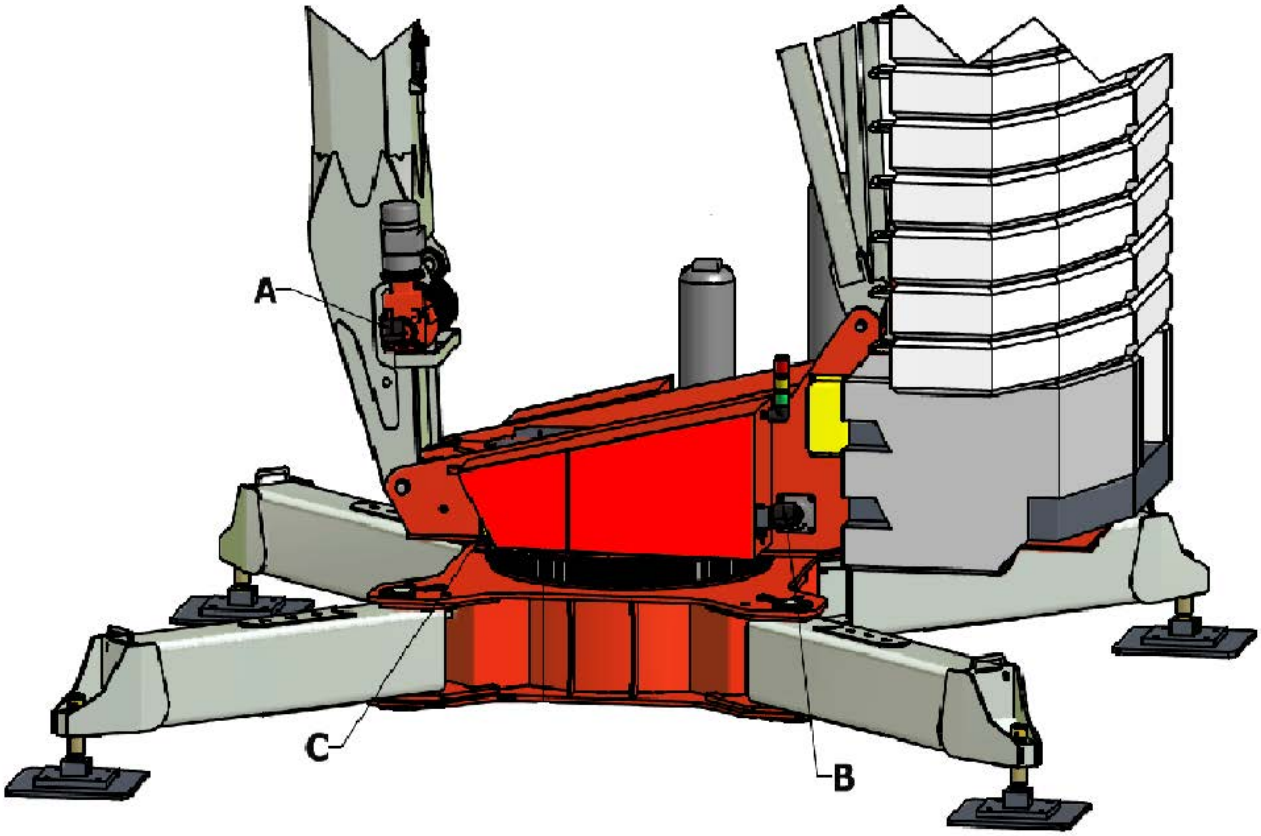
SEE CHAP 10 CHECK AND ADJUSTMENT OF BRAKES

PAY ATTENTION TO THE FACT THAT EVERY ELECTRIC MOTOR IS EQUIPPED WITH AN ELECTROMAGNETIC BRAKE WITHOUT POWER DIMENSIONED FOR THAT TYPE OF MOTOR AND FOR THAT TYPE OF DRIVE, EXCEPT FOR THE MOTOR OF THE HYDRAULIC CENTRAL UNIT.
THEREFORE CHECK THE BRAKE TYPE ACCORDING TO THE CRANE VERSION.

4.5.9) LIMIT SWITCHES

SEE CHAP 9 FOR LIMIT SWITCH ADJUSTMENT

4.5.9.1) POSITIONING THE CRANE LIMIT SWITCHES

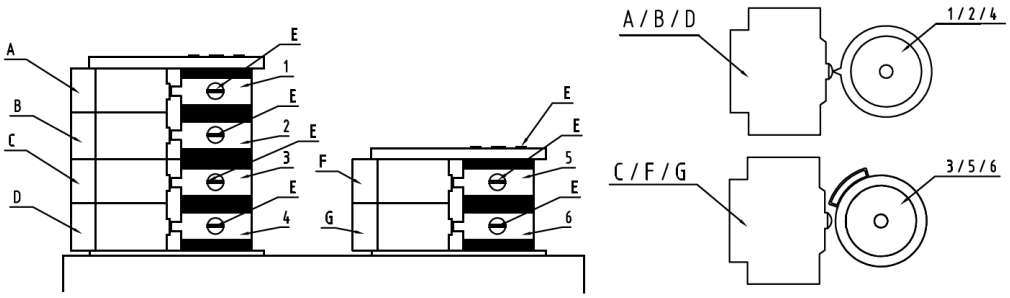


Picture 5

KEY:

" A " = TROLLEY LIMIT SWITCH
" B " = HOISTING LIMIT SWITCH
" C " = SLEWING LIMIT SWITCH

4.5.9.2) HOISTING LIMIT SWITCH

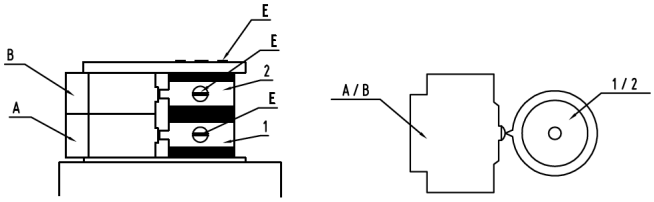


Picture 6

KEY:

A/B/C/D/F/G = MICROSWITCHES
1/2/3/4/5/6 = ADJUSTABLE CAMS
E = ADJUSTING SCREWS

4.5.9.3) SLEWING LIMIT SWITCH

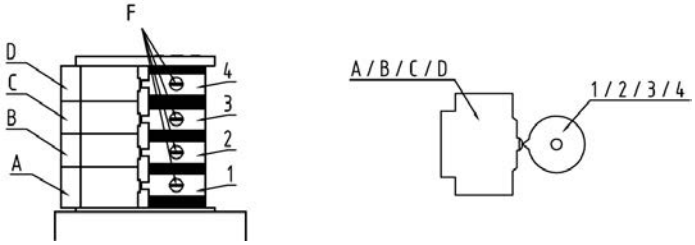


KEY:

A/B = MICROSWITCHES
1/2 = ADJUSTABLE CAMS
E = ADJUSTING SCREWS

Picture 7

4.5.9.4) TROLLEY LIMIT SWITCH



Picture 8

KEY:

A/B/C/D = MICROSWITCHES
1/2/3/4 = ADJUSTABLE CAMS
E = ADJUSTING SCREWS

4.6) CRANE BALLAST

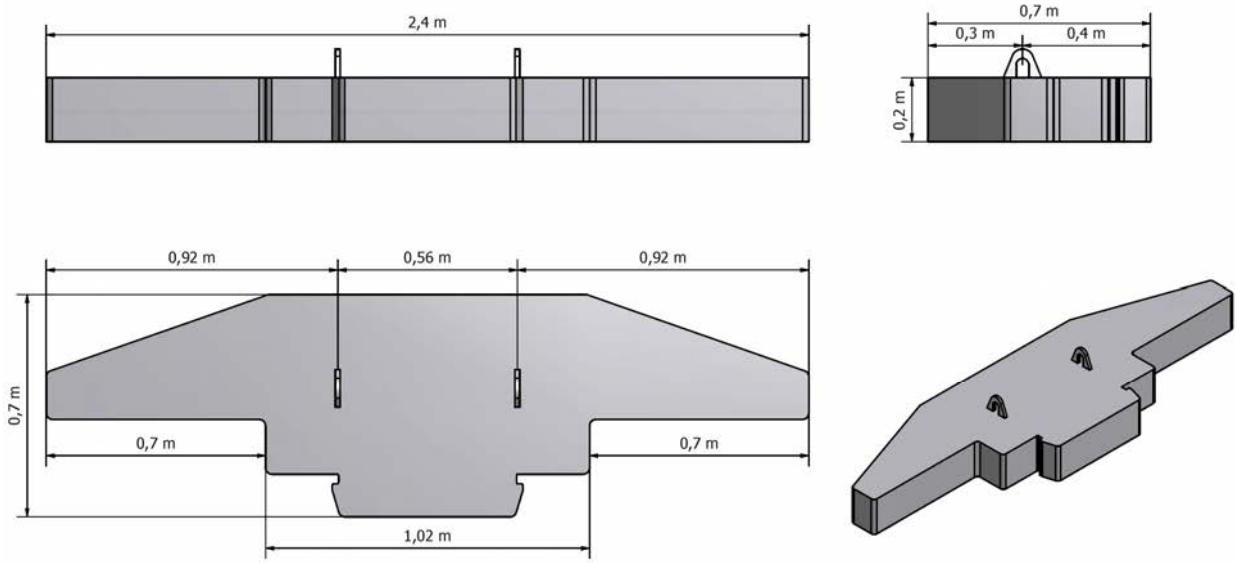
WARNING

4.6.1) CENTRAL BALLAST

THE CENTRAL BALLAST IS COMPOSED OF A PAINTED STEEL BLOCK, WHICH MUST NOT BE REMOVED FROM THE MACHINE, AND OF N° 2 CONCRETE BLOCKS ENRICHED INTERNALLY WITH HIGH DENSITY STEEL, WHICH CAN BE REMOVED DURING THE TRANSPORTATION PHASE OF THE CRANE.

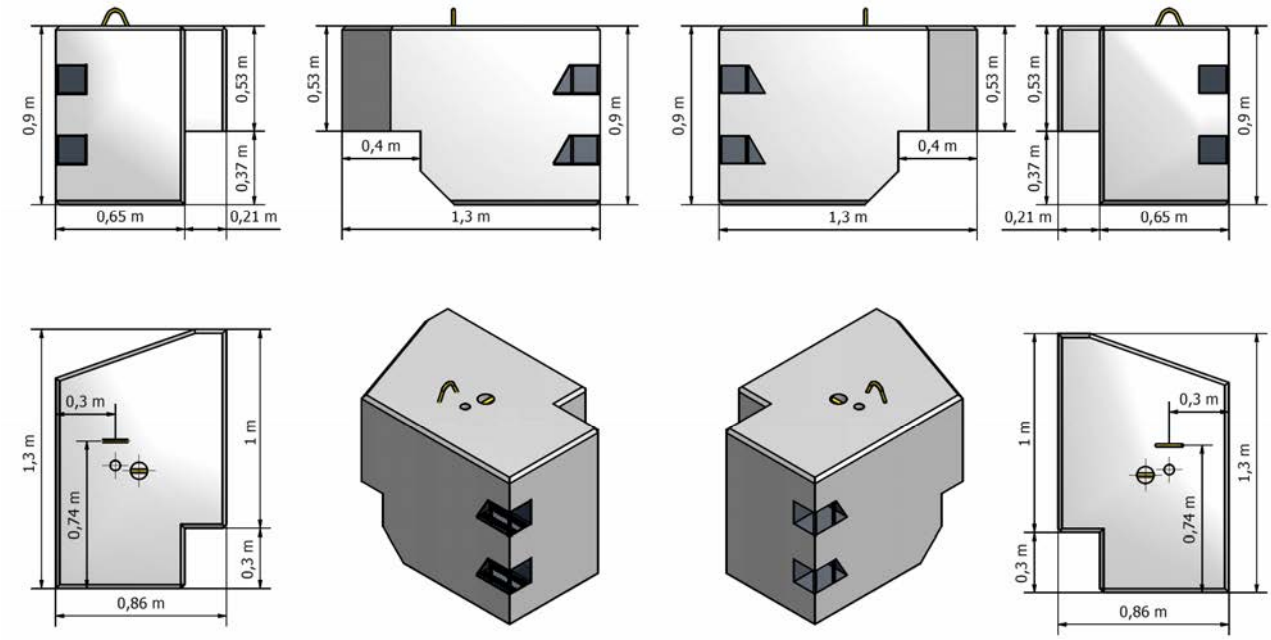
4.6.1.1) STEEL BASE BLOCK (1,6 ton)

MAKE SURE THAT THE STEEL BASE BLOCK IS ALWAYS ON BOARD THE CRANE.



Picture 9

4.6.1.2) LATERAL BASE BLOCKS (2 tons/each)

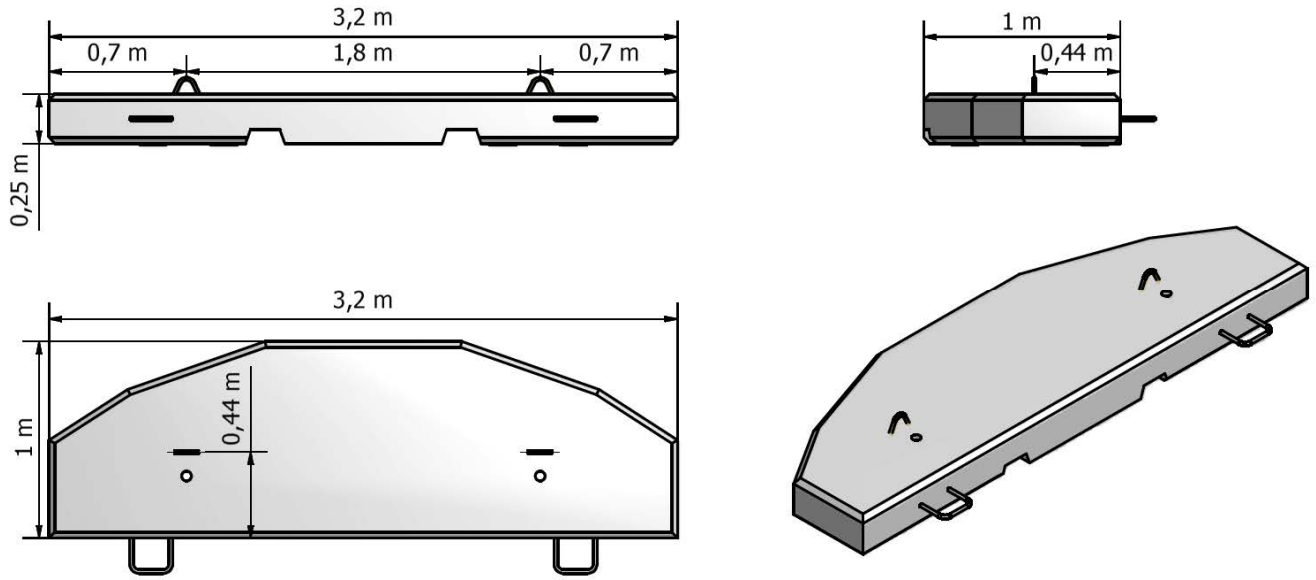


Picture 10

4.6.2) WORK BALLAST

THE WORK BALLAST OF THE CRANE IS COMPOSED OF **N 16** REINFORCED CONCRETE BLOCKS HAVING A UNITARY MASS OF **1750 Kg**.

WORK BALLAST = N° 16 BLOCKS (1,75 t) = 28 t



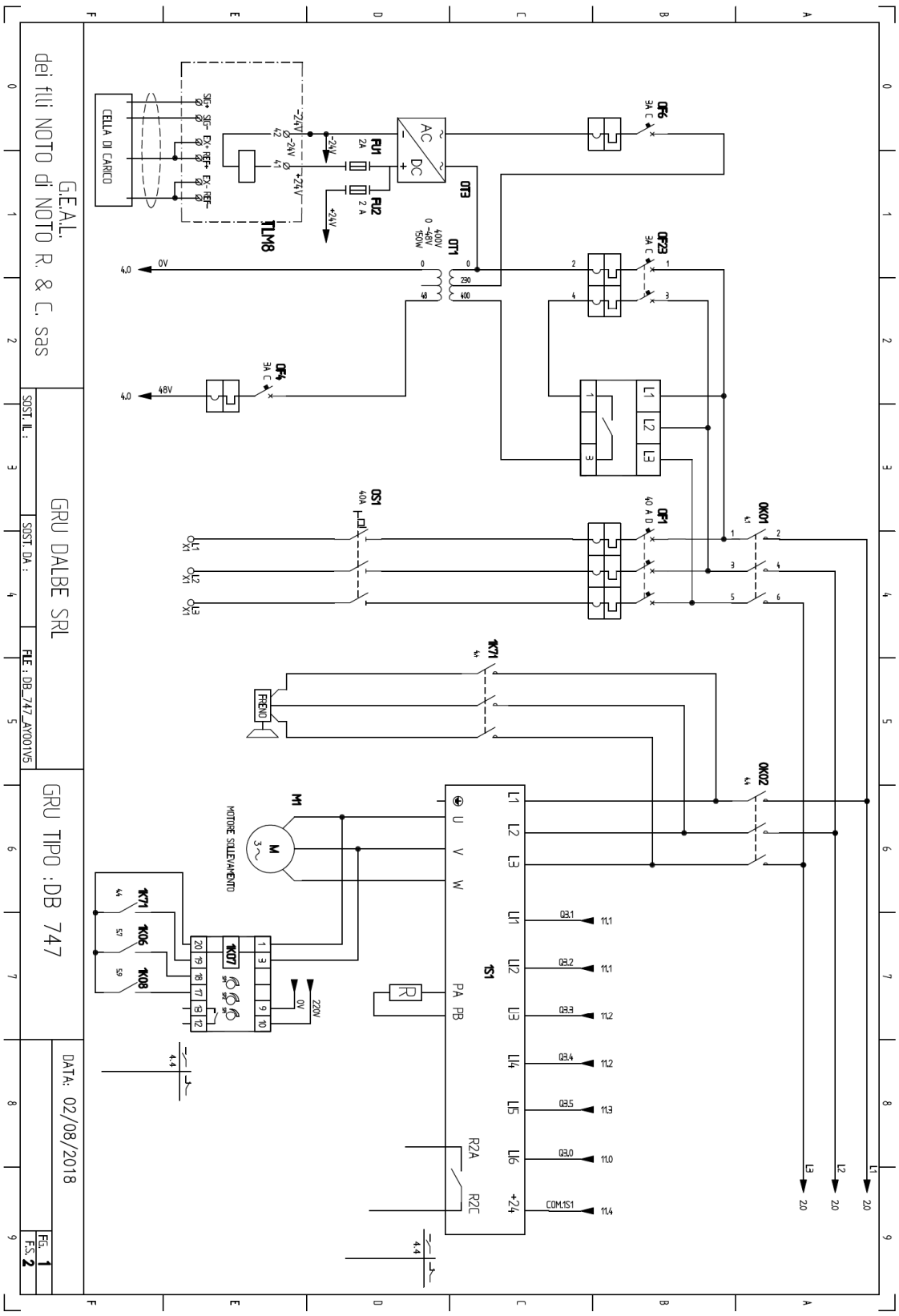
Picture 11

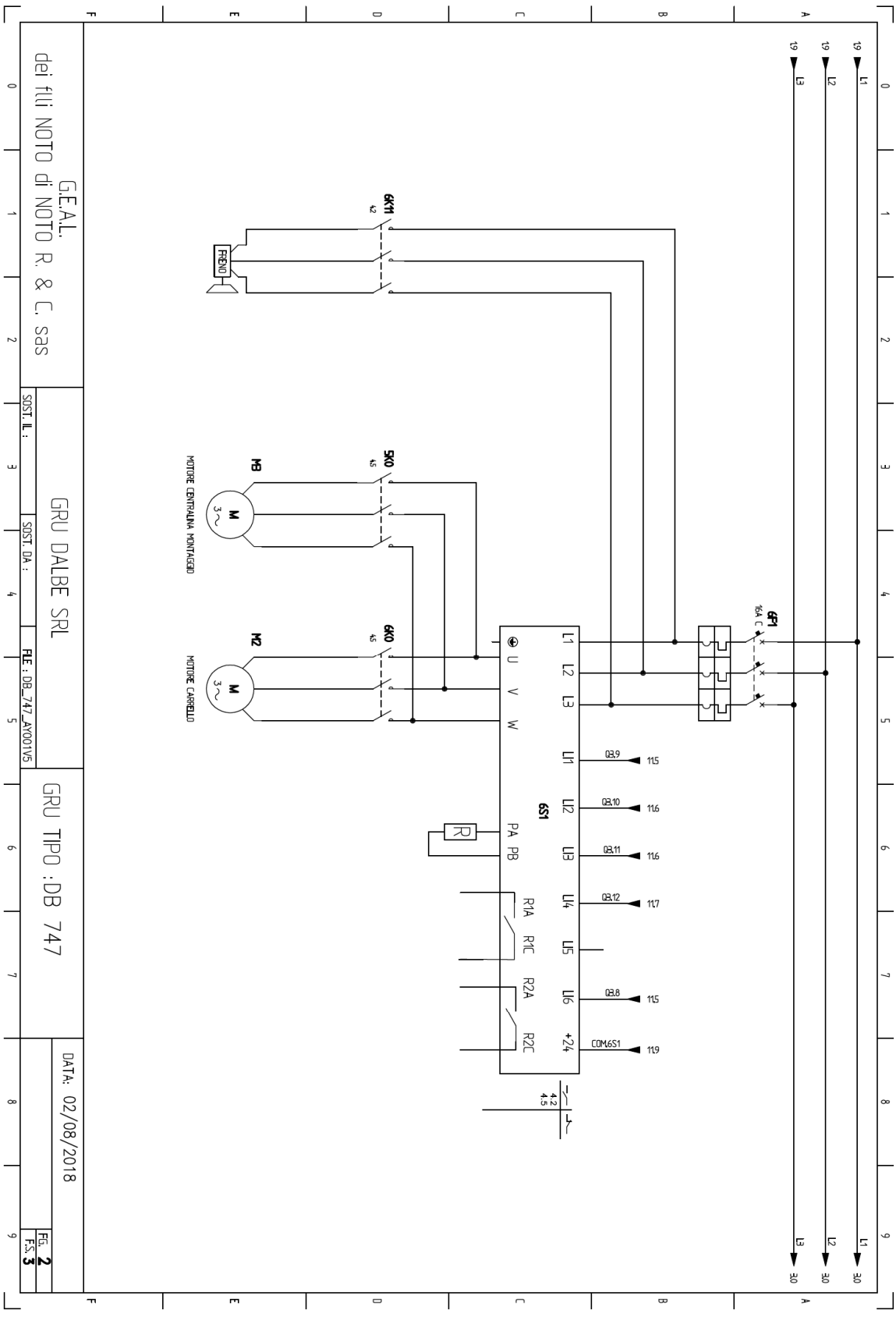
4.6.3) TOTAL BALLAST OF THE CRANE

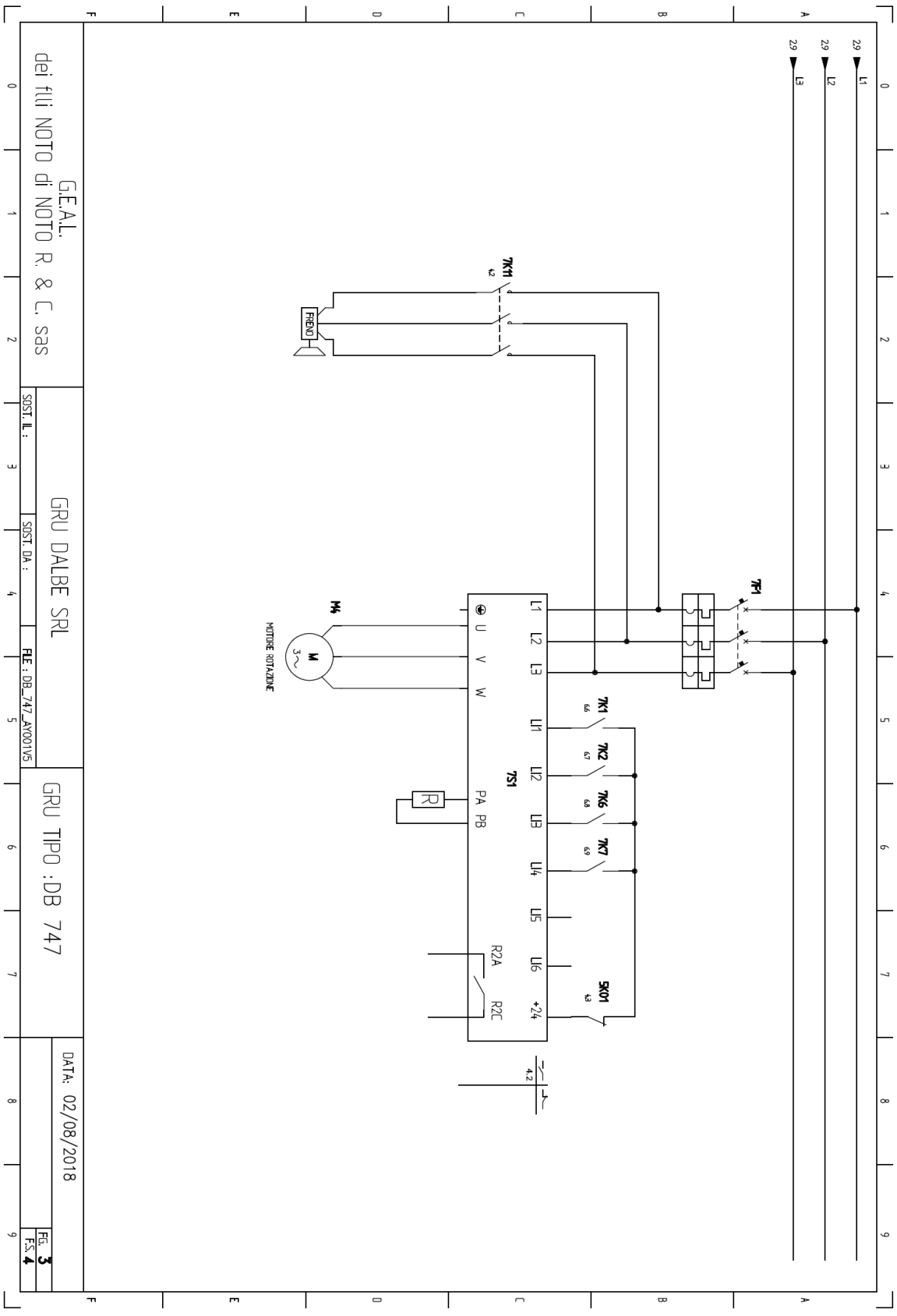
THE TOTAL BALLAST OF THE CRANE FOR ITS CORRECT USE WITHIN THE SAFETY LIMITS IS MADE UP OF THE SUM OF THE CENTRAL BALLAST + THE WORK BALLAST.

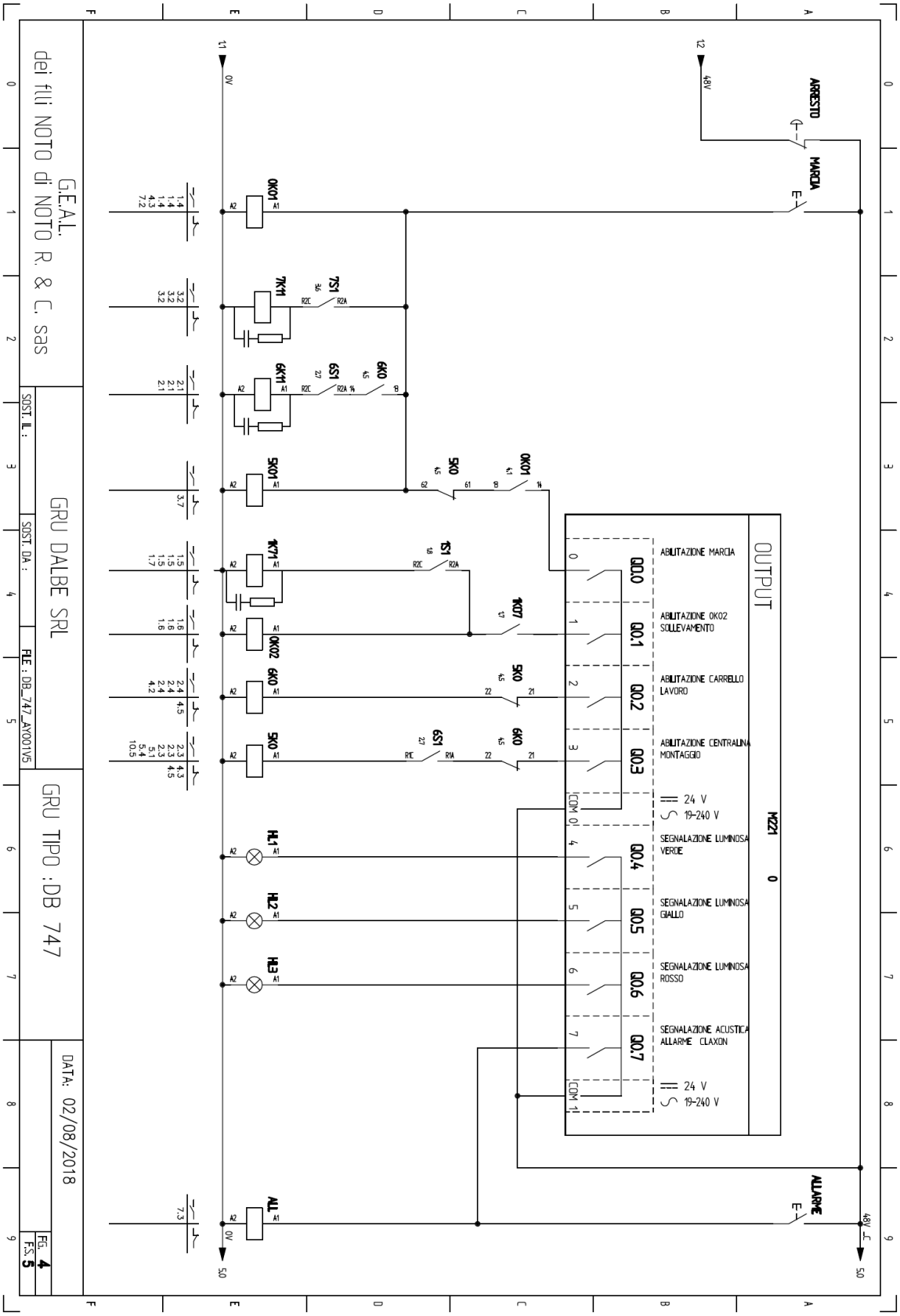
MIN TOTAL BALLAST = Kg 1600 + Kg 4000 + Kg 28000 = Kg 33600

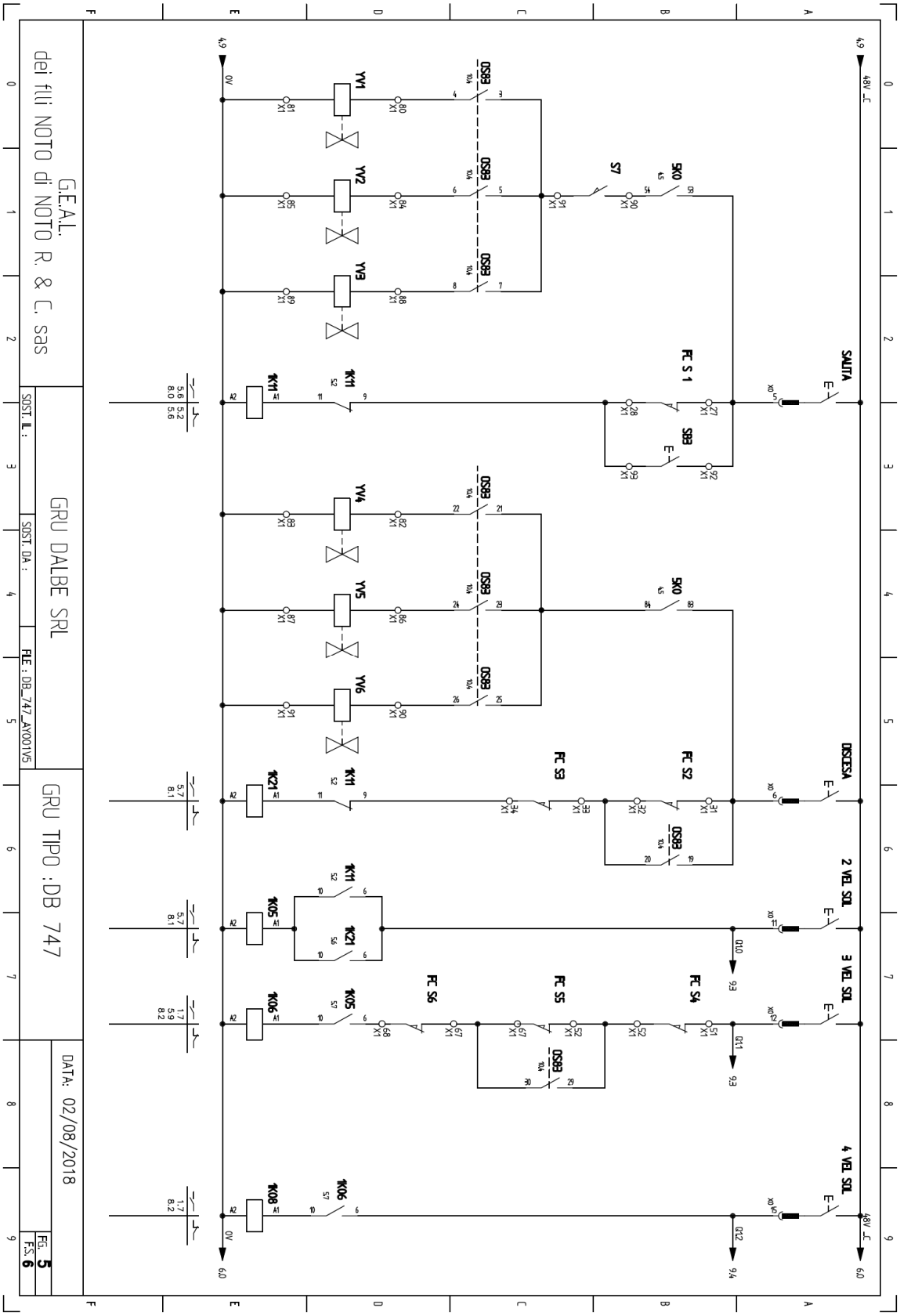
4.7) ELECTRICAL INSTALLATION - V VERSION CRANE

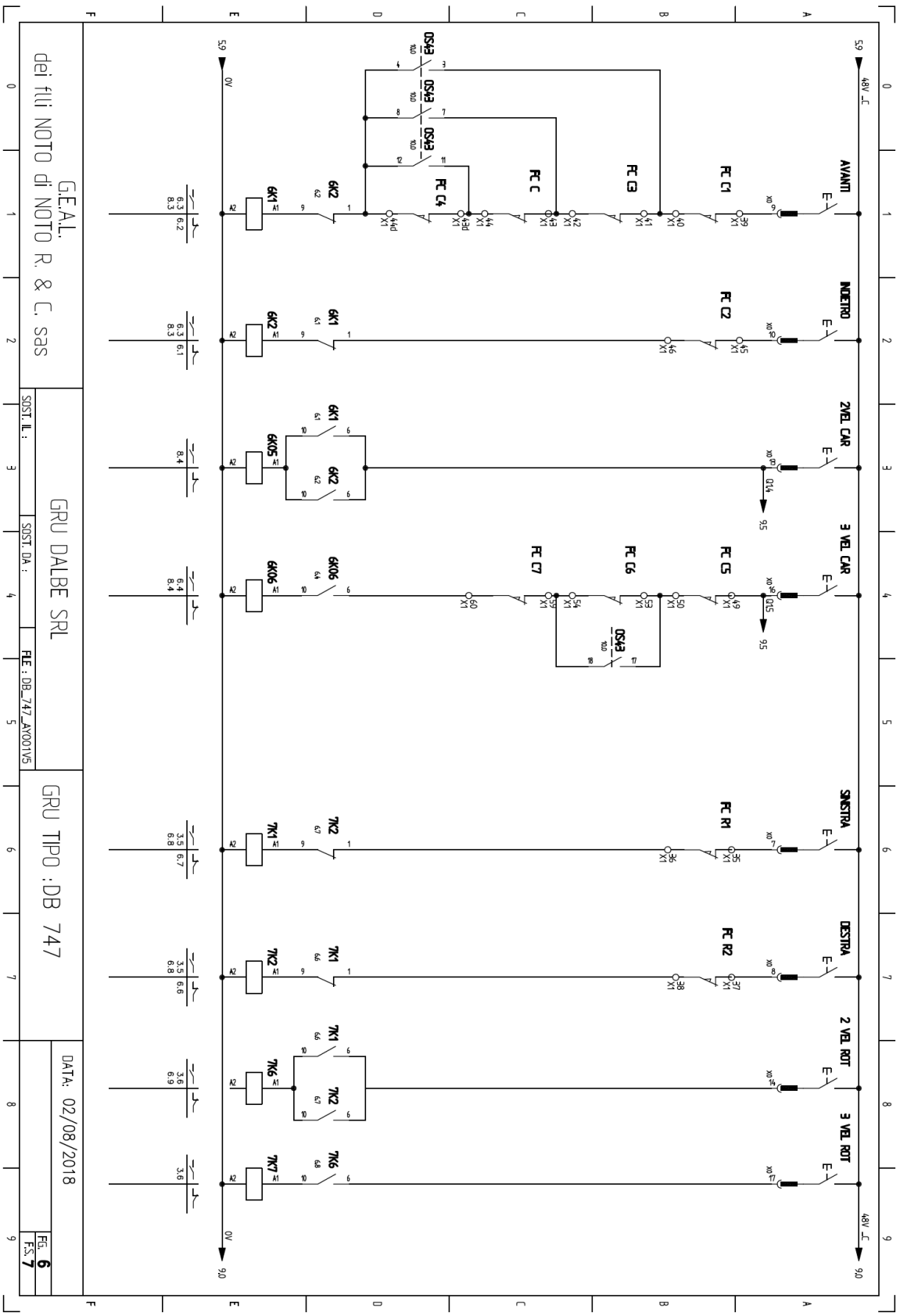


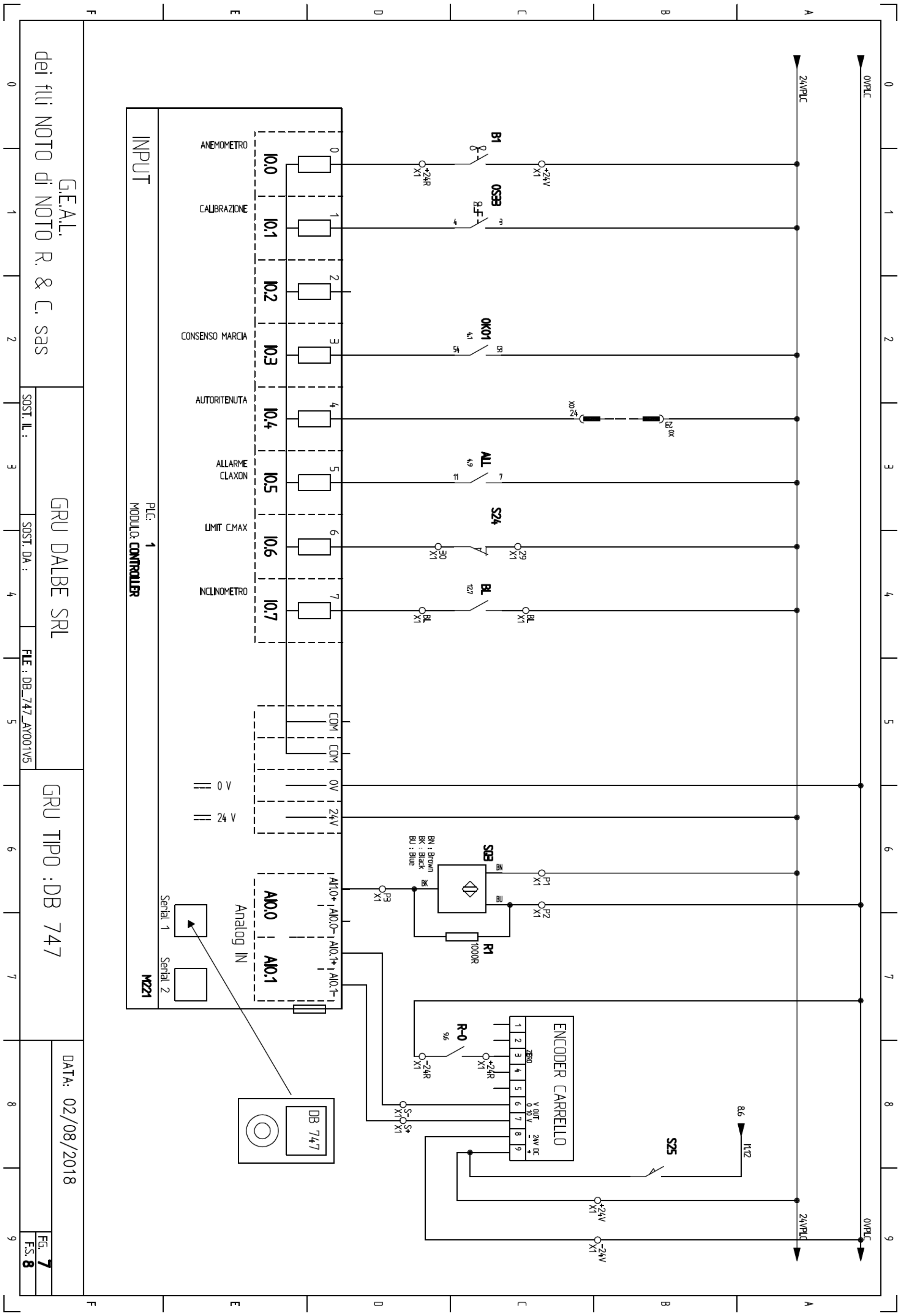

G.E.A.L.
dei fili NOTO di NOTO R. & C. sas
GRU DALBE SRL
GRU TIPO :DB 747
DATA: 02/08/2018
FG. 2
F.S. 3
6K11
FRENO
5K0
6K0
M3
M2
MOTORE CENTRALINA MONTAGGIO
MOTORE CARRELLO
6P1
16A C
6S1
L1
L2
L3
U
V
W
PA
PB
R1A
R1C
R2A
R2C
+24
COM.6S1
R
03.9
03.10
03.11
03.12
03.8
11.5
11.6
11.7
11.9

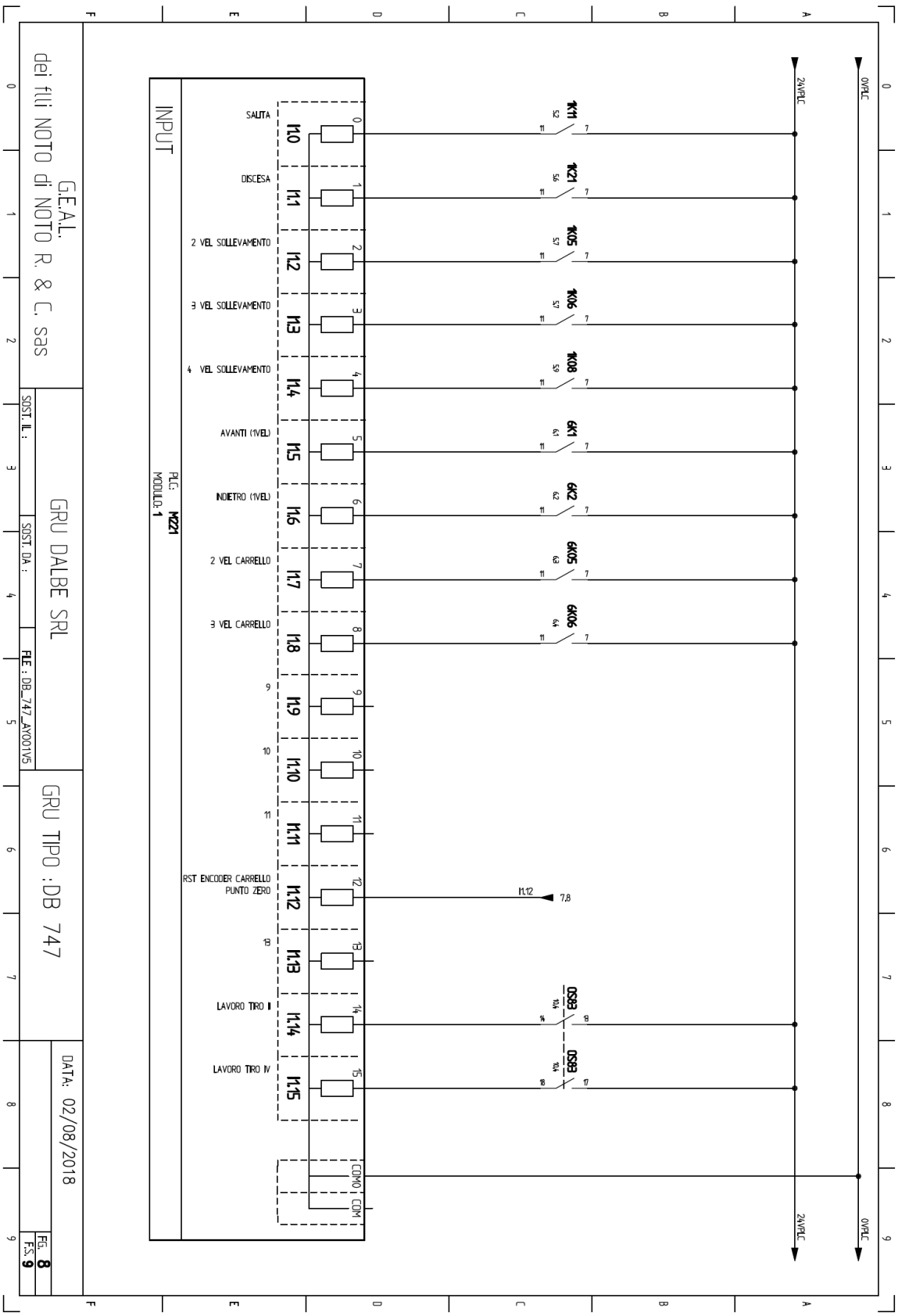

G.E.A.L.
dei fili NOTO di NOTO R. & C. sas
GRU DALBE SRL
GRU TIPO :DB 747
DATA: 02/08/2018
FIG. 3
F.S. 4
7K11
FRENO
7F1
M4
MOTORE ROTAZIONE
7S1
7K1
7K2
7K6
7K7
5K01
R2A
R2C
PA PB
L1
L2
L3

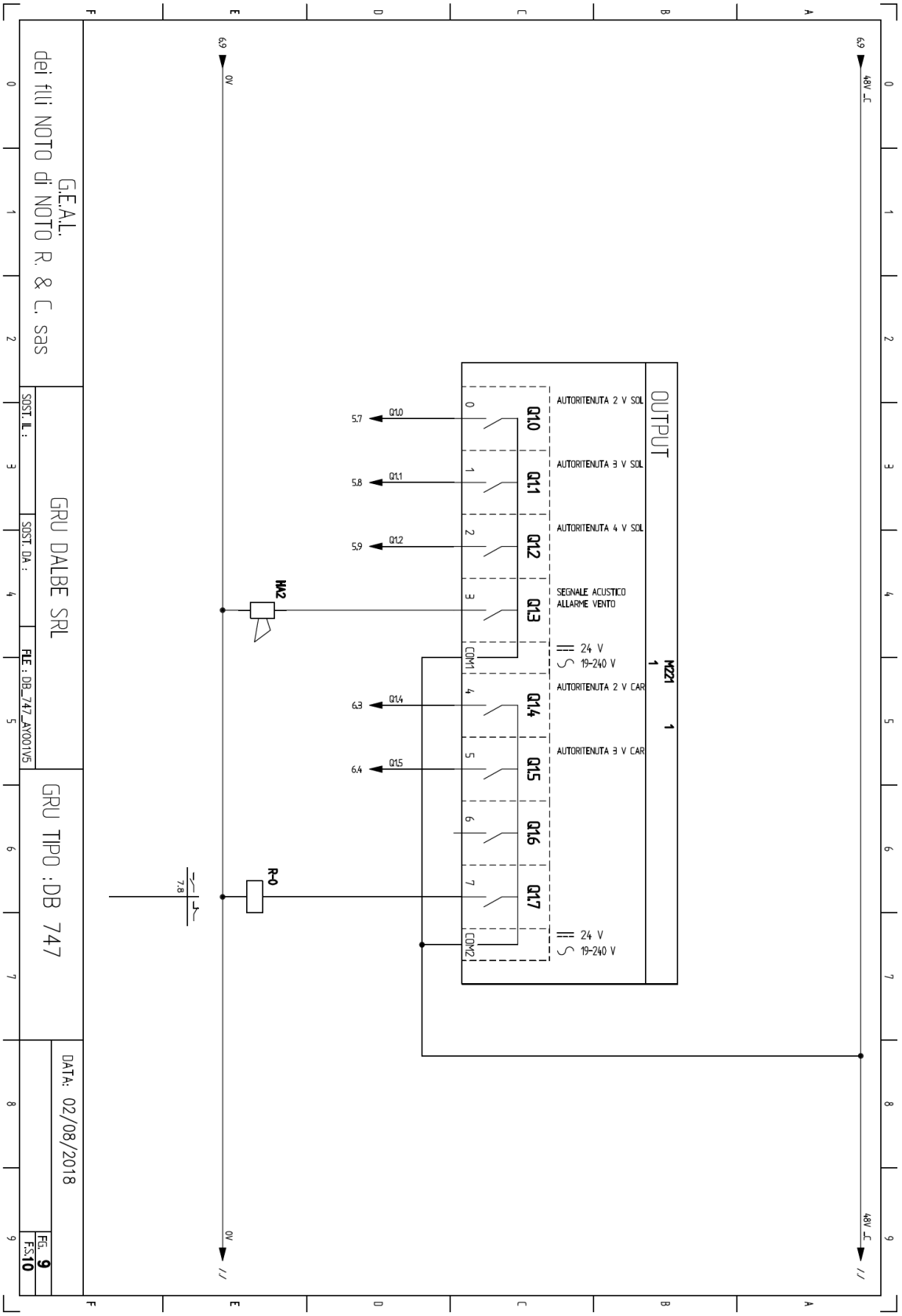

G.E.A.L.
dei fili NOTO di NOTO R. & C. sas
GRU DALBE SRL
GRU TIPO : DB 747
DATA: 02/08/2018
FILE : DB_747_AV001V5
SOST. IL :
SOST. DA :
Fg. 4
F.S. 5
ARRESTO
MARCIA
ALLARME
48V
0V
OUTPUT
M221 0
ABILITAZIONE MARCIA
ABILITAZIONE OK02 SOLLEVAMENTO
ABILITAZIONE CARRELLO LAVORO
ABILITAZIONE CENTRALINA MONTAGGIO
SEGNALAZIONE LUMINOSA VERDE
SEGNALAZIONE LUMINOSA GIALLO
SEGNALAZIONE LUMINOSA ROSSO
SEGNALAZIONE ACUSTICA ALLARME CLAXON
24 V
19-240 V
QK01
7K11
6K11
5K01
1K71
1K07
QK02
6K0
5K0
7S1
6S1
HL1
HL2
HL3
ALL

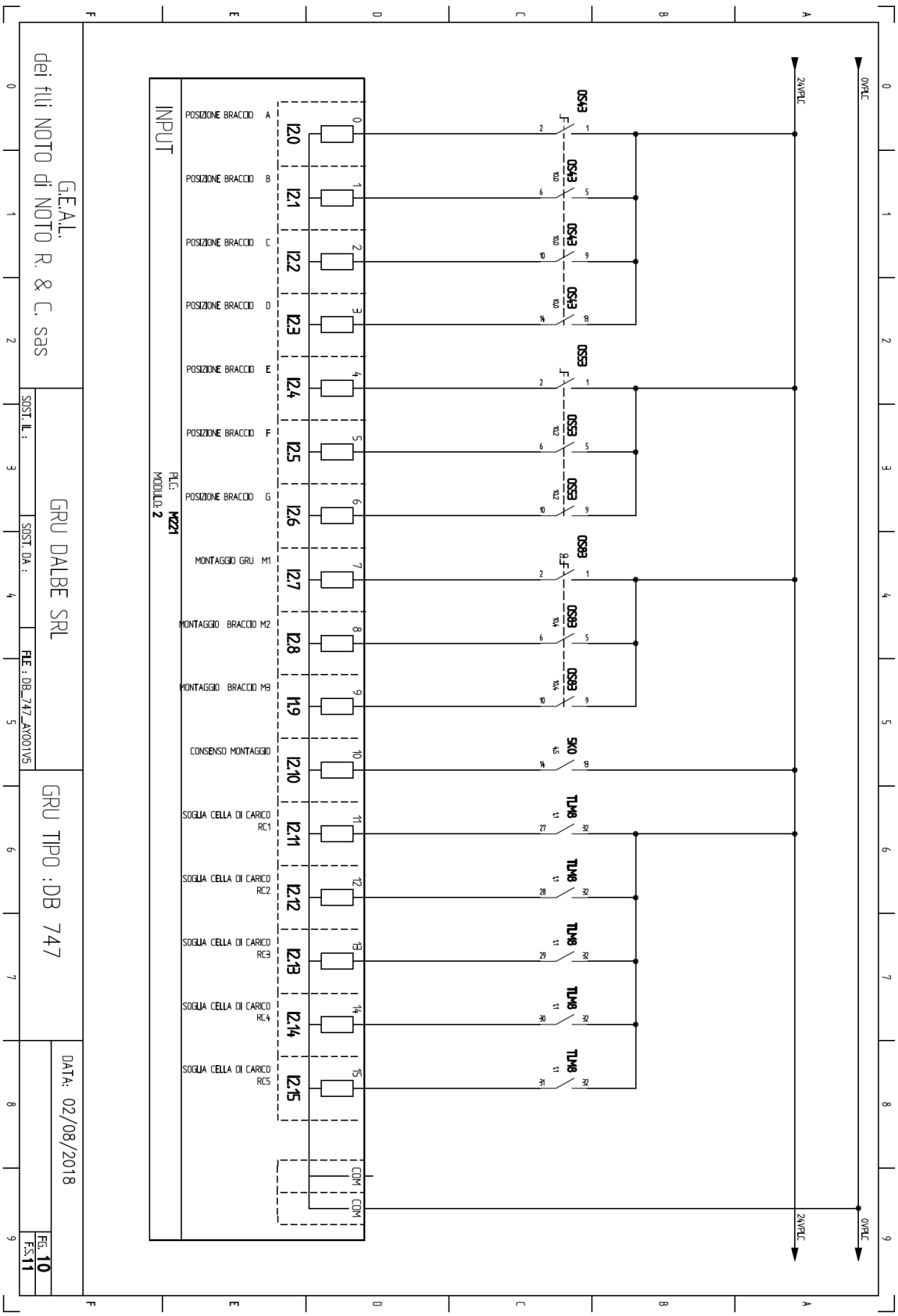

G.E.A.L.
dei fili NOTO di NOTO R. & C. sas
GRU DALBE SRL
GRU TIPO : DB 747
DATA: 02/08/2018
FILE : DB_747_AY0011V5
SALITA
DISCESA
2 VEL SOL
3 VEL SOL
4 VEL SOL
FC S1
FC S2
FC S3
FC S4
FC S5
FC S6
S7
SK0
SB3
YV1
YV2
YV3
YV4
YV5
YV6
DSB3
1K11
1K21
1K05
1K06
1K08
48V
0V

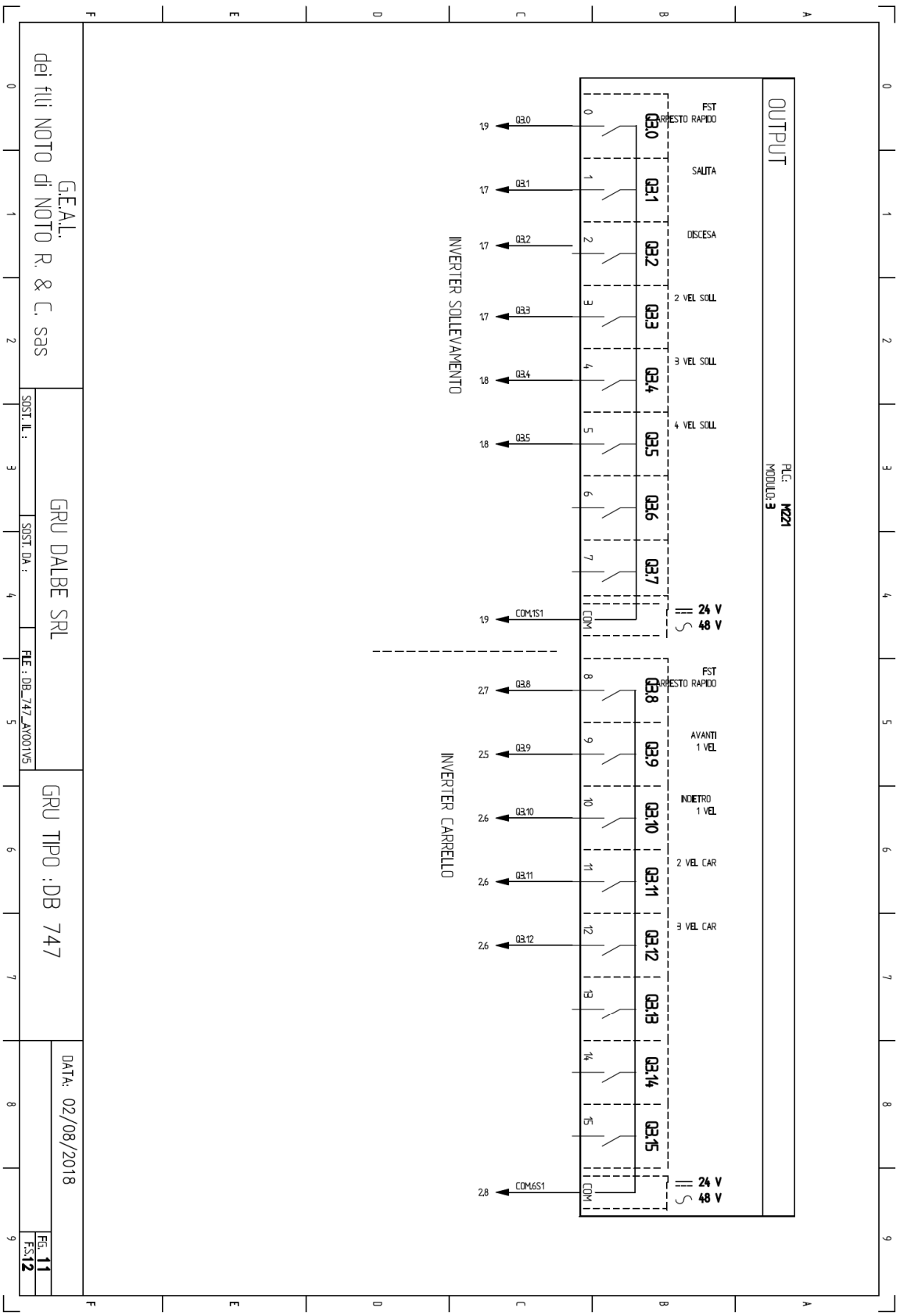

G.E.A.L.
dei fili NOTO di NOTO R. & C. sas
GRU DALBE SRL
GRU TIPO : DB 747
DATA: 02/08/2018
AVANTI
INDIETRO
2VEL CAR
3 VEL CAR
SINISTRA
DESTRA
2 VEL ROT
3 VEL ROT
FC C1
FC C2
FC C3
FC C4
FC C5
FC C6
FC C7
FC R1
FC R2
6K1
6K2
6K05
6K06
7K1
7K2
7K6
7K7
48V
0V

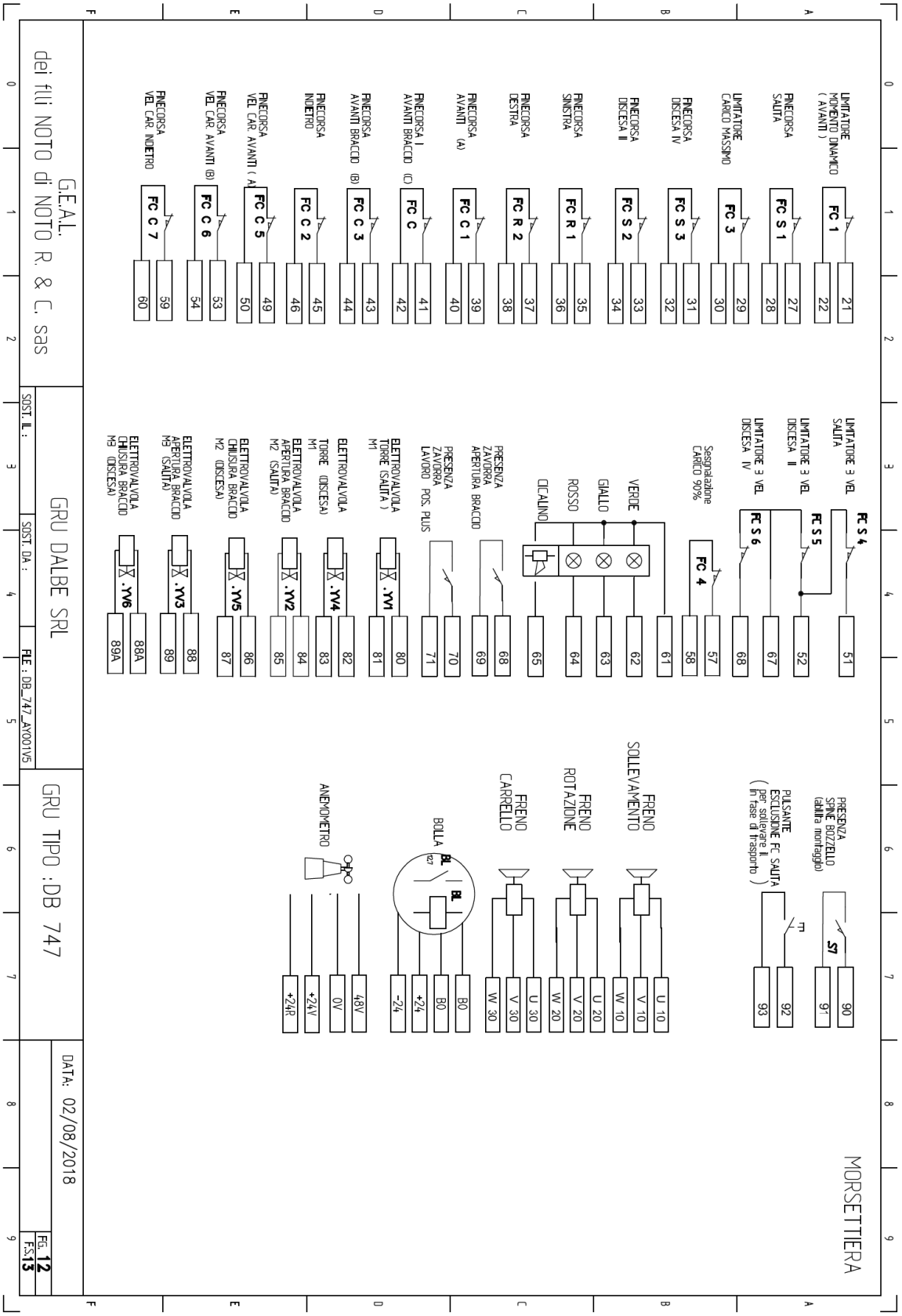

G.E.A.L.
dei f.lli NOTO di NOTO R. & C. Sas
GRU DALBE SRL
GRU TIPO :DB 747
DATA: 02/08/2018
FILE : DB_747_AY001V5
SOST. IL :
SOST. DA :
FG. 7
F.S. 8
INPUT
PLC: 1
MODULO: CONTROLLER
M221
ANEMOMETRO
CALIBRAZIONE
CONSENSO MARCIA
AUTORITENUTA
ALLARME CLAXON
LIMIT C.MAX
INCLINOMETRO
I0.0
I0.1
I0.2
I0.3
I0.4
I0.5
I0.6
I0.7
COM
0V
24V
0 V
24 V
Analog IN
AI0.0
AI0.1
Serial 1
Serial 2
B1
0S3B
0K01
ALL
S24
BL
S2B
BN : Brown
BK : Black
BU : Blue
R1
1000R
R-0
ENCODER CARRELLO
S25
DB 747
24VPLC
0VPLC

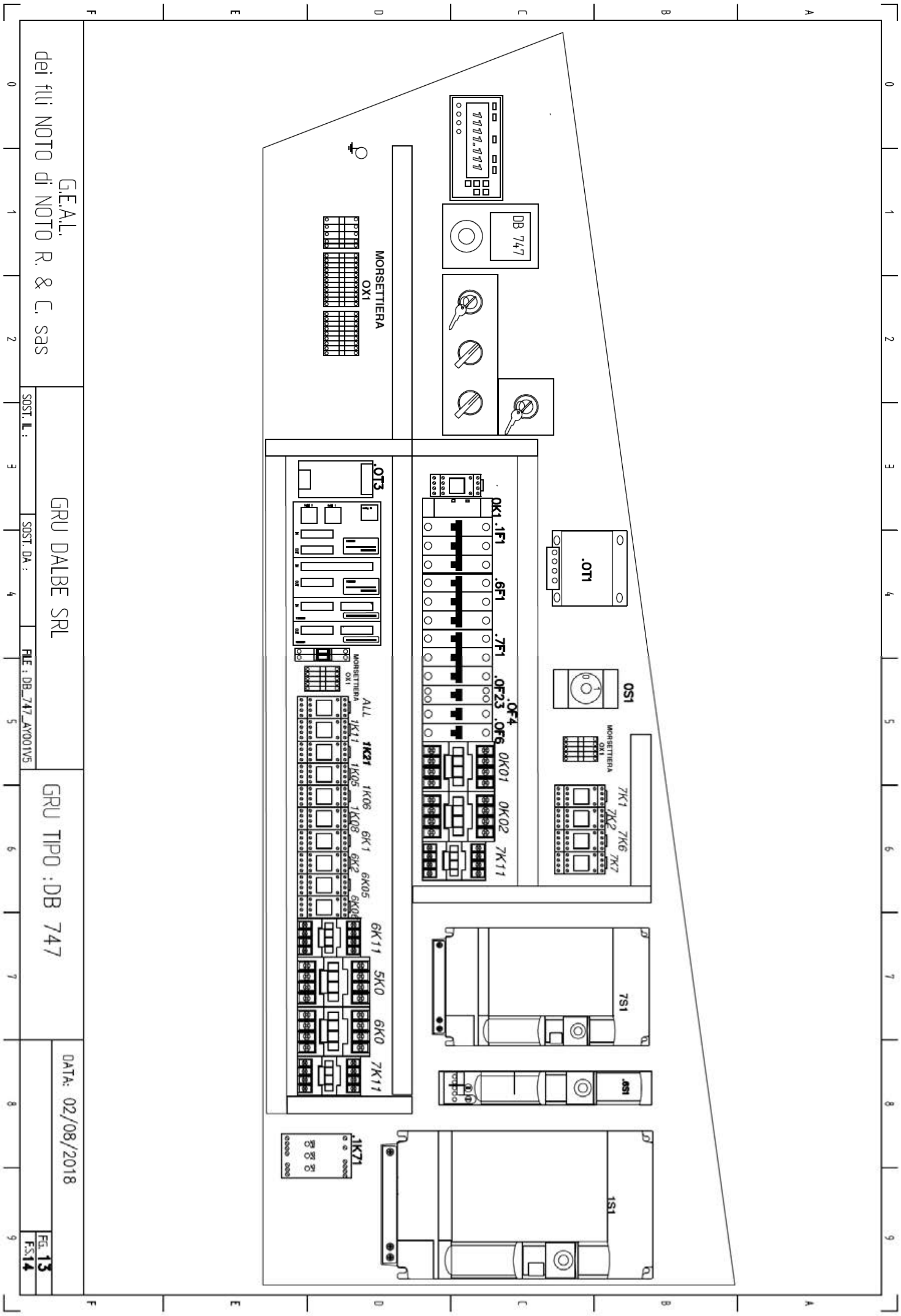

INPUT
PLC MODULO: 1
M221
SALITA
DISCESA
2 VEL SOLLEVAMENTO
3 VEL SOLLEVAMENTO
4 VEL SOLLEVAMENTO
AVANTI (1VEL)
INDIETRO (1VEL)
2 VEL CARRELLO
3 VEL CARRELLO
RST ENCODER CARRELLO PUNTO ZERO
LAVORO TIRO II
LAVORO TIRO IV
I1.0
I1.1
I1.2
I1.3
I1.4
I1.5
I1.6
I1.7
I1.8
I1.9
I1.10
I1.11
I1.12
I1.13
I1.14
I1.15
1K11
1K21
1K05
1K06
1K08
6K1
6K2
6K05
6K06
DS83
DS83
I1.12
7,8
COMO
COM
24VPLC
0VPLC
G.E.A.L.
dei fili NOTO di NOTO R. & C. sas
GRU DALBE SRL
GRU TIPO : DB 747
SOST. IL :
SOST. DA :
FILE : DB_747_AY001V5
DATA: 02/08/2018
FG. 8
F.S. 9


G.E.A.L.
dei fili NOTO di NOTO R. & C. sas
GRU DALBE SRL
GRU TIPO : DB 747
DATA: 02/08/2018
SOST. IL :
SOST. DA :
FILE : DB_747_AY001V5
Fg. 9
Fs. 10
OUTPUT
MZ21
1
Q1.0
Q1.1
Q1.2
Q1.3
Q1.4
Q1.5
Q1.6
Q1.7
AUTORITENUTA 2 V SOL
AUTORITENUTA 3 V SOL
AUTORITENUTA 4 V SOL
SEGNALE ACUSTICO
ALLARME VENTO
AUTORITENUTA 2 V CAR
AUTORITENUTA 3 V CAR
24 V
19-240 V
COM1
COM2
MA2
R-0
48V
0V


INPUT
PLC MODULO: 2 M221
POSIZIONE BRACCIO A
POSIZIONE BRACCIO B
POSIZIONE BRACCIO C
POSIZIONE BRACCIO D
POSIZIONE BRACCIO E
POSIZIONE BRACCIO F
POSIZIONE BRACCIO G
MONTAGGIO GRU M1
MONTAGGIO BRACCIO M2
MONTAGGIO BRACCIO M3
CONSENSO MONTAGGIO
SOGLIA CELLA DI CARICO RC1
SOGLIA CELLA DI CARICO RC2
SOGLIA CELLA DI CARICO RC3
SOGLIA CELLA DI CARICO RC4
SOGLIA CELLA DI CARICO RC5
I2.0
I2.1
I2.2
I2.3
I2.4
I2.5
I2.6
I2.7
I2.8
I1.9
I2.10
I2.11
I2.12
I2.13
I2.14
I2.15
COM
COM
24VPLC
0VPLC
G.E.A.L.
dei fili NOTO di NOTO R. & C. sas
GRU DALBE SRL
GRU TIPO : DB 747
SOST. IL :
SOST. DA :
FILE : DB_747_AY001V5
DATA: 02/08/2018
FG. 10
F.S. 11


OUTPUT
PLC: M221
MODULO: 3
INVERTER SOLLEVAMENTO
INVERTER CARRELLO
FST ARRESTO RAPIDO
SALITA
DISCESA
2 VEL SOLL
3 VEL SOLL
4 VEL SOLL
AVANTI 1 VEL
INDIETRO 1 VEL
2 VEL CAR
3 VEL CAR
Q3.0
Q3.1
Q3.2
Q3.3
Q3.4
Q3.5
Q3.6
Q3.7
Q3.8
Q3.9
Q3.10
Q3.11
Q3.12
Q3.13
Q3.14
Q3.15
COM
24 V
48 V
1.9
1.7
1.8
2.7
2.5
2.6
2.8
COM.1S1
COM.6S1
G.E.A.L.
dei fili NOTO di NOTO R. & C. sas
GRU DALBE SRL
GRU TIPO : DB 747
SOST. IL :
SOST. DA :
FILE : DB_747_AY001V5
DATA: 02/08/2018
FG. 11
F.S. 12


LIMITATORE MOMENTO DINAMICO (AVANTI)
FINECORSA SALITA
LIMITATORE CARICO MASSIMO
FINECORSA DISCESA IV
FINECORSA DISCESA II
FINECORSA SINISTRA
FINECORSA DESTRA
FINECORSA AVANTI (A)
FINECORSA I AVANTI BRACCIO (C)
FINECORSA AVANTI BRACCIO (B)
FINECORSA INDIETRO
FINECORSA VEL CAR. AVANTI (A)
FINECORSA VEL CAR. AVANTI (B)
FINECORSA VEL CAR. INDIETRO
FC 1
FC S 1
FC 3
FC S 3
FC S 2
FC R 1
FC R 2
FC C 1
FC C
FC C 3
FC C 2
FC C 5
FC C 6
FC C 7
LIMITATORE 3 VEL SALITA
LIMITATORE 3 VEL DISCESA II
LIMITATORE 3 VEL DISCESA IV
FC S 4
FC S 5
FC S 6
FC 4
Segnalazione CARICO 90%
VERDE
GIALLO
ROSSO
CICALINO
PRESENZA ZAVORRA APERTURA BRACCIO
PRESENZA ZAVORRA LAVORO POS. PLUS
ELETTROVALVOLA TORRE (SALITA)
ELETTROVALVOLA M1
ELETTROVALVOLA TORRE (DISCESA)
M1
ELETTROVALVOLA APERTURA BRACCIO M2 (SALITA)
ELETTROVALVOLA CHIUSURA BRACCIO M2 (DISCESA)
ELETTROVALVOLA APERTURA BRACCIO M3 (SALITA)
ELETTROVALVOLA CHIUSURA BRACCIO M3 (DISCESA)
.YV1
.YV2
.YV3
.YV4
.YV5
.YV6
PRESENZA SPINE BOZZELLO (abilita montaggio)
PULSANTE ESCLUSIONE FC SALITA (per sollevare il trasporto)
S7
FRENO SOLLEVAMENTO
FRENO ROTAZIONE
FRENO CARRELLO
BOLLA
ANEMOMETRO
+24R
+24V
0V
48V
-24
+24
MORSETTIERA
G.E.A.L.
dei fili NOTO di NOTO R. & C. sas
GRU DALBE SRL
GRU TIPO : DB 747
SOST. IL :
SOST. DA :
FILE : DB_747_AY001V5
DATA: 02/08/2018
FG. 12
F.S. 13


G.E.A.L.
dei f.lli NOTO di NOTO R. & C. sas
GRU DALBE SRL
GRU TIPO :DB 747
DATA: 02/08/2018
FILE : DB_747_AY001V5
MORSETTIERA OX1
DB 747
.OT3
.OT1
0S1
7S1
1S1
.1K71

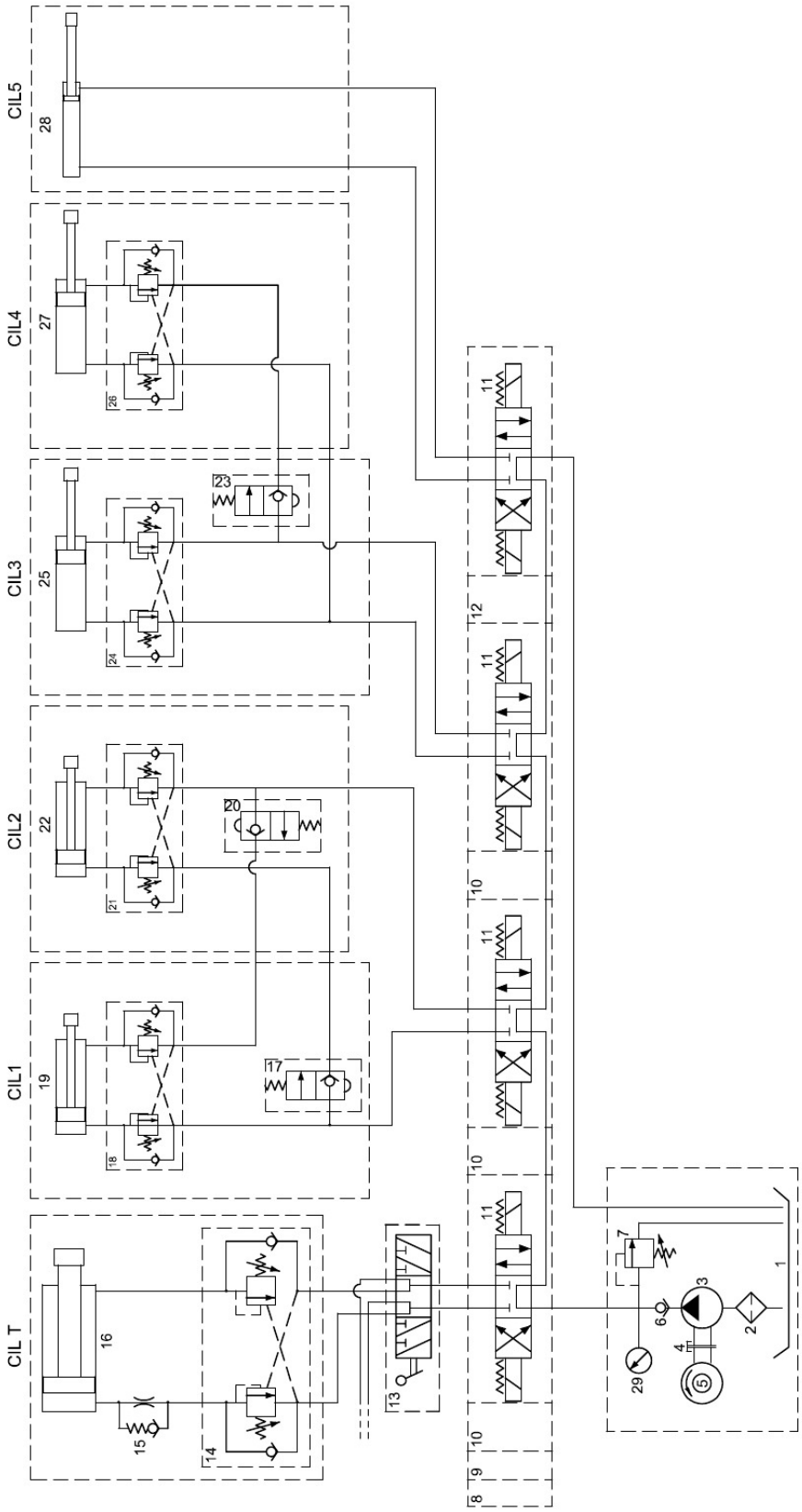
Nome/Item	Tipo/Type	Descrizione/Description	Funzione/Function [1]	Costruttore/Marke	Fg/Sh
0K01	LC1 D 38 E7	Bobina contattore	TELERUTTORE DI MARCIA	SCHNEIDER	4
0K02	LC1 D38 E7	Bobina contattore	LINEA SOLLEVAMENTO	SCHNEIDER	4
0S33		Comando con chiave NO	SELETTORE A CHIAVE PER PROGRAMMAZIONE	SCHNEIDER	7
1K05	4C 48V	Bobina rele' Aux	2 VEL SOLLEVAMENTO	GAVAZZI	5
1K06	4C 48V	Bobina rele' Aux	RELE' 3VEL SOLLEVAMENTO	GAVAZZI	5
1K08	4C 48V	Bobina rele' Aux	RELE' 4 VEL SOLLEVAMENTO	GAVAZZI	5
1K11	4C 48V	Bobina rele' Aux	RELE' SALITA	GAVAZZI	5
1K21	4C 48V	Bobina rele' Aux	RELE' DISCESA	GAVAZZI	5
1K71	LC1 K0610 E7 + RC	Rele' con circuito RC	FRENO SOLLEVAMENTO	SCHNEIDER	4
1K07	T07 →3	Bobina rele' Aux	RELE' CONTROLLO FREQUENZA		1
1S1	ATV 320 15N4B	INVERTER	SOLLEVAMENTO	SCHNEIDER	1
5K0	LC1D 09E7	Bobina contattore	MONTAGGIO	SCHNEIDER	4
5K01	4C 48V	Bobina rele' Aux	RELE' MONTAGGIO	GAVAZZI	4
6F1	10A 3 POLI	Int. aut. magnetotermico tripolare	PROTEZIONE INVERTER CARRELLO/MONTAGGIO	LS	2
6K0	LC1D 09E7	Bobina contattore	CARRELLO	SCHNEIDER	4
6K05	4C 48V	Bobina rele' Aux	RELE' 2 VEL CARRELLO	GAVAZZI	6
6K06	4C 48V	Bobina rele' Aux	RELE' 3 VEL CARRELLO	GAVAZZI	6
6K1	4C 48V	Bobina rele' Aux	RELE' AVANTI	GAVAZZI	6
6K11	LP1 K0610 + RC	Rele' con circuito RC	FRENO CARRELLO	SCHNEIDER	4
6K2	4C 48V	Bobina rele' Aux	RELE' INDIETRO	GAVAZZI	6
6S1	ATV 32U40N4B	INVERTER CARRELLO / MONTAGGIO	CARRELLO / MONTAGGIO	SCHNEIDER	2
7F1	16A C 3 POLI	Int. aut. magnetotermico tripolare	PROTEZIONE ROTAZIONE	LS	3
7K1	4C 48V	Bobina rele' Aux	SINISTRA	GAVAZZI	6
7K11	LC1 K0610 E7 + RC	Rele' con circuito RC	FRENO ROTAZIONE	SCHNEIDER	4
7K2	4C 48V	Bobina rele' Aux	DESTRA	GAVAZZI	6
7K6	4C 48V	Bobina rele' Aux	2 VEL ROTAZIONE	GAVAZZI	6
7K7	4C 48V	Bobina rele' Aux	3 V ROTAZIONE	GAVAZZI	6
7S1	ATV 320U55N4B	INVERTER ROTAZIONE	ROTAZIONE	SCHNEIDER	3
ALL	4C 48 V	Bobina rele' Aux	RELE' ALLARME	GAVAZZI	4
BL		Bobina rele' Aux			12
FU1	FUSE 5X20	Fus. unipolare sezionabile non sotto tensione	PROTEZIONE 24V DC	WIELAND	1
FU2	FUSE 5X20	Fus. unipolare sezionabile non sotto tensione	PROTEZIONE PLC	WIELAND	1
HA2	CICALINO	Tromba elettrica (clacson)	SEGNALAZIONE ACUSTICA ALLARME VENTO	SXCHNEIDER	9
HL1	VERDE	Segnalazione luminosa	SEGNALAZIONE MARCIA -VERDE-	SCHNEIDER	4
HL2	GIALLO	Segnalazione luminosa	SEGNALAZIONE 90% -GIALLO-	SCHNEIDER	4
HL3	ROSSO	Segnalazione luminosa	SEGNALAZIONE ALLARME -ROSSO-	SCHNEIDER	4
M221	M221	Resistore	PLC COMANDI GRU	SCHNEIDER	7
QF1	40A D 3 POLI	Int. aut. magnetotermico tripolare	PROTEZIONE LINEA	LS	1
QF4	1 P 3AC	Int. aut. magnetotermico unipolare	MAGNET. COMANDI 48V	LS	1
QF6	3A C 1P	Int. aut. magnetotermico unipolare	PROTEZIONE ALIMENTATORE QT3	LS	1
QF23	1P+N (1 MODULO) 2A C	Int. aut. magnetotermico bipolare(1 modulo)	ENTRATA TRASFORMATORE	LS	1
QS1	3 POLI 40 A	Sezionatore tripolare con dispositivo di blocco	SEZIONATORE GENERALE BLOCCO PORTA	SCHNEIDER	1
QS43	4 POSIZIONI	Comando rotativo a 4 posizioni NO	SELETTORE POSIZIONE BRACCIO	SCHNEIDER	10
QS53	3 POSIZIONI	Comando rotativo a 3 posizioni NO	SELETTORE INCLINAZIONE BRACCIO	SCHNEIDER	10
QS83	5 POSIZIONI	Comando con chiave a 5 posizioni NO	COMMUTATORE LAVORO / MONTAGGIO	SCHNEIDER	10

G.E.A.L. dei flli NOTO di NOTO R. & C. sas	GRU DALBE SRL SOST. IL : / SOST. DA : / FILE : DB_747_AY001V5	GRU TIPO :DB 747	DATA: 02/08/2018	FG. 14 F.S.15

Nome/Item	Tipo/Type	Descrizione/Description	Funzione/Function [1]	Costruttore/Marke	Fg/Sh
OT1	150 W	Trasformatore di potenza a due avvolgimenti con presa sul secondario	ALIM. COMANDI	NATALI	1
OT3	220V 24V DC 2,5 A	Convertitore di corrente AC-DC monofase	ALIMENTATORE SCHEDA PLC, TLM8	GAVAZZI	1
R1	1000R	Resistore			7
R-0	4C 48V	Bobina rele' Aux	RELE' RESET ENCODER CARRELLO	GAVAZZI	9
SQ3	XS4P18AB110 0-10V	Dispositivo di prossimita' per Input PLC	PROSSIMITI LIMITATORE	SCHNEIDER	7
TLM8	TLM8	CONTROLLO CELLA	SCHEDA CONTROLLO CELLA DI CARICO	LAUMAS	1

G.E.A.L. dei flli NOTO di NOTO R. & C. sas	GRU DALBE SRL SOST. IL : / SOST. DA : / FILE : DB_747_AY001V5	GRU TIPO :DB 747	DATA: 02/08/2018	FG. 15 F.S. /

4.8) HYDRAULIC ASSEMBLY SYSTEM – HYDRAULIC DIAGRAM



Picture 12

KEY:

" 1 " = ELECTROWELDED-SHEET HORIZONTAL TANK
" 2 " = SUCTION GROUP WITH FILTER
" 3 " = GEAR PUMP 4,2 cm3
" 4 " = PUMP MOTORING OVER
" 5 " = MOTOR KW 4 c/ INVERTER 900-1860 rev/min
" 6 " = CHECK VALVE
" 7 " = MAX PRESSURE VALVE
" 8 " = SPACER PLATE
" 9 " = ROTARY PLATE
" 10 " = SERIES CIRCUIT PLATE FOR CETOP3 (x3)
" 11 " = CLOSED CENTER SOLENOID VALVE (x4)
" 12 " = PARALLEL CIRCUIT PLATE FOR CETOP3 (x1)
" 13 " = 6-WAY DIVERTER -DDF 6 V TYPE
" 14 " = OVER - CENTER SAFETY VALVE
" 15 " = UNIDIRECTIONAL THROTTLING VALVE
" 16 " = HYDRAULIC JACK T - MAST ALIGNMENT
" 17 " = MONODIRECTIONAL LIMIT SWITCH VALVE
" 18 " = OVER - CENTER SAFETY VALVE
" 19 " = HYDRAULIC JACK 1 - ALIGNMENT OF JIBS 1-2
" 20 " = MONODIRECTIONAL LIMIT SWITCH VALVE
" 21 " = OVER - CENTER SAFETY VALVE
" 22 " = HYDRAULIC JACK 2 - ALIGNMENT OF JIBS 1-2
" 23 " = MONODIRECTIONAL LIMIT SWITCH VALVE
" 24 " = OVER - CENTER SAFETY VALVE
" 25 " = HYDRAULIC JACK 3 - ALIGNMENT OF JIBS 2-3
" 26 " = OVER - CENTER SAFETY VALVE
" 27 " = HYDRAULIC JACK 4 - ALIGNMENT OF JIBS 4-5
" 28 " = HYDRAULIC JACK 5 - "P3" LOWER SCREW DOWN JACK OPENING
" 29 " = PRESSURE GAUGE

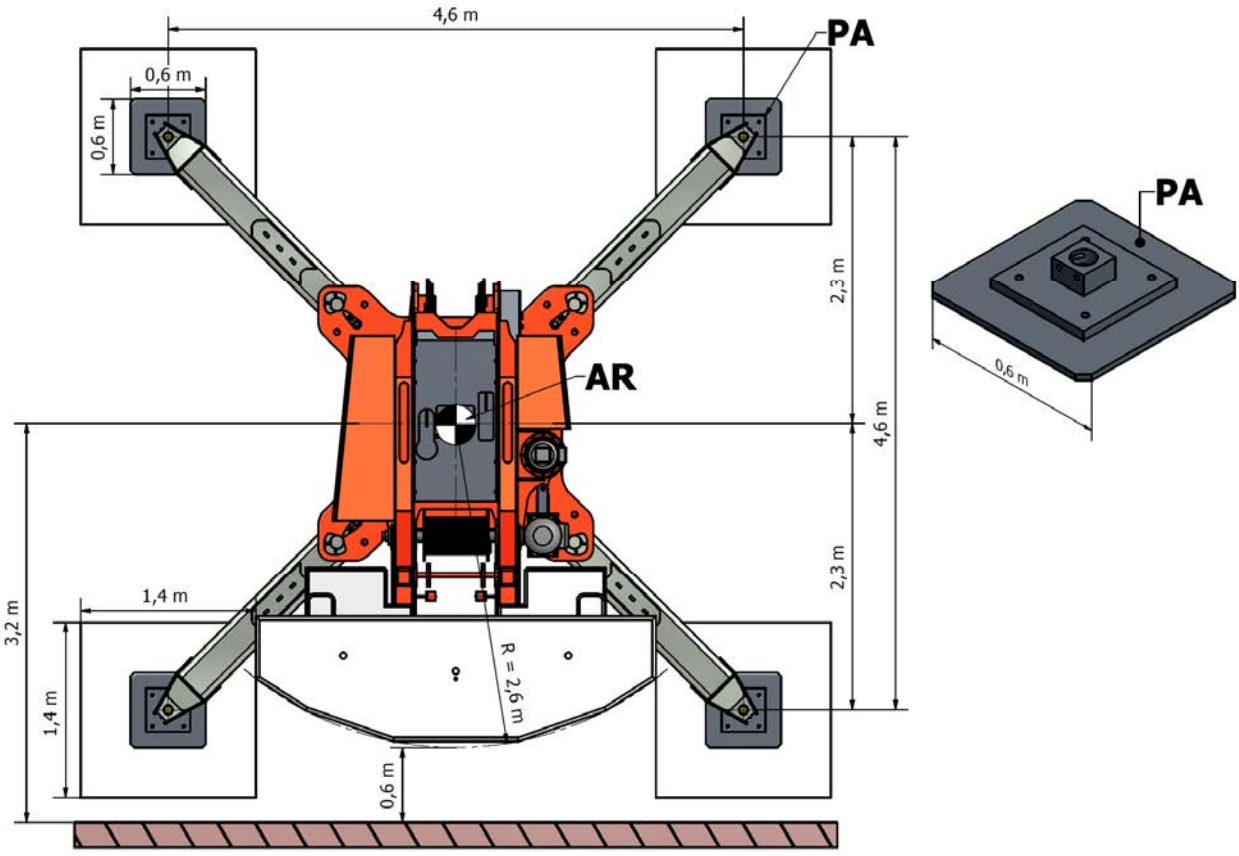
5- BUILDING YARD PREPARATION

WARNING

THE BUILDING YARD PREPARATION WILL BE CARRIED OUT BEFORE THE CRANE ARRIVAL. THE USER IS WHOLLY RESPONSIBLE FOR ALL THE WORKS RELATIVE TO THE BUILDING YARD PREPARATION.

5.1) STABILIZER BEARING SURFACE

THE MAXIMUM LOAD ON EVERY BEARING SURFACE IS **34,9 t**
THE BEARING SURFACES ARE CALCULATED FOR A MINIMUM RESISTANCE OF THE SOIL CORRESPONDING TO: **2 Kg/cm2.**
USE THE STANDARD BEARING PLATFORMS SUPPLIED WITH THE CRANE (UNITARY MASS **90** Kg).
THE FOUNDATION PLINTHS SHALL BE PLACED ON A SOLID, NOT FILLED-IN SOIL AND FAR FROM EXCAVATIONS.



Picture 1

KEY:

" AR " = SLEWING AXIS OF THE CRANE
" PA " = STEEL PLATFORMS (0,6m x 0,6m)

PLATFORMS HAVE A UNITARY MASS OF **90 Kg,**
BE CAREFUL DURING THE HANDLING AND POSITIONING OF THE PLATFORMS.

5.2) SOCKET

WARNING

CONTINUOUS VOLTAGE VALUE FOR EACH PHASE IN THE CABINET: "VOLTAGE" **400 V +5% -5%**

NOTE 1: THE CRANE CAN BE EQUIPPED OPTIONALLY ALSO WITH A **N-NEUTRAL** POLE CONNECTION: IN THIS CASE, THE SAME ARRIVES INSIDE THE ELECTRICAL CABINET TO BE LEFT AVAILABLE AS AN ADDITIONAL SERVICE FOR THE ASSISTANCE ON THE CRANE. THE NEUTRAL POLE CONNECTION IS NOT NECESSARY FOR THE OPERATION OF THE MACHINE.

5.2.1) "R" VERSION CRANE

POWER SUPPLY VOLTAGE	**400 V**
TOTAL POWER INSTALLED	**~ 17 KVA**
HOISTING MOTOR POWER	**11 KW**
DELAYED-ACTION FUSES ON THE LINE SOCKET	**50 A Slow type**
MINIMUM CONTINUOUS VOLTAGE VALUE FOR EACH PHASE IN THE CABINET	**380 V**
CONNECTION TO PERFORM	**GROUND-L1-L2-L3**

5.2.2) "V" VERSION CRANE

POWER SUPPLY VOLTAGE	**400 V**
TOTAL POWER INSTALLED	**~ 21 KVA**
HOISTING MOTOR POWER	**14,7 KW**
DELAYED-ACTION FUSES ON THE LINE SOCKET	**50 A Slow type**
MINIMUM CONTINUOUS VOLTAGE VALUE FOR EACH PHASE IN THE CABINET	**380 V**
CONNECTION TO PERFORM	**GROUND-L1-L2-L3**

5.2.2) "T" VERSION CRANE

POWER SUPPLY VOLTAGE	**400 V**
TOTAL POWER INSTALLED	**~ 25 KVA**
HOISTING MOTOR POWER	**18 KW**
DELAYED-ACTION FUSES ON THE LINE SOCKET	**63 A Slow type**
MINIMUM CONTINUOUS VOLTAGE VALUE FOR EACH PHASE IN THE CABINET	**380 V**
CONNECTION TO PERFORM	**GROUND-L1-L2-L3**

INSTALL AN "A" TYPE DIFFERENTIAL IN THE ELECTRIC CABINET OF THE BUILDING YARD.

5.3) POWER SUPPLY CABLE

WARNING

MINIMUM CROSS SECTION, FOR RUBBER-COATED POWER SUPPLY CABLE, PERFECTLY WORKING AND HORIZONTALLY STRETCHED ABOVE THE SOIL. IF THE CABLE IS PLACED ON THE SOIL, OR ON TREES OR WOUND UP, THE CROSS SECTION SHALL BE PROPERLY INCREASED.

THREE-PHASE CONNECTION:

CRANE VERS. R / GRU VERS. V

UP TO 50m	(3+t) x 10 mm²
UP TO 100m	(3+t) x 16 mm²

CRANE VERS. T

UP TO 100m	(3+t) x 16 mm²

THE FOUR-POLE CABLE SHALL BE PROVIDED WITH 3 WIRES + EARTH.

WARNING: THE CABLE SHALL BE DIMENSIONED IN SUCH A WAY AS TO FEED A MIN. CONTINUOUS VOLTAGE VALUE PER PHASE OF 5% LOWER THAN THE RATED VOLTAGE, TO THE TERMINALS OF THE ELECTRIC CABINET OF THE CRANE, WITH THE WHOLE BUILDING MACHINERY UNDER LOAD.

5.4) PROTECTION FROM ATMOSPHERIC DISCHARGES

WARNING

REFER TO THE C.E.I. 81-1 STANDARDS AND SUBSEQUENT MODIFICATIONS AND INTEGRATIONS.

NORMALLY, A GOOD EARTHING IS ENOUGH. IF AN ADDITIONAL COMPLEMENTARY PROTECTION IS REQUIRED, PROVIDE THE ELECTRIC CABINET WITH PROPER DISCHARGERS. INTERPOSE THEM ON EACH PHASE OF THE LINE.

5.5) CRANE BALLAST

NORMALLY, THE WHOLE BALLAST OF CONCRETE BLOCKS IS INCLUDED IN THE CRANE SUPPLY. OTHERWISE, PREPARE THE BALLAST AS INDICATED IN POINT 4.6

5.6) EARTHING

WARNING

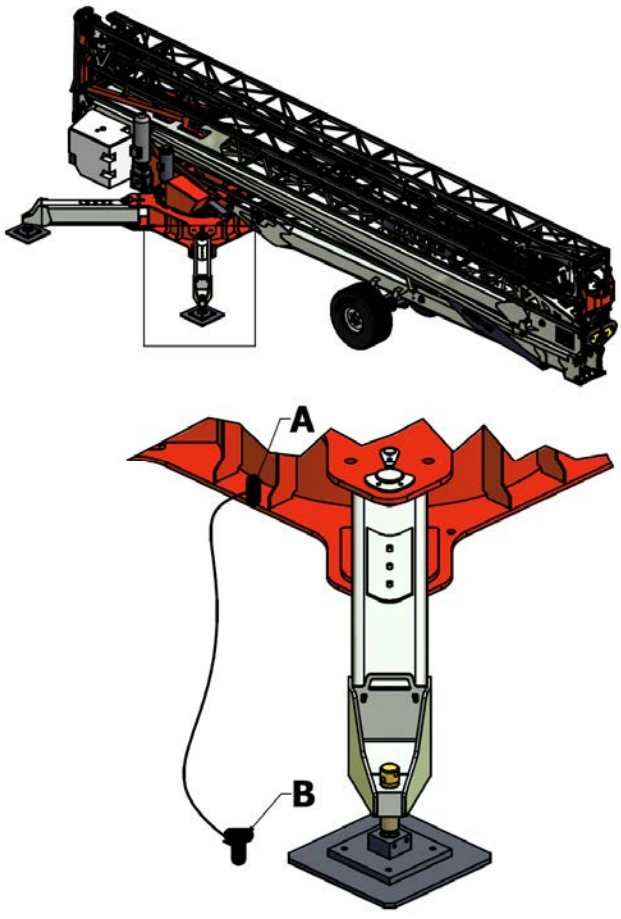
THE EARTHING SHALL BE CARRIED OUT BY A PROFESSIONAL OPERATOR BEFORE CONNECTING THE ELECTRIC LINE TO THE CRANE.

THE INSTALLATION SHALL COMPLY WITH ALL THE LAWS AND STANDARDS IN FORCE IN THE COUNTRY WHERE THE CRANE IS TO BE INSTALLED.

TWO TERMINALS FOR CONNECTING THE CRANE TO THE EARTH PLATES ARE PLACED ON THE BASE.

THE CONTACT SURFACES BETWEEN THE TERMINALS AND THE BARE COPPER PLAIT SHALL ENSURE THE PERFECT WORKING OF THE CONNECTION.

THE SOIL INTO WHICH THE EARTH PLATES ARE DRIVEN MUST NOT BE SANDY OR FILLED-IN AND MUST BE KEPT HUMID.



Picture 2

KEY:

" A " = CONNECTING TERMINAL
" B " = EARTH PLATE

5.7) TOWING MEANS

WARNING

THE TOWING WITH STANDARD AXLES MUST TAKE PLACE INSIDE THE BUILDING YARD AND NOT ON PUBLIC ROADS EXCEPT IF SPECIFICALLY AUTHORIZED BY THE COMPETENT AUTHORITIES.

IF FOR THE TOWING OTHER TYPES OF AXLES ARE USED, WHICH ARE AVAILABLE AS AN OPTION ALSO WITH BRAKE, PLEASE FOLLOW THE SPECIFIC INSTRUCTIONS PRESCRIBED IN THIS MANUAL.

THE MEANS ALLOWED FOR THE TOWING IN THE BUILDING YARD SHALL HAVE A WEIGHT EQUAL TO OR GREATER THAN THE WEIGHT OF THE TOWED CRANE.

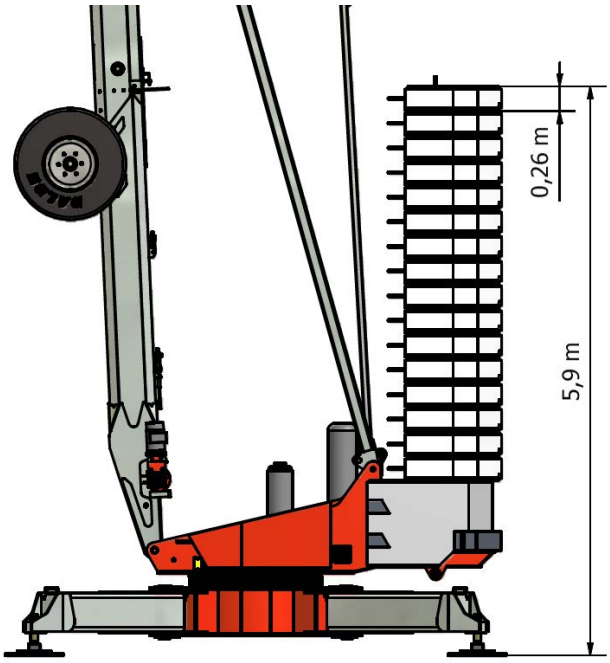
THE COUPLING BETWEEN THE TRACTOR AND THE TRAILER SHALL BE REALIZED IN SUCH A WAY AS TO AVOID THE ACCIDENTAL REMOVAL OF THE CONNECTING PIN BETWEEN THE SHACKLE AND THE HEAD.

THE CONNECTING PIN SHALL HAVE THE SAME SIZE AS THE COUPLING HEAD.

5.8) AUXILIARY ERECTION MEANS

DANGER

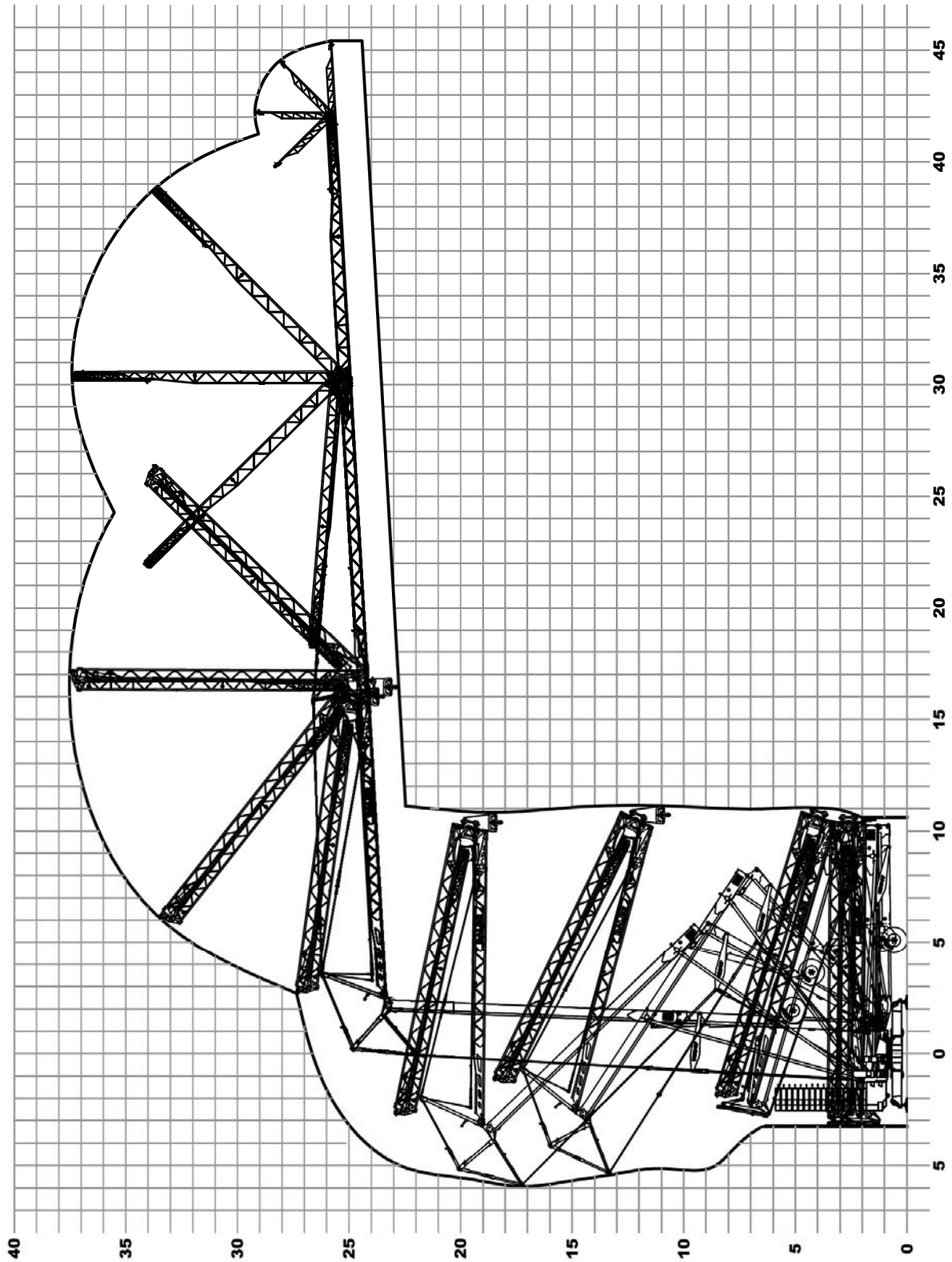
IT IS NECESSARY TO PROVIDE FOR SUITABLE HOISTING MEANS, WITH A CAPACITY NOT LOWER THAN **1750 KG** (SEE PAR. 4.6.2).
SINCE THE HEIGHT OF THE LAST BLOCK WITH RESPECT TO THE SOIL IS **ABOUT 5,9 mt**., THE MEANS MUST HAVE A WORKING HEIGHT FOR THE POSITIONING OF THE FORKS OF AT LEAST **5,9 mt + 0,6 mt = 6,5 mt.**



Picture 3

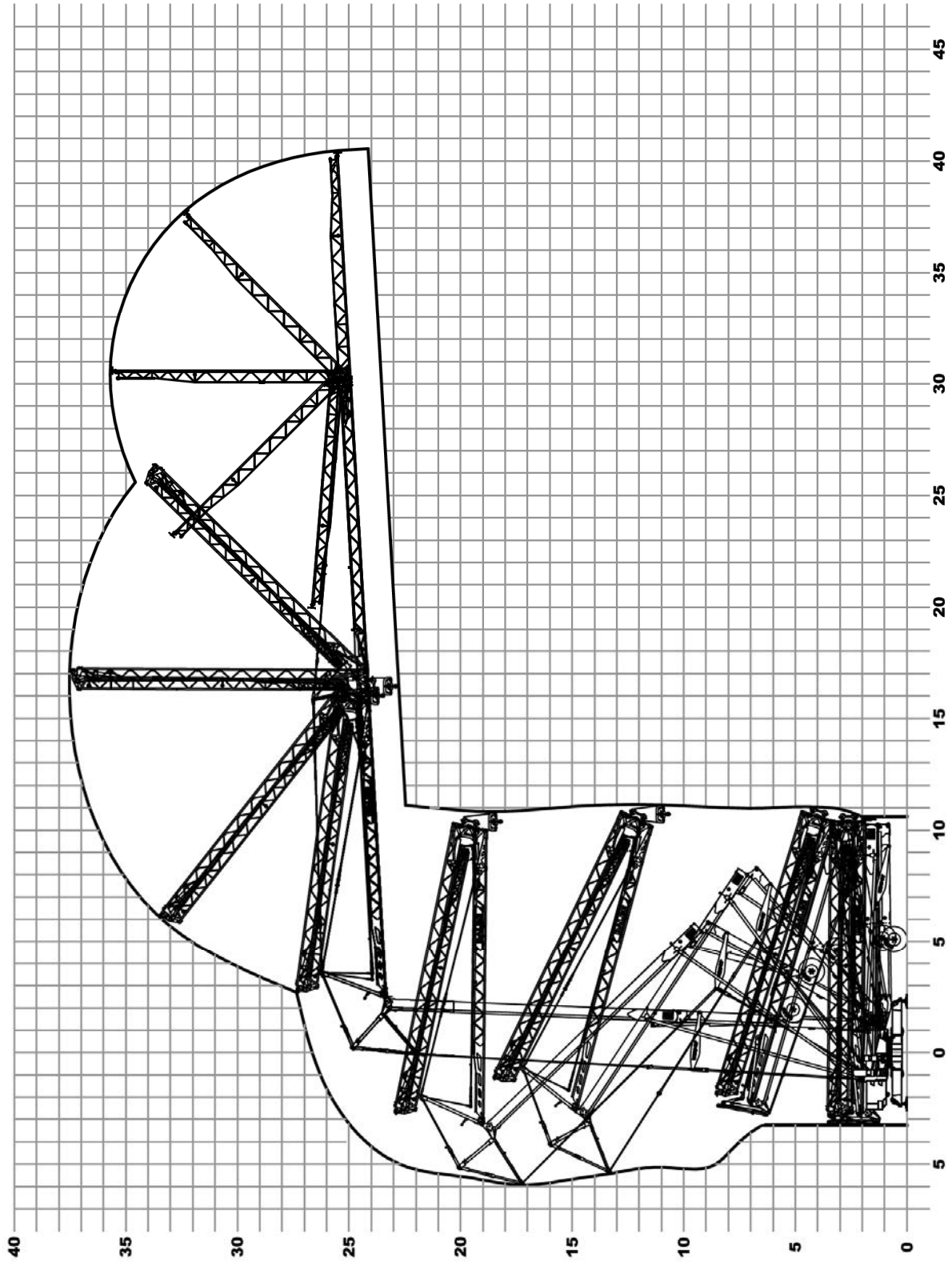
5.9) CRANE OVERALL DIMENSIONS WITH OPEN JIB

- JIB 45m



Picture 4

- JIB 40m



Picture 5

5.9.1) CRANE EMERGENCY DISASSEMBLY

ONLY IN CASE OF EMERGENCY AND ONLY WHEN IT IS NECESSARY TO LOWER THE CRANE WITH THE JIB EXTENDED, IT IS POSSIBLE TO LOWER THE MAST WITHOUT FOLDING **THE JIB 2** IN ORDER TO ACT ON THE JIB FOR MAINTENANCE.

LEAVE THE WHOLE WORK BALLAST ON BOARD THE CRANE.

CARRY OUT THE OPERATIONS DESCRIBED IN CHAPTER 12 FROM PRELIMINARY OPERATIONS (SEE FROM PAR 12.1) FOR THE CLOSING OF JIBS 4/5 AND JIB 3 PAYING ATTENTION TO THE TROLLEY POSITIONS IN THE DIFFERENT PHASES, UP TO PAR. 12.3).

DANGER

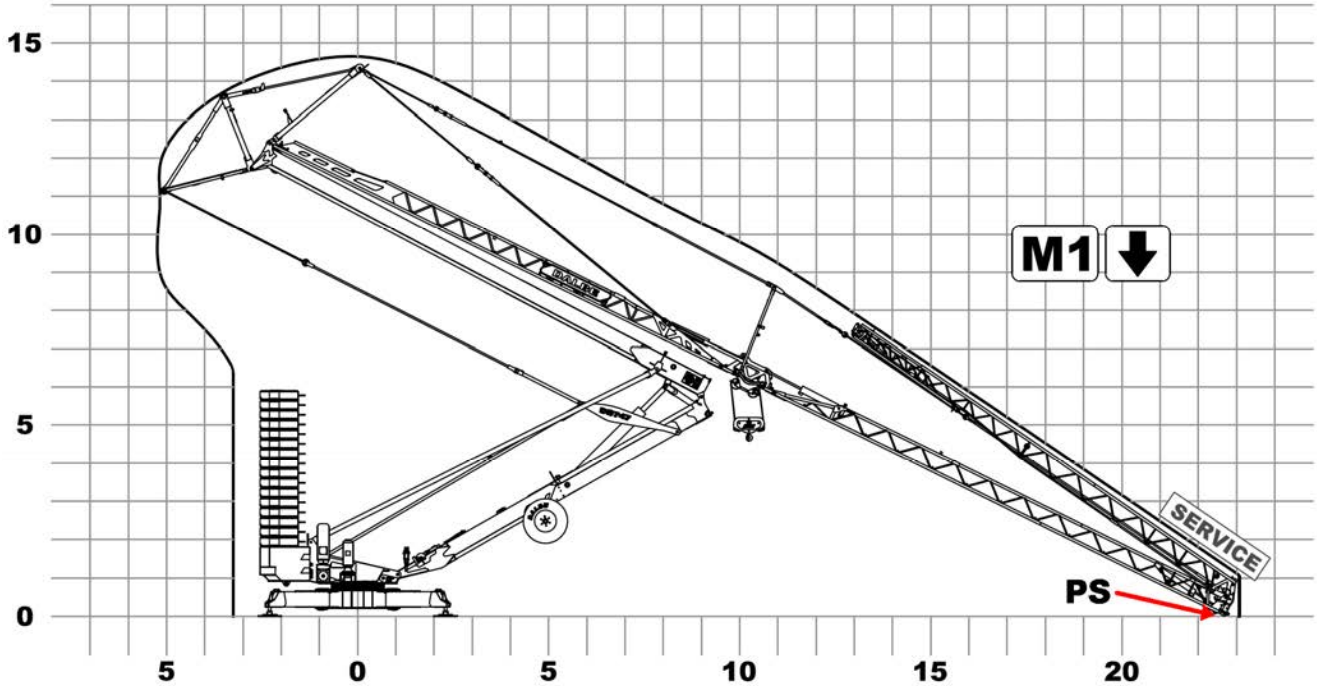
DO NOT REMOVE THE WORK BALLAST FOR ANY REASON.
IT IS FORBIDDEN TO LOWER THE CRANE BEYOND THE FINAL POSITION.
DO NOT SLEW THE CRANE IN THIS PHASE.

PROCEDURE:

- BRING THE TROLLEY TO DISASSEMBLY POSITION PROVIDED FOR CLOSING JIBS 1 AND 2 (SEE PAR 12.3)
- TURN THE "WORK/ERECTION CONFIGURATION" SELECTOR (SEE PAR. 9.1.2.1) TO **M1**
- PRESS THE BUTTON "HOISTING RISE " FOR SOME SECONDS (10 sec.) UNTIL YOU CAN HEAR THE NOISE OF THE OIL BEING DRAINED BY THE MAX. PRESSURE VALVE.
- PRESS THE BUTTON "HOISTING DESCENT" AND LOWER THE CRANE UP TO POSITION **"PS"** (SEE **PICTURE 6**) WITHOUT THE JIB TOUCHING THE GROUND IN ORDER TO AVOID DAMAGING THE STRUCTURE.

DANGER

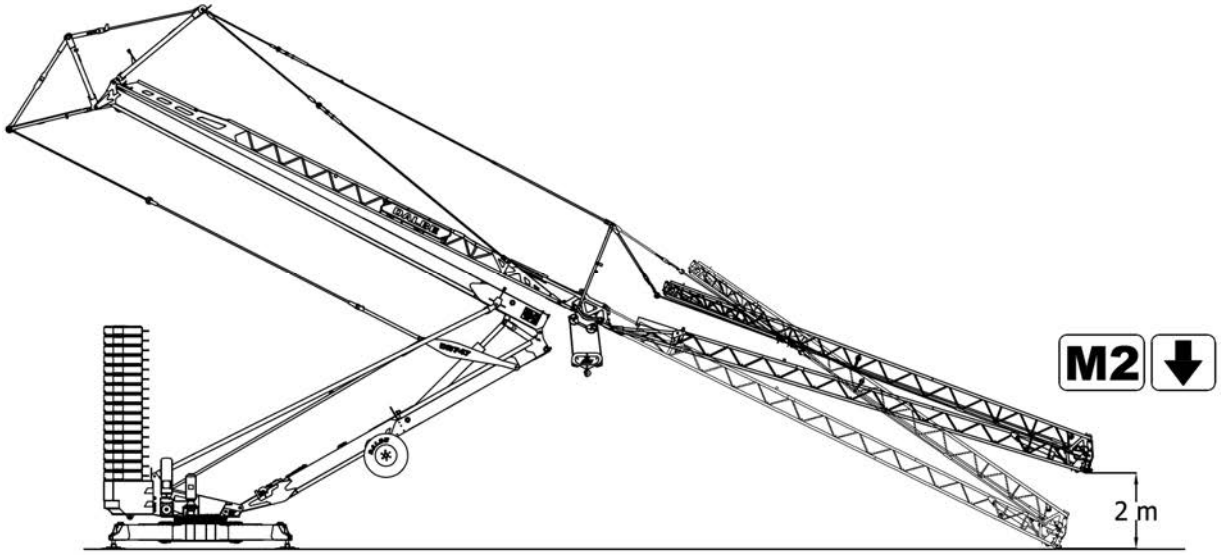
CARRY OUT THIS OPERATION IN ONE MANOEUVRE ONLY WITHOUT ANY INTERRUPTION.
INTERRUPT THE MANOEUVRE ONLY IF IT IS STRICTLY NECESSARY.



Picture 6

KEY: **" PS " = FINAL POSITION**

- TURN THE “WORK/ERECTION CONFIGURATION” SELECTOR (SEE PAR. 9.1.2.1) TO **M2**
- PRESS THE "HOISTING DESCENT" BUTTON AND RAISE THE SECOND JIB ELEMENT UNTIL THE TERMINAL SECTION HAS RAISED ABOUT 2m FROM THE GROUND (SEE **PICTURE 7**) .

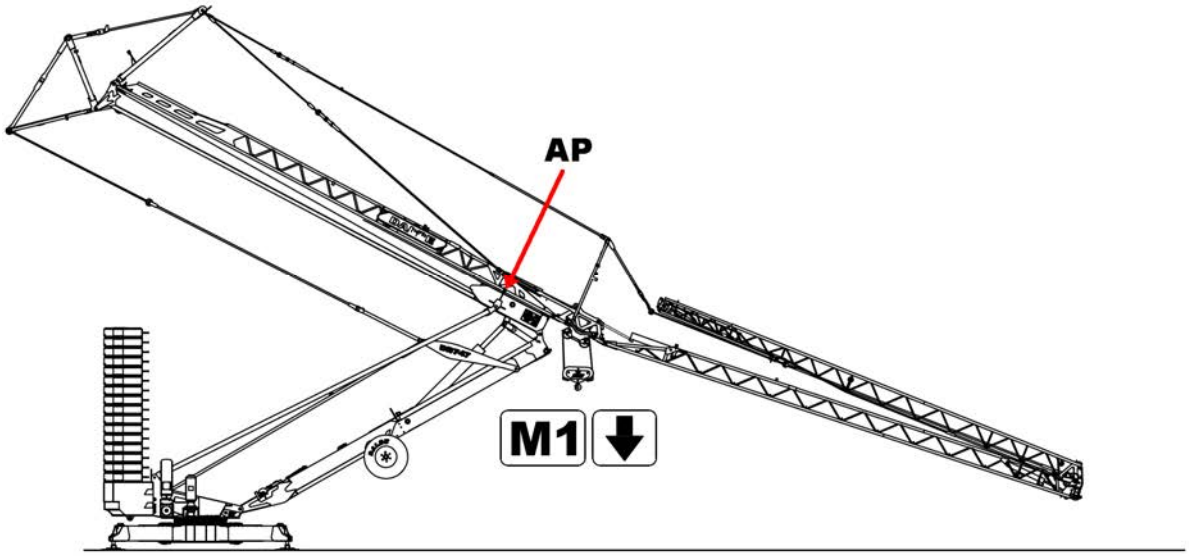


Picture 7

DANGER

DO NOT LEAVE THE CRANE IN THIS POSITION SINCE IT IS THE MOST STRESSFUL CONDITION FOR THE CRANE AND THE TIE-RODS. DO NOT STRESS THE CRANE IF IT IS NOT REQUIRED. DO NOT PERFORM THE CRANE SLEWING.

- TURN THE “WORK/ERECTION CONFIGURATION” SELECTOR (SEE PAR. 9.1.2.1) TO **M1**
- PRESS THE “HOISTING DESCENT” BUTTON AND LOWER THE CRANE UNTIL **THE CRANE JIB HAS RESTED ON THE MAST** AND HAS REACHED THE "**AP**" POINT (SEE **PICTURE 8**) AND IT IS CLEARLY VISIBLE THAT THE TIE RODS ARE NO LONGER TIGHTENED (SAFETY POSITION).



Picture 8

KEY: " AP " = REST OF THE JIB ON THE UPPER MAST

WARNING

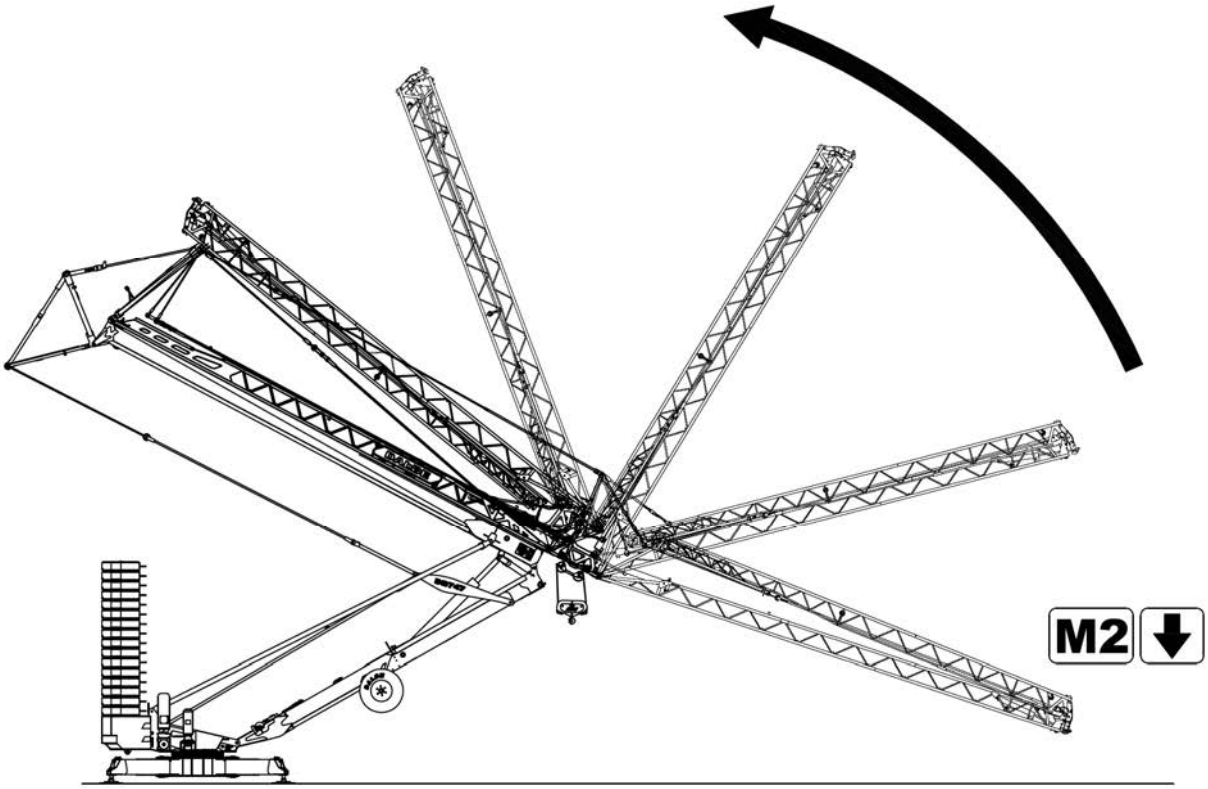
WARNING: ONLY IN THIS POSITION (JIB RESTED ON THE MAST) IT IS POSSIBLE TO CARRY OUT THE EXTRAORDINARY MAINTENANCE OPERATIONS ON THE JIB OR TROLLEY OF THE CRANE.

WARNING

USE ALL THE PERSONAL PROTECTIVE EQUIPMENT (PPE) REQUIRED FOR THIS PHASE, FOR EXAMPLE ANTI-SLIP SHOES, SAFETY SLING SYSTEMS SUCH AS BELT, GLOVES, ETC..

WHEN MAINTENANCE HAS BEEN COMPLETED, THE OPERATOR CAN CONTINUE TO FOLLOW THE PROCEDURE:

- TURN THE "WORK/ERECTION CONFIGURATION" SELECTOR (SEE PAR. 9.1.2.1) TO M2
- PRESS THE "HOISTING DESCENT" BUTTON AND CLOSE THE JIB UNTIL IT RESTS ON THE WHEELS PLACED ON THE TOP OF THE UPPER SCREW DOWN JACK "P1" (SEE PICTURE 9) .



Picture 9

DANGER

CLOSE THE CRANE JIB COMPLETELY (ALSO JIB 2) BEFORE REFITTING THE CRANE IN WORK CONFIGURATION.

ONLY AFTERWARDS CARRY OUT THE MAST RISE MANOEUVRE ACCORDING TO THE INDICATIONS GIVEN IN CAP. 8 "ERECTION OPERATIONS" FOLLOWING THE NORMAL PROCEDURE AND THEN REOPEN THE CRANE JIB.

5.10) TEST LOADS

DANGER

STATIC OR DYNAMIC OVERLOAD TESTS ARE NOT REQUIRED SINCE THEY HAVE ALREADY BEEN CARRIED OUT IN THE FACTORY.
TO CALIBRATE AND CHECK THE LOAD LIMITING DEVICES CARRY OUT WHAT FOLLOWS:

5.10.1) STATIC MOMENT LIMITING DEVICE

JIB 45m HORIZONTAL JIB COMPLETELY EXTENDED	= 1100 kg + 2.5% = 1128 kg
3 FOLDED ELEMENT	= 1700 kg + 2.5% = 1743 kg
JIB 40m HORIZONTAL JIB COMPLETELY EXTENDED	= 1400 kg + 2.5% = 1435 kg
3 FOLDED ELEMENT	= 1800 kg + 2.5% = 1845 kg

5.10.2) DYNAMIC MOMENT LIMITING DEVICE

JIB 45m HORIZONTAL JIB COMPLETELY EXTENDED	= 1100 kg + 5% = 1155 kg
3 FOLDED ELEMENT	= 1700 kg + 5% = 1785 kg
JIB 40m HORIZONTAL JIB COMPLETELY EXTENDED	= 1400 kg + 5% = 1470 kg
3 FOLDED ELEMENT	= 1800 kg + 5% = 1890 kg

5.10.3) MOMENT THRESHOLD INDICATOR (90%)

JIB 45m HORIZONTAL JIB COMPLETELY EXTENDED	= 990 kg + 5% = 1040 kg
3 FOLDED ELEMENT	= 1530 kg + 5% = 1607 kg
JIB 40m HORIZONTAL JIB COMPLETELY EXTENDED	= 1260 kg + 5% = 1323 kg
3 FOLDED ELEMENT	= 1620 kg + 5% = 1700 kg

5.10.4) MAX LOAD LIMITING DEVICE

CRANE VERS. **R :**	2050 kg + 5% = 2153 kg	TWO-FALL ROPE HOISTING (L2)
CRANE VERS. **V :**	2500 kg + 5% = 2625 kg	TWO-FALL ROPE HOISTING (L2)
CRANE VERS. **T :**	4100 kg + 5% = 4305 kg	TWO-FALL ROPE HOISTING (L2)
CRANE VERS. **R :**	4100 kg + 5% = 4305 kg	FOUR-FALL ROPE HOISTING (L4)
CRANE VERS. **V :**	5000 kg + 5% = 5250 kg	FOUR-FALL ROPE HOISTING (L4)

5.10.5) MAX. LOAD THRESHOLD INDICATOR (90%)

CRANE VERS. **R :**	1845 kg + 5% = 1937 kg	TWO-FALL ROPE HOISTING (L2)
CRANE VERS. **V :**	2250 kg + 5% = 2363 kg	TWO-FALL ROPE HOISTING (L2)
CRANE VERS. **T :**	3690 kg + 5% = 3875 kg	TWO-FALL ROPE HOISTING (L2)
CRANE VERS. **R :**	3690 kg + 5% = 3875 kg	FOUR-FALL ROPE HOISTING (L4)
CRANE VERS. **V :**	4500 kg + 5% = 4725 kg	FOUR-FALL ROPE HOISTING (L4)

5.10.6) THIRD HOISTING SPEED LIMITING DEVICE

CRANE VERS. **R :**	1100 kg + 5% = 1155 kg	TWO-FALL ROPE HOISTING (L2)
CRANE VERS. **V :**	1400 kg + 5% = 1470 kg	TWO-FALL ROPE HOISTING (L2)
CRANE VERS. **T :**	2000 kg + 5% = 2100 kg	TWO-FALL ROPE HOISTING (L2)
CRANE VERS. **R :**	2200 kg + 5% = 2310 kg	FOUR-FALL ROPE HOISTING (L4)
CRANE VERS. **V :**	2800 kg + 5% = 2940 kg	FOUR-FALL ROPE HOISTING (L4)

5.10.7) FOURTH HOISTING SPEED INDICATOR

CRANE VERS. **V :**	700 kg + 5% = 735 kg	TWO-FALL ROPE HOISTING (L2)
CRANE VERS. **T :**	1100 kg + 5% = 1155 kg	
CRANE VERS. **V :**	1400 kg + 5% = 1470 kg	FOUR-FALL ROPE HOISTING (L4)

5.10.8) LOAD LIMITING DEVICE FOR INTERMEDIATE LUFFING JIB (ONLY L2)

CRANE VERS. **R :**	2050 kg + 5% = 2153 kg
CRANE VERS. **V :**	2500 kg + 5% = 2625 kg
CRANE VERS. **T :**	2000 kg + 5% = 2100 kg

5.10.9) LOAD LIMITING DEVICE FOR MAX. LUFFING JIB (ONLY L2)

CRANE VERS. **R :**	1100 kg + 5% = 1155 kg
CRANE VERS. **V :**	1100 kg + 5% = 1155 kg
CRANE VERS. **T :**	1100 kg + 5% = 1155 kg

5.10.10) LOAD LIMITING DEVICE FOR FOLDED JIB

CRANE VERS. **R :**	2050 kg + 5% = 2153 kg	TWO-FALL ROPE HOISTING (L2)
CRANE VERS. **V :**	2250 kg + 5% = 2363 kg	
CRANE VERS. **T :**	4100 kg + 5% = 4305 kg	
CRANE VERS. **R :**	4100 kg + 5% = 4305 kg	FOUR-FALL ROPE HOISTING (L4)
CRANE VERS. **V :**	4500 kg + 5% = 4725 kg	

NOTE 1: IF A MIXED ASSEMBLY IS APPLIED (FOR EX. JIB 3 FOLDED ELEMENT AND MAXIMUM LUFFING JIB) PLEASE REFER TO THE MOST RESTRICTIVE CONDITIONS (IN THE EXAMPLE MENTIONED, LOAD LIMITING DEVICE RELATIVE TO CONSTANT CAPACITY OF 1100 Kg + MOMENT LIMITING DEVICE RELATIVE TO 1100 Kg).

5.11) SEGREGATION OF THE COUNTERWEIGHT SLEWING AREA

DANGER

PROVIDE FOR A CIRCULAR SEGREGATION OF 360° AT 0,6 mt. FROM THE SLEWING RADIUS OF THE COUNTERWEIGHT IN ORDER TO PREVENT THE OPERATORS FROM ENTERING THE AREA CONCERNED WITH THE COUNTERWEIGHT SLEWING.

THE BARRIERS SHALL SEGREGATE THE WHOLE CIRCULAR TRAVEL OF THE COUNTERWEIGHT AND PROVIDE FOR AN ENTRANCE DOOR CLOSED WITH A KEY HELD ONLY BY THE PERSONNEL AUTHORIZED TO THE ACCESS TO THE INSIDE AREA WITH THE CRANE DISCONNECTED FROM THE ELECTRIC LINE.

THE BARRIERS SHALL HAVE THE DIMENSIONS INDICATED IN POINT 5.1

5.11) WARNING LABELS AND MEANS FOR THE PREVENTION OF ACCIDENTS

WARNING

THE OPERATOR IN CHARGE OF THE BUILDING YARD SHALL PROVIDE FOR:

-ALL THE WARNING LABELS RELATIVE TO THE USE OF THE CRANE, SUCH AS:
WARNING: OVERHUNG LOADS
IT IS COMPULSORY TO USE THE HELMET
THE UNAUTHORISED PERSONNEL IS NOT ALLOWED TO USE THE CRANE
DO NOT STOP OR WALK IN THE WORKING AREA OF THE CRANE
DO NOT ABANDON THE CONTROL POST WITH THE OVERHUNG LOAD ETC.....

-ALL THE MEANS FOR THE PREVENTION OF ACCIDENTS DURING THE CRANE USE, SUCH AS:
SAFETY HELMET/SHOCKPROOF SHOES/CODED SIGNALING LABELS/SAFETY GLOVES ETC..

-IN ANY CASE, REFER TO THE LAWS IN FORCE.

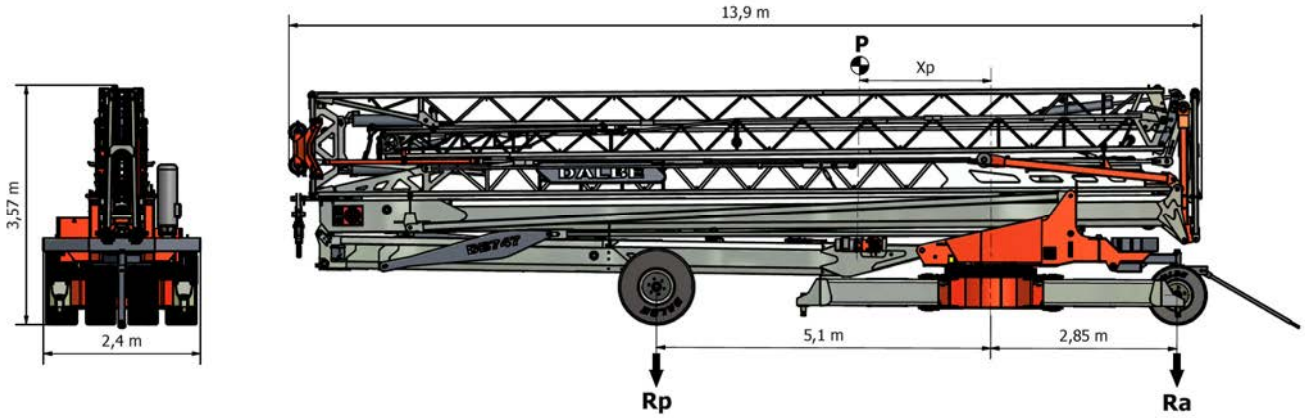
6- INSTRUCTIONS FOR THE CRANE TOWING

6.1) CRANE IN TOWING POSITION

THE CRANE EQUIPPED WITH STANDARD AXLES CAN BE TOWED INSIDE THE BUILDING YARDS AT A MAXIMUM SPEED OF 10 Km/h ON SOLID AND COMPACT SOILS.

6.1.1) CRANE WITH ONE STEEL CENTRAL BALLAST BLOCK

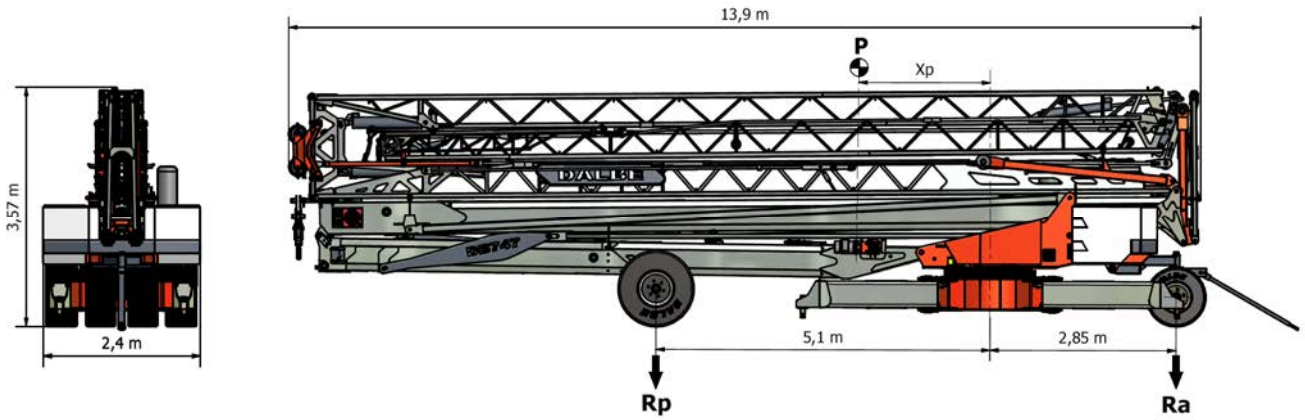
(SEE PAR. 4.6.1 CENTRAL BALLAST)



Picture 1

6.1.2) CRANE WITH 1 STEEL CENTRAL BALLAST BLOCK AND 2 LATERAL CENTRAL BALLAST BLOCKS

(SEE PAR. 4.6.1 CENTRAL BALLAST)



Picture 2

THE LATERAL CENTRAL BALLAST BLOCKS CAN REMAIN ON BOARD THE MACHINE BECAUSE THE WHEELS ARE DIMENSIONED FOR THIS PURPOSE, BUT THE USER CAN ASSESS THE OPPORTUNITY TO MANOEUVRE A CONSIDERABLY HIGHER MASS DURING THE TOWING PHASE, WITH HIGHER REACTIONS ON THE GROUND **(> 40%)** MAINLY IN THE FRONT AXLE (**Ra**).

6.2) LOADS ALLOWED ON THE AXLES AND ON THE DRAWBAR (STANDARD AXLES)

WARNING

- TOWING DRAWBAR: MAX HORIZONTAL PULL ALLOWED 5200 Kg
- VERTICAL LOADS ALLOWED DEPEND ON THE TOWING WITH COMPLETE OR PARTIAL CENTRAL BALLAST

6.2.1) CRANE WITH PARTIAL CENTRAL BALLAST

CRANE WITH ONE STEEL CENTRAL BLOCK

P = 21840 Kg **Xp = 2,0 m FROM THE RING PLATE AXIS**
RA = 8558 Kg
RB = 13282 Kg

6.2.2) CRANE WITH COMPLETE CENTRAL BALLAST

CRANE WITH 1 STEEL CENTRAL BLOCK AND 2 LATERAL BLOCKS

P = 25840 Kg **Xp = 1,4 m FROM THE RING PLATE AXIS**
RA = 11989 Kg
RB = 13851 Kg

6.2.3) MASS OF THE AXLES

TOTAL MASS OF STANDARD AXLES INCLUDING WHEELS

- N°1 FRONT AXLE - TOTAL MASS = **440** Kg
- N°1 STANDARD REAR AXLE - TOTAL MASS = **460** Kg

NOTE: OTHER TYPES OF AXLES AVAILABLE AS ACCESSORIES MAY HAVE DIFFERENT MASSES

6.3) TYRES

STANDARD FRONT AXLE:

N° 2 TYRES TYPE 445/45 R19.5 160J 6 HOLE DISC
INFLATION PRESSURE : 8 bar

STANDARD REAR AXLE:

N°2 TYRES TYPE 445/65 R22.5 169J 6 HOLE DISC
INFLATION PRESSURE: 9 bar

6.4) TOWING INSTRUCTIONS

WARNING

MAKE SURE THAT THE AXLES ARE SOUND AND CORRECTLY MOUNTED.
MAKE SURE THAT, DURING TOWING, NOBODY IS ALONG THE TRAJECTORY OF THE CRANE (FORWARDS AND BACKWARDS).

IT IS POSSIBLE TO TOW THE CRANE EQUIPPED WITH STANDARD AXLES INSIDE THE BUILDING YARDS TO TRANSFER THE MACHINE TO THE NEXT WORK POSITIONS.

THE TOWING OPERATION CAN BE CARRIED OUT ON A SOLID, COMPACT SOIL WITHOUT EXCAVATIONS, WITHOUT WORK BALLAST ON BOARD.

THE TOWING SPEED CANNOT BE HIGHER THAN 10 Km/h.

MAXIMUM SLOPES ALLOWED:
IN RUNNING DIRECTION = 10%
LATERALLY = 5%

THE STANDARD AXLES ARE NOT EQUIPPED WITH PNEUMATIC OR PARKING BRAKES, THEREFORE, IN CASE OF EMERGENCY, IT IS NECESSARY TO PROVIDE FOR WHEEL-LOCKING WEDGES.

6.5) FORBIDDEN TOWING OPERATIONS

DANGER

IT IS FORBIDDEN:

- TO APPLY A TOWING FORCE GREATER THAN THE HORIZONTAL LOAD ALLOWED ON THE DRAWBAR SHACKLE

-TO TOW THE CRANE WITH THE WHEELS DRIVEN INTO THE SOIL

-TO APPLY THE TOWING FORCE IN POINTS DIFFERENT FROM THE ONLY ONE ALLOWED, THAT IS, ON THE DRAWBAR SHACKLE

-TO EXCEED THE MAXIMUM SPEED OF 10 Km/h

- TO EXCEED THE MAXIMUM SLOPES ALLOWED

-TO CARRY PEOPLE ON BOARD THE TOWED CRANE

-TO TOW THE CRANE WITHOUT MAKING SURE THAT THE INFLATION PRESSURE VALUE CORRESPONDS TO THAT PRESCRIBED AND THAT THE COLUMN NUTS ARE CORRECTLY TIGHTENED

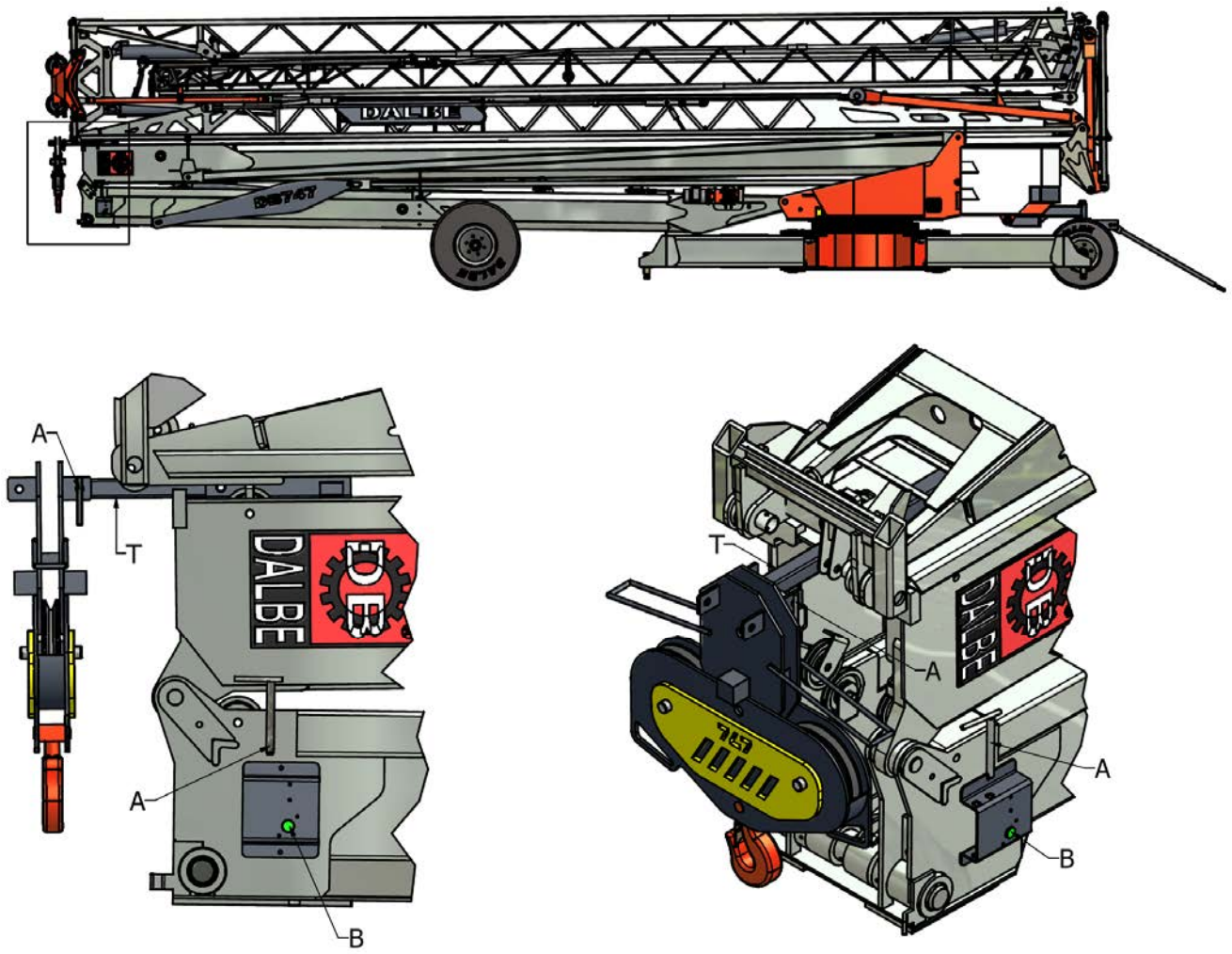
-TO TOW THE MACHINE WITH COMPONENTS FIXED TEMPORARILY OR WHICH MAY CAUSE THEIR ACCIDENTAL REMOVAL.

-TO GET ON THE CRANE DURING THE TOWING PHASE.

-TO TRANSPORT THE CRANE AT A SLOW PACE IN DANGEROUS ZONES, ETC...

6.6) INSTRUCTIONS FOR BLOCK HOOKING DURING TRANSPORT

WARNING



Picture 3

IN THE TRANSPORT CONFIGURATION, CONNECT THE BLOCK OF THE CRANE TO THE TELESCOPIC SUPPORTING ELEMENT (**T**) THROUGH THE APPROPRIATE PIN (**A**) WHICH MUST BE FIXED TO THE INTERMEDIATE BLOCK FOR FOUR-FALL ROPE.

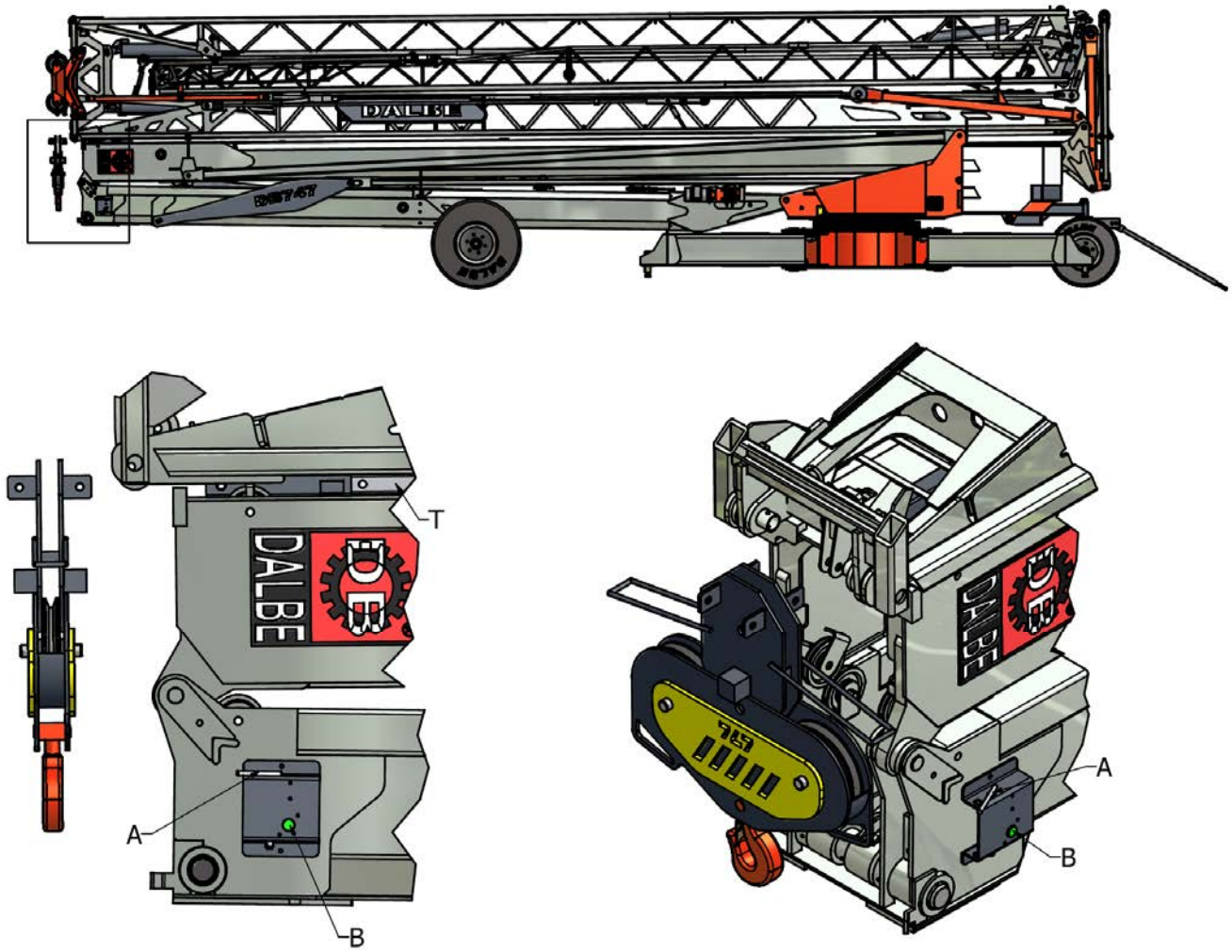
TURN THE "WORK / ERECTION CONFIGURATION" SELECTOR (SEE PAR 9.1.2.1), LOCATED INSIDE THE ELECTRICAL CABINET, TO "**L2**" OR "**L4**" AND CARRY OUT THE "RISE HOISTING" MANOEUVRE IN THE **FIRST SPEED** UP TO THE RISE LIMIT STOP, THEN PRESS THE BUTTON (**B**) AND CARRY OUT THE "RISE" MANOEUVRE UP TO THE POSITION SHOWN IN PICTURE 3, WHEN REACHING THE HEIGHT THAT ALLOWS INSERTING THE PIN.

REMOVE THE PIN "**B**" FROM THE PANEL AND INSERT IT IN THE HOLE SHOWN TO CONNECT THE BLOCK TO THE SUPPORT (**T**) IN TRANSPORT POSITION.

FIX EVERY PIN BY USING THE PROPER SPLIT PINS SUPPLIED WITH THE MACHINE.

6.7) INSTRUCTIONS FOR BLOCK RELEASE

WARNING



Picture 4

BEFORE STARTING THE CRANE ERECTION PHASE (SEE CHAP **8** "POSITIONING AND ERECTION") AND ONLY AFTER THE CRANE HAS REACHED THE WORK POSITION, REMOVE THE PIN (**A**) THAT FIXES THE INTERMEDIATE BLOCK TO THE SUPPORT, RELEASE THE BLOCK, PLACE THE PIN IN THE PANEL LOCKING IT WITH THE APPROPRIATE SPLIT PIN, CARRY OUT THE DESCENT MANOEUVRE UNTIL THE CRANE HOOK TOUCHES THE GROUND.

WARNING: MAKE SURE THAT THE HOISTING ROPE IS FREE TO RUN AND THAT EVERY PARTIAL ROTATION OF THE DRUM CORRESPONDS TO A DESCENT OF THE BLOCK!

CHECK THAT THE HOISTING ROPE IS FREE TO TURN INSIDE THE APPROPRIATE SEAT OF THE PULLEYS AND THAT THERE IS NO OBSTACLE.

REMOVE THE TELESCOPIC SUPPORT PIN (T) AND MOVE THE TUBE BACK ABOUT 30cm INSERTING THE PIN IN THE SECOND POSITION AS SHOWN IN PICTURE 4.

7- STRUCTURES AND ACCESS MODALITIES

THE CRANE IS OF AUTOMATIC HYDRAULIC ERECTION TYPE.

THE INITIAL IMPULSE TO SUCH OPERATIONS IS GIVEN BY THE OPERATOR, WHO IS NOT POSITIONED ON BOARD THE MACHINE.

THEREFORE, FOR ALL THE ERECTION AND/OR DISASSEMBLY OPERATIONS, THE PRESENCE OF THE PERSONNEL IS NOT REQUIRED ON BOARD THE MACHINE.

AS FOR MAINTENANCE, THE SAME CONDITIONS AS THE ERECTION PHASES ARE APPLIED, SINCE THE ERECTION/DISASSEMBLY OF THE CRANE IS AUTOMATIC WITHOUT THE PRESENCE OF OPERATORS ON BOARD THE MACHINE

ALL THE MAINTENANCE OPERATIONS SHALL BE CARRIED OUT ON THE GROUND WITH THE CRANE DISASSEMBLED.

IN CASE OF ANY CHECK AND/OR MAINTENANCE AND/OR REPAIR OF THE HIGH PART OF THE CRANE, WHEN THE CRANE IS ERECTED, PROVIDE FOR SUITABLE MEANS, SUCH AS OVERHEAD MAINTENANCE PLATFORMS OR EXTENSIBLE BRIDGES.

AS FOR THE WORKING PHASE OF THE CRANE, SEE POINT 3.3.8 RELATED TO THE CONTROL POST.

IT IS ABSOLUTELY FORBIDDEN TO GET ON THE CRANE IN USE CONDITIONS.

8- POSITIONING AND ERECTION

THE MANUFACTURER REJECTS ALL RESPONSIBILITY FOR THE INOBSERVANCE OF THESE INSTRUCTIONS, WHICH DO NOT REPRESENT ANY ALTERNATIVE TO THE SPECIFIC PREPARATION REQUIRED **TO PROFESSIONAL OPERATORS OF PROVEN COMPETENCE AND EXPERIENCE**.

IN ADDITION, THE MANUFACTURER REFUSES ALL RESPONSIBILITY FOR ANY DAMAGE DUE TO ERECTION/DISASSEMBLY OPERATIONS CARRIED OUT BY **UNSUITABLE** PERSONNEL.

8.1) GENERAL WARNINGS

GRU DALBE REFUSES ALL RESPONSIBILITY FOR DAMAGES DUE TO ERECTION/DISASSEMBLY OPERATIONS OTHER THAN THOSE PRESCRIBED BY THE COMPANY, FOR THE INOBSERVANCE OF THE INSTRUCTIONS MENTIONED BELOW, WHICH PROVIDE FOR THE CHECK AND VERIFICATION, BEFORE STARTING THE ERECTION/DISASSEMBLY OPERATIONS, OF WHAT FOLLOWS:

8.1.1) ALL THE ERECTION/DISASSEMBLY OPERATIONS OF THE CRANE SHALL BE ASSIGNED TO PROFESSIONAL OPERATORS OF PROVEN EXPERIENCE AND COMPETENCE, WITH SPECIFIC TRAINING IN THE MANOEUVRES RELATIVE TO THE CRANE SETTING AND WORKING, IN COMPLIANCE WITH ANY TEMPORARY LICENSE OR PERMISSION REQUIRED BY THE LAW.

8.1.2) THE WORKING OF THE FIXED OR REMOVABLE CONNECTIONS AND THE SOUNDNESS OF THE COMPONENTS CONCERNED WITH THE RELATED OPERATIONS

8.1.3) ALL THE CONNECTION AND COUPLING ELEMENTS SHALL BE ORIGINAL

8.1.4) THE LUBRICATION OF THE ARTICULATED JOINTS AND THE TOPPING-UP, IF NEEDED

8.1.5) THE OIL PRESSURE AND LEVEL IN THE HYDRAULIC CENTRAL UNIT SHALL REACH THE PRESCRIBED VALUE; IN CASE OF NEED, GIVE SOME PULSES TO THE ERECTION/DISASSEMBLY CONTROLS TO RESET THE CORRECT VALUE.

8.1.6) THE CORRECT WINDING OF THE ROPES IN THEIR OWN SEATS, THE GOOD CONDITION OF THE ROPES; MAKE SURE THAT AT LEAST THREE TURNS OF THE ROPE ARE WOUND IN THE DRUMS.

8.1.7) THE STABILITY AND THE FLATNESS OF THE BEARINGS ON THE GROUND AND THE PERFECT LEVELLING OF THE BASE

8.1.8) THE CORRECT WORKING OF THE EARTHING

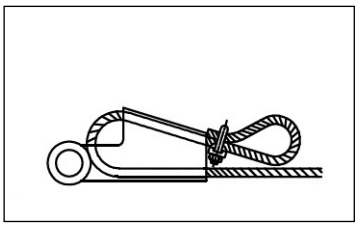
8.1.9) THE CONFORMITY OF THE MOTIVE POWER

8.1.10) THE WIND SPEED, WHICH SHALL NOT EXCEED THE VALUE OF **15 Km/h (SEE 3.3.6)**
IF THIS VALUE IS EXCEEDED, AN INTERMITTENT ACOUSTIC SIGNAL IS ACTIVATED THAT WARNS THE OPERATOR **NOT** TO START THE OPENING / CLOSING PHASE OF THE JIB (BOTH SELECTOR POSITION **M2** AND **M3**).

8.1.11) THE ROTATION DIRECTION OF ALL THE ELECTRIC MOTORS, WHICH MUST CORRESPOND TO THE INDICATION GIVEN ON THE CONTROLS

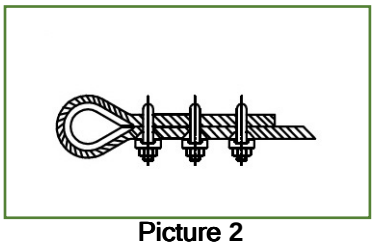
8.1.12) THE ROPE TERMINALS, WHICH SHALL HAVE THE FOLLOWING STRUCTURE:

- WEDGE TERMINAL WITH CLAMP



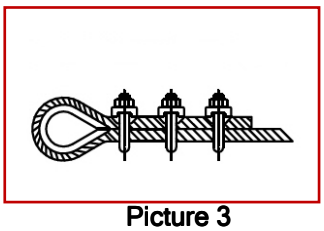
Picture 1

- 3 CLAMPS CORRECT

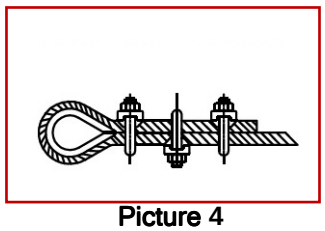


Picture 2

- 3 CLAMPS INCORRECT



Picture 3



Picture 4

8.1.2) OTHER INSTRUCTIONS BEFORE THE ERECTION PHASE

WARNING

- USE PERSONAL PROTECTION EQUIPMENT, SUCH AS HELMET, SAFETY SHOES WITH STEEL TOE, ETC.
- MAKE SURE THAT THE MINIMUM VALUE OF THE ERECTION BALLAST CORRESPONDS TO PRESCRIPTIONS OF POINT **4.6.1**).

8.2) MACHINE POSITIONING

DANGER

- MAKE SURE THAT THE NECESSARY SPACE CORRESPONDS TO THAT INDICATED IN POINTS 5.1) AND 5.9) AND THAT IT IS NOT OCCUPIED BY PEOPLE OR OBSTACLES.
-FOLLOW THE INDICATIONS OF CHAP. 5 ("BUILDING YARD PREPARATION") FROM 5.1 UP TO 5.9.
-POSITION THE CRANE CORRECTLY, CHECKING THAT IT IS LEVELLED AND THAT IT CANNOT MOVE ONCE IT HAS BEEN RELEASED FROM THE DRAWBAR.
-CHECK THE EARTHING.
- CONNECT THE POWER SUPPLY LINE (SEE PAR. 5.2/5.3)
- START THE CRANE MAKING SURE THAT THE GREEN LIGHT IS ON.
-AFTER CONNECTING THE ELECTRIC LINE, CHECK THE CORRECT ROTATION DIRECTION OF THE MOTORS: IF NEEDED, INVERT THE PHASES IN THE CONNECTION OF THE MOVABLE SOCKET SINCE THE HARNESS ON BOARD THE CRANE IS CORRECT AND HOMOGENEOUS.

DO NOT CHANGE ANY CONNECTION ON THE CRANE.

8.2.1) UNDERCARRIAGE POSITIONING

- REMOVE THE LOCK PINS "**C**" FROM THE MOVABLE ARMS "**D**" (SEE PICTURE 5), RELATED TO THE POSITION DURING TRANSPORT, AND TURN THE MOVABLE ARMS "**D**" UNTIL THEY REACH THE WORK POSITION.

- FIX THE MOVABLE ARMS "**D**" TO THE CRANE UNDERCARRIAGE BY USING THE RELATED LOCK PINS "**C**" INSERTING THE PIN IN WORK POSITION (**POS. 1**) AND FASTEN THE PINS THROUGH THE PROPER SAFETY SPLIT PINS (SEE PICTURES BELOW).

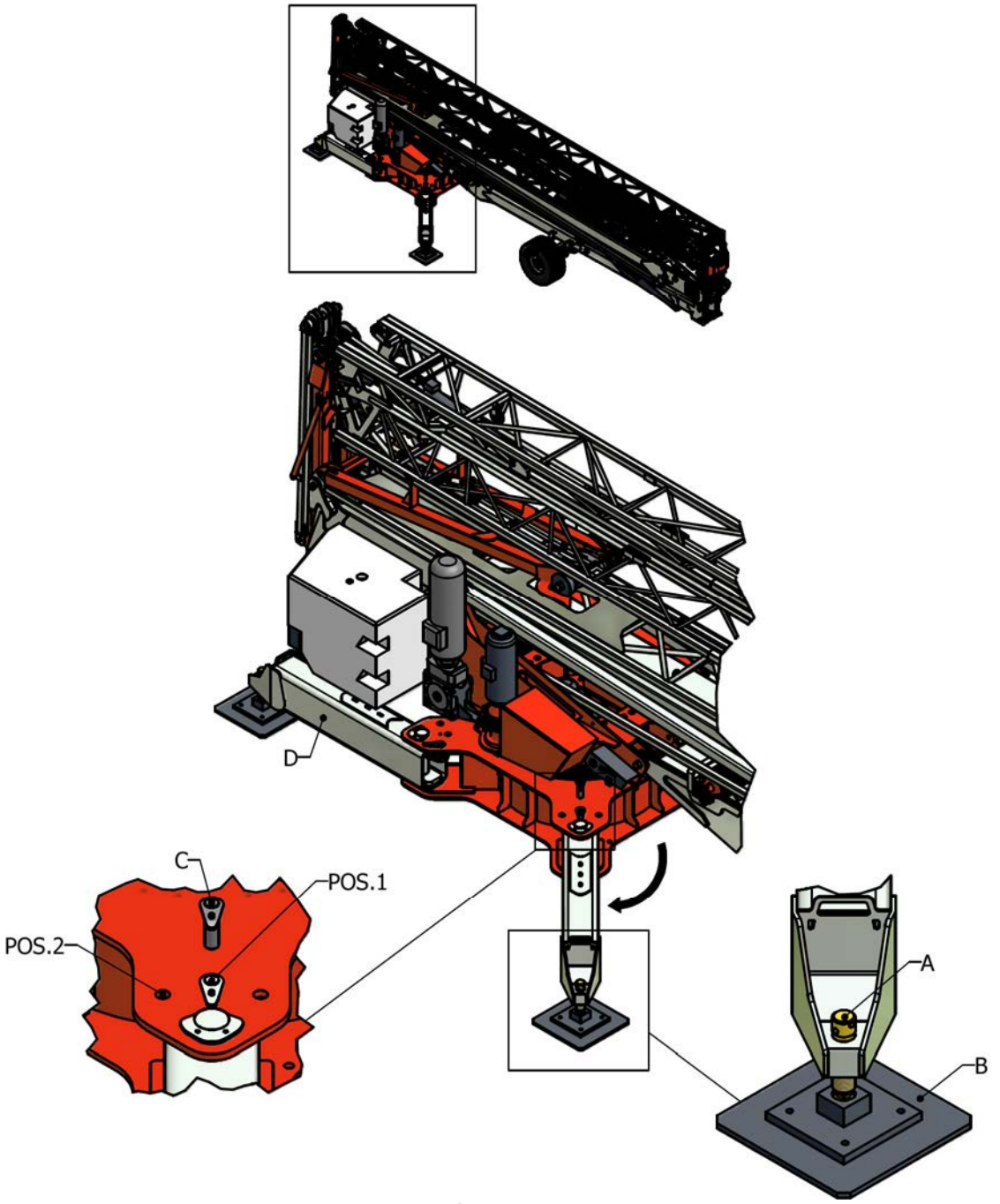
- PLACE THE SCREW JACKS ON THE STEEL SUPPORTS AND INSERT THE ROUNDED HEAD OF THE STABILIZER INTO THE PROPER SEAT, FIXING IT THROUGH THE INSERTION OF **TWO** SUITABLE LOCKING SCREWS (**V**), SUPPLIED WITH THE MACHINE (SEE PICTURE 1515), TO BE TIGHTENED WITH THE SPECIAL NUTS (**D**).

- IF IT IS NECESSARY, IT IS POSSIBLE TO OPERATE THE ERECTION MANOEUVRE (RISE) IN ORDER TO SLIGHTLY OSCILLATE THE UNDERCARRIAGE OF THE CRANE AND FACILITATE THE REST OF THE TWO STABILIZERS ON THE BALLAST SIDE ON THE STEEL BEARINGS; THEN PERFORM THE OPPOSITE MANOEUVRE TO LEVEL THE BASE AGAIN AND REST THE OTHER TWO STABILIZERS.

- REMOVE THE FRONT AXLE OF THE CRANE INCLUDING ADAPTER AND DRAWBAR, BY REMOVING THE TWO PINS THAT CONNECT IT TO THE SLEWING BASE OF THE CRANE. PAY ATTENTION TO THE ROTATION OF THE AXLE WITH RESPECT TO THE WHEEL AS THE MASSES ARE UNBALANCED (HELP YOURSELF WITH THE HANDLES LOCATED ON THE ADAPTER). KEEP AWAY THE UPPER PART OF THE BODY.

PERFORM THE LEVELLING OF THE UNDERCARRIAGE IN AN EXTREMELY PRECISE MANNER BY ACTING ON THE JACKS "A". CHECK THAT THE MOVABLE ARMS ARE LOCKED WITH THE APPROPRIATE LOCK PINS IN " POS.1 "

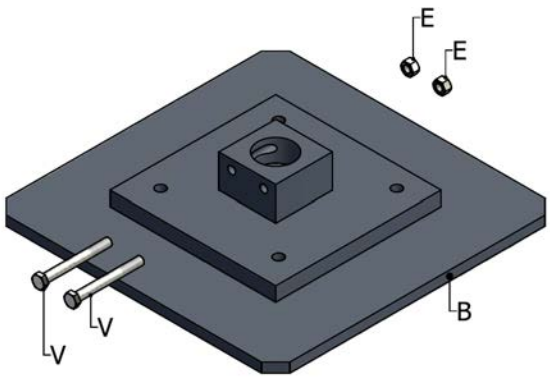
FASTEN THE LOCK PINS BY USING THE PROPER SPLIT PINS.



Picture 2

KEY:

" A " = SCREW JACK (THREADED STABILISER)
" B " = STEEL BEARINGS
" C " = LOCK PINS
" D " = MOVABLE ARM
" POS.1 " = LOCK PIN IN WORK POSITION
" POS.2 " = LOCK PIN IN TRANSPORT POSITION
" V " = LOCK SCREWS OF THE JACK
" E " = STOP NUTS

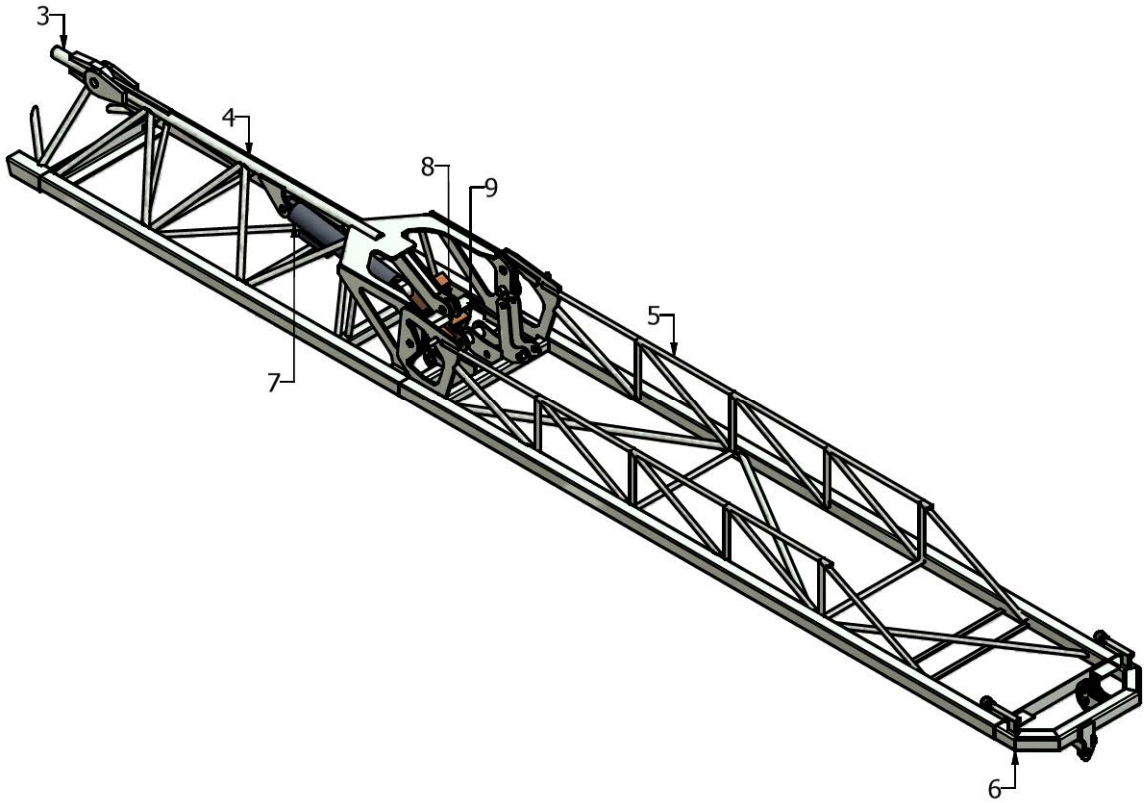


Picture 3

8.3) JIB CONFIGURATION PRE-SETTING

- DETERMINE THE PRE-SELECTED JIB CONFIGURATION BY IDENTIFYING THE OVERALL LENGTH OF THE JIB ACCORDING TO THE TWO AVAILABLE OPTIONS:

8.3.1) JIB 45m



Picture 4

KEY:

" 3 " = THIRD ELEMENT OF THE JIB
" 4 " = FOURTH ELEMENT OF THE JIB
" 7 " = NOSE CYLINDER (PISTON NUM4)
" 8 " = SHORT CONNECTING ROD FOR KINEMATIC MOTION OF JIB NOSE
" 9 " = LONG CONNECTING ROD FOR KINEMATIC MOTION OF JIB NOSE
" 5 " = FIFTH ELEMENT OF THE JIB
" 6 " = JIB CLOSING CROSSBEAM WITH ROPE TERMINAL

8.3.2) JIB 40m

IF THE JIB INSTALLED ON THE CRANE IS ALREADY 40m, SWITCH TO THE FOLLOWING POINT.
TO SWITCH FROM 45m JIB CONFIGURATION TO 40m JIB CONFIGURATION IT IS NECESSARY TO MOUNT THE **CLOSING CROSSBEAM** OF THE JIB DIRECTLY ON THE THIRD ELEMENT OF THE JIB AS SHOWN IN THE PICTURE.

THE **ROPE WINDING** SHALL BE CONFIGURED AS SHOWN IN THE DIAGRAM OF PAR. 8.9 FOR HOISTING ROPE AND PAR. 8.10 FOR TROLLEY ROPES.

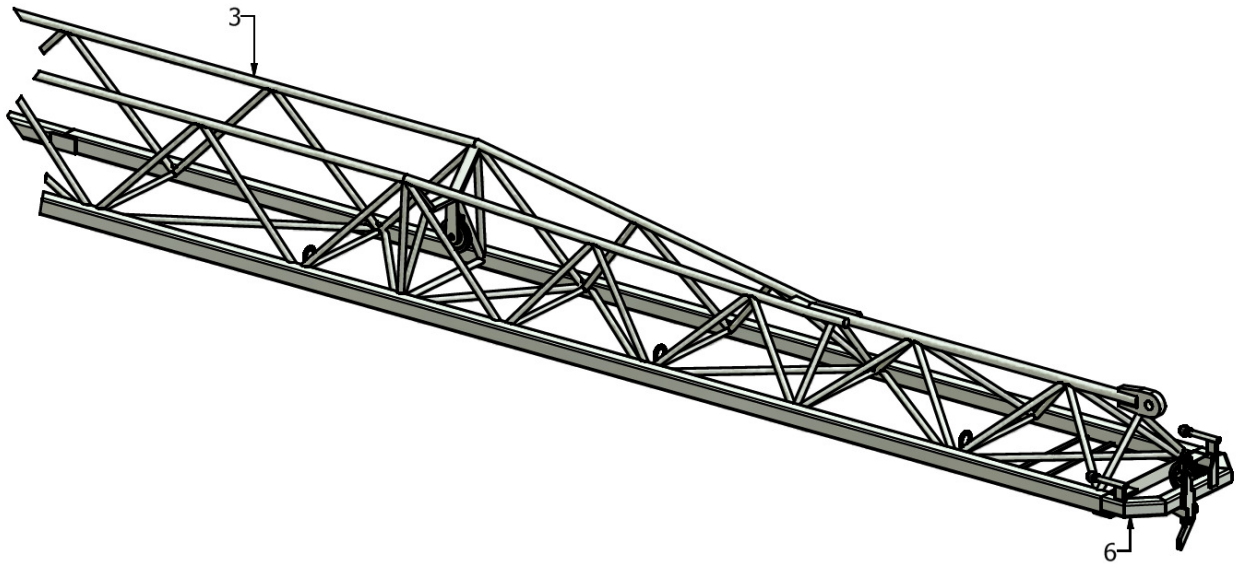
THE **HYDRAULIC CIRCUIT**, SINCE THE NOSE CYLINDER IS NOT PRESENT (PISTON NUM4, SEE PICTURE 7), MUST BE ARRANGED BY DISCONNECTING THE 2 HYDRAULIC PIPES THAT FEED THE SAID CYLINDER, CLOSING THE RELATED CONNECTIONS TO AVOID LEAKS OF OIL UNDER PRESSURE.

THE **E-TROLLEY SYSTEM** MUST BE RECONFIGURED BY CARRYING OUT THE CONNECTION BETWEEN THE 2 PINS (B40-B40) AS SHOWN IN PAR 9.12.2.2 "SELECTION OF THE INSTALLED JIB".

THE **TROLLEY LIMIT SWITCH** MUST BE RECONFIGURED WITH A NEW SETTING OF THE CAMS (3/4) THAT ACT ON THE "FAR" MOVEMENT OF THE FORWARDS TROLLEY, AS SHOWN IN PAR. 9.12.4 “E-TROLLEY SYSTEM CONFIGURATION: TROLLEY LIMIT SWITCH ADJUSTMENT”.

THE **QMS** SYSTEM FOR LIMITING THE CRANE MOMENT (CHAP. 9) MUST BE RECONFIGURED BY PERFORMING AGAIN THE CALIBRATION WITH THE RATED LOAD (SEE PAR. 3.3.2.5) RELATED TO THE 40m JIB, AS SHOWN IN PAR. 9.5 "CALIBRATION OF THE RATED MOMENT".

IN CASE YOU NEED TO MOUNT THE JIB SECTOR TO BRING THE JIB FROM 40m TO 45m, PROCEED IN REVERSE ORDER ACCORDING TO THE INSTRUCTIONS ABOVE.



Picture 5

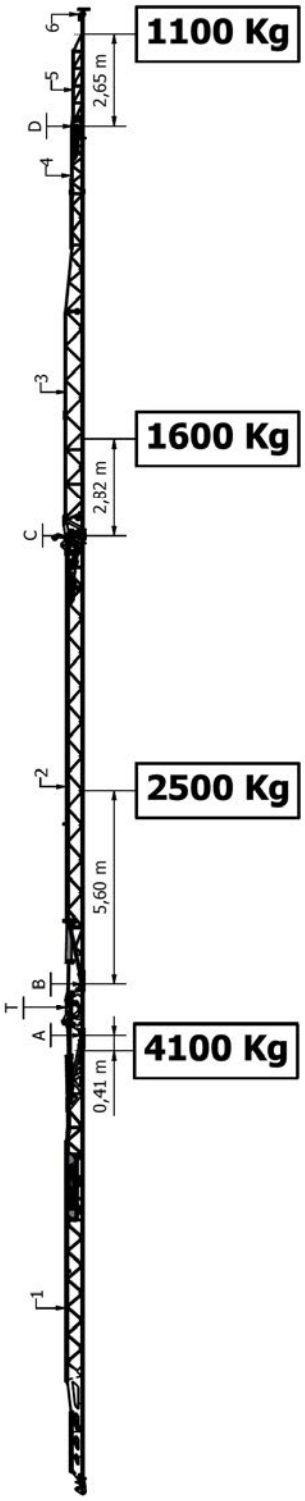
KEY:

“ 3 ” = THIRD ELEMENT OF THE JIB
“ 6 “ = JIB CLOSING CROSSBEAM WITH ROPE TERMINAL

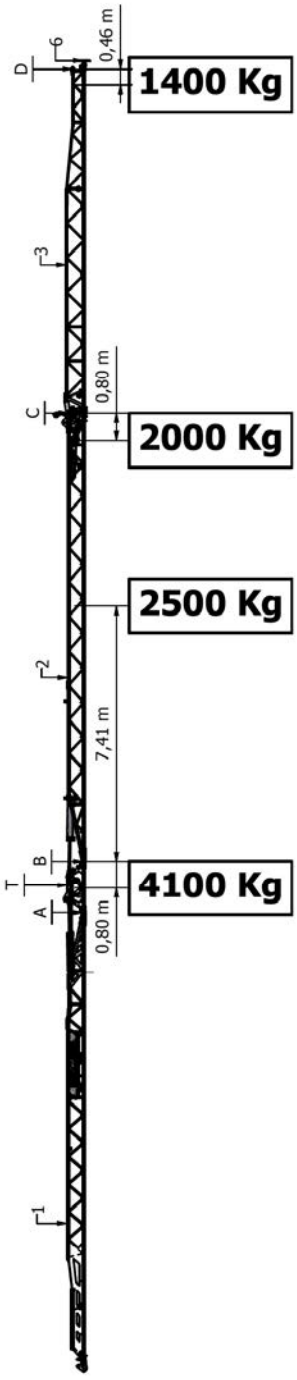
8.4) POSITIONING OF THE CAPACITY PLATES ON THE JIB

CRANE VERSION R / T

45m JIB NOSE



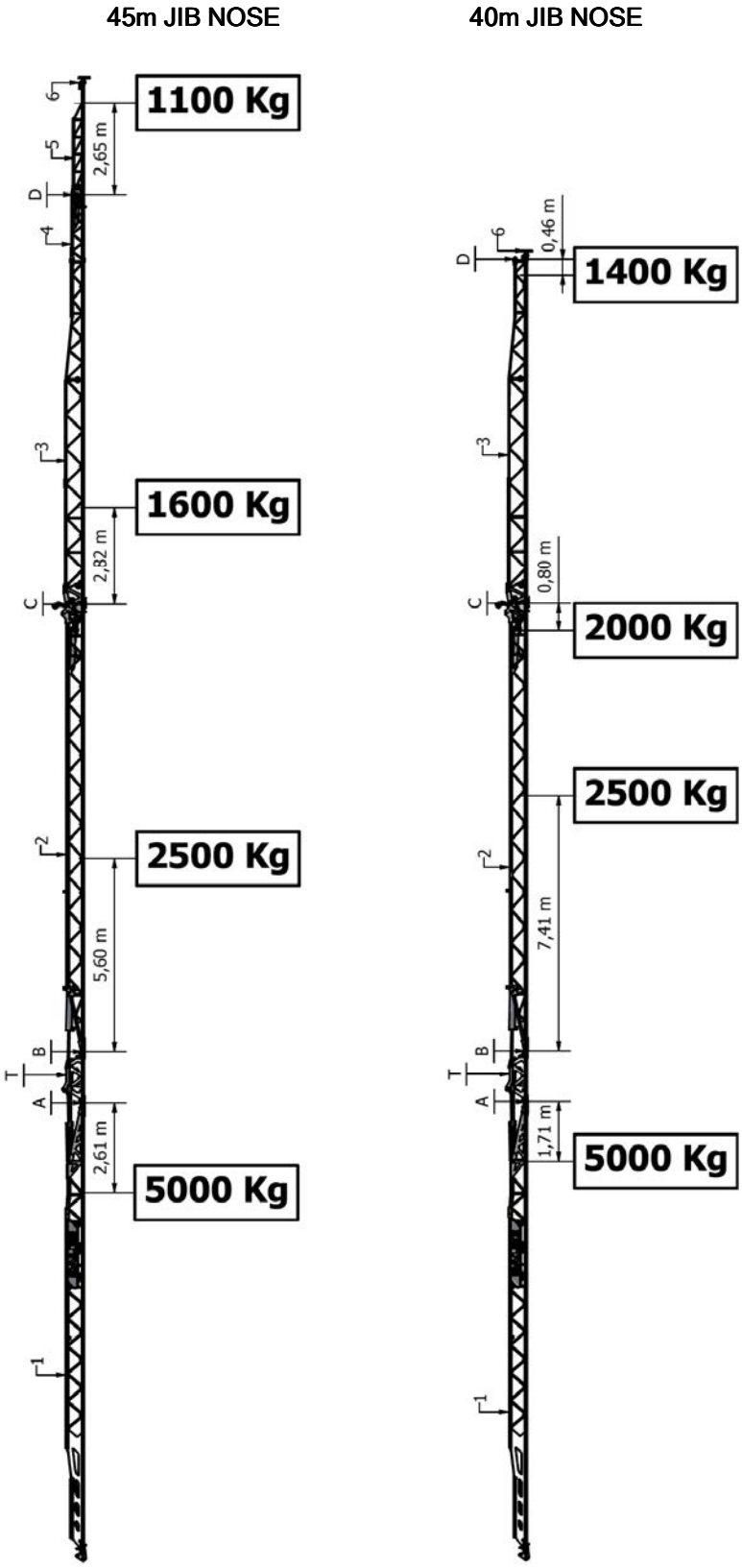
40m JIB NOSE



MAST CONNECTION

Picture 6

CRANE VERSION V



MAST CONNECTION

Picture 7

KEY:

" 1 " = FIRST JIB ELEMENT
" A " = FIRST JIB ELEMENT/ADAPTER HINGE
" T " = ADAPTER
" B " = ADAPTER/SECOND JIB ELEMENT HINGE
" 2 " = SECOND JIB ELEMENT
" C " = SECOND JIB ELEMENT /THIRD JIB ELEMENT HINGE
" 3 " = THIRD JIB ELEMENT
" 4 " = FOURTH JIB ELEMENT
" D " = FOURTH JIB ELEMENT /FIFTH JIB ELEMENT HINGE
" 6 " = JIB CLOSING CROSSBEAM

- CHECK THE EXACT POSITIONING OF THE CAPACITY PLATES ON THE JIB AS SHOWN BELOW ACCORDING TO THE CONFIGURATION OF THE CRANE AND THE JIB, RESTORING ANY DAMAGED OR WORN PLATES.

CRANE VERSION **R** - CRANE VERSION **T**

FOR JIB 45m : Kg 1100..... Kg 1600..... Kg 2500..... Kg 4100

FOR JIB 40m : Kg 1400..... Kg 2000..... Kg 2500..... Kg 4100

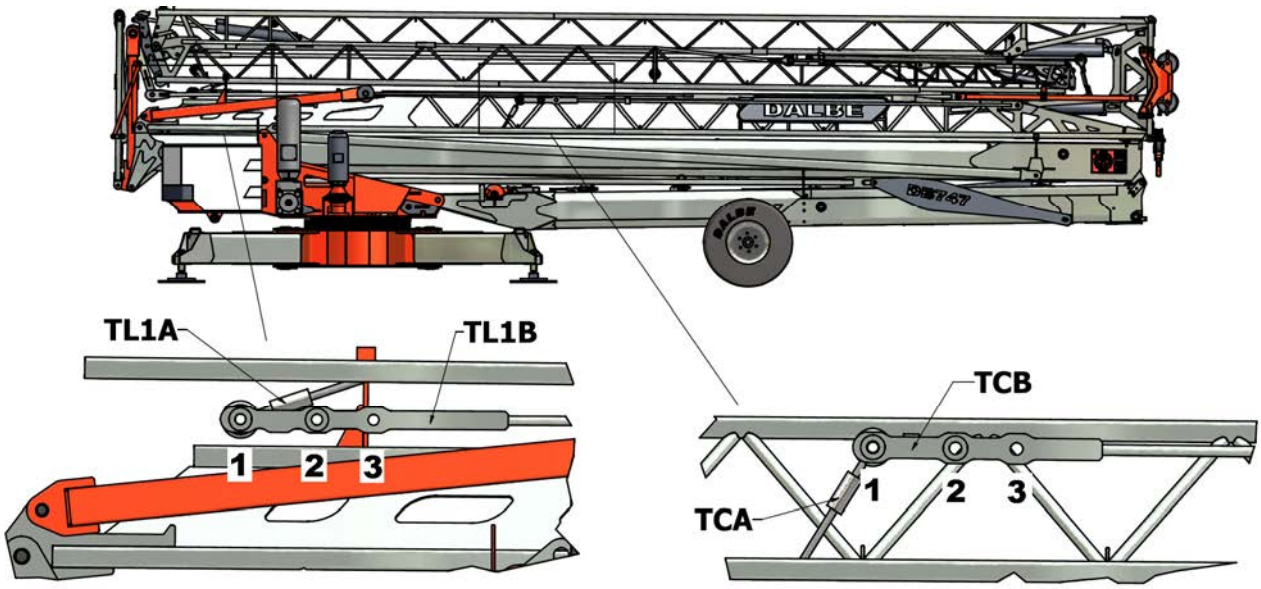
CRANE VERSION **V**

FOR JIB 45m : Kg 1100..... Kg 1600..... Kg 2500..... Kg 5000

FOR JIB 40m : Kg 1400..... Kg 2000..... Kg 2500..... Kg 5000

8.5) JIB ASSEMBLY

- PLACE THE TIE RODS ON THE JIB ACCORDING TO THE DESIRED ASSEMBLY, ACCORDING TO THE DRAWING BELOW, BY TURNING THE MODE SELECTOR OF THE ELECTRICAL CABINET TO THE CORRESPONDING POSITION (SEE PAR. **9.1.2.3** "JIB ASSEMBLY CONFIGURATION SELECTOR").



Picture 8

KEY:

" TL1A " = ROPE TIE RODS FROM P1 TO "TL1B" TOWARDS P4
" TL1B " = TIE RODS FROM "TL1B" TO P4 (STEEL TIE RODS WITH ROUND PROFILE)
" TCA " = ROPE TIE RODS FROM P1 TO "TCB" TOWARDS THE FIRST JIB ELEMENT
" TCB " = TIE RODS FROM "TCA" TOWARDS THE FIRST JIB ELEMENT (STEEL TIE RODS WITH ROUND PROFILE)

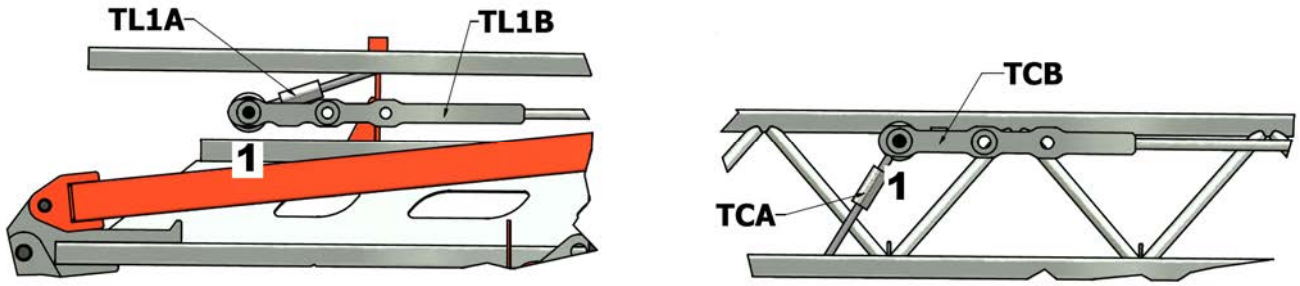
DANGER

- THE CHOICE OF THE CORRECT ASSEMBLY OF THE JIB IS CARRIED OUT THROUGH THE **CONTEMPORARY FASTENING** OF **2 PINS THAT ACT ON THE "TL" TIE ROD** THAT GOES FROM THE FIRST SCREW DOWN JACK OF THE CRANE ("P1") TO THE INTERMEDIATE SCREW DOWN JACK OF THE JIB ("P4") AND OF **2 PINS THAT ACT ON THE "TC" TIE ROD** THAT GOES FROM THE FIRST SCREW DOWN JACK OF THE CRANE ("P1") TO THE CONNECTIONS ON THE FIRST JIB ELEMENT.

IT IS STRICTLY FORBIDDEN TO INSERT THE PINS IN A DIFFERENT WAY.

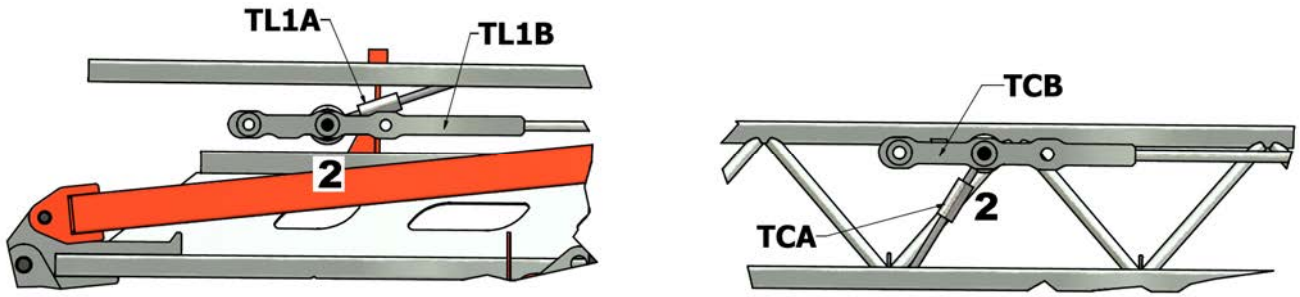
- ONCE THE DESIRED ASSEMBLY OF THE JIB HAS BEEN DETERMINED, BY CHOOSING THE POSITIONS OF THE RELATED PINS IN THE VARIOUS POSITIONS 1-2-3 (SEE THE FOLLOWING PICTURES), TURN THE JIB CONFIGURATION SELECTOR LOCATED INSIDE THE ELECTRICAL CABINET TO ONE OF THE FOLLOWING POSITIONS:

" E " = HORIZONTAL JIB : CONNECTIONS OF ROPE TIE RODS (TL1A) IN POS. "1"
CONNECTIONS OF ROPE TIE RODS (TCA) IN POS. "1"



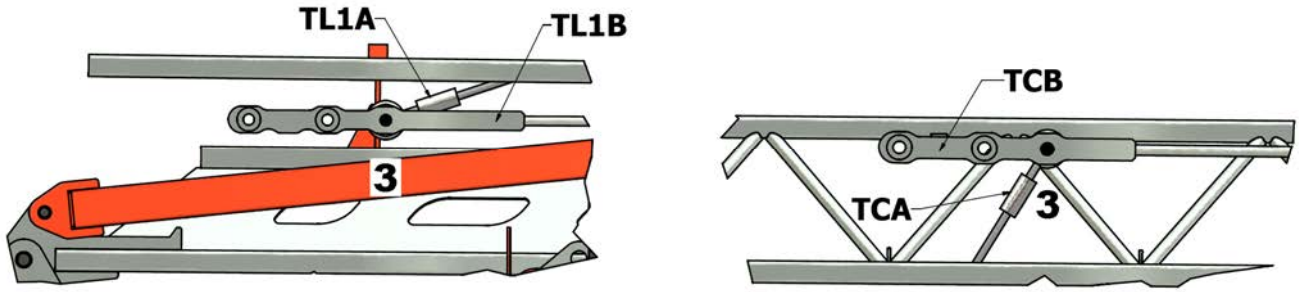
Picture 9

" F " = INTERMEDIATE LUFFING JIB : CONNECTIONS OF ROPE TIE RODS (TL1A) IN POS. "2"
CONNECTIONS OF ROPE TIE RODS (TCA) IN POS. "2"



Picture 10

" G " = MAX. LUFFING JIB : CONNECTIONS OF ROPE TIE RODS (TL1A) IN POS. "3"
CONNECTIONS OF ROPE TIE RODS (TCA) IN POS. "3"



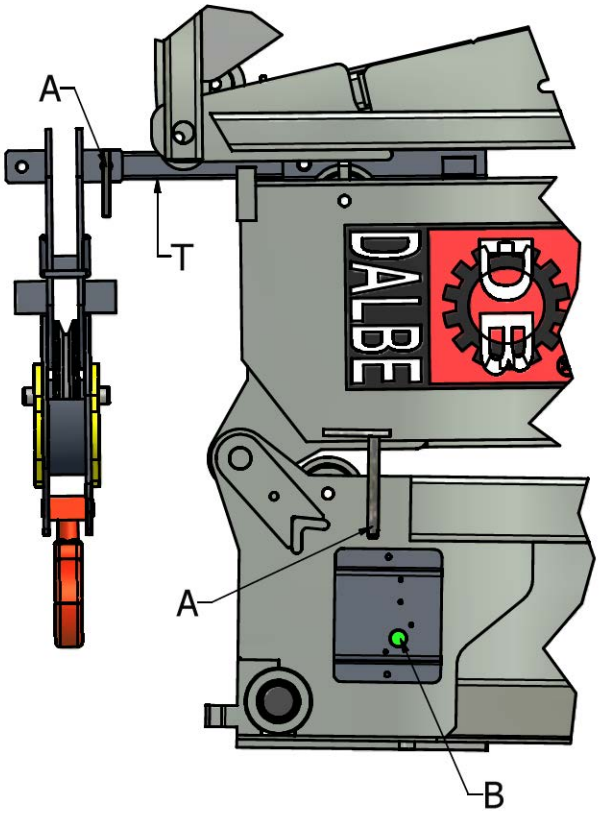
Picture 11

8.6) SUPPLEMENTARY CHECKS

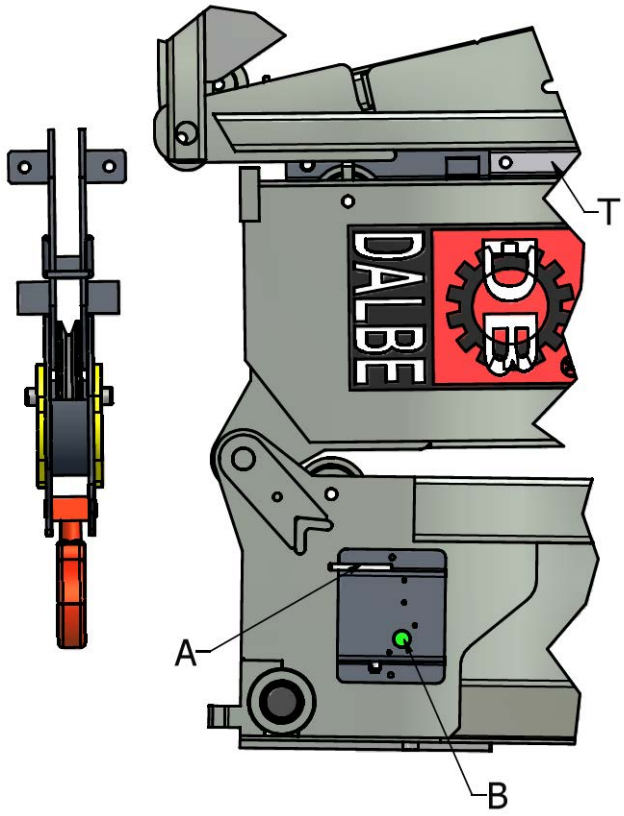
- CHECK THAT THE HOISTING ROPE IS CORRECTLY WOUND ON THE PULLEYS.

- MAKE SURE THAT THE HOISTING AND TROLLEY ROPES ARE **FREE** FROM OBSTACLES AND THAT THERE IS NOT THE DANGER OF ENTANGLEMENT DURING THE FOLLOWING CRANE OPENING PHASE.

- REMOVE THE BLOCK LOCK PIN **(A)** FOR TRANSPORT POSITION AND INSERT IT INTO THE PROPER POSITION IN THE LOWER MAST PANEL (SEE Picture 16) AND LOCK IT WITH THE SUITABLE SPLIT PIN.



Picture 12



Picture 13

- MOVE THE TELESCOPIC ELEMENT **(T)** BACKWARDS BY ABOUT 30cm FOR THE WORK POSITION OF THE CRANE BY ACTING ON THE PIN SHOWN AND INSERT IT IN THE SECOND POSITION.

WARNING: IF THE TELESCOPIC ELEMENT HAS NOT RETURNED INTO THE SHOWN POSITION, THIS MAY DAMAGE THE MASTS WHEN THEY ARE ALIGNED AT THE END OF THE ERECTION PHASE.

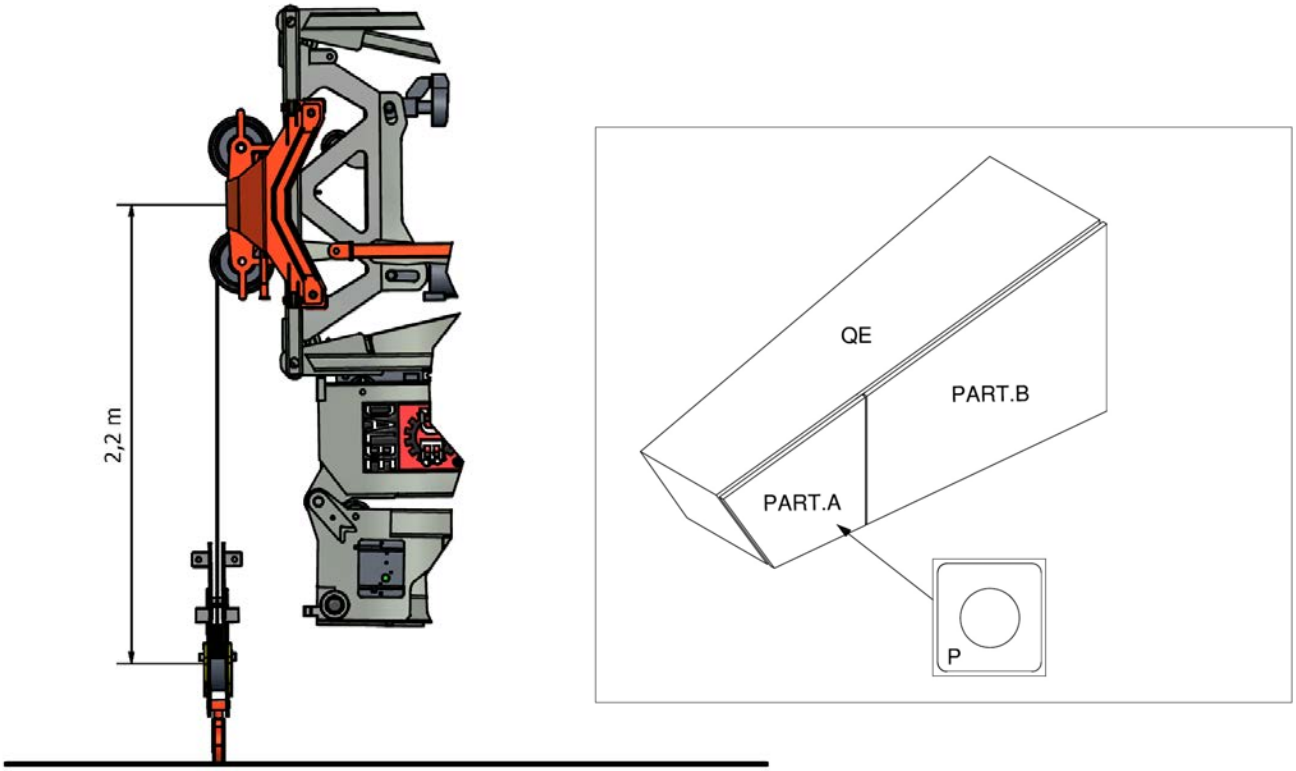
- PAY ATTENTION TO THE BLOCK WEIGHT THAT WILL BE SUPPORTED ONLY BY THE ROPES THAT GO DOWN FROM THE TROLLEY.

- CHECK THAT THE BLOCK IS CONFIGURED IN **FOUR-FALL HOISTING ROPE** POSITION WITH THE INTERMEDIATE ELEMENT FASTENED TO THE MAIN BLOCK THROUGH THE APPROPRIATE PIN WITH HANDLE AND THAT IT IS FREE TO GO UP TOGETHER WITH THE TROLLEY, DURING THE ERECTION PHASE OF THE CRANE, WITHOUT ANY ROPE BEING ENTANGLED IN THE STRUCTURE.

- TURN THE "WORK / ERECTION CONFIGURATION" SELECTOR **SEL 1** (SEE PAR 9.1.2.1), LOCATED INSIDE THE ELECTRICAL CABINET, TO "**M1**", KEEP PRESSED THE "P" BUTTON INSIDE THE **PART. A** OF THE ELECTRIC CABINET AND CARRY OUT THE “HOISTING RISE” MANEUVER UNTIL THE UPPER PART OF THE MAST HAS RISEN BY ABOUT **2 m**.

- TURN THE "WORK / ERECTION CONFIGURATION" SELECTOR **SEL 1** (SEE PAR 9.1.2.1), LOCATED INSIDE THE ELECTRICAL CABINET, TO "**L2**" OR "**L4**".
  PERFORM THE "HOISTING DESCENT" MANEUVER IN FIRST SPEED TO LET THE BLOCK GO DOWN UNTIL THE HOOK TOUCHES THE GROUND AND THEREFORE THE BLOCK IS AT A DISTANCE OF ABOUT **2.2 m** FROM THE TROLLEY VERTICALLY (SEE Picture 17).

WARNING: MAKE SURE THAT THE HOISTING ROPE IS FREE TO RUN AND THAT EVERY PARTIAL ROTATION OF THE DRUM CORRESPONDS TO A DESCENT OF THE BLOCK!



Picture 14

KEY:

P = BUTTON DISCONNECTING THE RISE LIMIT SWITCH DURING ERECTION

WARNING: DURING THE ERECTION OF THE CRANE - MAST ALIGNMENT THE HOISTING ROPE IS RECOVERED AND THEREFORE IT IS NECESSARY TO LEAVE SOME SPACE IN ORDER THAT THE BLOCK DOES NOT BUMP INTO THE TROLLEY.

WARNING

- CHECK THE EARTHING.

- CHECK THAT THE ERECTION BALLAST CORRESPONDS TO THAT OF POINT 4.6.1 "CENTRAL BALLAST", INCLUDING THE BASE BLOCKS (RIGHT SIDE AND LEFT SIDE BLOCKS OF 2t) AND THE STEEL BLOCK PLACED ON THE SLEWING BASE.

- CHECK THE USE OF PPE, SUCH AS PROTECTIVE HELMET, SAFETY SHOES WITH STEEL TOE, SAFETY GLOVES, ETC.

8.7) MOUNTING OPERATION

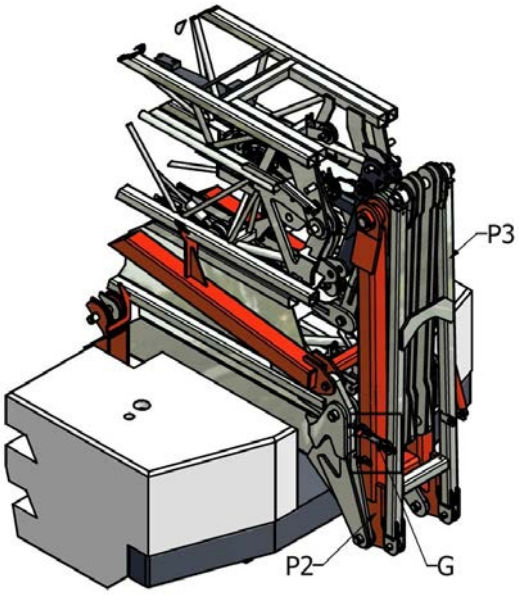
DANGER

8.7.1) TOWER ALIGNMENT

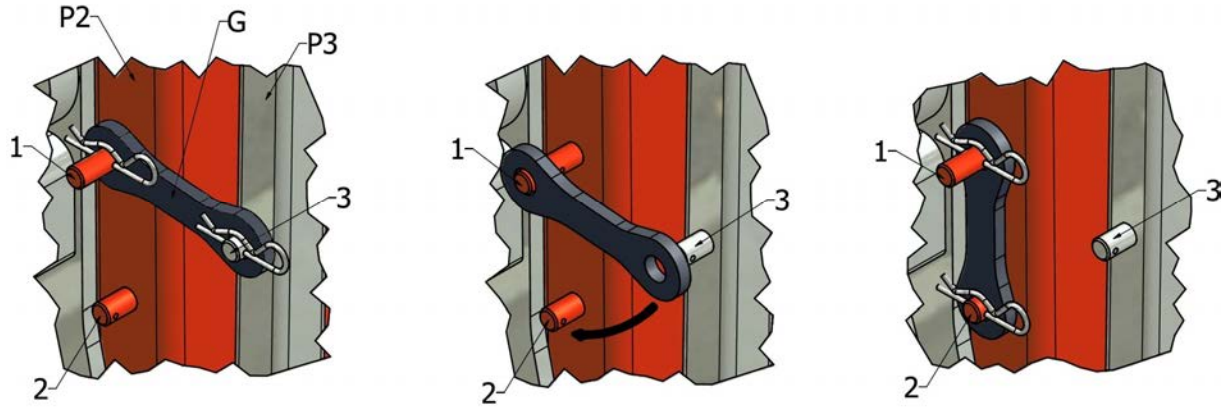
8.7.1.1) P3 SCREW DOWN JACK OPENING

- THE CRANE IS EQUIPPED WITH AN INTELLIGENT SYSTEM FOR OPENING THE LOWER SCREW DOWN JACK CALLED “P3”. THE SOLUTION ADOPTED INVOLVES THE USE OF A DEDICATED HYDRAULIC CYLINDER AND AN ANGULAR SENSOR, WHOSE FUNCTION IS TO MOVE THE OPENING/CLOSING SCREW DOWN JACK AUTOMATICALLY IN THE INTENDED POSITIONS.

THE ADVANTAGE OF THIS SOLUTION LIES IN THE FACT THAT THE INITIAL ENCUMBRANCE ON THE GROUND, REQUIRED TO POSITION THE CRANE FOR THE ERECTION PHASE, DOES NOT REQUIRE ANY SPACE FOR THE OPENING OF THE LOWER SCREW DOWN JACK.



Picture 15



Picture 169

LEGEND:

"P3" = LOWER SCREW DOWN JACK "P3"
"P2" = MEDIAN SCREW DOWN JACK "P2"
"G" = SCREW DOWN JACK LOCKING HOOK
"1" = ROUND BAR ON MEDIAN SCREW DOWN JACK FOR POSITION 1
"2" = ROUND BAR ON MEDIAN SCREW DOWN JACK FOR POSITION 2
"3" = ROUND BAR ON LOWER SCREW DOWN JACK FOR POSITION 3

- BEFORE MOUNTING THE CRANE, IT IS NECESSARY TO REMOVE THE SCREW DOWN JACK LOCKING HOOK FOR THE TRANSPORT POSITION.

- REMOVE THE SNAP SPLIT PINS FROM POSITIONS 1 AND 3.

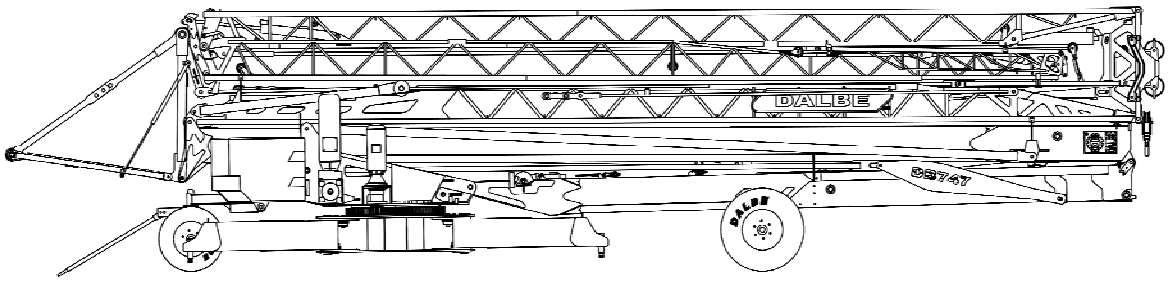
- PULL AND LIFT THE HOOK (G) ("SCREW DOWN JACK LOCKING HOOK") AND RELEASE IT FROM THE ROUND BAR 3 OF THE LOWER SCREW DOWN JACK. TURN THE HOOK (G) CLOCKWISE BY APPROXIMATELY 90 DEGREES AS SHOWN IN FIGURE 18.

- INSERT THE HOOK INTO THE ROUND BAR OF POSITION 2, PUSH THE HOOK TOWARDS THE MEDIAN SCREW DOWN JACK AND REPOSITION THE CORRESPONDING SNAP SPLIT PINS.

THE OPENING OF THE LOWER SCREW DOWN JACK “P3” IS NECESSARY TO ENSURE THE CORRECT POSITIONING OF THE TIE RODS DURING BOTH MOUNTING AND WORK.

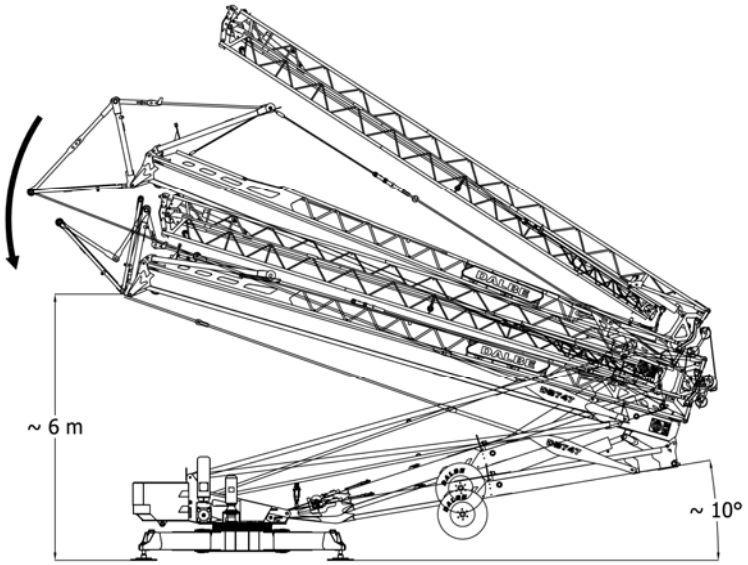
THE ABOVE SYSTEM HAS A RANGE IN WHICH THE LOWER SCREW DOWN JACK “P3” CAN BE OPENED. THIS RANGE IS COMPRISED BETWEEN:

- CRANE STILL IN TRANSPORT CONFIGURATION:



Picture 20

- CRANE IN MOUNTING PHASE AND HEIGHT FROM THE GROUND OF THE SCREW DOWN JACK



"P3" OF ABOUT 6m:

Picture 21

IT IS NECESSARY TO CHECK THAT AT THE HEIGHT WHERE THE OPERATOR DECIDES TO OPEN THE SCREW DOWN JACK P3 THERE IS THE NECESSARY FREE SPACE FOR ITS MOVEMENT, WHICH CANNOT BE CHANGED.

WARNING

THE OPENING PROCEDURE OF THE SCREW DOWN JACK "P3" MUST BE CARRIED OUT BY FOLLOWING THE STEPS BELOW:

OPENING ON THE GROUND:

1) POSITION THE SELECTOR FROM 'WORK' TO 'MOUNTING' (SEE PAR 9.1.2.1)
2) OPERATE THE "TROLLEY FORWARD" CONTROL TO OPEN THE LOWER SCREW DOWN JACK "P3" AND KEEP IT PRESSED UNTIL IT IS FULLY OPEN.
3) CHECK THAT THE SCREW DOWN JACK IS FULLY OPEN AND THAT THE TIE RODS BETWEEN THE LOWER SCREW DOWN JACK "P3" AND THE MEDIAN SCREW DOWN JACK "P2" ARE ALIGNED.

OPENING DURING MOUNTING:

1) POSITION THE SELECTOR FROM 'WORK' TO 'MOUNTING' (SEE PAR 9.1.2.1).
2) PROCEED WITH THE ALIGNMENT OF THE TOWERS, TAKING CARE TO HAVE FOLLOWED ALL THE INSTRUCTIONS IN THIS CHAPTER.
3) AT THE MAXIMUM HEIGHT AT WHICH IT IS POSSIBLE TO OPEN THE LOWER SCREW DOWN JACK "P3" THE CRANE HORN WILL SOUND 3 WARNINGS AND THE RED AND ORANGE LIGHT INDICATORS WILL FLASH 5 TIMES SIMULTANEOUSLY.
   AT THIS POINT THE MOUNTING PROCEDURE IS AUTOMATICALLY INTERRUPTED AND THE LOWER SCREW DOWN JACK "P3" MUST BE OPENED.
4) OPERATE THE "TROLLEY FORWARD" CONTROL TO OPEN THE LOWER SCREW DOWN JACK "P3" AND KEEP IT PRESSED UNTIL IT IS FULLY OPEN.
5) CHECK THAT THE SCREW DOWN JACK IS FULLY OPEN AND THAT THE TIE RODS BETWEEN THE LOWER SCREW DOWN JACK "P3" AND THE MEDIAN SCREW DOWN JACK "P2" ARE ALIGNED.
6) ONCE THE OPERATION IS COMPLETE, THE ALIGNMENT OF THE TOWERS CAN BE RESUMED USING THE 'RISE' CONTROL.

CHECK THAT THE SCREW DOWN JACK FULLY OPENS AND THAT THE TIE RODS BETWEEN THE LOWER SCREW DOWN JACK "P3" AND THE MEDIAN SCREW DOWN JACK "P2" ARE ALIGNED.

WARNING

WARNING

DO NOT MOUNT THE CRANE WITH THE "**P3**" SCREW DOWN JACK CLOSED OR NOT FULLY OPEN SINCE THERE IS THE DANGER OF DAMAGE TO THE STRUCTURE.

BEFORE PROCEEDING WITH THE TOWER MOUNTING OPERATION:

- CHECK THE PERFECT LEVELLING OF THE BASE.

- POSITION THE “WORK/MOUNTING CONFIGURATION” SELECTOR (SEE PAR 9.1.2.1), LOCATED INSIDE THE SWITCHBOARD, ON **"M1"** WHICH IS THE POSITION FOR THE TOWER MOUNTING.

CHECK THAT ALL THE ABOVE INSTRUCTIONS ARE COMPLIED WITH.

MAKE SURE THAT YOU ARE IN THE ABSENCE OF WIND IN ACCORDANCE WITH POINT 3.3.6).

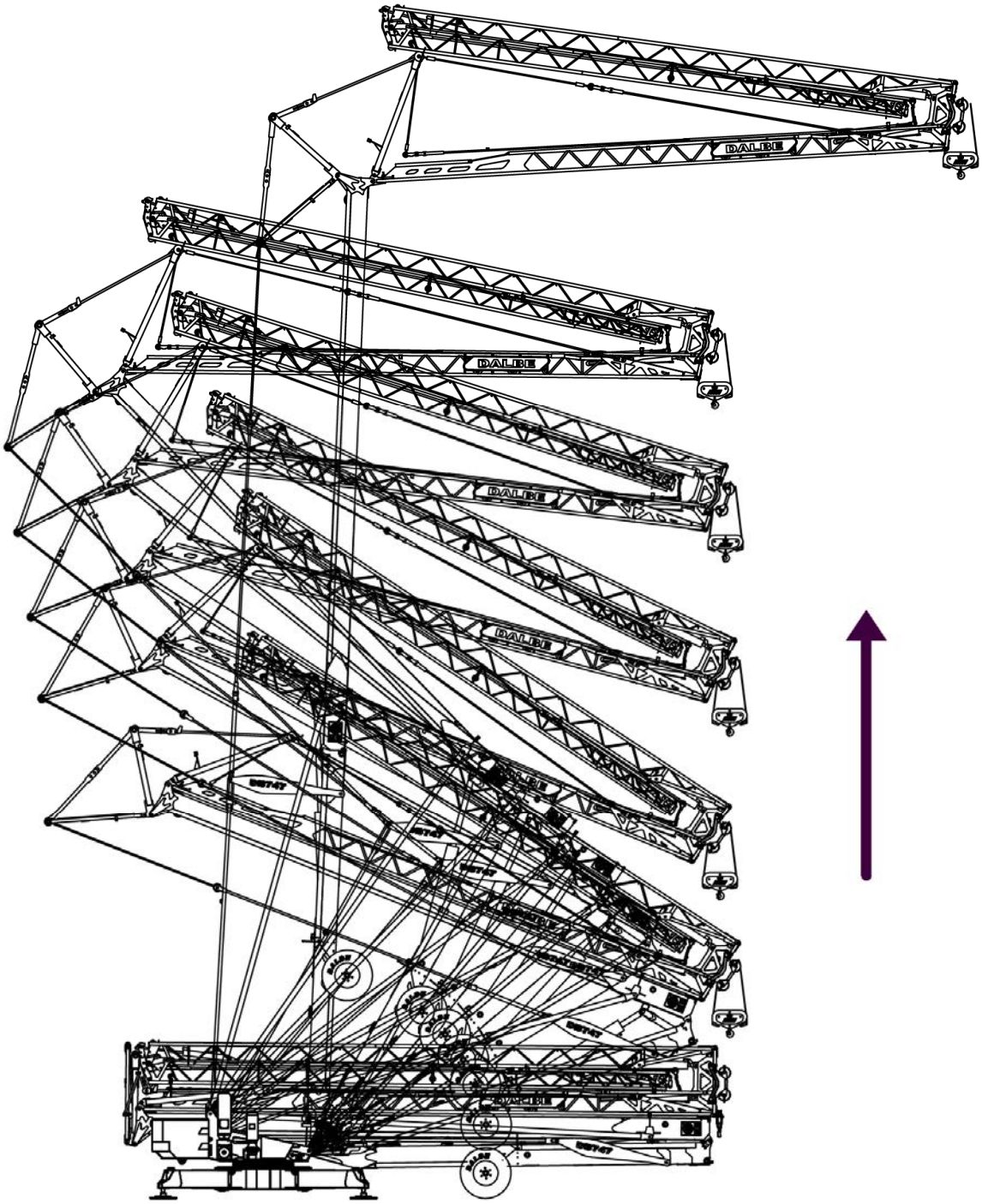
PRESS THE **“RISE-DESCENT” BUTTON** FOR ABOUT 5 SECONDS, RELEASING IT ONLY WHEN THE SOUND OF OIL BEING DISCHARGED FROM THE MAXIMUM PRESSURE VALVE IS AUDIBLE.

PRESS THE **“RISE-HOISTING” BUTTON** UNTIL THE VERTICAL ALIGNED POSITION OF THE TOWERS IS REACHED, RELEASING THE BUTTON ONLY WHEN THE SOUND OF OIL BEING DISCHARGED FROM THE MAXIMUM PRESSURE VALVE IS AUDIBLE.

CHECK THE CORRECT OPENING OF THE LOWER SCREW DOWN JACK "P3"

MAKE SURE THAT NO TIE ROD ENTANGLES DURING MOUNTING

DO NOT INTERRUPT, UNLESS STRICTLY NECESSARY, THE ALIGNMENT OF THE TOWERS, EXCEPT FOR THE OPENING OF THE LOWER SCREW DOWN JACK "P3" DURING ALIGNMENT.



Picture 22

- CHECK THE CORRECT ALIGNMENT OF THE MASTS.
- CHECK THE CORRECT OPENING OF THE SCREW DOWN JACK P3 AT THE MAST HEIGHT SHOWN.
- DO NOT HOIST ANY LOAD DURING THIS PHASE.

8.7.2) BALLASTING

DANGER

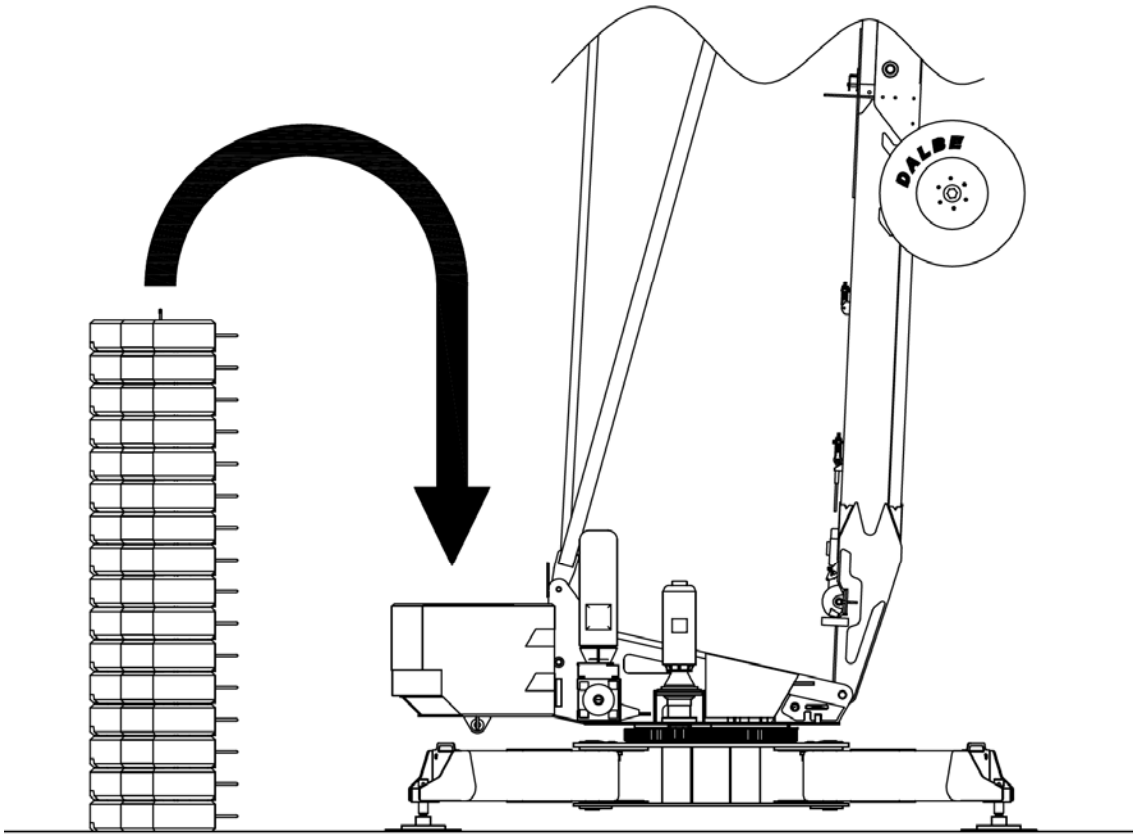
IT IS COMPULSORY TO CARRY OUT BALLASTING.

- IT IS NECESSARY TO PROVIDE FOR SUITABLE LIFTING MEANS AS PER PAR. 5.8).
THE MINIMUM HEIGHT MUST BE ABOUT **6m** IN ORDER TO POSITION ALL THE BLOCKS OF WORK BALLAST.

- POSITION ALL THE BLOCKS OF WORK BALLAST AS SHOWN BELOW, BY PLACING THE BLOCKS ONE ABOVE THE OTHER UNTIL YOU REACH THE TOTAL AMOUNT INDICATED IN POINT 4.6.3 "COUNTERWEIGHT" (N16 BLOCKS OF 1750 Kg/each).

- THE BLOCKS HAVE A SUITABLE SEAT TO FACILITATE POSITIONING.

- AFTER THIS OPERATION, FIX THE BLOCKS BY USING THE SUITABLE THREADED RODS SUPPLIED WITH THE MACHINE.



Picture 23

8.7.3) OPENING THE MAIN JIBS 1 AND 2

DANGER

BEFORE CARRYING OUT THE JIB OPENING:

- IF YOU INTEND TO USE THE CRANE WITH FULLY CLOSED JIB, SKIP TO CHAP 9 “SAFETY DEVICES AND CALIBRATION”.

- POSITION THE CRANE IN THE MOST APPROPRIATE DIRECTION.

- IN THIS PHASE IT IS ADVISABLE, EVEN IF NOT COMPULSORY, TO HANG A WINDSOCK ON THE BLOCK: THIS SHOWS THE DIRECTION OF THE WIND THAT, EVEN IF IT IS LOWER THAN THE SAFETY THRESHOLD, MAY PRODUCE WIND GUSTS. IN SUCH A CASE, POSITION THE CRANE AGAINST THE WIND BEFORE STARTING THE JIB OPENING (THE WIND BLOWS FROM THE NOSE TO THE MAST).

- CHECK THAT THE SPACE NECESSARY FOR THE OPENING OF THE JIB IS NOT OCCUPIED BY OBSTACLES.

BE SURE THAT IT IS NOT WINDY (**WIND SPEED LOWER THAN 15km/h**) ACCORDING TO PRESCRIPTIONS OF POINT 3.3.6).

WHEN THIS VALUE IS EXCEEDED, AN INTERMITTENT ACOUSTIC SIGNAL WARNS THE OPERATOR **NOT** TO START THE OPENING / CLOSING PHASE OF THE JIB.

DO NOT OPEN THE JIB OF THE CRANE IN THE EVENT OF **CROSS-WIND**, WAIT FOR THE WIND TO CEASE; IF POSSIBLE, POSTPONE THE OPERATION THE FIRST DAY WITHOUT WIND.

- IT IS FORBIDDEN TO CARRY OUT THE CRANE SLEWING DURING THE JIB OPENING.

- TURN THE "WORK/ERECTION CONFIGURATION” SELECTOR (SEE PAR 9.1.2.1), LOCATED INSIDE THE ELECTRICAL CABINET, TO "**M2**" WHICH IS THE POSITION FOR OPENING / CLOSING THE MAIN JIBS 1 AND 2.

WARNING: TO REMOVE ANY AIR BUBBLES FROM THE HYDRAULIC CIRCUIT, OPERATE THE **"HOISTING-DESCENT"** BUTTON FOR SOME SECONDS (ABUT 10 sec.) UNTIL YOU CAN HEAR THE NOISE OF THE OIL BEING DRAINED BY THE MAX. PRESSURE VALVE, CHECKING THE ACHIEVEMENT OF THE MAX. PRESSURE ON THE PRESSURE GAUGE.

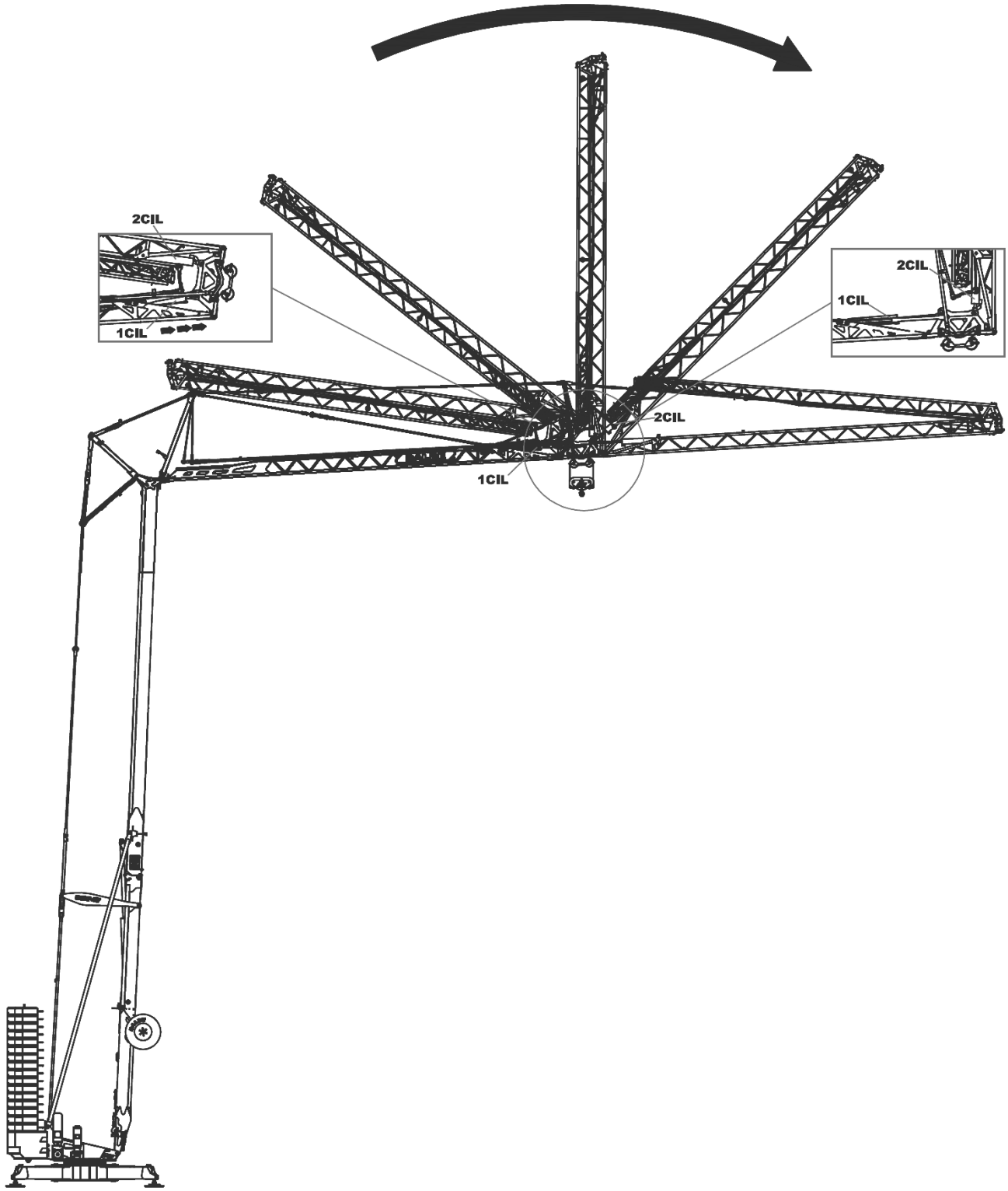
PRESS THE BUTTON **“HOISTING RISE “** UNTIL YOU REACH THE CORRECT ALIGNMENT OF THE TWO JIBS, RELEASE IT ONLY WHEN YOU CAN HEAR THE NOISE OF THE OIL BEING DRAINED BY THE MAX. PRESSURE VALVE, CHECKING THE ACHIEVEMENT OF THE MAX. PRESSURE ON THE PRESSURE GAUGE.

CHECK THE CORRECT SEQUENCE OF MOVEMENTS OF THE CYLINDERS THAT OPEN THE JIB, CHECKING THAT THE **1CIL** IS ACTIVATED FIRST AND THAT **2CIL** DOES NOT MOVE UP TO THE COMPLETE EXIT OF 1CIL.

CHECK THAT NO TIE ROD IS CAUGHT DURING THE JIB OPENING

NEVER INTERRUPT, IF NOT STRICTLY NECESSARY, THE JIB OPENING PHASE. IN THIS CASE, AVOID ANY STRUCTURE OSCILLATION AS FAR AS POSSIBLE.

- CHECK THE CORRECT ALIGNMENT OF THE JIB.



Picture 24

8.7.4) OPENING THE SECONDARY JIBS 3 E 4/5

DANGER

BEFORE CARRYING OUT THE JIB OPENING:

- IF YOU INTEND TO USE THE CRANE WITH THIRD JIB ELEMENT CLOSED, SKIP TO THE NEXT PARAGRAPH.

- POSITION THE CRANE IN THE MOST APPROPRIATE DIRECTION.

- IN THIS PHASE IT IS ADVISABLE, EVEN IF NOT COMPULSORY, TO HANG A WINDSOCK ON THE BLOCK: THIS SHOWS THE DIRECTION OF THE WIND THAT, EVEN IF IS LOWER THAN THE SAFETY THRESHOLD, MAY PRODUCE WIND GUSTS. IN SUCH A CASE, POSITION THE CRANE AGAINST THE WIND BEFORE STARTING THE JIB OPENING (THE WIND BLOWS FROM THE NOSE TO THE MAST).

- CHECK THAT THE SPACE NECESSARY FOR THE OPENING OF THE JIB IS NOT OCCUPIED BY OBSTACLES.

BE SURE THAT IT IS NOT WINDY (**WIND SPEED LOWER THAN 15km/h**) ACCORDING TO PRESCRIPTIONS OF POINT 3.3.6).

WHEN THIS VALUE IS EXCEEDED, AN INTERMITTENT ACOUSTIC SIGNAL WARNS THE OPERATOR **NOT** TO START THE OPENING / CLOSING PHASE OF THE JIB.

DO NOT OPEN THE JIB OF THE CRANE IN THE EVENT OF **CROSS-WIND**, WAIT FOR THE WIND TO CEASE; IF POSSIBLE, POSTPONE THE OPERATION THE FIRST DAY WITHOUT WIND.

- IT IS FORBIDDEN TO CARRY OUT THE CRANE SLEWING DURING THE JIB OPENING.

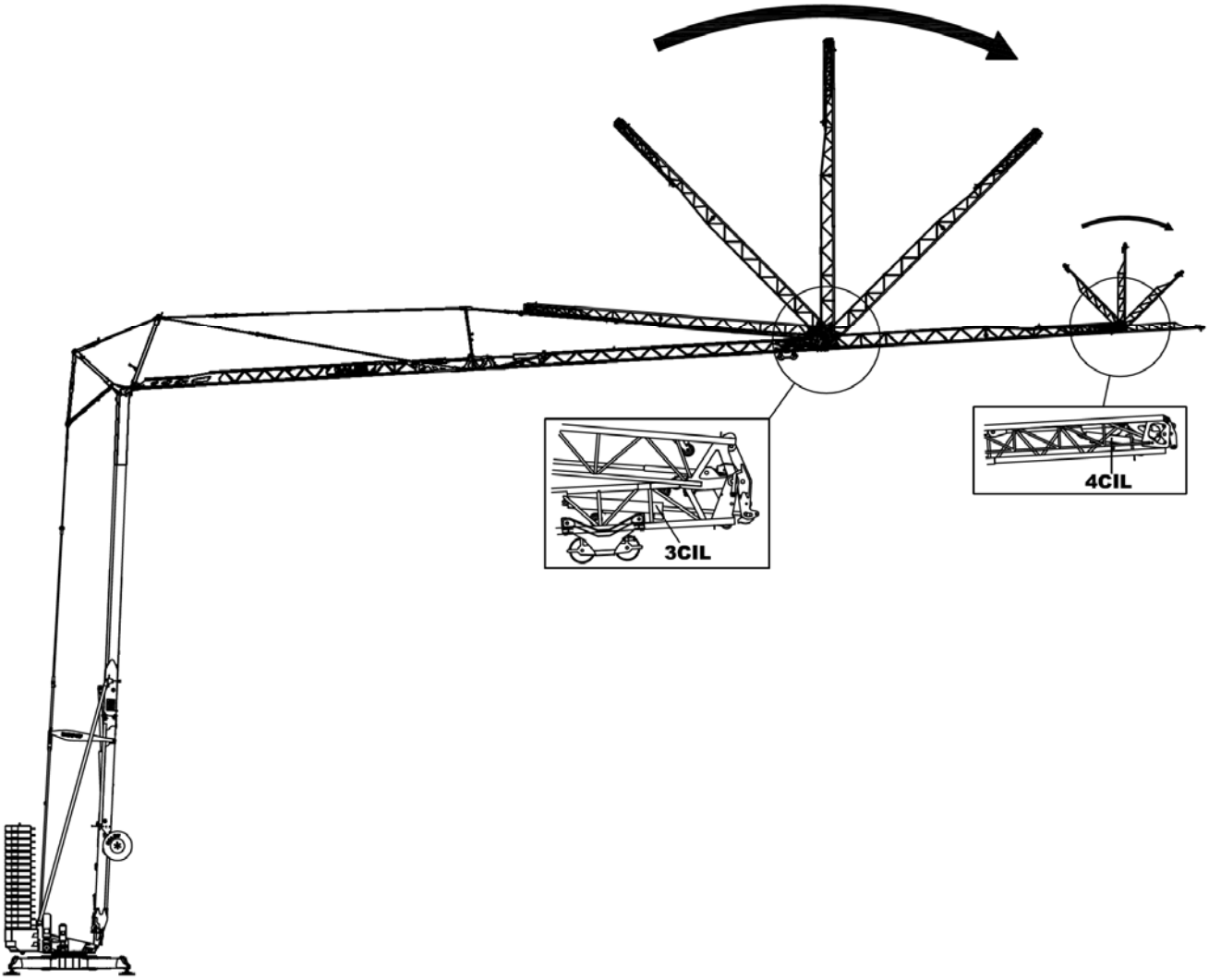
- TURN THE "WORK/ERECTION CONFIGURATION" SELECTOR (SEE PAR 9.1.2.1), LOCATED INSIDE THE ELECTRICAL CABINET, TO "**M3**" WHICH IS THE POSITION FOR OPENING / CLOSING THE SECONDARY JIBS 3 AND 4/5.

- PRESS THE "**HOISTING-DESCENT**" BUTTON FOR SOME SECONDS (ABUT 10 sec.) UNTIL YOU CAN HEAR THE NOISE OF THE OIL BEING DRAINED BY THE MAX. PRESSURE VALVE, CHECKING THE ACHIEVEMENT OF THE MAX. PRESSURE ON THE PRESSURE GAUGE.

PRESS THE BUTTON **"HOISTING RISE "** UNTIL YOU REACH THE CORRECT ALIGNMENT OF TWO JIBS, RELEASE IT ONLY WHEN YOU CAN HEAR THE NOISE OF THE OIL BEING DRAINED BY THE MAX. PRESSURE VALVE, CHECKING THE ACHIEVEMENT OF THE MAX. PRESSURE ON THE PRESSURE GAUGE.

IF THE JIBS 4/5 (40m) ARE NOT INSTALLED ON THE CRANE OR IF YOU INTEND TO USE THE CRANE WITHOUT OPENING THEM, SKIP TO THE NEXT PARAGRAPH.

TO OPERATE THE OPENING OF THE JIBS 4/5 (45m), WITH THE SAME PRECAUTIONS AS ABOVE, PRESS THE BUTTON **"HOISTING RISE "** UNTIL YOU REACH THE CORRECT ALIGNMENT OF THE TWO JIBS, RELEASE IT ONLY WHEN YOU CAN HEAR THE NOISE OF THE OIL BEING DRAINED BY THE MAX. PRESSURE VALVE, CHECKING THE ACHIEVEMENT OF THE MAX. PRESSURE ON THE PRESSURE GAUGE.



Picture 25

- PLEASE CHECK THE EXACT POSITION OF THE CAPACITY PLATES ON THE JIB ACCORDING TO THE JIB CONFIGURATION:

CRANE VERSION **R** - CRANE VERSION **T**

FOR JIB 45m : Kg 1100 - 44,7m..... Kg 1600 - 33,0m..... Kg 2500 - 22,8m..... Kg 4100 - 15,3m

FOR JIB 40m : Kg 1400 - 39,7m..... Kg 2000 - 29,6m..... Kg 2500 - 24,6m..... Kg 4100 - 16,4m

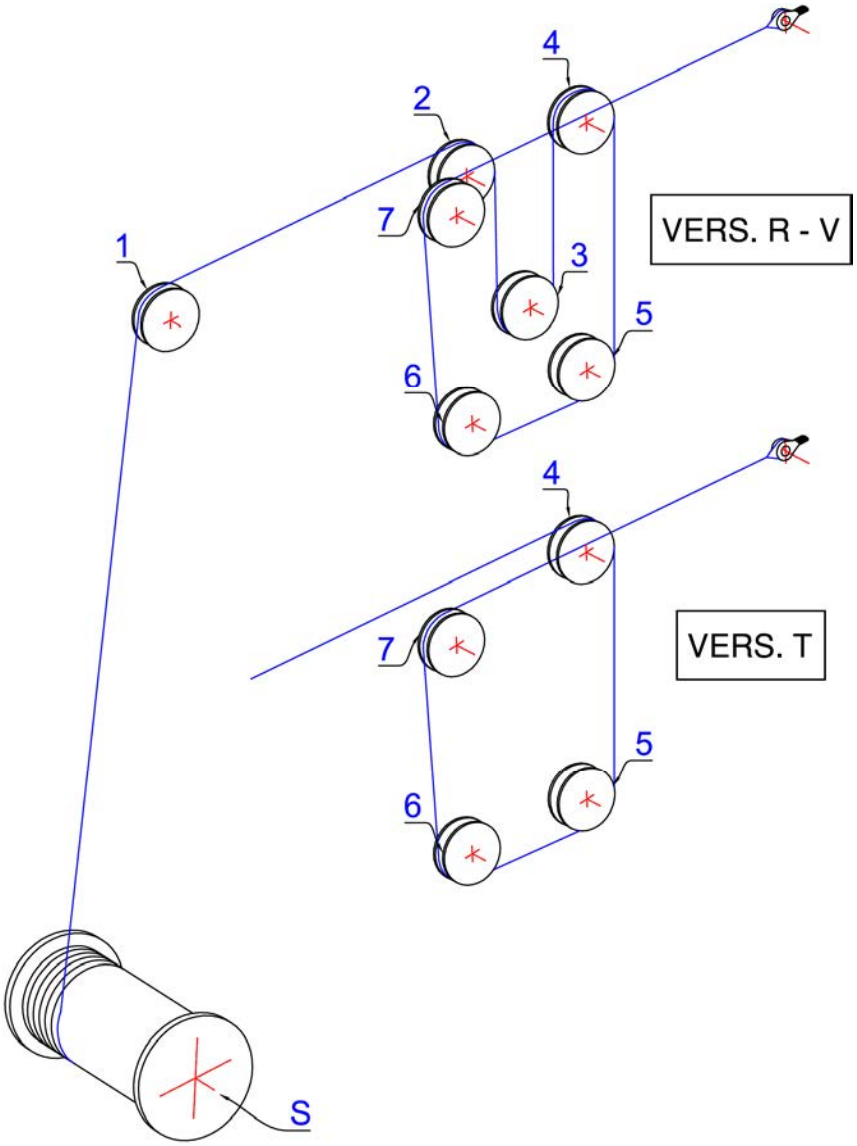
CRANE VERSION **V**

FOR JIB 45m : Kg 1100 - 44,7m..... Kg 1600 - 33,0m..... Kg 2500 - 22,8m..... Kg 5000 - 13,1m

FOR JIB 40m : Kg 1400 - 39,7m..... Kg 2000 - 29,6m..... Kg 2500 - 24,6m..... Kg 5000 - 14,0m

8.8) HOISTING ROPE WINDING

FOR THE TECHNICAL DATA OF THE ROPE SEE PAR. 4.3.



Picture 26

KEY:

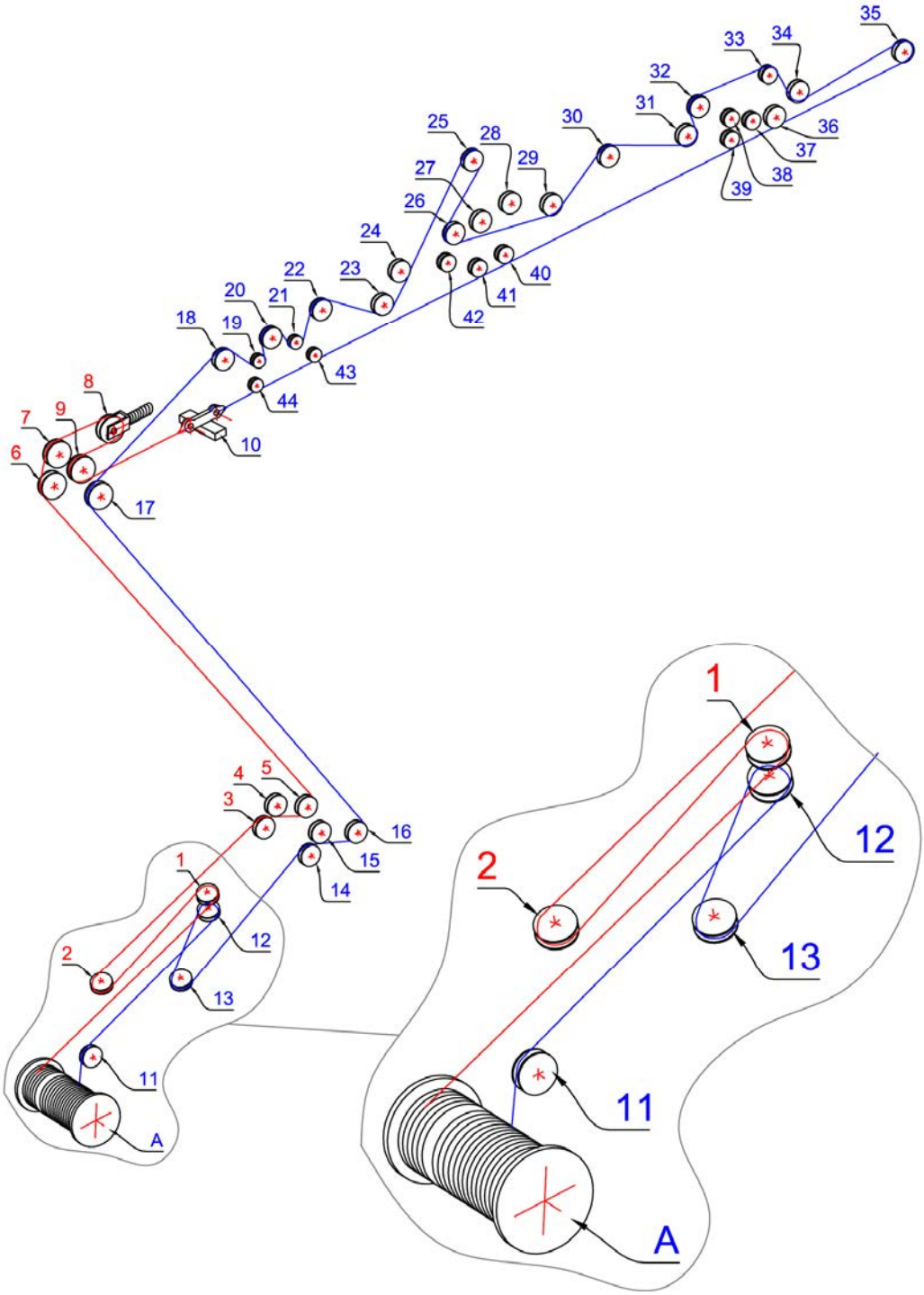
" S " = HOISTING DRUM - MOVABLE BASE
" 1 " = TRANSMISSION PULLEY - UPPER MAST TERMINAL
" 2 " = LEFT PULLEY - ON THE TROLLEY
" 3 " = PULLEY ON INTERMEDIATE BLOCK FOR FOUR-FALL ROPE
" 4 " = FRONT PULLEY - ON THE TROLLEY
" 5 " = PULLEY ON THE MAIN BLOCK
" 6 " = PULLEY ON THE MAIN BLOCK
" 7 " = RIGHT PULLEY - ON THE TROLLEY
" 8 " = SLEWING ROPE TERMINAL - JIB NOSE TERMINAL

DO NOT REMOVE THE ROPE TERMINAL IF NOT STRICTLY NECESSARY (SEE CHAP.18)

8.9 TROLLEY TOWING ROPE WINDING

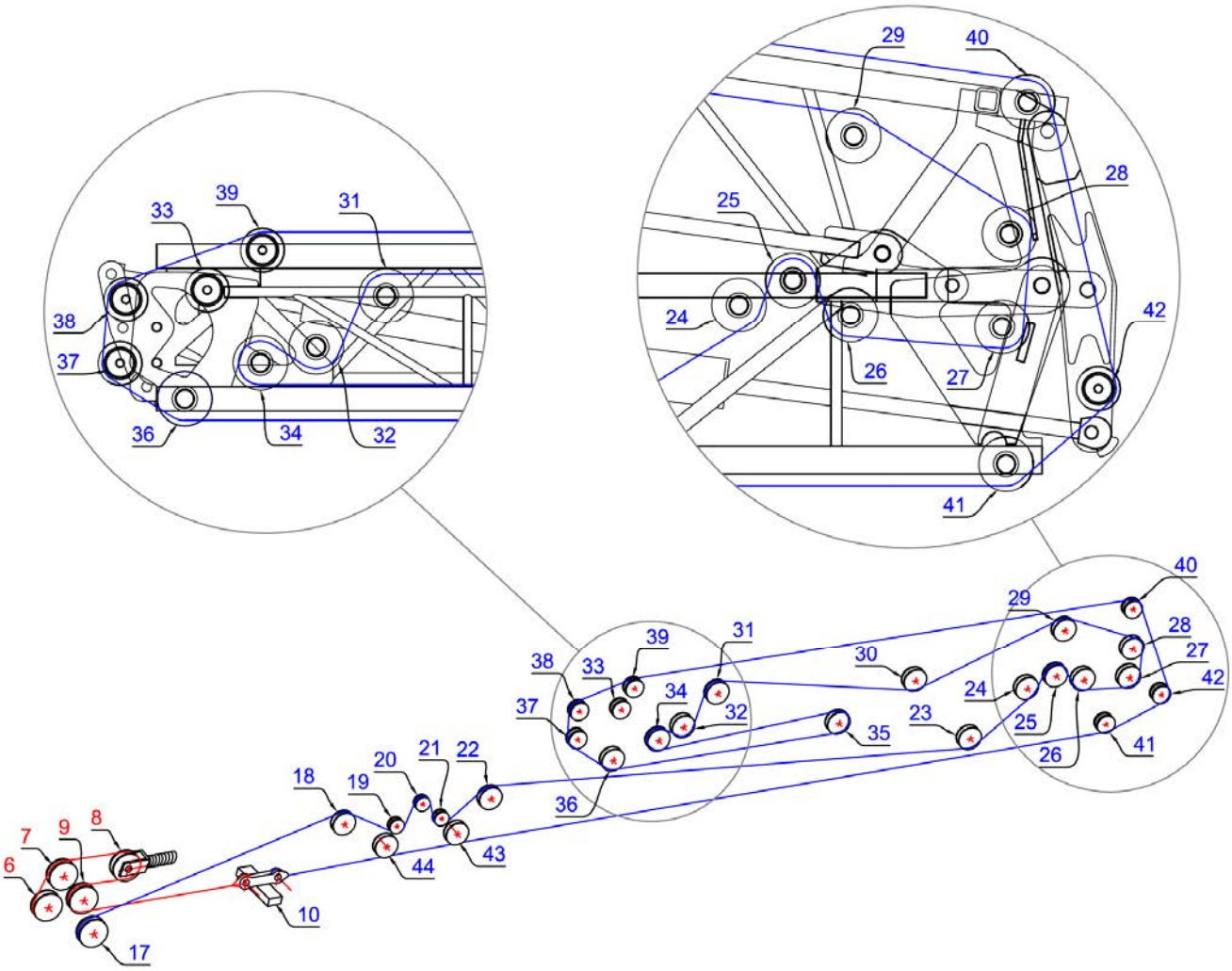
FOR THE TECHNICAL DATA OF THE ROPE SEE PAR. 4.3.

CRANE WITH JIB 45m - DRAWING WITH OPEN JIB



Picture 27

CRANE WITH JIB 45m - DRAWING WITH FIRST AND SECOND ELEMENTS OPEN / THIRD + FOURTH/FIFTH ELEMENTS CLOSED

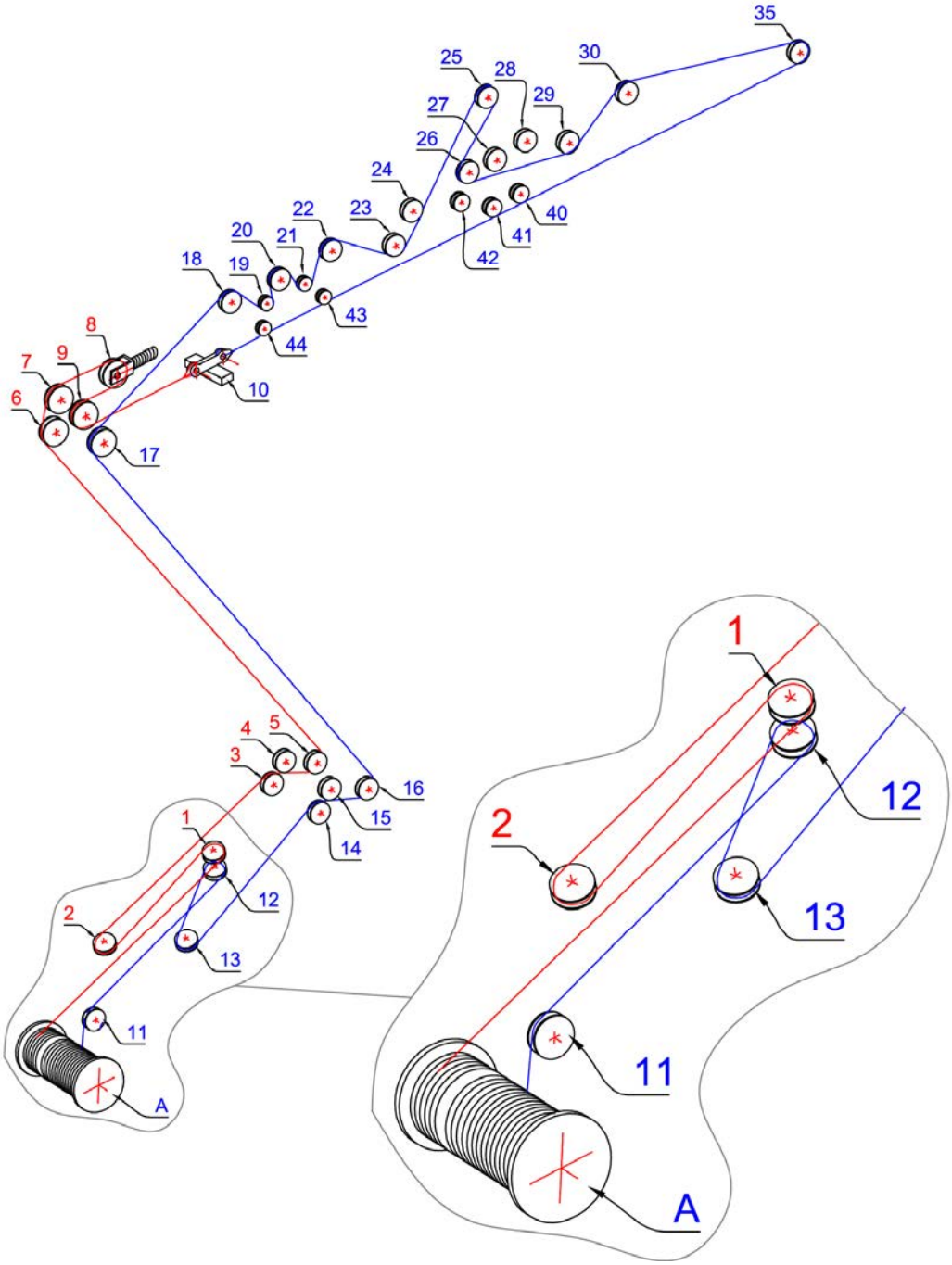


Picture 178

KEY:

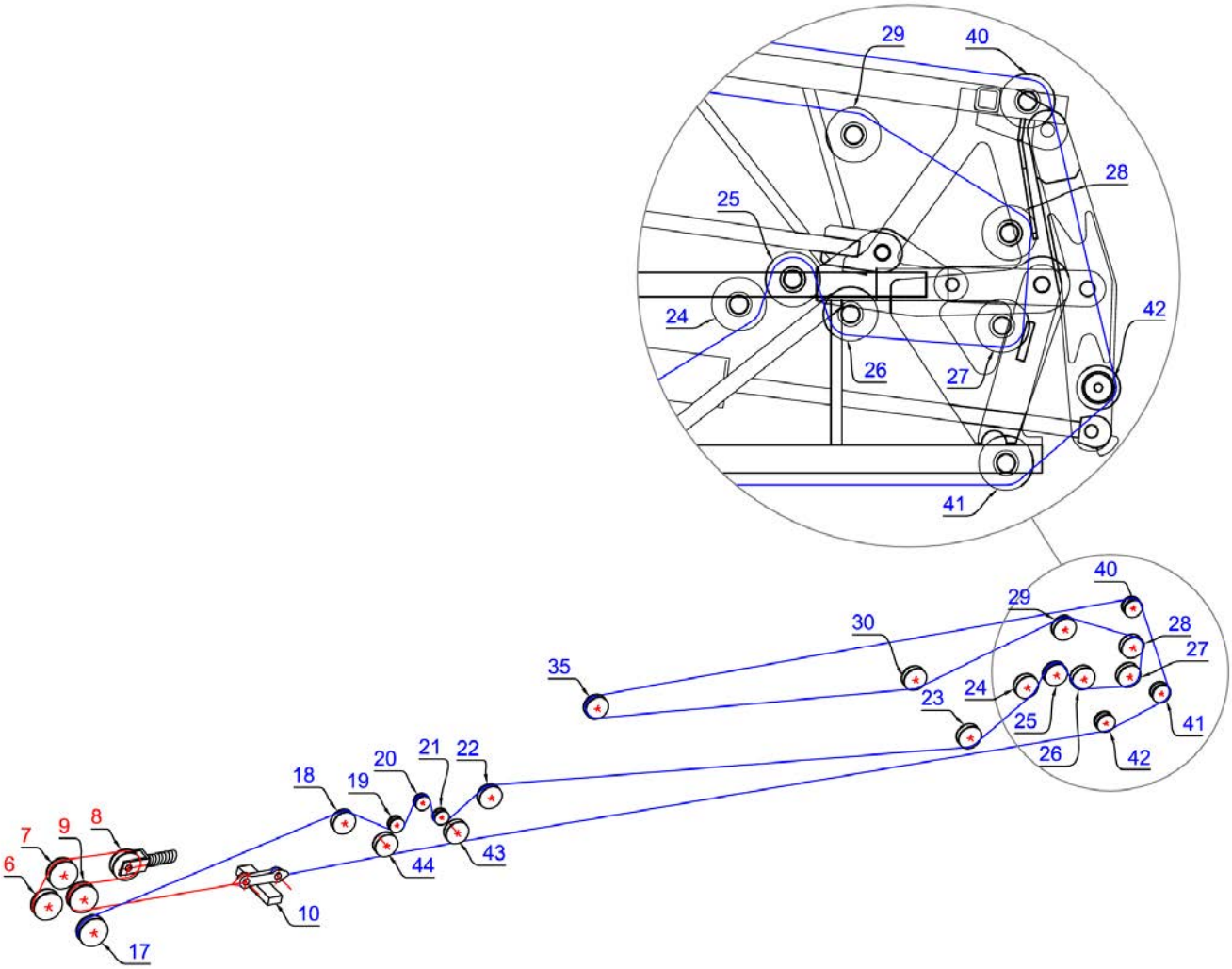
" A " = TROLLEY TOWING WINCH - FIRST SECTION OF THE LOWER MAST
" 11 " = SLIDING PULLEY - FIRST SECTION OF THE LOWER MAST
" 1 " - " 2 " - " 3 " = LEFT TRANSMISSION PULLEY - LOWER MAST
" 12 " - " 13 " - " 14 " = RIGHT TRANSMISSION PULLEY - LOWER MAST
" 4 " - " 5 " = LEFT TRANSMISSION PULLEY - UPPER MAST
" 15 " - " 16 " = RIGHT TRANSMISSION PULLEY - UPPER MAST
" 6 " - " 7 " - " 9 " = LEFT TRANSMISSION PULLEY - FIRST JIB ELEMENT
" 8 " = PULLEY ON TENSION SPRING - FIRST JIB ELEMENT
" 17 " - " 18 " = RIGHT TRANSMISSION PULLEY - FIRST JIB ELEMENT
" 19 " - " 20 " - " 21 " = ROLL, PULLEY, RIGHT TRANSMISSION ROLL- CENTRAL ADAPTER
" 44 " - " 43 " = RIGHT TRANSMISSION ROLL - PIN BETWEEN JIB AND ADAPTER
" 22 " - " 23 " - " 24 " - " 26 " - " 27 " - " 41 " = RIGHT TRANSMISSION ROLL - SECOND JIB ELEMENT
" 25 " = RIGHT TRANSMISSION PULLEY - SHORT CONNECTING ROD 2-3
" 28 " - " 29 " - " 30 " - " 40 " = RIGHT TRANSMISSION PULLEY - THIRD JIB ELEMENT
" 42 " = RIGHT TRANSMISSION ROLL - LONG CONNECTING ROD 2-3
" 31 " - " 32 " - " 39 " = PULLEY (X2), RIGHT TRANSMISSION ROLL - FOURTH JIB ELEMENT
" 33 " - " 34 " - " 36 " = ROLL, RIGHT PULLEY (X2) - FIFTH JIB ELEMENT
" 37 " - " 38 " = RIGHT TRANSMISSION ROLL - LONG CONNECTING ROD 4-5
" 35 " = RIGHT TRANSMISSION PULLEY - JIB TERMINAL CROSSBEAM
" 10 " = TERMINAL ROPES- TROLLEY

CRANE WITH JIB 40m - DRAWING WITH OPEN JIB



Picture 189

CRANE WITH JIB 40m - DRAWING WITH FIRST AND SECOND ELEMENTS OPEN / THIRD ELEMENT CLOSED



Picture 30

KEY:

" A " = TROLLEY TOWING WINCH - FIRST SECTION OF THE LOWER MAST
" 11 " = SLIDING PULLEY - FIRST SECTION OF THE LOWER MAST
" 1 " - " 2 " - " 3 " = LEFT TRANSMISSION PULLEY - LOWER MAST
" 12 " - " 13 " - " 14 " = RIGHT TRANSMISSION PULLEY - LOWER MAST
" 4 " - " 5 " = LEFT TRANSMISSION PULLEY - UPPER MAST
" 15 " - " 16 " = RIGHT TRANSMISSION PULLEY - UPPER MAST
" 6 " - " 7 " - " 9 " = LEFT TRANSMISSION PULLEY - FIRST JIB ELEMENT
" 8 " = PULLEY ON TENSION SPRING - FIRST JIB ELEMENT
" 17 " - " 18 " = RIGHT TRANSMISSION PULLEY - FIRST JIB ELEMENT
" 19 " - " 20 " - " 21 " = ROLL, PULLEY, RIGHT TRANSMISSION ROLL- CENTRAL ADAPTER
" 44 " - " 43 " = RIGHT TRANSMISSION ROLL - PIN BETWEEN JIB AND ADAPTER
" 22 " - " 23 " - " 24 " - " 26 " - " 27 " - " 41 " = RIGHT TRANSMISSION PULLEY - SECOND JIB ELEMENT
" 25 " = RIGHT TRANSMISSION PULLEY - SHORT CONNECTING ROD 2-3
" 28 " - " 29 " - " 30 " - " 40 " = RIGHT TRANSMISSION PULLEY - THIRD JIB ELEMENT
" 42 " = RIGHT TRANSMISSION ROLL - LONG CONNECTING ROD 2-3
" 35 " = RIGHT TRANSMISSION PULLEY - JIB TERMINAL CROSSBEAM
" 10 " = TERMINAL ROPES- TROLLEY

9- SAFETY DEVICES AND CALIBRATION

WARNING

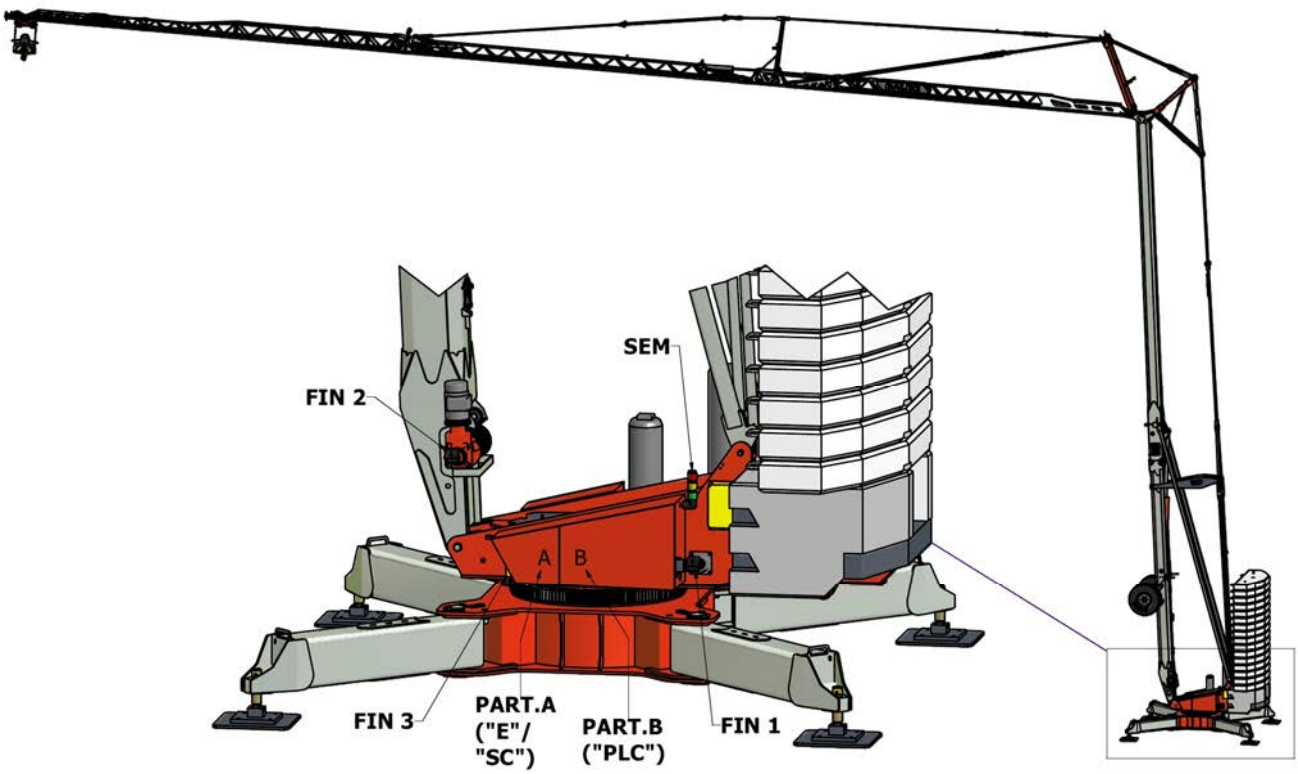
9.1.1) LOCATION OF THE SAFETY DEVICES

NOTE: CARRY OUT THE ADJUSTMENT OF THE SAFETY DEVICES ONLY AFTER LOADING THE WHOLE BALLAST

Picture 1

KEY:

" PR " = PROXIMITY SENSOR ON MAST T4 TIE ROD
" CC " = LOAD CELL
" AN " = ANEMOMETER



Picture 2

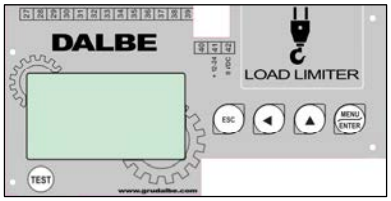
KEY:

" FIN 1 " = HOISTING LIMIT SWITCH
" FIN 2 " = "E-TROLLEY" LIMIT SWITCH
" FIN 3 " = SLEWING LIMIT SWITCH
" SC " = "QLS" ELECTRONIC BOARD
" PLC " = "QMS" PLC CONTROLLER
" E " = PLC REMOTE DISPLAY AND SETTING "QMS"
" SEM " = LIGHT SIGNALS

INSIDE THE ELECTRICAL CABINET

PLC = "QMS" CONTROLLER

" E " = PLC DISPLAY

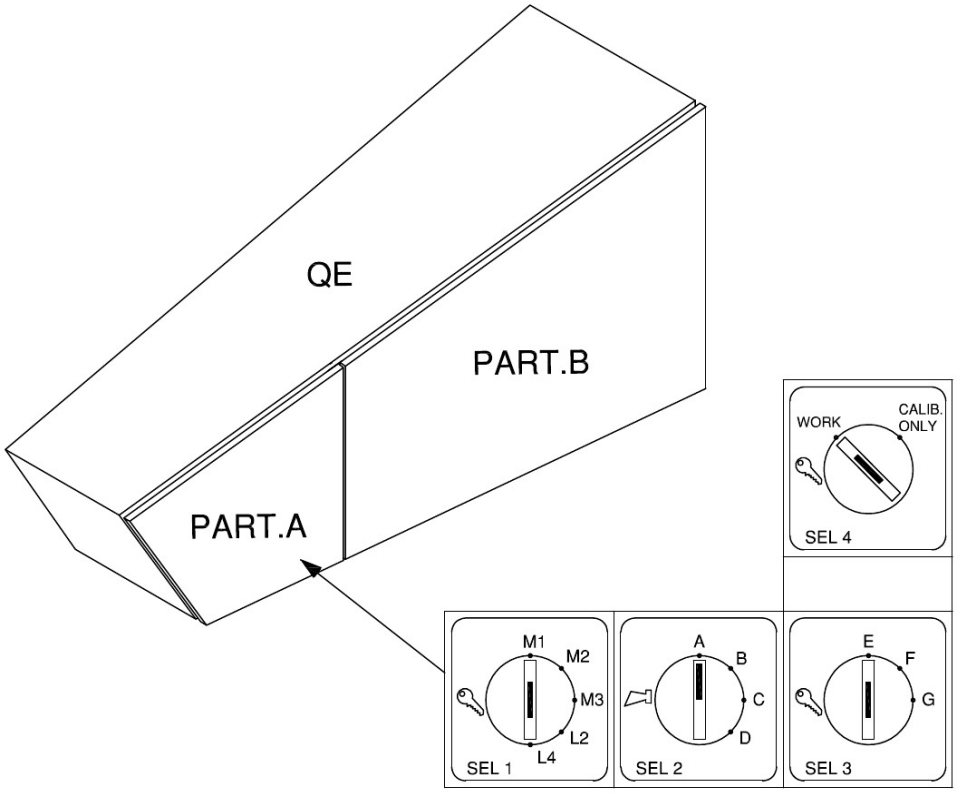


SC = "QLS" BOARD

9.1.2) OPERATION MODE SELECTORS

DANGER

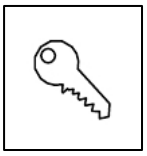
THE SELECTORS MOUNTED INSIDE THE ELECTRICAL CABINET OF THE CRANE ARE:



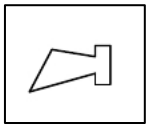
Picture 3

KEY:

" QE " = ELECTRICAL CABINET
" SEL 1" = SELECTOR
" SEL 2" = SELECTOR
" SEL 3" = SELECTOR
" SEL 4" = SELECTOR



= SYMBOL OF THE KEY SELECTOR



= SYMBOL OF THE LEVER SELECTOR

9.1.2.1) WORK/ERECTION CONFIGURATION SELECTOR (SEL 1)

- WORK/ERECTION SELECTOR : (BELOW ON THE LEFT)

THE MODE SELECTOR (SEL 1) IS A SWITCH LOCATED INSIDE THE ELECTRICAL CABINET ON THE LEFT (PART. A) USED AS THE HUMAN-MACHINE INTERFACE.

IN THE WORK CONFIGURATION THE MODE SELECTOR MUST BE POSITIONED ON **"L2"** OR **"L4"** ("WORK"): YOU HAVE THE FUNCTIONALITIES OF THE ELECTROMECHANICAL SAFETY DEVICES OF THE CRANE, WHILE IN THE ERECTION OR REMOVAL CONFIGURATION OF THE CRANE IT MUST BE POSITIONED ON **"M1"** OR **"M2"** OR **"M3"** ("ERECTION").

IT IS POSSIBLE TO CHOOSE FROM SEVERAL POSITIONS INDICATED BELOW:

1- POS.M1 : IT CORRESPONDS TO THE MAST ERECTION (MAST CYLINDER OPERATION)

2- POS.M2 : IT CORRESPONDS TO THE JIB OPENING (FIRST AND SECOND ELEMENTS)

3- POS.M3 : IT CORRESPONDS TO THE JIB OPENING (THIRD ELEMENT AND NOSES)

4- POS.L2 : IT CORRESPONDS TO WORK WITH TWO-FALL ROPE (2 ROPES)

5- POS.L4 : IT CORRESPONDS TO WORK WITH FOUR-FALL ROPE (4 ROPES)

9.1.2.2) EXTENDED JIB CONFIGURATION SELECTOR (SEL 2)

- EXTENDED JIB CONFIGURATION SELECTOR: (BELOW IN THE MIDDLE)

THE MODE SELECTOR (SEL 2) IS A SWITCH LOCATED INSIDE THE ELECTRICAL CABINET ON THE LEFT (PART. A) USED AS THE HUMAN-MACHINE INTERFACE.

IN THE WORK CONFIGURATION OF THE CRANE IT IS NECESSARY TO SPECIFY THE EXTENSION OF THE JIB THAT IS BEING USED SINCE, ACCORDING TO THIS POSITION, THE CRANE LOAD DIAGRAM (SEE PAR. 3.3.1) AND SOME SPEED CHARACTERISTICS PRESET AUTOMATICALLY MAY CHANGE.

IT IS POSSIBLE TO CHOOSE FROM SEVERAL POSITIONS INDICATED BELOW:

1- POS. A : IT CORRESPONDS TO EXTENDED HORIZONTAL JIB ONLY FOR CRANE WITH **45m** JIB

2- POS. B : IT CORRESPONDS TO **45m** JIB WITH FOLDED NOSE (OR **40m** JIB)

3- POS. C : IT CORRESPONDS TO JIB WITH THIRD ELEMENT FOLDED

4- POS. D : IT CORRESPONDS TO JIB WHOLLY FOLDED

SELECTING THE POSITION OF THE JIB CONFIGURATION SELECTOR YOU HAVE THE PROGRAMMED DECELERATIONS RELATED TO THE TROLLEY TRANSLATION MOVEMENT FOR THAT JIB ASSEMBLY (SEE ADJUSTMENT PAR 9.12 "E-TROLLEY" SYSTEM) AND THE STOP POINTS CONCERNING THE "TROLLEY FORWARDS" MOVEMENT.

9.1.2.3) JIB ASSEMBLY CONFIGURATION SELECTOR (SEL 3)

- JIB ASSEMBLY CONFIGURATION SELECTOR : (BELOW ON THE RIGHT)

THE MODE SELECTOR IS A SWITCH LOCATED INSIDE THE ELECTRICAL CABINET.

IN THE WORK CONFIGURATION OF THE CRANE IT IS NECESSARY TO SPECIFY THE ASSEMBLY OF THE JIB THAT IS BEING USED SINCE, ACCORDING TO THIS POSITION, THE CRANE LOAD DIAGRAM (SEE PAR. 3.3.1) AND SOME SPEED CHARACTERISTICS PRESET AUTOMATICALLY MAY CHANGE.

IT IS POSSIBLE TO CHOOSE FROM SEVERAL POSITIONS INDICATED BELOW:

1- POS. E : IT CORRESPONDS TO EXTENDED HORIZONTAL JIB

2- POS. F : IT CORRESPONDS TO INTERMEDIATE LUFFING JIB

3- POS. G : IT CORRESPONDS TO MAX. LUFFING JIB

SEE PAR. 3.3.1 “PROGRAMMED CONFIGURATIONS” FOR THE JIB ASSEMBLY.
SEE PAR. 3.3.2 “LOAD DIAGRAM” FOR THE PROVIDED CAPACITIES.

NOTE: IT IS VERY IMPORTANT THAT THE SELECTORS ARE CORRECTLY POSITIONED FOR THE JIB CONFIGURATION ACCORDING TO THE ASSEMBLY IN USE, IN ORDER TO OBTAIN THE CORRECT OPERATION OF THE CRANE ACCORDING TO THE PROJECT SETTINGS THAT ARE EXPRESSED THROUGH THE FUNCTIONALITY OF THE ELECTROMECHANICAL SAFETY DEVICES OF THE CRANE RELATED TO THE DIFFERENT PROGRAMS.

DANGER

DO NOT USE THE CRANE WITH THE SELECTORS IN A DIFFERENT POSITION; THIS MAY CAUSE THE FAILURE OF THE SAFETY MEASURES, WITH HIGH PROBABILITIES OF DAMAGE OR INJURY TO PROPERTY OR PEOPLE.

9.1.2.4) SELECTOR ENABLING THE “QMS” SYSTEM CALIBRATION (SEL4)

- “QMS” SYSTEM CALIBRATION SELECTOR : (ABOVE ON THE RIGHT)

THE MODE SELECTOR IS A SWITCH LOCATED INSIDE THE ELECTRICAL CABINET.

TURN THE KEY OF THE MODE SELECTOR TO "WORK" FOR THE NORMAL CRANE WORKING CONDITION (WORK PHASE) OR TURN THE KEY TO "CALIB. ONLY " FOR THE “QMS" SYSTEM SETTING (CALIBRATION PHASE).

IT IS POSSIBLE TO CHOOSE FROM SEVERAL POSITIONS INDICATED BELOW:

1- POS. WORK : IT CORRESPONDS TO THE WORK PHASE OF THE CRANE

2- POS. CALIB. ONLY: IT CORRESPONDS TO THE SETTING PHASE (CALIBRATION) OF THE “QMS” SYSTEM

SEE CHAP. 9.3 “QMS SYSTEM”, IN PARTICULAR PAR. 9.5.2 “CALIBRATION PROCEDURE”.

9.2) CHECKS AT THE BEGINNING OF EACH WORK SHIFT

DANGER

AT THE BEGINNING OF EACH WORK SHIFT IT IS NECESSARY TO CHECK THE WORKING AND CALIBRATION OF THE FOLLOWING DEVICES IN ACCORDANCE WITH THE MANUFACTURER'S PRESCRIPTIONS:

- CORRECT WORKING OF THE CONTROL DEVICE

- PERFECT EFFICIENCY AND CORRECT OPERATION OF THE "QMS" SYSTEM FOR THE LIMITATION AND CONTROL OF THE CRANE MOMENT

- PERFECT EFFICIENCY AND CORRECT OPERATION OF THE "QLS" SYSTEM FOR THE INDICATION AND LIMITATION OF THE CRANE LOAD

- HOISTING LIMIT SWITCH

- PERFECT EFFICIENCY AND CORRECT OPERATION OF THE "E-TROLLEY" SYSTEM FOR THE INDICATION AND LIMITATION OF THE TROLLEY POSITION

- SLEWING LIMIT SWITCH

- CORRECT SETTING OF THE SELECTORS IN THE ELECTRICAL CABINET (PART. A)

DO NOT USE THE CRANE IF THE “HOISTING-RISE” AND “TROLLEY-FORWARDS” MOVEMENTS ARE OPPOSITE WITH RESPECT TO THE CONTROL OPERATED; THE ELECTRO-MECHANIC SAFETY DEVICES MAY BE DISABLED.

ALSO THE SLEWING BRAKE RELEASE SYSTEM IS A SAFETY DEVICE SINCE IT PREVENTS THE TIPPING OVER OF THE CRANE WHEN IT IS OFF DUTY UNDER STORM CONDITIONS.
THEREFORE, IT IS COMPULSORY TO CHECK ALSO THE WORKING OF THE SLEWING BRAKE AT THE BEGINNING AND THE BRAKE RELEASE SYSTEM AT THE END OF EACH WORK SHIFT.

9.3) “QMS” SYSTEM (QUICK MOMENT SETTING SYSTEM): DESCRIPTION

WARNING

9.3.1) “QMS” SYSTEM : FUNCTIONS

THE "QMS" SYSTEM INSTALLED ON THIS MACHINE IS A LIMITATION AND CONTROL SYSTEM THAT ALLOWS THE MACHINE TO REMAIN, DURING THE WORK PHASE, WITHIN THE ADMITTED LOAD DIAGRAM. THE LIMITATION REGARDS THE PART RELATED TO THE DISTANCE OF THE HOISTED LOAD FROM THE SLEWING AXIS.

THE “QMS” SYSTEM ENABLES SOME OPERATIONS ON SOME MOVEMENTS OF THE CRANE AND SOME SOUND AND LIGHT WARNING SIGNALS.

THE "QMS" SYSTEM PROVIDES AN AID AND IT DOES NOT REPLACE THE CONTROL OF THE OPERATOR AND HIS RESPONSIBILITY FOR THE CORRECT USE OF THE HOISTING DEVICE.

THE OPERATOR MUST KNOW THE LOAD DIAGRAM ADMITTED FOR THE CRANE AND THE WEIGHT OF THE LOAD BEING HOISTED, REGARDLESS OF WHAT IS DETECTED OR SIGNALLED BY THE CRANE.

IN ADDITION, THE "QMS" SYSTEM ALLOWS A QUICK CONFIGURATION OF THE CRANE MOMENT LIMITATION BY ACTING ONLY ON THE DATA STORAGE WITHIN THE SYSTEM WITHOUT ANY MANUAL ADJUSTMENT WITH WRENCHES OR SCREWS.

9.3.2) “QMS” SYSTEM : FUNCTIONALITY

THE "QMS" SYSTEM IS COMPOSED OF AN ELECTRONIC PLC CONTROLLER PROGRAMMED IN THE FACTORY AND INSTALLED INSIDE THE ELECTRICAL CABINET; IT IS PROVIDED WITH A REMOTE DISPLAY, USER INTERFACE BUTTONS AND INDUCTIVE PROXIMITY SENSOR.

THE "QMS" SYSTEM, IN ORDER TO OPERATE, MUST BE CALIBRATED BY THE INSTALLER BEFORE PUTTING THE CRANE INTO SERVICE BY USING THE PROCEDURE DESCRIBED IN **PAR. 9.5**) "RATED MOMENT CALIBRATION ".

DANGER

NOTE: THE CALIBRATION SEL 2 POS A IS DIFFERENT FROM THE CALIBRATION SEL 2 POS C

REPEAT THE CALIBRATION IF YOU CHANGE FROM ONE CALIBRATION TO THE OTHER

THIS OPERATION IS PRE-PERFORMED IN THE FACTORY **(FOR EXTENDED JIB IN POS A**) AND IT MUST BE PERFORMED AGAIN IF YOU USE THE CRANE WITH JIB WITH THIRD ELEMENT FOLDED OR WITH **SEL2** SELECTOR IN POSITION **C**, OR WHEN DURING THE USE OF THE MACHINE THE LIMITATION OF THE CRANE MOMENT (LOAD HOISTED ACCORDING TO THE DISTANCE FROM THE SLEWING AXIS) IS OUTSIDE THE APPROXIMATION RANGE (SEE **PAR. 9.5.5** "CALIBRATION TEST AND CHECKS AT THE BEGINNING OF EACH WORK SHIFT").

THE "QMS" SYSTEM IS ACTIVATED WHEN THE MAXIMUM MOMENT OF THE CRANE IS EXCEEDED IN ORDER TO PREVENT ANY OVERLOAD CONDITION. IT ACTS ON THE "HOISTING-RISE" MOVEMENT AND ON THE "TROLLEY FORWARDS" MOVEMENT AS WELL AS ON THE " YELLOW LIGHT " AND "RED LIGHT" SIGNALS.

THE "**GREEN LIGHT**" INDICATES A CONDITION OF OPERATING MACHINE, READY FOR USE AND WITH SAFETY DEVICES DISABLED AT THAT MOMENT.

THE "**YELLOW LIGHT**" INDICATES A PRE-ALARM CONDITION: THE MOMENT OF THE CRANE IS EXCEEDED BY ABOUT 90% OF THE RATED CAPACITY (SEE THE LOAD DIAGRAM OF THE CRANE) OR BY ABOUT 90% OF THE MAXIMUM CAPACITY OF THE CRANE (SEE PAR. 5.10 “TEST LOADS”). THE YELLOW LIGHT IS ONLY A SIGNAL AND DOES NOT ACT ON THE MANOEUVRES ACTUATED BY THE OPERATOR.

THE "**RED LIGHT**" INDICATES AN ALARM CONDITION RESULTING FROM THE EXCEEDING OF THE MAXIMUM MOMENT OF THE CRANE (SEE FROM PAR. 3.3.2.1 TO PAR. 3.3.2.4 “LOAD DIAGRAM”)) OR OF THE MAXIMUM CAPACITY OF THE CRANE (SEE PAR. 5.10 “TEST LOADS”). THE RED LIGHT CORRESPONDS TO THE LOCK OF THE "HOISTING-RISE" MOVEMENT AND "TROLLEY FORWARDS" MOVEMENT IN ADDITION TO THE SOUND ALARM SIGNAL.

TO ENSURE THAT THE MACHINE REMAINS IN SAFETY CONDITIONS, THE OVERLOAD MUST BE REMOVED WITH THE "TROLLEY-BACKWARDS" OR "HOISTING-DESCENT" MOVEMENT WITH THE RESULTING EXIT FROM THE ALARM CONDITION.

9.4) “QMS” SYSTEM CONFIGURATION

THE PLC CONTROLLER HAS BEEN PROGRAMMED IN THE FACTORY AND IT IS NOT NECESSARY TO CONFIGURE OR ENTER ANY PARAMETER IN THE PLC (THEREFORE DO NOT TRY TO CHANGE ANY), EXCEPT FOR THE CALIBRATION VALUE.

THE PLC PROGRAMMING MUST NOT BE CHANGED EXCEPT FOR PRIOR SPECIFIC AUTHORIZATION BY GRU DALBE srl.

OTHERWISE, THE GUARANTEE WILL BE VOID DUE TO TAMPERING.

CAUTION : ANY CHANGE MAY CAUSE DANGER OF INJURY TO PROPERTY / PEOPLE

9.5) RATED MOMENT CALIBRATION

WARNING

CALIBRATION MUST BE CARRIED OUT BY SKILLED AND COMPETENT TECHNICAL PERSONNEL.

NOTE 1 : NEVER INTERRUPT THE POWER SUPPLY DURING THE CALIBRATION PHASE IN ORDER TO AVOID DATA LOSS.

NOTE 2: THE LOAD, DURING THE CALIBRATION PHASE, MUST BE ABSOLUTELY STEADY (OSCILLATION IS NOT ALLOWED), AND THE STRUCTURE OF THE CRANE MUST NOT SUFFER ANY DYNAMIC OSCILLATIONS DUE TO THE PREVIOUS MOVEMENTS PERFORMED FOR THE POSITIONING OR HOISTING OF THE LOAD FOR CALIBRATION OPERATIONS.

CALIBRATION MUST BE CHECKED BY THE INSTALLER EVERY TIME THE CRANE IS PUT INTO SERVICE DURING THE ADJUSTMENT PHASE OF THE SAFETY DEVICES.

9.5.1) RATED LOAD POSITION

IT IS NECESSARY TO POSITION THE EXACT RATED LOAD (**PN**) THE CRANE CAN HOIST AT THE MAXIMUM DISTANCE FROM THE SLEWING AXIS AND CHECK THE MASS EXPRESSED IN Kg (PAR. 5.10 "TEST LOADS").

RATED LOAD " **PN** " = **RATED LOAD ON THE JIB NOSE**

9.5.2) CALIBRATION PROCEDURE

WARNING

NOTE: SINCE THIS OPERATION MUST BE PERFORMED WITH THE ELECTRICAL CABINET OPEN (**PART. A**), BE CAREFUL NOT TO TOUCH ANY BARE WIRES OR OTHER PARTS WHICH MAY TRANSMIT CURRENT. WEAR INSULATING SHOES AND GLOVES AS WELL AS ANY PERSONAL PROTECTIVE EQUIPMENT USEFUL TO PREVENT THE RISK OF ELECTRIC SHOCKS.

CARRY OUT THE FOLLOWING OPERATIONS:

- TURN ON THE CRANE USING THE MAIN SWITCH AND START THE RUN

- MAKE SURE THAT THE PLC IS PROPERLY ON AND THAT IT DISPLAYS THE HOME SCREEN

- PLACE THE TROLLEY IN LIMIT STOP POSITION ON THE JIB NOSE TRYING NOT TO KNOCK AGAINST THE BUMPERS THAT DELIMIT THE FORWARD MOVEMENT OF THE TROLLEY, IN THIS CASE ADJUST THE TROLLEY LIMIT SWITCH AGAIN.

IT IS NOT ALLOWED TO HOIST LOADS OTHER THAN THOSE PROVIDED FOR IN THE CALIBRATION PHASE OR IN POSITIONS THAT ARE NOT ADMITTED BY THE LOAD DIAGRAM OF THE CRANE. THE CALIBRATION PROCEDURE IS NOT A WORK CONFIGURATION OF THE CRANE, THEREFORE IT ENDS WITH THE ADJUSTMENT OF THE SAFETY DEVICES OF THE MACHINE.

NOTE: WARNING! CALIBRATION SHOULD BE PERFORMED ACCURATELY BECAUSE IT AFFECTS SAFETY!

WARNING

WARNING: IF CALIBRATION DOES NOT CORRESPOND TO THE ACTUAL MASS OF THE REFERENCE LOAD, YOU MAY CAUSE SITUATIONS OF SERIOUS DANGER FOR DAMAGES TO PEOPLE OR PROPERTY.

THE CALIBRATION OF THE SYSTEM MUST BE SHOWN ON THE PAGE OF THE CHECK RECORD INHERENT TO THE INSTALLATION OF THE CRANE AS REGARDS THE ADJUSTMENT OF THE SAFETY DEVICES, WITH THE DATE AND SIGNATURE OF THE ERECTION OPERATOR OR THE PERSON WHO HAS CARRIED OUT THIS PROCEDURE.

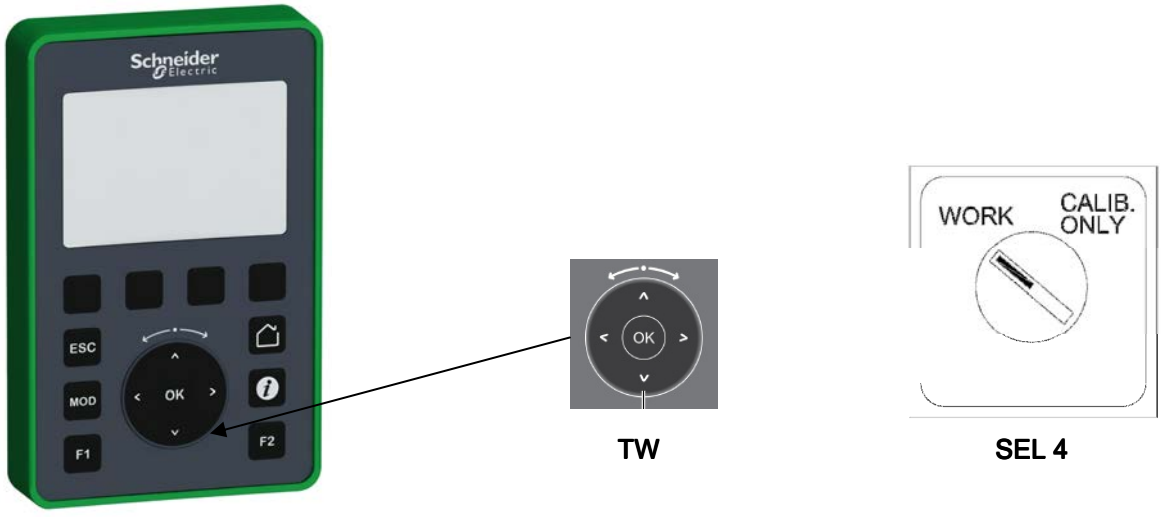
SINCE IT IS A PROCEDURE PROTECTED BY PASSWORD, CALIBRATION CAN BE CONSIDERED OF SECOND LEVEL AND THE RESPONSIBLE PERSON ASSUMES THE RESPONSIBILITY FOR SUCH A DECLARATION.

9.5.3) SYSTEM CALIBRATION

WARNING

HOIST THE RATED LOAD "**PN**" OF WHICH YOU KNOW EXACTLY THE MASS (AS SHOWN IN PAR. 9.5.1 “RATED LOAD POSITION” AND STOP THE MANOEUVRE AT ABOUT **50 cm** FROM THE GROUND AND THEN WAIT FOR THE STRUCTURE OSCILLATIONS TO STOP AND THAT THE LOAD IS STEADY.

IDENTIFY THE PLC REMOTE DISPLAY AND THE KEY MODE SELECTOR (**SEL 4**) INSIDE THE ELECTRICAL CABINET OF THE CRANE (**PART. A**) (SEE **Picture 3**):



E **TW** **SEL 4**

Picture 4

KEY:

“ E ” = PLC REMOTE DISPLAY AND SETTING “QMS”
“ TW ” = TOUCH WHEEL (SENSOR DISC)
“ SEL ” = KEY MODE SELECTOR FOR CALIBRATION

MAKE SURE YOU ARE IN THE HOME PAGE:
(INITIAL SCREEN) :

	Home		22/01/2019 14:21:50
Setup Operator Interface			
Select	Alarm		

Picture 5

USING THE TOUCH WHEEL (SENSOR DISC, SEE PICTURE 6) AND PRESSING THE FINGER CLOCKWISE OR COUNTERCLOCKWISE OR PRESSING THE KEYS WITH THE SYMBOLS [^] [v] SELECT THE SECOND LINE: “Operator Interface” AND PRESS THE CENTRAL BUTTON “OK” ONCE.

Picture 6

THE DISPLAY SHOWS:

	DALBE		22/01/2019 14:21:51
1-MONITORING 2-CALIBRATION 3-CONFIG 4-PLC STATUS 5_TAC			
Select	Alarm		

Picture 7

SELECT THE SECOND LINE “ 2-CALIBRATION ” BY PRESSING THE KEY [v] ONCE AND PRESS THE CENTRAL BUTTON “OK” ONCE.

THE DISPLAY SHOWS:

	Password		22/01/2019 14:21:53
0 0 0 0			
Valid			Cancel

Picture 8

SELECT THE PASSWORD SAFETY CODE **" 3 1 3 4 "** BY USING THE TOUCH WHEEL OR PRESSING THE KEYS WITH SYMBOLS [<] [^] [>] [v] MAKING SURE THAT THE PASSWORD IS NOT SEEN OR WRITTEN DOWN BY PEOPLE NOT AUTHORIZED FOR THE CALIBRATION PROCEDURE.

THE DISPLAY SHOWS:

	Password		22/01/2019 14:21:53
3 1 3 4			
Valid			Cancel

Picture 9

PRESS THE CENTRAL BUTTON "OK" TO CONFIRM THE PASSWORD SELECTION. THE DISPLAY SHOWS:

	CALIBRATION		22/01/2019 14:21:54
2a_MOMENT CALIBRATION			
Select	Alarm		ESC

Picture 10

SELECT THE MENU : 2a_MOMENT CALIBRATION, BY PRESSING THE CENTRAL BUTTON "OK", THE DISPLAY SHOWS A NUMBER THAT CORRESPONDS TO THE PREVIOUS CALIBRATION.

Alarm	PROXIMITY CALIB.	22/01/2019 14:21:56
	301	
	mom	
Min = 0		Max = 1000
	Alarm	CALIB ESC

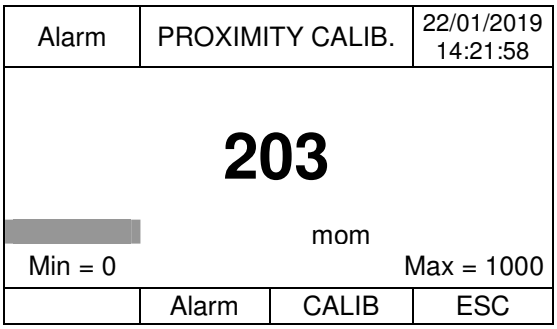
Picture 11

IDENTIFY THE "CALIBRATION KEY SELECTOR (**SEL 4**) OF THE QMS SYSTEM" THAT REPRESENTS THE SECOND PROTECTION LEVEL FOR THE CALIBRATION PHASE, NORMALLY POSITIONED ON "WORK" FOR THE CRANE WORK PHASE:

Picture 12

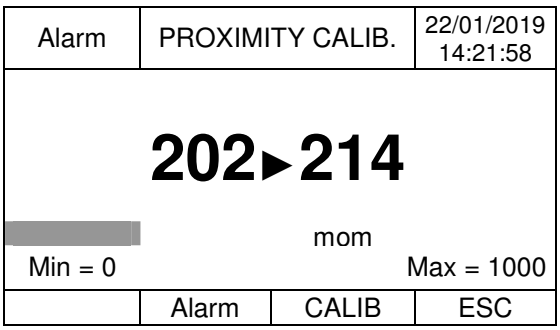
TURN THE KEY CLOCKWISE TO POSITION “CALIB. ONLY”

Picture 13



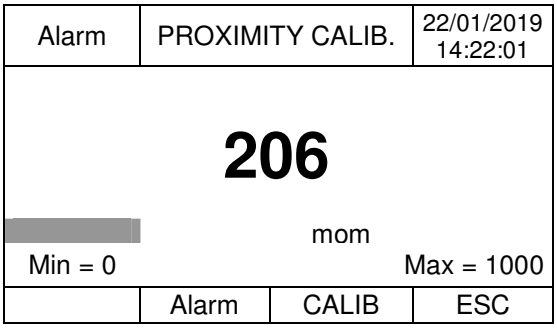
Picture 14

PHASE 1 : PRESS ONCE **THE KEY UNDER "CALIB"** ON THE SCREEN OF PICTURE **14**; ON THE DISPLAY THE CENTRAL NUMBER BEGINS TO OSCILLATE AROUND A REFERENCE NUMBER, FOR EXAMPLE YOU MAY READ THE NUMBERS BETWEEN 202 AND 214 THAT CONTINUE TO OSCILLATE.
THE DISPLAY SHOWS A NUMBER THAT VARIES *BY* **SOME UNITS** WITHOUT REMAINING FIXED:



Picture 15

PHASE 2 : MAKE SURE THAT THE LOAD IS STEADY AND THAT THE STRUCTURE OF THE CRANE IS NOT OSCILLATING FOR ANY REASON AND PRESS AGAIN **THE KEY UNDER "CALIB".** THE DISPLAY SHOWS A **FIXED NUMBE**R. THIS OPERATION STORES THE VALUE OF THE RATED MOMENT WITHIN THE SYSTEM.



Picture 16

9.5.4) EXIT FROM THE CALIBRATION PROCEDURE

TURN THE MODE SELECTOR **(SEL 4)** FOR THE CALIBRATION OF THE QMS SYSTEM TO **" WORK "** THAT CORRESPONDS TO THE NORMAL POSITION FOR THE WORK PHASE OF THE CRANE.

Picture 17

LOWER THE LOAD IN FIRST SPEED AND PLACE IT ON THE GROUND IN SAFETY POSITION.

TURN OFF THE CRANE COMPLETELY AND WAIT APPROXIMATELY 1 MINUTE.

TURN ON THE CRANE AGAIN AND START IT, WAIT THE NECESSARY TIME FOR THE VARIOUS CHECKS OF THE SENSORS THE ELECTRONIC BOARD CARRIES OUT AUTOMATICALLY AND CHECK THE CORRECT OPERATION OF THE VARIOUS MOVEMENTS OF THE CRANE.

9.5.5) CALIBRATION TEST AND CHECKS AT THE BEGINNING OF EACH WORK SHIFT

WARNING

CAREFULLY BRING THE SYSTEM TO ALARM CONDITION AND CHECK THAT THE MAXIMUM MOMENT ALARM IS ENABLED.

CHECK WITH FREQUENT MOVEMENTS OF “TROLLEY FORWARDS” AND “HOISTING RISE” THE CORRECT ACTIVATION OF THE SYSTEM IN CASE AN ATTEMPT IS MADE TO EXCEED THE RATED MOMENT OF THE CRANE.

IT IS POSSIBLE TO USE THE CAPACITY PLATES POSITIONED ON THE JIB FOR A FIRST APPROXIMATE CHECK OF THE QMS LIMITATION SYSTEM INTERVENTION.

TEST THE CALIBRATION HOISTING A LOAD OF KNOWN MASS AND ENSURE THAT THE "TROLLEY FORWARDS" MOVEMENT IS STOPPED AT THE EXACT DISTANCE FROM THE CRANE SLEWING AXIS AND WITH THE RATED LOAD ADMITTED FOR THAT DISTANCE.
THE MAXIMUM ERROR ON THE LIMITATION OF THE "TROLLEY FORWARDS" MOVEMENT MUST BE LOWER THAN **2,5%** OF THE DISTANCE VALUE.
SEE THE LOAD DIAGRAM OF THE CRANE (SEE FROM PAR 3.3.2.1 TO PAR. 3.3.2.4).

IN ADDITION, TEST THE CALIBRATION HOISTING A LOAD OF KNOWN MASS AND ENSURE THAT THE "HOISTING RISE" MOVEMENT IS STOPPED FOR THE LOAD HOISTED, INCREASED BY **5%** AND PLACED AT THE EXACT DISTANCE FROM THE SLEWING AXIS.
SEE THE LOAD DIAGRAM OF THE CRANE (SEE FROM PAR 3.3.2.1 TO PAR. 3.3.2.4).

9.5.6) NOTES ON CALIBRATION

THE ACQUISITION OF THE CALIBRATION VALUE IS CARRIED OUT BY DOUBLE PASSWORD AUTHENTICATION. IT IS POSSIBLE TO CHECK BEFORE **PHASE** 2 IF THIS PROCESS IS SUCCESSFUL BY PRESSING ONCE THE BUTTON UNDER "Alarm" IN THE SCREEN OF PICTURE **14**.
THE DISPLAY SHOWS:

	Alarm View		22/01/2019 14:22:00
ALL2 90% Moment Calibration ON Key ON			
History			Back

Picture 18

THE SECOND LINE "Calibration ON" CONFIRMS THAT THE KEY UNDER "CALIB" HAS BEEN PRESSED **ONCE** AND THAT THE VALUE ACQUISITION PHASE IS READY.
IF THE KEY HAS NOT BEEN PRESSED, THE SECOND LINE WILL NOT BE DISPLAYED.

THE THIRD LINE "Key ON" CONFIRMS THAT THE KEY OF THE MODE SELECTOR HAS BEEN CORRECTLY TURNED TO THE POSITION ADMITTED FOR THE CALIBRATION PHASE.
IF THE SELECTOR IS NOT IN THE CORRECT POSITION, THE THIRD LINE WILL NOT BE DISPLAYED.

FOR THE MEANING OF THE FIRST LINE SEE PAR. 9.5.7).
AT THE END OF THE CHECK PRESS THE BUTTON UNDER "**Back**" ONCE.
IF THE PASSWORD CODE IS ENTERED INCORRECTLY, THE SYSTEM WILL SHOW "**Incorrect Password**"

9.5.7) DISPLAYS

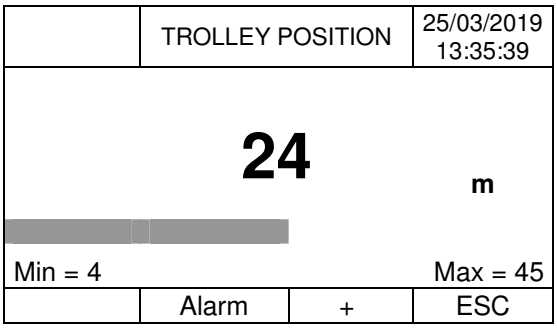
WARNING

NORMALLY THE DISPLAY SHOWS THE HOME PAGE.
SOME USEFUL INFORMATION CAN BE DISPLAYED.
SELECTING THE ACCESS TO THE PAGE **1-MONITORING,** THE DISPLAY SHOWS:

Alarm	MONITORING		25/03/2019 13:35:36
1a-TROLLEY POSITION+(Bargraph) 1b-MOMENT VALUE + (Bargraph) 1c-LEVEL SENSOR 1d-ALARM STATUS			
Select	Alarm	+	ESC

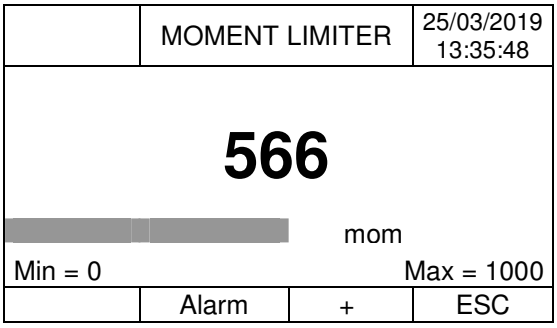
Picture 19

SELECTING THE FIRST LINE **1a-TROLLEY POSITION** AND PRESSING OK IN THE TOUCH WHEEL YOU OBTAIN THE INFORMATION OF THE APPROXIMATE POSITION OF THE TROLLEY EXPRESSED IN METERS [m]; THE DISPLAY SHOWS:



Picture 20

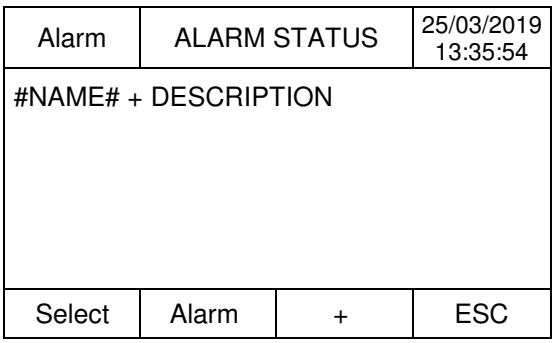
SELECTING THE SECOND LINE **1b-MOMENT VALUE** AND PRESSING OK IN THE TOUCH WHEEL YOU OBTAIN THE INFORMATION OF THE VALUE OF THE CRANE MOMENT EXPRESSED IN POINTS; THE DISPLAY SHOWS:



Picture 21

SELECTING THE THIRD LINE **1c-LEVEL SENSOR** AND PRESSING OK IN THE TOUCH WHEEL YOU OBTAIN THE INFORMATION ABOUT THE STATUS OF THE CRANE LEVEL SENSOR (IF PRESENT); IF THE CRANE REMAINS AT LEVEL WITHIN THE RANGE SET, THE DISPLAY SHOWS THE WORD "**OK**".

SELECTING THE FOURTH LINE **1d-ALARM STATUS** AND PRESSING OK IN THE TOUCH WHEEL YOU OBTAIN THE INFORMATION ABOUT THE PRESENCE OF ANY SYSTEM ALARM; THE DISPLAY SHOWS:



Picture 22

#NAME# + DESCRIPTION CORRESPONDS TO AN ALARM MESSAGE (OPTIONAL)

THE POSSIBLE ALARM OR ERROR MESSAGES THAT MAY BE VIEWED BY THE REMOTE DISPLAY OF THE ELECTRONIC PLC ARE:

ALL1 Max Moment : THE MAXIMUM MOMENT OF THE CRANE HAS BEEN EXCEEDED

POSSIBLE SOLUTION: LOWER THE LOAD TO RESET THE ALARM CONDITION AND HOIST THE LOAD AGAIN IF ADMITTED.
MOVE THE LOAD BACKWARDS UNTIL THE RED LIGHT IS OFF, WHICH MEANS THAT THE ALARM CONDITION IS RESET.

ALL2 90% Moment : THE MAX MOMENT THRESHOLD OF THE CRANE HAS BEEN EXCEEDED (90%)

POSSIBLE SOLUTION: LOWER THE LOAD TO RESET THE PRE-ALARM CONDITION AND HOIST THE LOAD AGAIN IF ADMITTED.
MOVE THE LOAD BACKWARDS UNTIL THE YELLOW LIGHT IS OFF, WHICH MEANS THAT THE PRE-ALARM CONDITION IS RESET.

Err1 Too Far Prox : PROXIMITY SENSOR TOO FAR FROM THE METAL PART

POSSIBLE SOLUTION: CHECK THE ELECTRICAL CONNECTIONS OF THE PROXIMITY SENSOR.
VERIFY THAT THERE ARE NO OBJECTS IN THE MOMENT READING DEVICE THAT MAY PREVENT THE CORRECT OPERATION OF THE SENSOR.
IF THE JIB IS CLOSED, TURN THE MODE SELECTOR FOR THE JIB ASSEMBLY TO "**D" FOLDED JIB POSITION.**

Err2 Too Close Prox : PROXIMITY SENSOR TOO CLOSE TO THE METAL PART

POSSIBLE SOLUTION: CHECK THE ELECTRICAL CONNECTIONS OF THE PROXIMITY SENSOR.
VERIFY THAT THERE ARE NO OBJECTS IN THE MOMENT READING DEVICE THAT MAY PREVENT THE CORRECT OPERATION OF THE SENSOR.

.

9.5.8) SYSTEM PRECAUTIONS

ADOPT A SERIES OF PRECAUTIONS PERTAINING TO THE SYSTEM.
DISCONNECT THE POWER SUPPLY OF THE DEVICE BEFORE ANY WIRING OPERATION OR REPLACEMENT.

TAKE THE UTMOST CARE OF THE WIRING CABLES OF THE PROXIMITY SENSOR, CHECKING IF THE CABLE IS PERFECTLY SOUND, NOT DAMAGED OR BENT OR WITH DETERIORATION SIGNS IN THE EXTERNAL PROTECTION SHEATH.
DO NOT HIT THE SENSOR WITH WATER JETS OR DEGREASING LIQUID UNDER PRESSURE.

MAKE SURE THAT NOBODY TAMPERS WITH THE SOFTWARE OF THE ELECTRONIC PLC, THUS CHANGING THE INNER PROGRAM OR THE CORRECT ADJUSTMENT OF PARAMETERS.

MAKE SURE THAT NOBODY HAS ACCESS TO THE PASSWORD (TO BE FOUND ONLY IN THIS MANUAL), TO THE REMOTE DISPLAY OR TO THE SENSOR IF NOT EXPRESSLY AUTHORIZED.

9.6) “QLS” QUICK LOAD LIMITERS SETTING SYSTEM: DESCRIPTION

WARNING

THE "QLS" SYSTEM INSTALLED ON THIS MACHINE IS A LIMITATION AND INDICATION SYSTEM THAT ALLOWS THE USER TO ELECTRONICALLY CONTROL SOME MOVEMENTS OF THE CRANE AND PRODUCE WARNING SIGNALS.

THE "QLS" SYSTEM PROVIDES A PURE INDICATION OF THE MASS THAT IS MANAGED AS A PARAMETER WITHIN THE SYSTEM, THEREFORE IT DOES NOT REPLACE THE CONTROL OF THE OPERATOR AND HIS RESPONSIBILITY FOR THE CORRECT USE OF THE HOISTING DEVICE.
THEREFORE, IT IS NOT POSSIBLE TO USE THE "QLS" SYSTEM INFORMATION AS A WEIGHT REFERENCE; IN FACT, THE OPERATOR MUST KNOW THE LOAD REGARDLESS OF WHAT IS SIGNALLED BY THE CRANE.

IN ADDITION, THE "QLS" SYSTEM ALLOWS A QUICK CONFIGURATION OF THE LOAD LIMITATION BY ACTING ONLY ON THE DATA STORAGE WITHIN THE ELECTRONIC BOARD WITHOUT ANY MANUAL ADJUSTMENT WITH WRENCHES OR SCREWS.

9.7) “QLS” SYSTEM: FUNCTIONALITY

THE "QLS" SYSTEM IS COMPOSED OF AN ELECTRONIC BOARD INSTALLED INSIDE THE ELECTRICAL CABINET AND PROVIDED WITH A DISPLAY AND USER INTERFACE BUTTONS, A STRAIN TRANSDUCER (LOAD CELL) AND OPERATION MODE SELECTORS.

THE "QLS" SYSTEM, IN ORDER TO CORRECTLY OPERATE, MUST BE CALIBRATED BY THE INSTALLER BEFORE PUTTING THE CRANE INTO SERVICE BY USING THE PROCEDURE DESCRIBED IN PAR. 9.9) "LOAD TRANSDUCER CALIBRATION ".

THIS OPERATION IS PRE-PERFORMED IN THE FACTORY AND MUST BE CARRIED OUT AGAIN IF, DURING A CHECK, THE VALUES OF THE HOISTED LOAD SHOULD RESULT TO BE OUTSIDE THE APPROXIMATION RANGE (SEE PAR. 9.10 " “QLS” SYSTEM: CHECKS AT THE BEGINNING OF EACH WORK SHIFT").
THE "QLS" SYSTEM IS ACTIVATED WHEN THE SET-POINT OF THE LOAD IS EXCEEDED.
IT ACTS ON THE "HOISTING-RISE" MOVEMENT AND ON THE "TROLLEY FORWARDS" MOVEMENT AS WELL AS ON THE DISPLAY SIGNALS " YELLOW LIGHT " AND "RED LIGHT".

THE "QLS" SYSTEM INTERRUPTS THE "HOISTING-RISE" MOVEMENT AND THE "TROLLEY FORWARDS" MOVEMENT IF YOU ARE TRYING TO MOVE A LOAD EXCEEDING THE RATED CAPACITY OF THE CRANE; IT ALSO ACTS ON THE SELECTION OF THE MAXIMUM SPEEDS ALLOWED ACCORDING TO THE LOAD BY ENABLING THE ACTIVATION OF THE CONTROLS OF THE VARIOUS HOISTING SPEEDS.

THE "GREEN LIGHT" INDICATES A CONDITION OF OPERATING MACHINE, READY FOR USE AND WITH SAFETY DEVICES DISABLED AT THAT MOMENT.

THE "YELLOW LIGHT" INDICATES A PRE-ALARM CONDITION: THE MOMENT OF THE CRANE IS EXCEEDED BY ABOUT 90% OF THE RATED CAPACITY (SEE “LOAD DIAGRAM”) OR BY ABOUT 90% OF THE MAXIMUM CAPACITY OF THE CRANE (SEE PAR. 5.10 “TEST LOADS”). THE YELLOW LIGHT IS ONLY A SIGNAL AND DOES NOT ACT ON THE MANOEUVRES ACTUATED BY THE OPERATOR.

THE "**RED LIGHT**" INDICATES AN ALARM CONDITION RESULTING FROM THE EXCEEDING OF THE MOMENT OF THE RATED CAPACITY (SEE " LOAD DIAGRAM") OR OF THE MAXIMUM CAPACITY OF THE CRANE (REF. PAR. 5.10 "TEST LOADS). THE RED LIGHT CORRESPONDS TO THE LOCK OF THE "HOISTING-RISE" MOVEMENT AND "TROLLEY FORWARDS" MOVEMENT IN ADDITION TO THE SOUND ALARM SIGNAL.

9.8) CONFIGURATION OF THE "QLS" SYSTEM ELECTRONIC BOARD

IT ACTS ON THE "HOISTING-RISE" AND "TROLLEY FORWARDS" MOVEMENTS.

IT IS NOT NECESSARY TO CONFIGURE OR ENTER ANY PARAMETER IN THE ELECTRONIC BOARD (THEREFORE DO NOT TRY TO CHANGE ANY), EXCEPT FOR THE CALIBRATION VALUES.

THE ELECTRONIC BOARD HAS BEEN PRE-CONFIGURED IN THE FACTORY AS REGARDS THE LOAD PARAMETERS FOR THE DIFFERENT ASSEMBLIES OF THE CRANE AND THE DIFFERENT WORKING PROGRAMS.

DANGER

THE BOARD PROGRAMMING MUST NOT BE CHANGED EXCEPT WITH PRIOR SPECIFIC AUTHORIZATION BY GRU DALBE srl.

OTHERWISE, THE GUARANTEE WILL BE VOID DUE TO TAMPERING

CAUTION : ANY CHANGE MAY CAUSE DANGER OF INJURY TO PROPERTY / PEOPLE

9.9) LOAD TRANSDUCER CALIBRATION

WARNING

NOTE 1 : NEVER INTERRUPT THE POWER SUPPLY DURING THE CALIBRATION PHASE IN ORDER TO AVOID DATA LOSS.
NOTE 2 : WHEN THE BOARD IS SWITCHED ON, A CHECK OF A FEW SECONDS IS CARRIED OUT. WAIT FOR AT LEAST 40 SEC. BEFORE PERFORMING THE CALIBRATION.

NOTE 3 : POSITION THE CRANE WITH TWO-FALL ROPE OR USING ONLY THE MAIN BLOCK AND CARRYING OUT THE LOAD HOISTING WITH TWO BEARING ROPES.

TURN THE MODE SELECTOR **SEL 1** TO " **L2** " AND MAKE SURE THAT THE CRANE IS POSITIONED WITH TWO-FALL ROPE .

THE CALIBRATION OF THE TRANSDUCER MUST BE CHECKED BY THE INSTALLER EVERY TIME THE CRANE IS PUT INTO SERVICE DURING THE ADJUSTMENT PHASE OF THE SAFETY DEVICES.

9.9.1) REFERENCE LOAD PREPARATION

IT IS NECESSARY TO PREPARE A KNOWN REFERENCE LOAD (**Pref**.) OF WHICH YOU KNOW EXACTLY THE MASS EXPRESSED IN KILOGRAMS AND POSSIBLY CLOSE TO THE MAXIMUM CAPACITY OF THE CRANE (PAR. 5.10 "TEST LOADS") AND IN ANY CASE GREATER THAN 50% OF THIS MAXIMUM CAPACITY.

REFERENCE LOAD " **Pref**" >= 50% "Pmax"

CRANE VERSION R	CRANE VERSION V	CRANE VERSION T
Pref > = 1100 Kg	**Pref > = 1250 Kg**	**Pref > = 2100 Kg**

9.9.2) CALIBRATION PROCEDURE

WARNING

NOTE: SINCE THIS OPERATION MUST BE PERFORMED WITH THE ELECTRICAL CABINET OPEN **(PART. A)**, BE CAREFUL NOT TO TOUCH ANY BARE WIRES OR OTHER PARTS WHICH MAY TRANSMIT CURRENT. WEAR INSULATING SHOES AND GLOVES AS WELL AS ANY PERSONAL PROTECTIVE EQUIPMENT USEFUL TO PREVENT THE RISK OF ELECTRIC SHOCKS.

CARRY OUT THE FOLLOWING OPERATIONS:

- TURN ON THE CRANE USING THE MAIN SWITCH AND START THE RUN

- MAKE SURE THAT THE BOARD IS PROPERLY ON AND THAT IT DISPLAYS THE HOME SCREEN WITH A NUMBER THAT CORRESPONDS TO THE CURRENT READING OF THE LOAD HANGING ON THE HOOK.

- PLACE THE TROLLEY IN A POSITION BETWEEN THE POINT OF "LIMIT SWITCH BACKWARDS" (NEAR THE MAST) AND THE POINT WHERE THE PLATE REFERRING TO THE MAXIMUM CAPACITY OF THE CRANE IS LOCATED AND MOVE THE HOOK TO "RISE LIMIT SWITCH" POSITION.

IT IS NOT ALLOWED TO LIFT LOADS OTHER THAN THOSE PROVIDED FOR IN THE CALIBRATION PHASE OR IN POSITIONS THAT ARE NOT ADMITTED BY THE LOAD DIAGRAM OF THE CRANE. THE CALIBRATION PROCEDURE IS NOT A WORK CONFIGURATION OF THE CRANE, THEREFORE IT ENDS WITH THE ADJUSTMENT OF THE SAFETY DEVICES OF THE MACHINE.

NOTE: WARNING! CALIBRATION SHOULD BE PERFORMED ACCURATELY BECAUSE IT AFFECTS SAFETY!

THE CALIBRATION OF THE SYSTEM MUST BE SHOWN ON THE PAGE OF THE CHECK RECORD INHERENT TO THE INSTALLATION OF THE CRANE AS REGARDS THE ADJUSTMENT OF THE SAFETY DEVICES, WITH THE DATE AND SIGNATURE OF THE ERECTION OPERATOR OR THE PERSON WHO HAS CARRIED OUT THIS PROCEDURE.

SINCE IT IS A PROCEDURE PROTECTED BY PASSWORD, CALIBRATION CAN BE CONSIDERED OF SECOND LEVEL AND THE RESPONSIBLE PERSON ASSUMES THE RESPONSIBILITY FOR SUCH A DECLARATION.

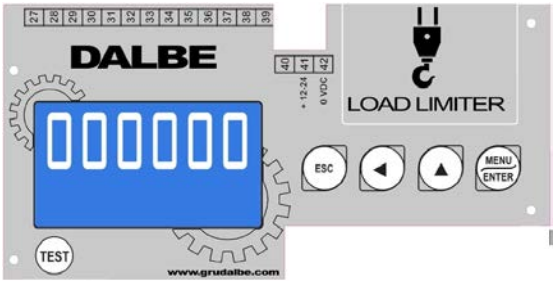
WARNING: IF CALIBRATION DOES NOT CORRESPOND TO THE ACTUAL MASS OF THE REFERENCE LOAD, YOU MAY CAUSE SITUATIONS OF SERIOUS DANGER FOR DAMAGES TO PEOPLE OR PROPERTY.

9.9.3) TRANSDUCER ZERO

WARNING

MAKE SURE THAT NO LOAD OR CHAIN OR OTHER SLING DEVICE IS HUNG ON THE HOOK.
PLACE THE HOOK IN RISE LIMIT STOP POSITION.

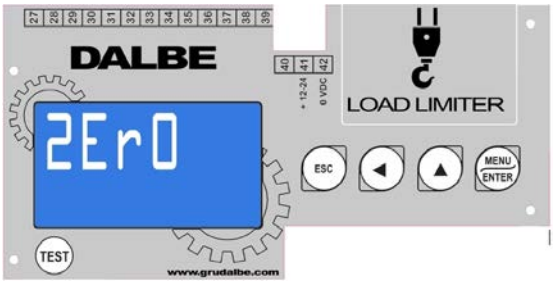
THE DISPLAY OF THE ELECTRONIC BOARD SHOWS A NUMBER, FOR EX:



Picture 23

PRESS THE BUTTON  FOR THREE SECONDS.

THE DISPLAY SHOWS:



Picture 24

CONFIRM THE SELECTION BY PRESSING THE  BUTTON

THE SCREEN DISPLAYS THE WEIGHT VALUE TO BE SET TO ZERO, IN THIS PHASE ALL LEDs ARE BLINKING.

BY CONFIRMING AGAIN, THE WEIGHT IS SET TO ZERO.

PRESS THE BUTTON ONCE 

THE ZERO VALUE IS SAVED PERMANENTLY.

9.9.4) TRANSDUCER REFERENCE LOAD

WARNING

LIFT THE REFERENCE LOAD "Pref" OF WHICH YOU KNOW EXACTLY THE MASS AND STOP THE MANOEUVRE AT ABOUT 50 cm FROM THE GROUND AND THEN WAIT FOR THE OSCILLATIONS TO STOP AND THAT THE LOAD IS STEADY.

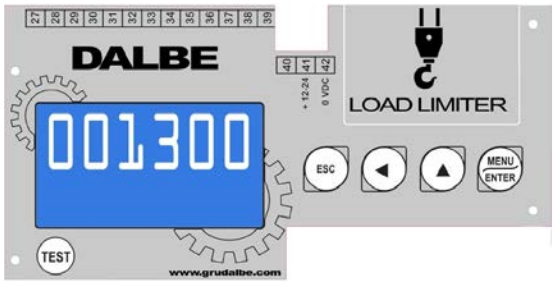
THE DISPLAYED VALUE SHOULD CORRESPOND TO THE REFERENCE LOAD VALUE ROUNDED UP TO 20 KG AND INCREASED BY THE WEIGHT OF THE SLING ACCESSORIES IF PRESENT, FOR EXAMPLE CHAINS OR HOOKS.

LOAD TO DECLARE = REFERENCE LOAD + ACCESSORIES + + 20 Kg (ROUNDING UP)

EXAMPLE: WITH A KNOWN LOAD OF 1300 Kg AND CHAINS WITH IRON LINKS OF 10 Kg

```
Kg   1300 +   ( Pref = REFERENCE LOAD )
Kg     10 +   ( ACCESSORIES )
Kg     20 =   (ROUNDING UP )
---------------
Kg   1330     ( LOAD TO DECLARE )
```

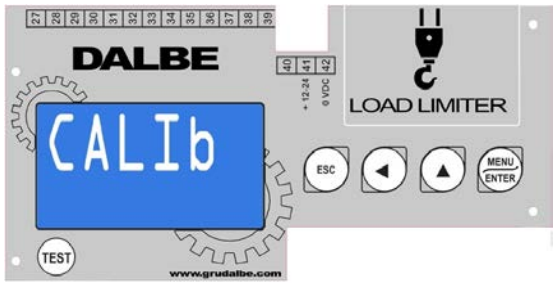
EXAMPLE: THE SCREEN OF THE ELECTRONIC BOARD DISPLAYS A NUMBER:



Picture 25

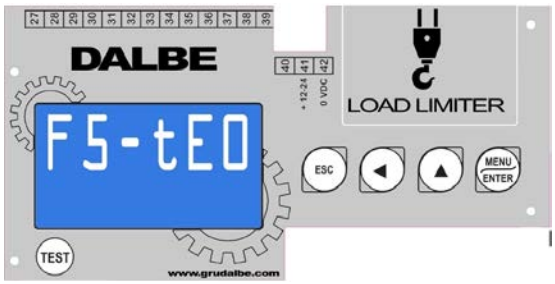
PRESS THE BUTTON  AND KEEPING IT PRESSED, PRESS THE  BUTTON

THE SCREEN DISPLAYS:



Picture 26

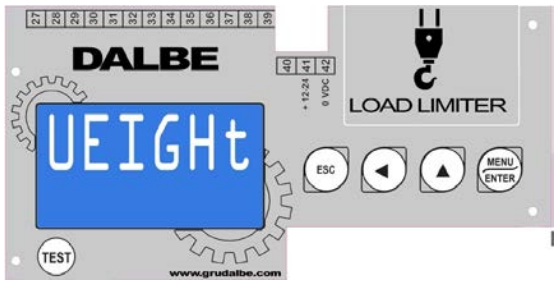
PRESS THE BUTTON  ONCE AND THE SCREEN DISPLAYS:



Picture 27

PRESS THE BUTTON  TWICE

TO DISPLAY THE FOLLOWING SCREEN:



Picture 28

CONFIRM THE SELECTION BY PRESSING THE BUTTON  ONCE

THE SCREEN DISPLAYS THE WEIGHT VALUE LOADED BY THE SYSTEM, IN THIS PHASE ALL LEDS ARE OFF (THE WEIGHT VALUE FLASHES).

USE THE ARROW KEYS TO ADJUST THE DISPLAYED VALUE UNTIL THE NUMBER THAT CORRESPONDS EXACTLY TO THE VALUE OF THE " LOAD TO DECLARE" PREVIOUSLY DESCRIBED IS DISPLAYED.

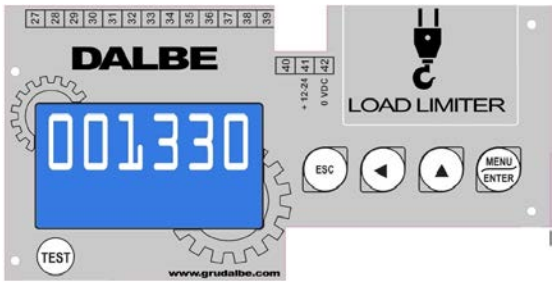
PRESS THE BUTTON 

TO INCREASE THE NUMBER OF UNITS, THEN MOVE THE CURSOR ON THE TENS THROUGH THE

KEY  AND INCREASE THE CORRESPONDING NUMBER USING THE KEY 

PERFORM THIS OPERATION TO CHANGE ALSO THE VALUE OF THE HUNDREDS AND THOUSANDS UNTIL YOU REACH THE VALUE NECESSARY FOR THE CALIBRATION.

IN THE EXAMPLE WITH REFERENCE LOAD OF 1300 KG AND ACCESSORIES OF 10 KG, YOU MUST DECLARE THE NUMBER OF 1330 KG AS DISPLAYED BELOW:



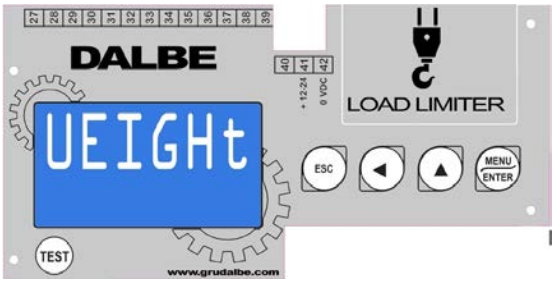
Picture 29

CONFIRM THE SELECTION BY PRESSING THE KEY  ONCE

ALL THE LEDs BLINK

CONFIRM AGAIN THE SELECTION BY PRESSING THE KEY  ONCE

THE SCREEN DISPLAYS:

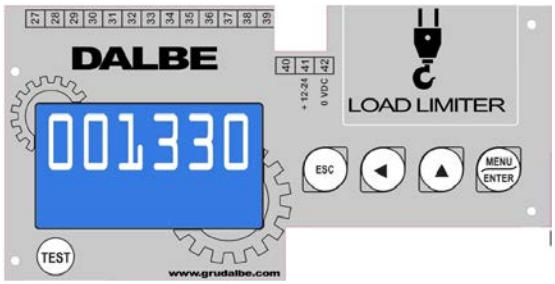


Picture 30

9.9.5) EXIT FROM THE CALIBRATION OPERATION

PRESS THE KEY  REPEATEDLY

TO RETURN TO THE NORMAL DISPLAY OF THE WEIGHT:



Picture 31

LOWER THE LOAD IN FIRST SPEED AND PLACE IT ON THE GROUND IN SAFETY POSITION.

TURN OFF THE CRANE COMPLETELY AND WAIT APPROXIMATELY 1 MINUTE.

TURN ON THE CRANE AGAIN AND START IT, WAIT THE NECESSARY TIME FOR THE VARIOUS CHECKS OF THE SENSORS THAT THE BOARD CARRIES OUT IN AUTOMATIC MODE AND CHECK THE CORRECT OPERATION OF THE VARIOUS MOVEMENTS OF THE CRANE.

CAREFULLY BRING THE SYSTEM TO ALARM CONDITION AND CHECK THAT THE MAXIMUM LOAD ALARM IS ENABLED.

CHECK WITH FREQUENT MOVEMENTS THE CORRECT DISPLAY OF THE LOAD AND THE CORRECT ACTIVATION OF THE SYSTEM IN CASE AN ATTEMPT IS MADE TO EXCEED THE RATED CAPACITY OF THE CRANE.

9.9.6) ELECTRONIC BOARD ERROR DISPLAY

WARNING

THE POSSIBLE ERRORS THAT MAY BE DISPLAYED BY THE ELECTRONIC BOARD ARE:

nOCEL : NO LOAD CELL DETECTED
POSSIBLE SOLUTION : CHECK THE ELECTRIC CONNECTIONS OF THE CELL

ErCEL : THE CELL SIGNAL EXCEEDS 39 mV
POSSIBLE SOLUTION : THE CONVERSION ELECTRONICS (AD CONVERTER) IS DAMAGED, CONTACT GRU DALBE srl OR THE AUTHORISED SERVICE.

ErCEL 1 : THE CELL IS NOT CONNECTED CORRECTLY (CHANNEL 1)
POSSIBLE SOLUTION : CHECK THE ELECTRIC CONNECTIONS OF THE CELL

Er Ad : FAULTY CONVERTER INSIDE THE INSTRUMENT
POSSIBLE SOLUTION : CONVERSION ELECTRONICS (AD CONVERTER) IS DAMAGED, CONTACT GRU DALBE srl OR THE AUTHORISED SERVICE.

Error : THE VALUE SET FOR THE PARAMETER DURING CALIBRATION IS OUTSIDE THE RANGE OF ADMITTED VALUES
POSSIBLE SOLUTION: PRESS THE **ESC** KEY AND EXIT THE SETTING MODE BY KEEPING IN MEMORY THE OLD VALUE STORED.
ENTER A SAMPLE WEIGHT VALUE THAT IS CONSISTENT WITH THE INCREASE OF **mV** DETECTED BY THE ELECTRONIC BOARD

LOAD : THE SAMPLE WEIGHT IS NOT LOADED OR IT IS TOO LIGHT.
POSSIBLE SOLUTION : CHECK THE MASS OF THE HOISTED LOAD.

bLOC : THE BLOCK IS ENABLED ON THE SET-POINT PROGRAMMING MENU.

9.9.7) SYSTEM PRECAUTIONS

ADOPT A SERIES OF PRECAUTIONS PERTAINING TO THE SYSTEM. DISCONNECT THE POWER SUPPLY OF THE DEVICE BEFORE ANY WIRING OPERATION OR REPLACEMENT.
PROVIDE FOR APPROPRIATE PROTECTIONS AND TAKE THE UTMOST CARE OF THE CONNECTION CABLES OF THE LOAD TRANSDUCER.
DO NOT HIT THE TRANSDUCERS OR SENSORS WITH WATER JETS OR DEGREASING LIQUID UNDER PRESSURE.
DO NOT PERFORATE THE ELECTRONIC BOARD OR SENSORS.
MAKE SURE THAT NOBODY TAMPERS WITH THE ELECTRONIC BOARD AND THE CORRECT ADJUSTMENTS.

9.10) "QLS" SYSTEM: CHECKS AT THE BEGINNING OF EACH WORK SHIFT

WARNING

THE MAIN CHECKS TO BE CARRIED OUT ARE LISTED BELOW:

- VERIFICATION AND VISUAL CHECK OF TRANSDUCERS, ELECTRONIC BOARD AND CABLES.

- CHECK OF THE CORRECT VALUE DETECTED BY THE "QLS" SYSTEM BY HOISTING A LOAD OF KNOWN MASS AND VERIFYING THAT THE SCREEN DISPLAYS THE SAME VALUE WITH A MAXIMUM APPROXIMATION OF **+-5%** ERROR ON SUCH VALUE

PROCEDURE:
- HOIST A KNOWN LOAD.
- DISCONNECT THE POWER SUPPLY AND OPEN THE ELECTRICAL CABINET (LEFT PART - **PART. A**) AND MAKE SURE THAT NO RAIN OR CONDENSATE COMES IN.
- TURN ON THE MAIN SWITCH WITHOUT STARTING THE RUN.
- READ THE VALUE SHOWN, WAITING ABOUT 30 SECONDS FOR THE ACTIVATION OF THE ELECTRONIC BOARD.
- IN THE END CLOSE THE ELECTRICAL CABINET AND RESET THE NORMAL WORKING CONDITIONS.

NOTE: IN CASE OF USE OF THE CRANE WITH MAXIMUM LUFFING JIB AND "JIB CONFIGURATION" SELECTOR IN POSITION "**G**", THE APPROXIMATE VALUE OF THE MASS ON THE DISPLAY HAS A HIGHER PERCENTAGE ERROR WITH RESPECT TO THE HORIZONTAL JIB, BUT IN ANY CASE IT FALLS WITHIN THE TOLERANCES FOR CRANE OPERATION.

- IF THE DISPLAYED VALUE SHOULD BE OUTSIDE THIS RANGE, REPEAT THE CALIBRATION OF THE TRANSDUCER AS INDICATED IN PAR. 9.9. "CALIBRATION OF THE LOAD TRANSDUCER" AND WRITE DOWN THE DATA ON THE PAGE OF THE CHECK RECORD INHERENT TO THE INSTALLATION OF THE CRANE.

- CHECK THE CORRECT OPERATION OF THE "QLS" SYSTEM SIMULATING CAREFULLY A JAM CONDITION OF THE MACHINE.

9.11) HOISTING LIMIT SWITCH

WARNING

IT ACTS ON THE "HOISTING-RISE", "HOISTING-DESCENT" MOVEMENTS (REF 4.5.8.1).

- REFERENCES (SEE POINT 4 5.8.1)

ADJUSTMENTS MUST BE CARRIED OUT LOADLESS AND WITHOUT LOADS HUNG ON THE HOOK.
CONSIDER THAT, AFTER THE ACTIVATION OF THE LIMIT SWITCH, THE MOVEMENT DOES NOT STOP IMMEDIATELY BUT IT FOLLOWS A DECELERATION RAMP: THE HIGHER THE APPLIED SPEED, THE LONGER THE RAMP.

THEREFORE, THE VALIDITY OF THE CALIBRATION MUST BE CHECKED WITH THE MOVEMENT IN MAXIMUM SPEED, WHICH REQUIRES MORE SPACE TO STOP COMPLETELY.

9.11.1) CAM 1

ADJUST THE "**CAM 1"** OF THE **RISE** MOVEMENT BY MEANS OF THE MICRO-SCREW **E** IN ORDER TO OBTAIN THE ACTIVATION OF THE MICROSWITCH "**A"** TO STOP THE TRAVEL OF THE BLOCK AT ABOUT 1 m BELOW THE LOWER LONGITUDINAL MEMBERS OF THE JIB.

CARRY OUT THE ADJUSTMENT WITH FOUR-FALL ROPE FOR **VERS. R - VERS. V. CRANES.**

9.11.2) CAM 2

ADJUST THE "**CAM 2"** OF THE **SPEEDY RISE** MOVEMENT BY MEANS OF THE MICRO-SCREW "**E"** IN ORDER TO OBTAIN THE ACTIVATION OF THE MICROSWITCH "**B"** TO ACTIVATE THE PROGRESSIVE DECELERATION/RAMP PROVIDED WITHOUT GOING BEYOND THE RISE STOP POINT.

VERS. R CRANE : CARRY OUT THE ADJUSTMENT WITHOUT LOAD WITH **FOUR-FALL ROPE** TO OBTAIN THE DECELERATION OF THE THIRD RISE SPEED WITH VARIOMATIC SYSTEM.

VERS. V CRANE : CARRY OUT THE ADJUSTMENT WITHOUT LOAD WITH **FOUR-FALL ROPE** TO OBTAIN THE DECELERATION OF THE FOURTH RISE SPEED WITH VARIOMATIC SYSTEM.

VERS. T CRANE : CARRY OUT THE ADJUSTMENT WITHOUT LOAD WITH **TWO-FALL ROPE** TO OBTAIN THE DECELERATION OF THE FOURTH RISE SPEED WITH VARIOMATIC SYSTEM.

9.11.3) CAM 3

ADJUST THE "**CAM 3"** OF THE **DESCENT** MOVEMENT BY MEANS OF THE MICRO-SCREW "**E"** IN ORDER TO OBTAIN THE ACTIVATION OF THE MICROSWITCH "**C"** TO ACTIVATE THE PROGRESSIVE DECELERATION/RAMP PROVIDED WITHOUT GOING BEYOND THE DESCENT STOP POINT WITH MODE SELECTOR ON **"L2" (TWO-FALL ROPE).**

CRANE VERS. R : CARRY OUT THE ADJUSTMENT WITHOUT LOAD WITH **TWO-FALL ROPE** TO OBTAIN THE DECELERATION OF THE THIRD DESCENT SPEED WITH VARIOMATIC SYSTEM.

CRANE VERS. V - CRANE VERS. T : CARRY OUT THE ADJUSTMENT WITHOUT LOAD WITH **TWO-FALL ROPE** TO OBTAIN THE DECELERATION OF THE FOURTH DESCENT SPEED WITH VARIOMATIC SYSTEM.

MAKE SURE THAT AT LEAST THREE TURNS OF ROPE ARE ALWAYS WOUND AROUND THE DRUM AND THAT THERE IS NOT THE RISK OF MOVEMENT REVERSAL.

TEST THE CALIBRATION FREQUENTLY BY REPEATING THE MOVEMENTS CONCERNED.

9.11.4) CAM 4

ADJUST THE "**CAM 4"** OF THE **DESCENT** MOVEMENT BY MEANS OF THE MICRO-SCREW "**E"** IN ORDER TO OBTAIN THE ACTIVATION OF THE MICROSWITCH "**D"** TO STOP THE TRAVEL OF THE BLOCK BEFORE THE HOOK TOUCHES THE GROUND AND SLACKENS THE TENSION OF THE LINKS OF THE SUSPENSION CHAIN WITH MODE SELECTOR ON **"L4".**

CRANE VERS. R - CRANE VERS. V : CARRY OUT THE ADJUSTMENT WITH MODE SELECTOR ON FOUR-FALL ROPE TO OBTAIN THE STOP OF THE BLOCK DESCENT.

CRANE VERS. T : NOT OPERATING CONTACT (NO ACTIVATION).

9.11.5) CAM 5

ADJUST THE "**CAM 5"** OF THE **SPEEDY DESCENT** MOVEMENT BY MEANS OF THE MICRO-SCREW "**E"** IN ORDER TO OBTAIN THE ACTIVATION OF THE MICROSWITCH "**F"** TO ACTIVATE THE PROGRESSIVE DECELERATION/RAMP PROVIDED WITH MODE SELECTOR ON **"L2"** AT ABOUT 2,5 m FROM THE GROUND.

CRANE VERS. R : CARRY OUT THE ADJUSTMENT WITHOUT LOAD WITH **TWO-FALL ROPE** TO OBTAIN THE DECELERATION OF THE THIRD DESCENT SPEED WITH VARIOMATIC SYSTEM.

CRANE VERS. V : CARRY OUT THE ADJUSTMENT WITHOUT LOAD WITH **TWO-FALL ROPE** TO OBTAIN THE DECELERATION OF THE FOURTH DESCENT SPEED WITH VARIOMATIC SYSTEM.

CRANE VERS. T : CARRY OUT THE ADJUSTMENT WITHOUT LOAD WITH **TWO-FALL ROPE** TO OBTAIN THE DECELERATION OF THE FOURTH DESCENT SPEED WITH VARIOMATIC SYSTEM.

9.11.6) CAM 6

ADJUST THE "**CAM 6"** OF THE **SPEEDY DESCENT** MOVEMENT BY MEANS OF THE MICRO-SCREW "**E"** IN ORDER TO OBTAIN THE ACTIVATION OF THE MICROSWITCH "**G"** TO ACTIVATE THE PROGRESSIVE DECELERATION/RAMP PROVIDED WITH MODE SELECTOR ON **"L4"** AT ABOUT 2,5 m FROM THE GROUND.

CRANE VERS. R : CARRY OUT THE ADJUSTMENT WITHOUT LOAD WITH **FOUR-FALL ROPE** TO OBTAIN THE DECELERATION OF THE THIRD DESCENT SPEED WITH VARIOMATIC SYSTEM.

CRANE VERS. V : CARRY OUT THE ADJUSTMENT WITHOUT LOAD WITH **FOUR-FALL ROPE** TO OBTAIN THE DECELERATION OF THE FOURTH DESCENT SPEED WITH VARIOMATIC SYSTEM.

CRANE VERS. T : NOT OPERATING CONTACT (NO ACTIVATION).

9.12) E-TROLLEY SYSTEM

WARNING

9.12.1) E-TROLLEY SYSTEM DESCRIPTION

THE "E-TROLLEY" SYSTEM INSTALLED ON THIS MACHINE IS A LIMITATION AND INDICATION SYSTEM THAT ALLOWS YOU TO ELECTRONICALLY CONTROL SOME CRANE MOVEMENTS AND PRODUCE WARNING SIGNALS.

THE "E-TROLLEY" SYSTEM INDICATES THE DISTANCE (EXPRESSED IN METERS m.) OF THE TROLLEY FROM THE CRANE SLEWING AXIS, WHICH IS DISPLAYED ON THE SCREEN.
THIS INFORMATION IS PROCESSED BY THE CONTROL SYSTEM THAT PRODUCES SLOWDOWNS AND LIMITATIONS OF THE "TROLLEY FORWARDS" AND "TROLLEY BACKWARDS" MOVEMENTS ACCORDING TO THIS DISTANCE.

THE "E-TROLLEY" SYSTEM DOES NOT PROCESS ANY CONNECTION INFORMATION BETWEEN THE TROLLEY POSITION AND THE LOAD HOISTED, THEREFORE REFER TO THE OTHER SYSTEMS INSTALLED ON THE CRANE FOR THE CONTROL OF THE HOISTING FUNCTION.

THE "E-TROLLEY" SYSTEM ALLOWS A QUICK CONFIGURATION OF THE LIMITATION OF TROLLEY MOVEMENTS BY ACTING ONLY ON THE DATA STORAGE WITHIN THE CONTROLLER (PLC) WITHOUT ANY MANUAL ADJUSTMENT WITH KEYS OR SCREWS.

9.12.2) E-TROLLEY SYSTEM FUNCTIONALITY

WARNING

THE "E-TROLLEY" ACTS IN 2 WAYS:

- IT CONTROLS **THE DECELERATIONS** BY DISCONNECTING THE CONTROLS OF THE TROLLEY SPEEDS (SECOND AND THIRD SPEEDS)

- IT CONTROLS THE **STOP POINTS** OF THE TROLLEY MOVEMENT WHEN IT REACHES THE JIB END POINTS, BOTH TOWARDS THE MAST AND TOWARDS THE NOSE OF THE JIB ITSELF.

THE ACTIVATION POSITIONS ARE PROGRAMMED ACCORDING TO THE JIB ASSEMBLY (SEE **PAR. 9.12.2.1 "SELECTION OF THE JIB EXTENSION CONFIGURATION"**) AND THE ACTUAL JIB LENGTH OF 45m OR 40m (SEE **PAR. 9.12.2.2 "SELECTION OF THE INSTALLED JIB LENGTH"**).
IN ANY CASE, THIS SYSTEM DOES NOT REPLACE THE OPERATOR'S CONTROL ON THE TRAJECTORIES AND ON THE VIEW OF THE TROLLEY POSITION.

THE OPERATOR MUST KNOW THIS POSITION REGARDLESS OF WHAT APPEARS ON THE DISPLAY, AND THEREFORE HE WHOLLY KEEPS THE RESPONSIBILITY FOR THE CORRECT USE OF THE HOISTING EQUIPMENT.

CHECK THAT THE MODE SELECTOR IS CORRECTLY POSITIONED ON THE LETTER THAT CORRESPONDS TO THE ACTUAL ASSEMBLY OF THE JIB IN THE CURRENT WORK CONFIGURATION.

DANGER

DANGER: IF THE SELECTOR DOES NOT CORRESPOND TO THE JIB ASSEMBLY, IT IS POSSIBLE THAT THE SYSTEM IS NOT ACTIVATED WITH THE CORRECT SLOWDOWN AND IN THE LIMIT STOP POINTS, WITH THE RISK THAT THE TROLLEY KNOCKS AGAINST THE BUMPERS AND THAT THE TROLLEY ROPE SLACKENS WITH THE RESULTING EXIT FROM THE SEATS ON THE PULLEYS.

CHECK THE CORRESPONDENCE BETWEEN THE MODE SELECTOR AND JIB ASSEMBLY.

9.12.2.1) SELECTION OF THE INSTALLED JIB LENGTH

WARNING

CHECK THE LENGTH OF THE JIB REALLY INSTALLED ON THE CRANE AND IDENTIFY THE **B40-B40** TERMINALS PRESENT IN THE TERMINAL BOARD INSIDE THE ELECTRICAL CABINET.

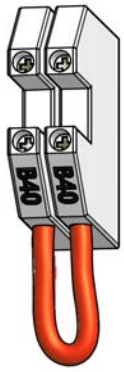
JIB INSTALLED 45m

THE TERMINAL MUST NOT BE CONNECTED

JIB INSTALLED 40m

THE TERMINAL MUST BE CONNECTED IN CLOSED CIRCUIT

SELECTING THE JIB OF **40m** THE SYSTEM DOES NOT ALLOW THE OPERATION OF THE CRANE WITH THE JIB EXTENSION CONFIGURATION SELECTOR POSITIONED ON A AND IT ALSO RECALCULATES THE POSITION B AS A FINAL POSITION OF THE JIB WITH A LENGTH OF 40m.



Picture 32

ACT ON THE TROLLEY LIMIT SWITCH APPROPRIATELY ADJUSTING CAM **3** AND CAM **4** AS PER **PAR. 9.12.4) E-TROLLEY SYSTEM CONFIGURATION: TROLLEY LIMIT SWITCH ADJUSTMENT.**

9.12.3) DISPLAY OF THE E-TROLLEY SYSTEM

IT IS POSSIBLE TO DISPLAY SOME INFORMATION PROVIDED BY THE E-TROLLEY SYSTEM ON THE TERMINAL DISPLAY WHICH IS LOCATED INSIDE THE ELECTRICAL CABINET OF THE CRANE.

THE INFORMATION IS THE FOLLOWING:

- THE DISTANCE EXPRESSED IN METERS [m] OF THE TROLLEY POSITION WITH RESPECT TO THE CRANE SLEWING AXIS.
- A VALUE EXPRESSED IN PERCENTAGE POINTS OF THIS GROWING POSITION AS THE TROLLEY LEAVES THE SLEWING AXIS.

MAKE SURE YOU ARE IN THE HOME PAGE:
(INITIAL SCREEN) :

	Home	22/01/2019 14:21:50	
Setup Operator Interface			
Select	Alarm		

Picture 33

USING THE TOUCH WHEEL (SENSOR DISC) AND PRESSING THE FINGER CLOCKWISE OR COUNTERCLOCKWISE OR PRESSING THE KEYS WITH THE SYMBOLS [^] [v] SELECT THE SECOND LINE: "Operator Interface" AND PRESS THE CENTRAL BUTTON "OK" ONCE.

THE DISPLAY SHOWS:

	DALBE	22/01/2019 15:21:31
1-MONITORING 2-CALIBRATION 3-CONFIG. 4_PLC STATUS 5_TAC		
Select	Alarm		

Picture 34

SELECT THE FIRST LINE **" 1-MONITORING"** AND PRESS THE CENTRAL BUTTON "OK" ONCE

THE DISPLAY SHOWS:

	MONITORING	22/01/2019 15:21:35
1a-TROLLEY POSITION+(Bargraph) 1b-MOMENT VALUE + (Bargraph) 1c-LEVEL SENSOR 1d-ALARM STATUS		
Select	Alarm	+	ESC

Picture 35

SELECT THE FIRST LINE **" 1a-TROLLEY POSITION+(Bargraph)"** AND PRESS THE CENTRAL BUTTON "OK" ONCE

THE DISPLAY SHOWS:

	TROLLEY VALUE	22/01/2019 15:23:58
14 **m** Min = 4 Max = 45		
	Alarm	+	ESC

Picture 36

THIS SCREEN SHOWS AN INDICATION OF THE TROLLEY POSITION EXPRESSED IN METERS [m] WITH RESPECT TO THE CRANE SLEWING AXIS.

PRESS THE "**ESC**" BUTTON ONCE TO RETURN TO THE **MONITORING** PAGE AND A SECOND TIME THE "**ESC**" BUTTON TO RETURN TO THE INITIAL DISPLAY

9.12.4) E-TROLLEY SYSTEM CONFIGURATION: TROLLEY LIMIT SWITCH ADJUSTMENT

WARNING

IT ACTS ON "TROLLEY FORWARDS" AND "TROLLEY BACKWARDS" MOVEMENTS" (SEE PAR. 4.5.8.3 “TROLLEY LIMIT SWITCH”).

THE SYSTEM HAS ALREADY BEEN CALIBRATED IN THE FACTORY. THESE INSTRUCTIONS CAN BE USED WHEN UPDATING CALIBRATION.

AT THE END OF THE ADJUSTMENT, FREQUENTLY TEST THE SETTING BY REPEATING THE MOVEMENTS CONCERNED.

ADJUST THE CAMS AS FOLLOWS:

9.12.4.1) CAM 1 ALL THE JIB ASSEMBLIES

ADJUST THE **CAM “1”** OF THE "TROLLEY BACKWARDS" MOVEMENT BY MEANS OF THE MICRO SCREW “**F”** IN ORDER TO OBTAIN THE ACTIVATION OF THE MICROSWITCH “**A”** TO STOP THE TRAVEL OF THE TROLLEY AT ABOUT **0,2 m** BEFORE THE LIMIT STOPS ON THE JIB FOOT.

9.12.4.2) CAM 2 ALL THE JIB ASSEMBLIES

THIS CAM IS USEFUL TO THE E-TROLLEY SYSTEM AS A CONFIGURATION OF PROGRAMMED ZERO AND ZERO CONTROL OF THE TROLLEY TRAVEL.

ADJUST THE **CAM “2”** OF THE "TROLLEY BACKWARDS" MOVEMENT BY MEANS OF THE MICRO SCREW “**F”** IN ORDER TO OBTAIN THE ACTIVATION OF THE MICROSWITCH “**B”** WITH THE TROLLEY AT ABOUT **0,3 m** BEFORE THE LIMIT STOPS ON THE JIB FOOT.

CHECK THAT THE SETTING OF THIS CAM IS SLIGHTLY HIGHER THAN THE SETTING OF CAM 1 OR THAT THE RELATED MICROSWITCH "B" IS ACTIVATED BEFORE THE MICROSWITCH "A".

THE E-TROLLEY SYSTEM MAY MALFUNCTION IN CASE OF TAMPERING WITH SUCH ADJUSTMENT.

9.12.4.3) CAM 3 ALL THE JIB ASSEMBLIES

THIS CAM IS USEFUL TO THE E-TROLLEY SYSTEM AS A PROGRAMMED REFERENCE CONFIGURATION AND CONTROL CONFIGURATION RELATED TO THE CRANE JIB LENGTH (FOR EX. 45m OR 40m).

ADJUST THE **CAM “3”** OF THE "TROLLEY FORWARDS" MOVEMENT BY MEANS OF THE MICRO SCREW “**F”** IN ORDER TO OBTAIN THE ACTIVATION OF THE MICROSWITCH “**C”** WITH THE TROLLEY AT ABOUT **0,3 m** BEFORE THE LIMIT STOPS ON THE JIB NOSE.

CHECK THAT THE SETTING OF THIS CAM IS SLIGHTLY LOWER THAN THE SETTING OF CAM 4 OR THAT THE RELATED MICROSWITCH "C" IS ACTIVATED BEFORE THE MICROSWITCH "D".

THE E-TROLLEY SYSTEM MAY MALFUNCTION IN CASE OF TAMPERING WITH SUCH ADJUSTMENT.

9.12.4.4) CAM 4 ALL THE JIB ASSEMBLIES

ADJUST THE **CAM "4"** OF THE "TROLLEY FORWARDS" MOVEMENT BY MEANS OF THE MICRO SCREW "**F"** IN ORDER TO OBTAIN THE ACTIVATION OF THE MICROSWITCH "**D"** TO STOP THE TRAVEL OF THE TROLLEY AT ABOUT **0,2 m** BEFORE THE LIMIT STOPS ON THE JIB NOSE.

9.12.6) CALIBRATION TEST AND CHECKS AT THE BEGINNING OF EACH WORK SHIFT

WARNING

CHECK WITH REPEATED MOVEMENTS OF "TROLLEY FORWARDS" AND "TROLLEY BACKWARDS" THE CORRECT ACTIVATION OF THE "E-TROLLEY" SYSTEM OF THE CRANE.

CHECK ACCORDING TO THE JIB ASSEMBLY AND MODE SELECTOR (SEE **PAR 9.1.2.2 "JIB EXTENSION CONFIGURATION SELECTOR**") THAT THE DECELERATIONS OF THE TROLLEY SPEEDS TAKE PLACE AT ABOUT **1.75m** FROM THE JIB NOSE FOR THE DISCONNECTION OF THE "TROLLEY 2ND SPEED" CONTROL" AND AT ABOUT **3m** FROM THE JIB NOSE FOR THE DISCONNECTION OF THE "TROLLEY THIRD SPEED " CONTROL (FOR THE VERSIONS WHERE IT IS PRESENT).

REPEAT THE SAME CHECK FOR POSITIONS RELATED TO THE JIB FOOT TOWARDS THE MAST OF THE CRANE WITH SLOWDOWNS PROPORTIONAL TO THE RETURN MOVEMENT OF THE TROLLEY.

9.13) SLEWING LIMIT SWITCH

WARNING

IT ACTS ON "RIGHT SLEWING" AND "LEFT SLEWING" MOVEMENTS. REFER TO POINT 4.5.8.2.

UNLOCK THE SAFETY SCREW "S", ADJUST THE **CAM "1"** OF THE "RIGHT SLEWING" MOVEMENT BY MEANS OF THE MICRO-SCREW "**E"** IN ORDER TO OBTAIN THE ACTIVATION OF THE MICROSWITCH "**A"**, AND BY MEANS OF THE MICRO-SCREW "**E"** ADJUST THE **CAM "2"** OF THE "LEFT SLEWING" MOVEMENT TO OBTAIN THE ACTIVATION OF THE MICROSWITCH "**B"** IN ORDER TO ALLOW NOT MORE THAN **THREE SLEWING MOVEMENTS** TO THE RIGHT AND **THREE TO THE LEFT**.

TEST THE SETTING FREQUENTLY BY REPEATING THE MOVEMENTS CONCERNED.

9.14) SPEED REGULATORS

THE SPEED REGULATION IS CARRIED OUT BY THE ELECTRIC ASYNCHRONOUS MOTORS RELATIVE TO THE THREE CRANE MOVEMENTS AND BY THE FREQUENCY VARIATORS IN CHARGE OF THE DIFFERENT MOVEMENTS.
THESE DEVICES ARE PROGRAMMED IN THE FACTORY AND ALLOW PRE-CALIBRATING ACCELERATION AND DECELERATION RAMPS AND KEEPING THE RPM OF THE MOTORS CONSTANT.

WARNING

THE PROGRAMMING OF THE INVERTERS CAN BE CHANGED ONLY WITH PRIOR WRITTEN AUTHORIZATION OF THE MANUFACTURER.

OTHERWISE, THE WARRANTY WILL NOT BE VALID ANYMORE DUE TO TAMPERING.

CAUTION: ANY CHANGE CAN CAUSE DANGER OF INJURIES TO PEOPLE/PROPERTY.

9.15) "2ND SPEED AUTO-SELECTION" SYSTEM

THE "2ND SPEED AUTO-SELECTION" SYSTEM INSTALLED ON THIS MACHINE ACTS ON THE VALUE OF THE SECOND SPEED (EXPRESSED IN FREQUENCY) OF THE "HOISTING-RISE" AND "HOISTING-DESCENT" MOVEMENTS.
THIS FUNCTION IS ALWAYS ACTIVE AUTOMATICALLY SINCE IT IS LOCATED INSIDE THE STRUCTURE OF THE ELECTRICAL EQUIPMENT.

THE CHOICE, CARRIED OUT BY THE SYSTEM, OF THE VALUE OF THE SECOND SPEED DEPENDS ON THE LOAD BEING HOISTED.

THE VALUE OF THE SECOND SPEED IS ALWAYS THE MAXIMUM VALUE AVAILABLE FOR THAT LOAD AND IS CHOSEN BY THE SYSTEM BETWEEN 2 PRECONFIGURED VALUES FOR EACH PROGRAM.

THIS SYSTEM IS PARTICULARLY ADVANTAGEOUS WHEN HANDLING MEDIUM - LOW LOADS SINCE THE SECOND SPEED IS GREATER WITH RESPECT TO THE USE OF THE CRANE WITH MEDIUM - HIGH LOADS, REDUCING THE TIMES AND IMPROVING THE PERFORMANCE OF THE MACHINE.

9.16) "VARIOMATIC" SYSTEM

THE "VARIOMATIC" SYSTEM INSTALLED ON THIS MACHINE ACTS ON THE "HOISTING-RISE" AND "HOISTING-DESCENT" MOVEMENTS.

THIS FUNCTION IS ACTIVATED AUTOMATICALLY WITHIN THE PROGRAMMING OF THE FREQUENCY VARIATOR THAT CONTROLS THE HOISTING AND ALLOWS THE USER TO OPTIMIZE THE CYCLE TIMES OF THE HOISTING MOVEMENTS WHEN THE LOAD IS MEDIUM/LIGHT.

THIS FUNCTION ADJUSTS THE THIRD HOISTING SPEED (FOR CRANE VERS. **R**) OR THE FOURTH SPEED (FOR CRANE VERS. **V**/VERS. **T**) ACCORDING TO THE INSTANTANEOUS CONDITIONS OF VOLTAGE DETECTED BY THE VARIATOR AND OF CURRENT ABSORBED BY THE MOTOR, THUS DETERMINING THE SPEED ACCORDING TO THE LOAD.

THEREFORE, THE THIRD SPEED (VERS. **R**) AND THE FOURTH SPEED (VERS. **V**/VERS. **T**) ARE IN GENERAL VARIABLE WITHIN THE MAXIMUM SPEEDS PRESET IN THE FACTORY.

THIS SYSTEM IS PARTICULARLY USEFUL WHEN HANDLING MEDIUM/LIGHT LOADS AT HIGH SPEED SINCE THE THIRD/FOURTH SPEED IS GREATER, THUS REDUCING THE TIMES AND IMPROVING THE PERFORMANCE OF THE MACHINE.

9.17) "2ND/3RD SPEED AUTO-SELECTION" SYSTEM OF THE TROLLEY MOVEMENT

THE FAST AUTO-SELECTION SYSTEM OF THE TROLLEY INSTALLED ON THIS MACHINE ACTS ON THE "FAST TROLLEY FORWARDS " AND "FAST TROLLEY BACKWARDS " MOVEMENTS.

THIS FUNCTION IS AUTOMATICALLY ACTIVATED INSIDE THE PROGRAMMING OF THE PLC SYSTEM THAT ACTS ON THE FREQUENCY VARIATOR IN CHARGE OF THE TROLLEY MOVEMENT, THROUGH THE TWO-FALL ROPE (2 ROPES) OR FOUR-FALL ROPE (4 ROPES) SELECTOR.

IF YOU ARE HOISTING A LOAD WITH 4 ROPES (**L4**), THE SPEED VALUE OF THE TROLLEY MOVEMENT IS REDUCED TO ALLOW A GREATER SAFETY CHECK OF THE LOAD TRANSLATION.

FOR THE CRANE VERSION **R** THIS SYSTEM IS ACTIVE ON THE SECOND SPEED OF THE TROLLEY (AUTO-SELECTION), WHILE FOR THE CRANE VERSION **V** IT IS ACTIVE ON THE THIRD SPEED OF THE TROLLEY.

THIS SYSTEM IS PARTICULARLY USEFUL WHEN MOVING MEDIUM / HEAVY LOADS, BECAUSE IT IMPROVES DECELERATION IN THE PRESET SLOWDOWN POSITIONS.

9.18) LIMIT STOPS AND BUMPERS

ONLY FOR THE TROLLEY TRANSLATION. THE BUMPERS CONSIST OF ELASTIC PADS.

9.19) ALARM SIGNALS

THEY CAN BE EMITTED BY USING THE ELECTRIC HORN, WHICH CAN BE OPERATED BY PRESSING THE RELATIVE BUTTON ON THE PUSH-BUTTON PANEL OR THE RADIO CONTROL.

9.20) PRECESSIONAL SOUND SIGNALS ON SAFETY DEVICES

THE ACTIVATION OF THE SAFETY DEVICES IS PRE-SIGNALED BY THE SOUND SIGNAL OF THE ELECTRIC HORN AND BY THE VISUAL SIGNAL OF THE RED LIGHT THAT INDICATES THE MACHINE STATUS.

9.21) ANTI-INTERFERENCE DEVICES

THE CRANE IS NOT PROVIDED WITH ANY DEVICE OR EQUIPMENT TO AVOID THE INTERFERENCE WITH OTHER MACHINES PLACED IN THE NEIGHBOURHOOD (SEE POINT 3.3.15).

9.22) ANEMOMETER

IT IS POSSIBLE TO INSTALL AN **ANEMOMETER** THAT SHOULD BE PLACED IN THE APPROPRIATE SHAPED SECTION AT THE BEGINNING OF THE FIRST ELEMENT OF THE JIB.

THE DEVICE DOES NOT ACT DIRECTLY ON THE MOVEMENTS OR PERFORMANCE OF THE CRANE, IT ONLY HAS THE FUNCTION TO INFORM THE OPERATOR ABOUT THE WIND CONDITIONS.

Picture 37

KEY:

" A " = PRE-ALARM (YELLOW)
" B " = ALARM (RED)

THE OPERATION OF THE ANEMOMETER CONSISTS IN PROVIDING THE OPERATOR WITH TWO TYPES OF SIGNAL:
- ACOUSTIC;
- VISUAL

PRE-ALARM THRESHOLD:

INTERMITTENT ACTIVATION OF THE YELLOW " FLASH " LIGHT INDICATOR AND OF THE SIREN WHEN REACHING A WIND SPEED BETWEEN 50 AND 70 KM/H.
BE VERY CAREFUL BECAUSE THE WIND MAY PRODUCE SUDDEN SKIDS OF THE CRANE OR THE LOAD.

ALARM THRESHOLD:

CONTINUOUS ACTIVATION OF THE RED " FLASH " LIGHT INDICATOR AND OF THE SIREN WHEN REACHING A WIND SPEED OF 70 KM/H. THIS SIGNAL WILL BE DEACTIVATED AS SOON AS THE SPEED OF THE WIND DECREASES BELOW THE VALUE SET FOR THE ALARM THRESHOLD, OR IT CAN BE DEACTIVATED ONLY BY SWITCHING OFF THE DEVICE. UPON THE ACTIVATION OF THIS SIGNAL, PUT THE CRANE OUT OF SERVICE AS DESCRIBED IN PAR.11.4.
WE RECOMMEND PARTICULARLY THE SLEWING UNLOCK, THE ABSENCE OF HANGING LOADS AND THE BLOCK ON THE RISE LIMIT STOP.

ALWAYS REFER TO THE DOCUMENTATION PROVIDED BY THE MANUFACTURER OF THE ANEMOMETER, AS REGARDS BOTH THE DESCRIPTION AND ITS USE.

9.23) OTHER DEVICES

THE CRANE IS NOT PROVIDED WITH ANY OTHER DEVICE BESIDES THOSE DESCRIBED ABOVE.

9.24) FAILURE IN THE CONTROL CIRCUIT

DANGER

FOR THE MACHINE SHUT-DOWN, REFER TO PAR. 11.04) "HOW TO DISABLE THE CRANE".

IN CASE OF FAILURE IN THE ELECTRIC CONTROL CIRCUIT, WHERE IT IS NOT POSSIBLE TO FOLLOW THE SUPPLIED INDICATIONS, IN PARTICULAR IF THE LOAD IS HUNG OR IF IT IS NOT POSSIBLE TO CARRY OUT HOISTING OR TROLLEYING MOVEMENTS, IMMEDIATELY DISABLE THE CRANE IN ORDER TO PUT IT IN SAFETY CONDITIONS.

BEFORE DOING SO, KEEP TO THE SAFETY RULES: WEAR SAFETY SHOES AND GLOVES AND PROVIDE FOR ALL THE PERSONAL PROTECTION EQUIPMENT IN ACCORDANCE WITH THE LAWS IN FORCE.

FOR THE FOLLOWING OPERATIONS IT IS NOT NECESSARY TO ELECTRICALLY DISCONNECT THE CRANE.
THE CONTROL CIRCUIT IS COMPOSED OF LIMIT SWITCHES AND REMOTE CONTROL SWITCHES.

IN CASE OF MALFUNCTIONING OF ONE OF THE REMOTE CONTROL SWITCHES, REPLACE IT WITH ONE OF THE SAME TYPE.

IN CASE OF FAILURE OF ONE OF THE LIMIT SWITCHES, CARRY OUT THE "HOISTING-DESCENT" AND "TROLLEY BACKWARDS" MANOEUVRES.
TO DISABLE THE LIMIT SWITCH RELATIVE TO THE "HOISTING-DESCENT" MOVEMENT, USE THE TERMINAL BOARD INSIDE THE ELECTRICAL CABINET (SEE “WIRING DIAGRAM” CHAP. 4).

IDENTIFY THE TERMINALS (33-34) AND MAKE SURE THAT THIS CONTACT IS NC FOR THE CORRECT WORKING OF THE LIMIT SWITCH.

OTHERWISE, CHECK THE CORRESPONDING CAM AND WIRING INSIDE THE LIMIT SWITCH.

IF IT SHOULD BE ABSOLUTELY NECESSARY TO LOWER THE LOAD DISCONNECTING THE “DESCENT” LIMIT SWITCH, TEMPORARILY PROVIDE FOR A JUMPER WITH AN ELECTRIC WIRE IN ORDER TO DISABLE THE LIMIT SWITCH.

LOWER THE LOAD IN FIRST SPEED AND LOCK THE MACHINE IN OFF-DUTY CONDITIONS.

DO NOT USE THE CRANE IN THIS SITUATION AND IMMEDIATELY CONTACT THE TECHNICAL SERVICE TO RESET THE LIMIT SWITCHES AND BRING THE ELECTRICAL CABINET BACK TO ITS ORIGINAL CONFIGURATION WITH ALL THE SAFETY DEVICES PERFECTLY WORKING.

IF IT SHOULD BE NECESSARY TO PLACE THE TROLLEY CLOSE TO THE MAST TO LOWER THE LOAD AND IF ALSO THIS MOVEMENT SHOULD NOT BE POSSIBLE DUE TO THE RELATIVE LIMIT SWITCH, IDENTIFY THE TERMINALS (45-46) AND MAKE SURE THAT THIS CONTACT IS NC FOR THE CORRECT WORKING OF THE LIMIT SWITCH.

OTHERWISE, CHECK THE CORRESPONDING CAM AND WIRING INSIDE THE LIMIT SWITCH.

IF IT SHOULD BE ABSOLUTELY NECESSARY TO LOWER THE LOAD DISCONNECTING THE “TROLLEY BACKWARDS“ LIMIT SWITCH, TEMPORARILY PROVIDE FOR A JUMPER WITH AN ELECTRIC WIRE IN ORDER TO DISABLE THE LIMIT SWITCH.

MOVE THE TROLLEY CLOSE TO THE MAST AND LOWER THE LOAD AS DESCRIBED ABOVE.

PLEASE REMEMBER THAT THESE OPERATIONS TAMPER THE ELECTRIC CIRCUIT OF THE CRANE AND THUS THEY SHALL BE CARRIED OUT ONLY IN CASE OF EMERGENCY.

AFTER REPLACING THE LIMIT SWITCH WITH A NEW ONE, THE WIRING DIAGRAM MUST BE RESET AND BROUGHT BACK TO ITS ORIGINAL CONFIGURATION.

10- CHECKING AND ADJUSTING THE BRAKES

THE CRANE IS EQUIPPED WITH HOISTING, TROLLEYING AND SLEWING BRAKES.

WARNING

THE BRAKES MAY CONTAIN DUST AND SUBSTANCES THAT ARE HARMFUL FOR PEOPLE AND ENVIRONMENT.
PROVIDE YOURSELF, BEFORE STARTING, WITH SUITABLE PROTECTION EQUIPMENT (GLOVES AND MASKS). SEAL WITH CELLOPHANE ALL THE COMPONENTS THAT HAVE BEEN REMOVED.
WASH ABUNDANTLY AFTER THE OPERATION.
THE REPLACED PARTS SHALL BE DISPOSED OF IN ACCORDANCE WITH THE LAWS IN FORCE.

COMMON PART:

THE MAGNETIC GAP IS THE DISTANCE BETWEEN THE ELECTROMAGNET (3) AND THE MOVABLE KEEPER (4) EXPRESSED IN mm.

THE MAGNETIC GAP SHALL HAVE A CONSTANT EQUAL VALUE ON THE WHOLE CIRCUMFERENCE OF THE BRAKE DISC.

FOR THE CORRECT ADJUSTMENT OF THE DISTANCE BETWEEN THE MOVABLE KEEPER "**4"** AND THE ELECTROMAGNET "**3"**, ACT ON THE NUTS "**8"** BY LOCKING THEM COMPLETELY AFTER THE ADJUSTMENT (REFER TO THE PICTURES WITH THE DESCRIPTION OF ALL THE BRAKES).

THE WEAR OF THE GASKET DUE TO THE NORMAL USE OF THE BRAKE INCREASES THE THICKNESS OF THE MAGNETIC GAP.

IF THE WEAR IS REMARKABLE, THE ELECTROMAGNET DOES NOT ATTRACT THE MOVABLE KEEPER ANY MORE, THEREFORE IT IS IMPORTANT TO PERIODICALLY ADJUST THE MAGNETIC GAP.

THE LACK OF ADJUSTMENT OF THE MAGNETIC GAP LEADS TO THE DEFECTIVE WORKING OF THE BRAKE.

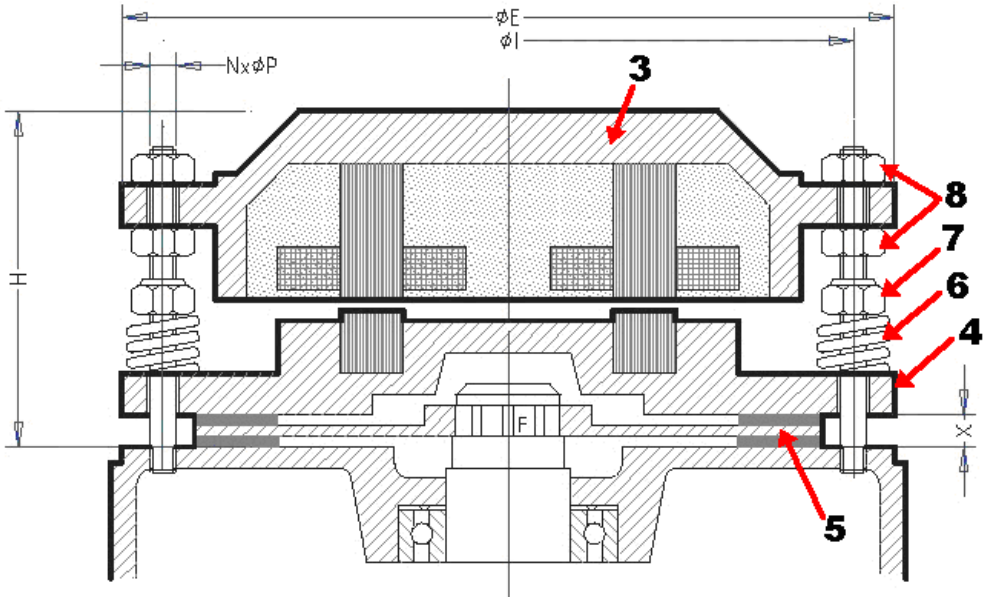
BEFORE THE REFITTING OF THE PROTECTION COVER REPEATEDLY CHECK THAT THE ELECTROMAGNET IS ABLE TO EASILY ATTRACT THE MOVABLE KEEPER,

DANGER

IT IS NECESSARY TO CHECK THE WORKING AND THE CORRECT ADJUSTMENT OF THE BRAKES AT THE BEGINNING OF EACH WORK SHIFT.

10.1) DESCRIPTION OF THE DISC BRAKES

IT IS A DISC BRAKE WITH SPLINED HUB KEYED ONTO THE PINION.



Picture 1

KEY:

B (BRAKE DISC DIAMETER)
E (ELECTROMAGNET DIAMETER)
F (HUB HEIGHT)
H (TOTAL BRAKE HEIGHT)
I (TIE ROD CIRCUMFERENCE DIAMETER)
N (TIE RODS)
P (TYPE OF TIE ROD)
X (BRAKE DISC HEIGHT)

3 = ELECTROMAGNET
8 = LOCK NUTS
7 = SPRING ADJUSTING NUTS
6 = SPRINGS
4 = MOVABLE KEEPER
5 = DISC WITH BRAKING SURFACE

10.2) TROLLEY WINCH BRAKE

THE TROLLEY MOTOR BRAKE TYPE IS: **100 S**

THIS IS A DISC BRAKE WITH SPLINED HUB KEYED ONTO THE PINION.

CHARACTERISTICS (SEE Picture 1) :

B	(BRAKE DISC DIAMETER)	= 141 mm
E	(ELECTROMAGNET DIAMETER)	= 180 mm
F	(HUB HEIGHT)	= 18x22x6
H	(TOTAL BRAKE HEIGHT)	= 82 mm
I	(TIE ROD CIRCUMFERENCE DIAMETER)	= 160 mm
N	(TIE RODS)	= 3
P	(TYPE OF TIE ROD)	= M8
X	(BRAKE DISC HEIGHT)	= 10 mm

MAGNETIC GAP ADJUSTMENT

MAGNETIC GAP = 0,60 mm (FIRST ADJUSTMENT)

MAXIMUM ALLOWED VALUE OF THE MAGNETIC GAP = 0.9 mm

BRAKING TORQUE ADJUSTMENT

BRAKING TORQUE = 19,9 Nm (FIRST ADJUSTMENT)
HEIGHT OF THE SPRINGS = DISTANCE BETWEEN THE LEVEL OF THE SELF-LOCKING NUT AND THE LEVEL OF THE KEEPER
HEIGHT OF THE SPRINGS = 16,5 mm (FIRST ADJUSTMENT)
(MAX BRAKING TORQUE = 35 Nm HEIGHT OF THE SPRINGS = 13,5 mm)
(FREE HEIGHT OF THE SPRINGS (6) = 20,5 mm.)

LIMIT THICKNESS FOR THE DISC REPLACEMENT

THE REPLACEMENT OF THE DISC MUST OCCUR AFTER THE CONSUMPTION OF THE FRICTION MATERIAL EQUAL TO 1.5 mm PER RING, THAT IS, WHEN THE MINIMUM VALUES OF TOTAL THICKNESS ARE REACHED (METAL THICKNESS + RING THICKNESS) SEE BELOW:
LIMIT THICKNESS FOR THE DISC REPLACEMENT
THICKNESS = 8.5 mm.

TROLLEY TOWING BRAKE ADJUSTMENT

THE ADJUSTMENT OF THE BRAKING TORQUE IS OBTAINED BY COMPRESSING THE SPRINGS "**6**" BY MEANS OF THE SELF-LOCKING NUTS "**7**".
THE PRELOAD MUST BE UNIFORM FOR ALL THE SPRINGS AND SUCH AS TO OBTAIN A BRAKING ACTION THAT STOPS THE TROLLEY TRANSLATION MOVEMENT IN A SPACE OF MAX. **0,3 mt.** TEST THE CALIBRATION SEVERAL TIMES WITH REPEATED MANEUVERS WITH LOAD.

10.3) SLEWING BRAKE

THE SLEWING MOTOR BRAKE TYPE IS: **110 S**

THIS IS A DISC BRAKE WITH SPLINED HUB KEYED ONTO THE PINION.

CHARACTERISTICS (SEE Picture 1) :

B	(BRAKE DISC DIAMETER)	= 153 mm
E	(ELECTROMAGNET DIAMETER)	= 200 mm
F	(HUB HEIGHT)	= 23X28X6
H	(TOTAL BRAKE HEIGHT)	= 88 mm
I	(TIE ROD CIRCUMFERENCE DIAMETER)	= 170 mm
N	(TIE RODS)	= 3
P	(TYPE OF TIE ROD)	= M10
X	(BRAKE DISC HEIGHT)	= 10 mm

MAGNETIC GAP ADJUSTMENT

MAGNETIC GAP = 0,60 mm (FIRST ADJUSTMENT)
MAXIMUM ALLOWED VALUE OF THE MAGNETIC GAP = 0.9 mm

BRAKING TORQUE ADJUSTMENT

BRAKING TORQUE = 26,4 Nm (FIRST ADJUSTMENT)
HEIGHT OF THE SPRINGS = DISTANCE BETWEEN THE LEVEL OF THE SELF-LOCKING NUT AND THE LEVEL OF THE KEEPER
HEIGHT OF THE SPRINGS = 20,5 mm (FIRST ADJUSTMENT)
(MAX BRAKING TORQUE = 55 Nm HEIGHT OF THE SPRINGS = 15,5 mm)
(FREE HEIGHT OF THE SPRINGS (**6**) = 25,5 mm.)

LIMIT THICKNESS FOR THE DISC REPLACEMENT

The REPLACEMENT OF THE DISC MUST OCCUR AFTER THE CONSUMPTION OF THE FRICTION MATERIAL EQUAL TO 1.5 mm PER RING, THAT IS, WHEN THE MINIMUM VALUES OF TOTAL THICKNESS ARE REACHED (METAL THICKNESS + RING THICKNESS) SEE BELOW:
LIMIT THICKNESS FOR THE DISC REPLACEMENT
THICKNESS = 8,5 mm.

SLEWING GROUP BRAKE ADJUSTMENT

THE ADJUSTMENT OF THE BRAKING TORQUE IS OBTAINED BY COMPRESSING THE SPRINGS "**6**" BY MEANS OF THE SELF-LOCKING NUTS "**7**".
THE PRELOAD MUST BE UNIFORM FOR ALL THE SPRINGS AND SUCH AS TO OBTAIN A BRAKING ACTION THAT KEEPS THE JIB IN ITS POSITION AGAINST THE WIND, AFTER THE STOP OBTAINED WITH THE ELECTRIC BRAKING.

DANGER

IT IS COMPULSORY TO UNLOCK THE SLEWING BRAKE THROUGH THE PROPER MANOEUVRE AT THE END OF EACH WORK SHIFT.
(SEE PAR. 4.17) " HOW TO DISABLE THE CRANE").

10.4) HOISTING WINCH BRAKE

10.4.1) CRANE VERSION R

THE HOISTING MOTOR BRAKE TYPE (11 KW) IS: **140 MSDD**

THIS IS A DOUBLE DISC BRAKE WITH SPLINED HUB KEYED ONTO THE PINION.

10.4.2) CRANE VERSION V

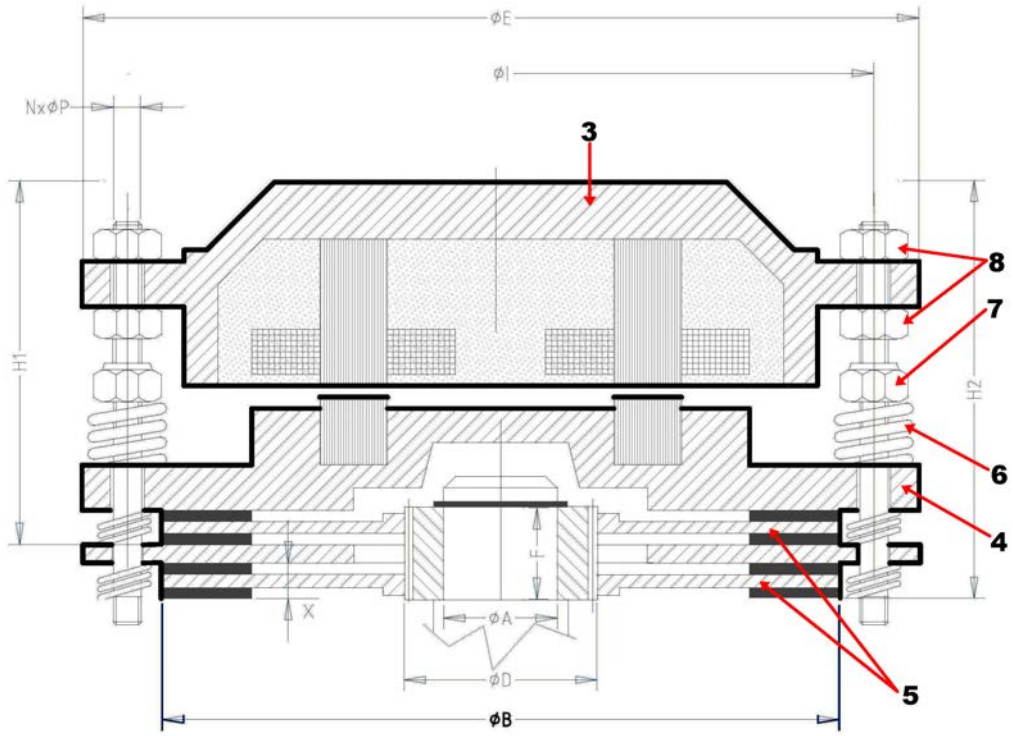
THE HOISTING MOTOR BRAKE TYPE (14,7 KW) IS: **GR9**

THIS IS A DC POWERED BRAKE HAVING A DISC BRAKE WITH SPLINED HUB KEYED ONTO THE PINION.

10.4.3) CRANE VERSION T

THE HOISTING MOTOR BRAKE TYPE (18 KW) IS: **160 MSDD**

THIS IS A DOUBLE DISC BRAKE WITH SPLINED HUB KEYED ONTO THE PINION.



Picture 2

KEY:

A (MOTOR SHAFT DIAMETER)
B (BRAKE DISC DIAMETER)
E (ELECTROMAGNET DIAMETER)
F (HUB HEIGHT)
H2 (TOTAL BRAKE HEIGHT)
I (TIE ROD CIRCUMFERENCE DIAMETER)
N (TIE RODS)
P (TYPE OF TIE ROD)
X (BRAKE DISC HEIGHT)

3 = ELECTROMAGNET
8 = LOCK NUTS
7 = SPRING ADJUSTING NUTS
6 = SPRINGS
4 = MOVABLE KEEPER
5 = 2 DISCS WITH BRAKING SURFACE

10.4.4) CHARACTERISTICS OF THE 140 MSDD BRAKE

CHARACTERISTICS (SEE Picture 2) :

A (MOTOR SHAFT DIAMETER)	= 34 mm
B (BRAKE DISC DIAMETER)	= 192 mm
E (ELECTROMAGNET DIAMETER)	= 240 mm
F (HUB HEIGHT)	= 20X35X6
H2 (TOTAL BRAKE HEIGHT)	= 120 mm
I (TIE ROD CIRCUMFERENCE DIAMETER)	= 210 mm
N (TIE RODS)	= 6
P (TYPE OF TIE ROD)	= M12
X (BRAKE DISC HEIGHT)	= 10,5 mm

MAGNETIC GAP ADJUSTMENT

MAGNETIC GAP = 0,80 mm (FIRST ADJUSTMENT)
MAXIMUM ALLOWED VALUE OF THE MAGNETIC GAP = 1,2 mm

BRAKING TORQUE ADJUSTMENT

BRAKING TORQUE = 155 Nm (FIRST ADJUSTMENT)
HEIGHT OF THE SPRINGS = DISTANCE BETWEEN THE LEVEL OF THE SELF-LOCKING NUT AND THE LEVEL OF THE KEEPER
HEIGHT OF THE SPRINGS = 24 mm (FIRST ADJUSTMENT)
(MAX BRAKING TORQUE = 310 Nm HEIGHT OF THE SPRINGS = 18 mm)
(FREE HEIGHT OF THE SPRINGS (**6**) = 30 mm.)

LIMIT THICKNESS FOR THE DISC REPLACEMENT

The REPLACEMENT OF THE DISC MUST OCCUR AFTER THE CONSUMPTION OF THE FRICTION MATERIAL EQUAL TO 1.5 mm PER RING, THAT IS, WHEN THE MINIMUM VALUES OF TOTAL THICKNESS ARE REACHED (METAL THICKNESS + RING THICKNESS) SEE BELOW:
LIMIT THICKNESS FOR THE DISC REPLACEMENT
THICKNESS = 9 mm.

HOISTING BRAKE ADJUSTMENT

THE ADJUSTMENT OF THE BRAKING TORQUE IS OBTAINED BY COMPRESSING THE SPRINGS "**6**" BY MEANS OF THE SELF-LOCKING NUTS "**7**".
THE PRELOAD MUST BE UNIFORM FOR ALL THE SPRINGS AND SUCH AS TO OBTAIN A BRAKING ACTION THAT STOPS THE LOAD DESCENT IN A SPACE OF MAX. **0,5 mt.** TEST THE CALIBRATION SEVERAL TIMES WITH REPEATED MANEUVERS WITH LOAD.

10.4.4) CHARACTERISTICS OF THE 160 MSDD BRAKE

CHARACTERISTICS (SEE Picture 2) :

A	(MOTOR SHAFT DIAMETER)	= 42 mm
B	(BRAKE DISC DIAMETER)	= 205 mm
E	(ELECTROMAGNET DIAMETER)	= 255 mm
F	(HUB HEIGHT)	= 23X40X6
H2	(TOTAL BRAKE HEIGHT)	= 124 mm
I	(TIE ROD CIRCUMFERENCE DIAMETER)	= 225 mm
N	(TIE RODS)	= 6
P	(TYPE OF TIE ROD)	= M12
X	(BRAKE DISC HEIGHT)	= 10,5 mm

MAGNETIC GAP ADJUSTMENT

MAGNETIC GAP = 0,70 mm (FIRST ADJUSTMENT)
MAXIMUM ALLOWED VALUE OF THE MAGNETIC GAP = 1,05 mm

BRAKING TORQUE ADJUSTMENT

BRAKING TORQUE = 150 Nm (FIRST ADJUSTMENT)
HEIGHT OF THE SPRINGS = DISTANCE BETWEEN THE LEVEL OF THE SELF-LOCKING NUT AND THE LEVEL OF THE KEEPER
HEIGHT OF THE SPRINGS = 25,0 mm (FIRST ADJUSTMENT)
(MAX BRAKING TORQUE = 280 Nm HEIGHT OF THE SPRINGS = 21 mm)
(FREE HEIGHT OF THE SPRINGS (6) = 30 mm.)

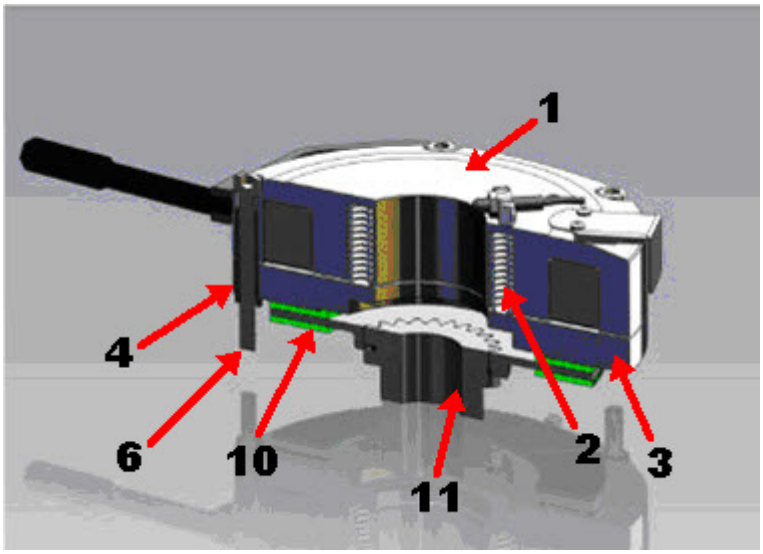
LIMIT THICKNESS FOR THE DISC REPLACEMENT

The REPLACEMENT OF THE DISC MUST OCCUR AFTER THE CONSUMPTION OF THE FRICTION MATERIAL EQUAL TO 1.5 mm PER RING, THAT IS, WHEN THE MINIMUM VALUES OF TOTAL THICKNESS ARE REACHED (METAL THICKNESS + RING THICKNESS) SEE BELOW:
LIMIT THICKNESS FOR THE DISC REPLACEMENT
THICKNESS = 9 mm.

HOISTING GROUP BRAKE ADJUSTMENT

THE ADJUSTMENT OF THE BRAKING TORQUE IS OBTAINED BY COMPRESSING THE SPRINGS "**6**" BY MEANS OF THE SELF-LOCKING NUTS "**7**".
THE PRELOAD MUST BE UNIFORM FOR ALL THE SPRINGS AND SUCH AS TO OBTAIN A BRAKING ACTION THAT STOPS THE LOAD DESCENT IN A SPACE OF MAX. **0,5 mt.** TEST THE CALIBRATION SEVERAL TIMES WITH REPEATED MANEUVERS WITH LOAD.

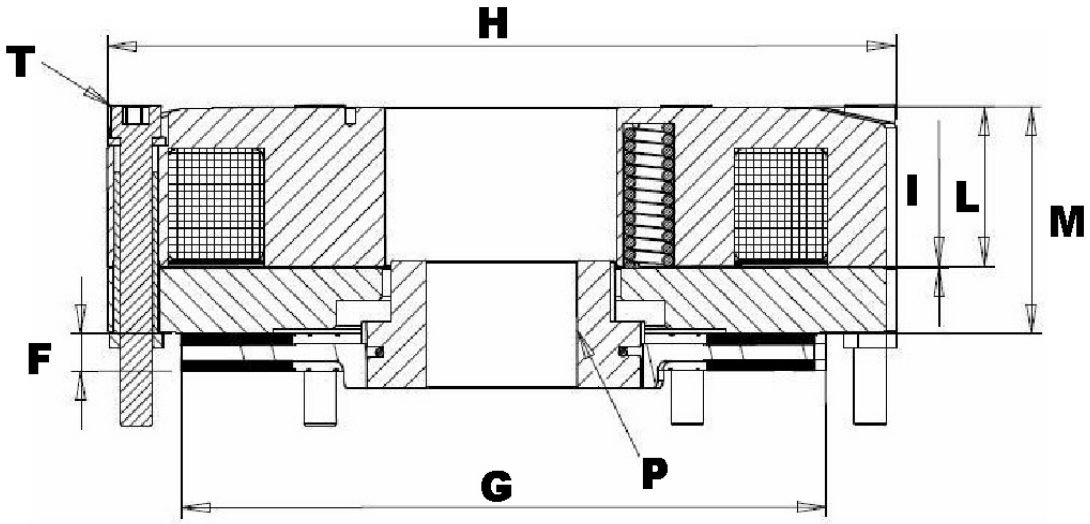
10.4.5) CHARACTERISTICS OF THE GR9 BRAKE



Picture 3

KEY:

1 = ELECTROMAGNET
2 = PRESSURE SPRINGS
3 = MOVABLE KEEPER
4 = ADJUSTING UNITS
6 = FASTENING SCREWS (TIE RODS)
10 = BRAKE DISC
11 = PINION



Picture 4

KEY:

BRAKE TYPE GR9

POWER 135 Watt
STATIC TORQUE = 280 Nm
TIE RODS (T) = 6 TYPE M10 x 90
PINION (P) mod 3
Z = 28
∅A = 230 mm
B = 60 mm
∅C = 256 mm
D = 261 mm
E = 438 mm
F = 12 mm
∅G = 202 mm
∅H = 248 mm
I = 0,3 mm
L = 50 mm
M = 71 mm

FIRST ADJUSTMENT OF THE BRAKE

BRAKE GR9

BRAKING TORQUE = 250 Nm (FIRST ADJUSTMENT)

THE MAGNETIC GAP IS THE DISTANCE BETWEEN ELECTROMAGNET (1) AND MOVABLE KEEPER (3) EXPRESSED IN mm.
MAGNETIC GAP = 0,40 mm (FIRST ADJUSTMENT)

ELECTROMAGNETIC RESISTANCE (Ω) AT 20°C = 215

MAGNETIC GAP

THE WEAR OF THE GASKET DUE TO THE NORMAL WORKING OF THE BRAKE INCREASES THE THICKNESS OF THE MAGNETIC GAP.
IF THE WEAR IS EXCESSIVE THE ELECTROMAGNET DOES NOT ATTRACT THE MOVABLE KEEPER ANYMORE.
IT IS VERY IMPORTANT TO PERFORM A PERIODICAL ADJUSTMENT OF THE MAGNETIC GAP.

THE MINIMUM THICKNESS OF THE BRAKE DISC IS 9mm.

WHEN THE MAGNETIC GAP REACHES THE VALUE OF 1mm IT IS COMPULSORY TO BRING THE MEASURE AGAIN TO 0.40 mm.

DANGER

MAGNETIC GAP ADJUSTMENT

THE MAGNETIC GAP CAN BE ADJUSTED BY ACTING ON THE ADJUSTING UNITS (4), AFTER LOOSENING THE FASTENING SCREWS (6). THE IDEAL VALUE OF THE MAGNETIC GAP IS 0.40 mm (+0.05 / - 0.05).

THE MAXIMUM ACCEPTABLE VALUE OF THE MAGNETIC GAP IS 1mm.

THE INCREASE OF THE MAGNETIC GAP RESULTING FROM THE WEAR OF THE GASKET CHANGES THE PERFORMANCE OF THE BRAKE.

THE NON-ADJUSTMENT OF THE MAGNETIC GAP LEADS TO THE MALFUNCTION OF THE BRAKE.

ADJUSTMENT OF THE BRAKE TORQUE

THE BRAKE "GR" TYPE ALLOWS CHANGING THE TORQUE BY MODIFYING THE NUMBER OF SPRINGS. SINCE THE SPRINGS ARE INSIDE THE BRAKE UNIT, THIS ADJUSTMENT CAN BE CARRIED OUT ONLY LOOSENING THE FIXING TIE RODS, LIFTING THE WHOLE MOVABLE KEEPER AND ELECTROMAGNET GROUP AND REPLACING THE INTERNAL SPRINGS.

11- MACHINE SETTING

11.1) OPERATIONS TO CARRY OUT BEFORE ANY WORK CYCLE

- CALIBRATION AND TEST OF THE MOMENT LIMITING DEVICES (QMS), MAXIMUM LOAD AND SPEED LIMITING DEVICES (QLS) AND TROLLEY TRANSLATION LIMITING DEVICES (E-TROLLEY)
- FREQUENT CHECK OF THE HOISTING, SLEWING AND TROLLEYING LIMIT SWITCHES
- CHECK OF THE CORRECT WORKING OF THE HOISTING, SLEWING AND TROLLEYING BRAKES
- CHECK THE EARTHING
- CHECK THE CORRECT WINDING OF THE ROPES ON THE PULLEYS AND ON THE DRUMS, WHERE AT LEAST 3 TURNS OF ROPE MUST ALWAYS BE WOUND.
- CHECK ALL THE FIXED AND MOVABLE JOINTS
- CHECK THE 4 BASE BEARINGS
- MAKE SURE THAT THE BEARING STRUCTURE OF THE MACHINE KEEPS ITS OWN GEOMETRICAL SHAPE, WITHOUT ANY CHANGE OF ITS COMPONENTS.
- MAKE SURE THAT THE MESH OF THE UNCOVERED GEARS IS NOT POTENTIALLY DANGEROUS FOR THE NORMAL USE OF THE CRANE
- CHECK THE CORRECT ROTATION DIRECTION OF THE MOTORS

11.2) INSTRUCTIONS FOR THE RATIONAL USE OF THE CONTROLS

- THE CONTROL BUTTONS SHALL BE OPERATED IN SEQUENCE AND NOT SIMULTANEOUSLY.

THE "EMERGENCY STOP" BUTTON MUST NOT BE USED NORMALLY AS A MANOEUVRE DEVICE.

- THE CONTROL DEVICE, THE PUSH-BUTTON PANEL OR THE RADIO CONTROL SHALL BE PLACED ON A FLAT SURFACE IN ORDER TO GUARANTEE STABILITY.
- THE LOAD LIMITING DEVICES, THE STOP BUTTON AND THE MOMENT LIMITING DEVICES ARE SAFETY DEVICES, WHICH CANNOT BE USED FOR THE MANOEUVRES: THEREFORE, IT IS FORBIDDEN TO USE THEM AS CONTROL AND/OR STOP DEVICES.

11.3) ADJUSTMENT OF THE TIMERS

THE TIMERS, WHERE INSTALLED, HAVE ALREADY BEEN ADJUSTED CORRECTLY BEFORE THE CRANE DELIVERY.

11.4) PUTTING THE CRANE OUT OF SERVICE

WARNING

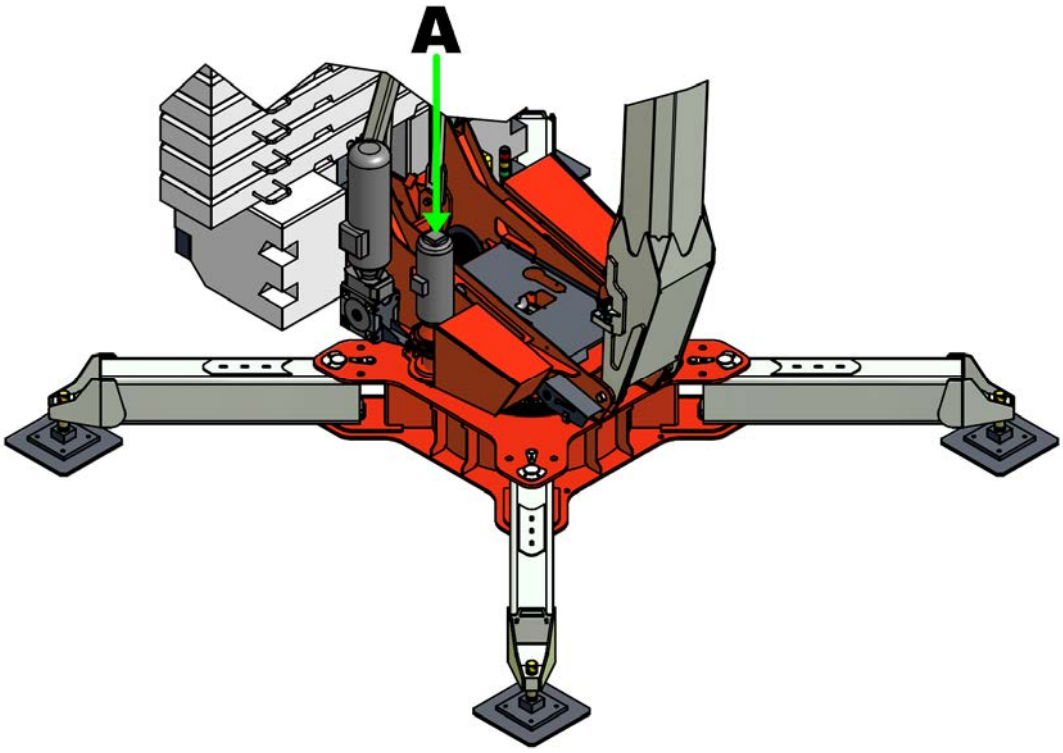
AT THE END OF EACH WORK CYCLE OR IF THE WIND SPEED EXCEEDS THE VALUES MENTIONED IN POINT 3.3.6, IT IS COMPULSORY TO PUT THE CRANE OUT OF SERVICE ACCORDING TO PRESCRIPTIONS OF POINT 3.3.13.

IT IS IMPORTANT TO POSITION THE JIB CORRECTLY, IN THE PROBABLE DIRECTION OF THE WIND, AND CHECK THAT THERE ARE NO HANGING LOADS. RELEASE THE SLEWING BRAKE, CHECK THAT NO OBSTACLE HINDERS THE SLEWING, MAKE SURE THAT THE CRANE CAN BE FREELY POSITIONED LEEWARD, TURN THE MAIN SWITCH TO "**0**", REMOVE THE CONTROL PUSH-BUTTON PANEL AND PLACE IT IN A SAFE PLACE.

SLEWING BRAKE RELEASE

TURN THE KNOB "**A**" CLOCKWISE UNTIL YOU REACH THE LOCK POSITION THAT CORRESPONDS TO THE STROKE END OF THE KNOB: IN THIS WAY, THE MOVABLE KEEPER IS FORCEFULLY LIFTED AND THE BRAKE DISC IS FREE TO TURN.

WHEN IT IS NECESSARY TO PUT THE CRANE AGAIN INTO SERVICE, TURN THE KNOB "**A**" COUNTERCLOCKWISE UP TO THE STROKE END OF THE KNOB TO RESTORE THE NORMAL OPERATION OF THE SLEWING BRAKE.



Picture 1

KEY:

" A " = SLEWING BRAKE RELEASE KNOB

11.5) INVERTER ADJUSTMENT

ALL THE PROGRAMMING PARAMETERS ARE CORRECTLY ENTERED INTO THE INVERTERS IN THE FACTORY BEFORE THE CRANE DELIVERY: IT IS STRICTLY FORBIDDEN TO CHANGE SUCH PROGRAMMING, EXCEPT IF AFTER SPECIFIC AUTHORIZATION OF THE COMPANY.

OTHERWISE, THE WARRANTY WILL BE NO MORE VALID DUE TO TAMPERING .

WARNING

THE TAMPERING OF INVERTERS AND RELATED PROGRAMS MAY CAUSE SERIOUS DAMAGES TO PROPERTY OR PEOPLE.

12- CRANE DISASSEMBLY

WARNING

THE MANUFACTURER REFUSES ALL RESPONSIBILITY FOR ANY INOBSERVANCE OF THESE INSTRUCTIONS, WHICH DO NOT REPRESENT ANY ALTERNATIVE TO THE SPECIFIC PREPARATION OF PROFESSIONAL OPERATORS OF **PROVEN COMPETENCE AND EXPERIENCE**. IN ADDITION, THE MANUFACTURER REFUSES ALL RESPONSIBILITY FOR ANY DAMAGE DUE TO ERECTION/DISASSEMBLY OPERATIONS CARRIED OUT BY UNAUTHORISED PERSONNEL.

12.1) PRELIMINARY OPERATIONS FOR CLOSING JIBS 4/5 AND JIB 3

- MAKE SURE THAT THE MINIMUM NECESSARY SPACE CORRESPONDS TO THAT INDICATED IN POINTS 5.1) AND 5.9)

- IN THIS PHASE IT IS ADVISABLE, EVEN IF NOT COMPULSORY, TO HANG A WINDSOCK ON THE BLOCK: THIS SHOWS THE DIRECTION OF THE WIND THAT, EVEN IF IT IS LOWER THAN THE SAFETY THRESHOLD, MAY PRODUCE WIND GUSTS. IN SUCH A CASE, POSITION THE CRANE LEEWARD BEFORE STARTING THE JIB CLOSING (THE WIND BLOWS TOWARDS THE CRANE MAST).

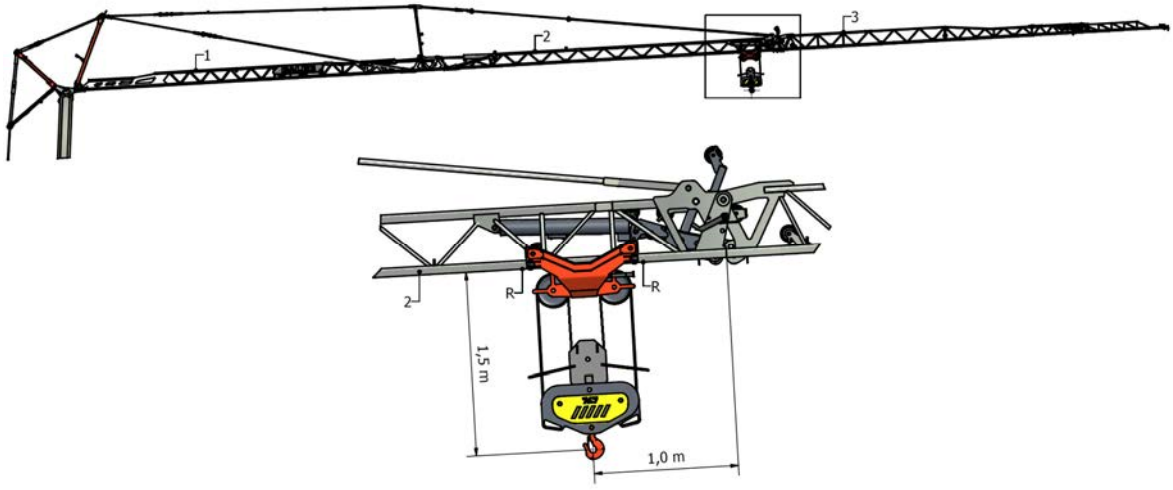
- MAKE SURE OF USING PERSONAL PROTECTION EQUIPMENT.

- MAKE SURE THAT FROM NOW ON NO LOAD IS HUNG ON THE BLOCK.

- SWITCH THE “WORK/ERECTION CONFIGURATION” SELECTOR TO "**L4**".
(SEE DIAGRAM PAR. 9.1.2.1 “WORK/ERECTION CONFIGURATION” SELECTOR)

- PLACE THE CONNECTION BETWEEN THE MAIN BLOCK AND THE INTERMEDIATE BLOCK AND SET THE HOISTING POSITION WITH **FOUR-FALL ROPE**.

- **PLACE THE TROLLEY IN DISASSEMBLY POSITION PROVIDED FOR THE CLOSING OF 4/5 AND 3 JIBS,** APPROXIMATELY ABOUT **1m** FROM THE END OF THE SECOND JIB ELEMENT IN THE AREA DELIMITED BY THE RED PAINT UNDER THE LOWER LONGITUDINAL MEMBERS OF THE JIB, AS SHOWN IN THE PICTURE BELOW, BRINGING THE BLOCK TO RISE LIMIT STOP POSITION.
THE ADJACENCY OF THE TROLLEY AT THE BEGINNING OF THE 3RD JIB ELEMENT ALLOWS THE ROPES OF THE TROLLEY TO ENTER THE APPROPRIATE SEATS OF THE PULLEYS / ROLLERS.
CAUTION: CHECK THAT THE TROLLEY ROPES DO NOT EXIT DURING THE FOLDING OF THE JIB.



Picture 1

DANGER

NOTE: IT IS FORBIDDEN TO REMOVE THE WORK BALLAST FROM THE CRANE
BEFORE CARRYING OUT THE OPERATIONS OF THE POINTS THAT PRECEDE PAR. 12.4).

12.2) FOLDING OF JIBS 4/5 AND 3

WARNING

NOTE: IT IS FORBIDDEN TO FOLD THE JIB IN A WAY OTHER THAN THE ONE DESCRIBED IN PAR. 12.2. KEEP TO THE DESCRIBED PROCEDURE.

- CHECK THAT THE SPACE REQUIRED FOR THE JIB FOLDING IS FREE FROM OBSTACLES.

- MAKE SURE IT IS NOT WINDY (WIND SPEED LOWER THAN **15km/h**) AS DESCRIBED IN POINT 3.3.6).

WHEN THIS VALUE IS EXCEEDED, AN INTERMITTENT ACOUSTIC SIGNAL WARNS THE OPERATOR **NOT** TO START THE OPENING / CLOSING PHASE OF THE JIB.

DO NOT CLOSE THE JIB OF THE CRANE IN THE EVENT OF **CROSS-WIND**, WAIT FOR THE WIND TO CEASE; IF POSSIBLE, POSTPONE THE OPERATION THE FIRST DAY WITHOUT WIND.

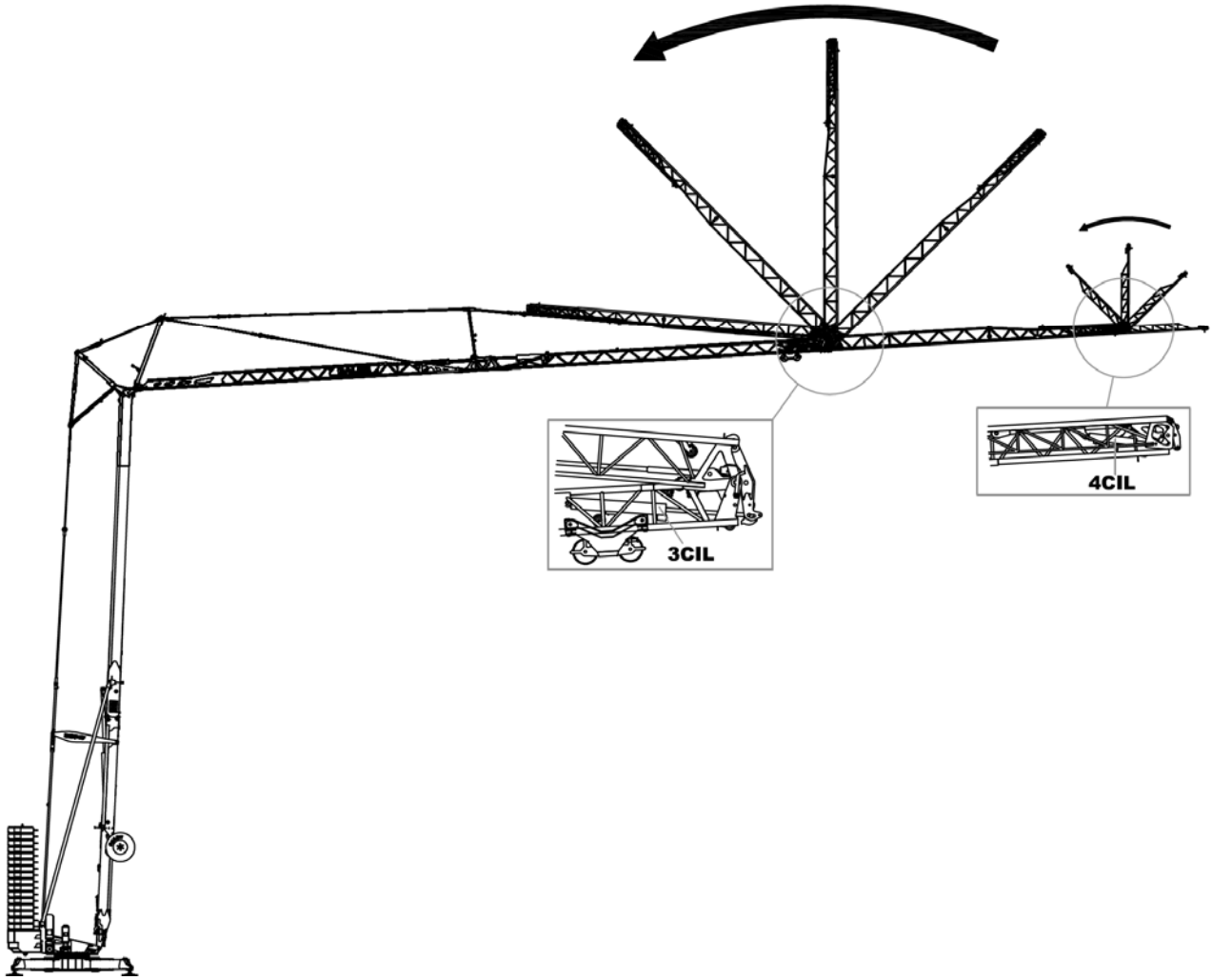
- IT IS FORBIDDEN TO CARRY OUT THE CRANE SLEWING DURING THE JIB CLOSING.

- TURN THE "WORK/ERECTION CONFIGURATION" SELECTOR (SEE PAR 9.1.2.1), LOCATED INSIDE THE ELECTRICAL CABINET, TO "**M3**" WHICH IS THE POSITION FOR OPENING / CLOSING THE SECONDARY JIBS 4/5 AND 3.

- WARNING: TO REMOVE ANY AIR BUBBLES FROM THE HYDRAULIC CIRCUIT, PRESS THE **"HOISTING-RISE"** BUTTON FOR SOME SECONDS (ABUT 10 sec.) UNTIL YOU CAN HEAR THE NOISE OF THE OIL BEING DRAINED BY THE MAX. PRESSURE VALVE, CHECKING THE ACHIEVEMENT OF THE MAX. PRESSURE ON THE PRESSURE GAUGE.

- PRESS THE BUTTON **"HOISTING DESCENT "** UNTIL YOU REACH THE COMPLETE FOLDING OF JIB 3 ON THE TIE ROD THAT SUPPORTS THE SECOND JIB ELEMENT; RELEASE IT ONLY WHEN YOU CAN HEAR THE NOISE OF THE OIL BEING DRAINED BY THE MAX. PRESSURE VALVE.

THE OPERATION PROVIDES THAT JIB **5** CLOSES ON JIB **4** AUTOMATICALLY AND THEN THAT JIB **3** (INCLUDING **4/5**) FOLDS ON JIB **2** AUTOMATICALLY.



Picture 2

12.3) PRELIMINARY OPERATIONS FOR CLOSING JIB 2 AND JIB 1

WARNING

NOTE: IT IS FORBIDDEN TO FOLD THE JIB IN A WAY OTHER THAN THE ONE DESCRIBED IN PAR. 12.2. KEEP TO THE DESCRIBED PROCEDURE.

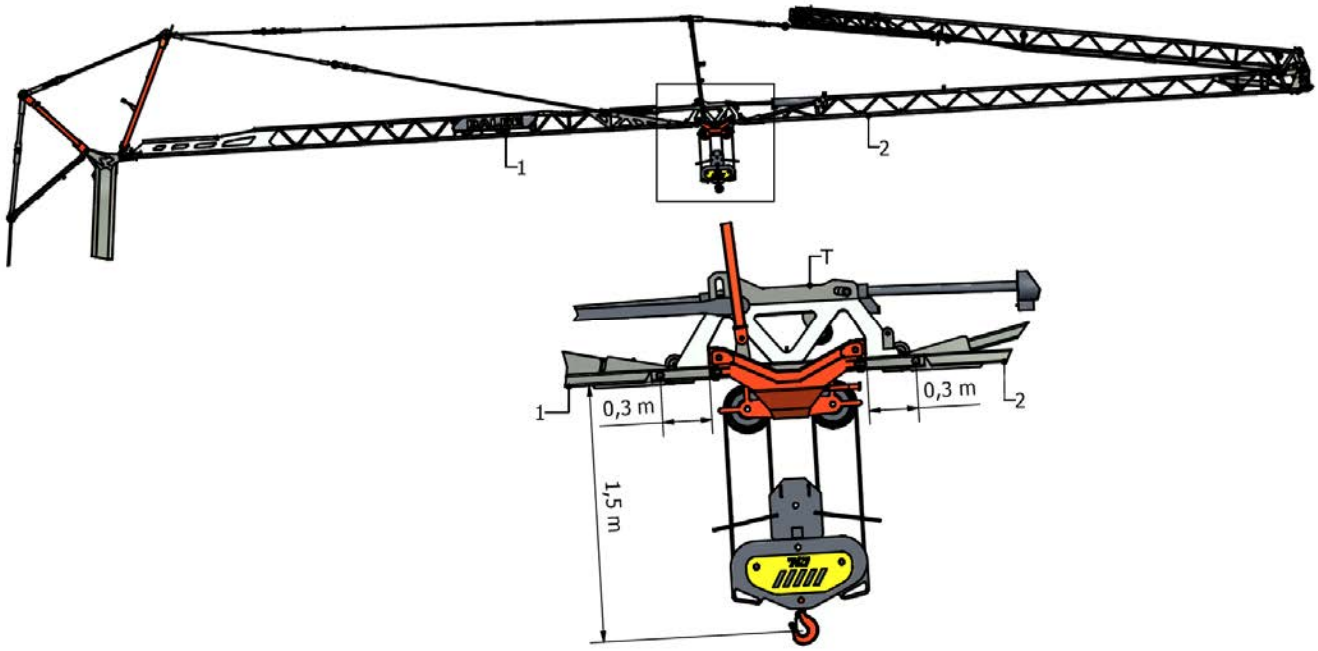
- MAKE SURE THAT THE MINIMUM NECESSARY SPACE CORRESPONDS TO THAT INDICATED IN POINTS 5.1) AND 5.9)

- IN THIS PHASE IT IS ADVISABLE, EVEN IF NOT COMPULSORY, TO HANG A WINDSOCK ON THE BLOCK: THIS SHOWS THE DIRECTION OF THE WIND THAT, EVEN IF IS LOWER THAN THE SAFETY THRESHOLD, MAY PRODUCE WIND GUSTS. IN SUCH A CASE, POSITION THE CRANE LEEWARD BEFORE STARTING THE JIB CLOSING (THE WIND BLOWS TOWARDS THE CRANE MAST).

- PLACE THE CONNECTION BETWEEN THE MAIN BLOCK AND THE INTERMEDIATE BLOCK AND SET THE POSITION WITH **FOUR-FALL ROPE**.

- SWITCH THE “WORK/ERECTION CONFIGURATION” SELECTOR TO "**L4**".

- **PLACE THE TROLLEY IN THE DISASSEMBLY POSITION PROVIDED FOR THE CLOSING OF JIBS 1 AND 2,** EXACTLY UNDER THE CENTRAL ADAPTER OF THE JIB, IN THE AREA DELIMITED BY THE RED PAINT IN THE LOWER PART OF THE ADAPTER, AS SHOWN IN THE PICTURE BELOW, BRINGING THE BLOCK TO RISE LIMIT STOP POSITION.



Picture 3

12.4) FOLDING OF JIBS 2 AND 1

WARNING

NOTE: IT IS FORBIDDEN TO FOLD THE JIB IN A WAY OTHER THAN THE ONE DESCRIBED IN PAR. 12.2. KEEP TO THE DESCRIBED PROCEDURE.

- CHECK THAT THE SPACE REQUIRED FOR THE JIB FOLDING IS FREE FROM OBSTACLES.

- IN THIS PHASE IT IS ADVISABLE, EVEN IF NOT COMPULSORY, TO HANG A WINDSOCK ON THE BLOCK: THIS SHOWS THE DIRECTION OF THE WIND THAT, EVEN IF IS LOWER THAN THE SAFETY THRESHOLD, MAY PRODUCE WIND GUSTS. IN SUCH A CASE, POSITION THE CRANE LEEWARD BEFORE STARTING THE JIB CLOSING (THE WIND BLOWS TOWARDS THE CRANE MAST).

- MAKE SURE IT IS NOT WINDY (WIND SPEED LOWER THAN 15km/h) AS DESCRIBED IN POINT 3.3.6).

WHEN THIS VALUE IS EXCEEDED, AN INTERMITTENT ACOUSTIC SIGNAL WARNS THE OPERATOR **NOT** TO START THE OPENING / CLOSING PHASE OF THE JIB.
DO NOT CLOSE THE JIB OF THE CRANE IN THE EVENT OF CROSS-WIND, WAIT FOR THE WIND TO CEASE; IF POSSIBLE, POSTPONE THE OPERATION THE FIRST DAY WITHOUT WIND.

- IT IS FORBIDDEN TO CARRY OUT THE CRANE SLEWING DURING THE JIB CLOSING.

- TURN THE "WORK/ERECTION CONFIGURATION" SELECTOR (SEE PAR 9.1.2.1), LOCATED INSIDE THE ELECTRICAL CABINET, TO "**M2**" WHICH IS THE POSITION FOR OPENING / CLOSING THE MAIN JIBS 1 AND 2.

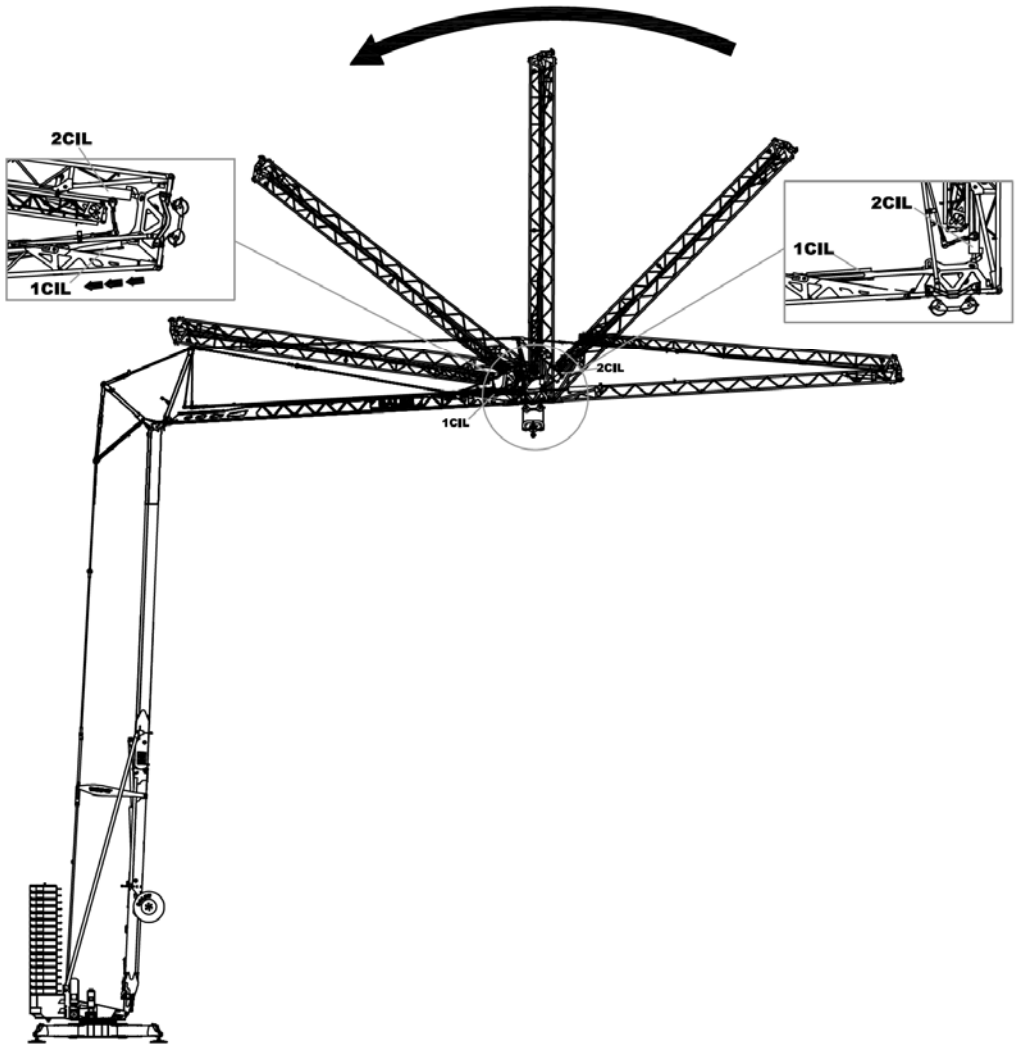
- TO REMOVE ANY AIR BUBBLES, PRESS THE "**HOISTING-RISE" BUTTON** FOR SOME SECONDS (ABUT 10 sec.) UNTIL YOU CAN HEAR THE NOISE OF THE OIL BEING DRAINED BY THE MAX. PRESSURE VALVE, CHECKING THE ACHIEVEMENT OF THE MAX. PRESSURE ON THE PRESSURE GAUGE.

- PRESS THE BUTTON **"HOISTING DESCENT "** UNTIL YOU REACH THE COMPLETE FOLDING OF JIB 1 ON THE ROLLS THAT ACT ON THE PIN OF THE MAIN SCREW DOWN JACK "P1"; RELEASE IT ONLY WHEN YOU CAN HEAR THE NOISE OF THE OIL BEING DRAINED BY THE MAX. PRESSURE VALVE.

CHECK THE CORRECT SEQUENCE OF MOVEMENTS OF THE CYLINDERS THAT CLOSE THE JIB, CHECKING THAT THE **2CIL** IS ACTIVATED FIRST AND THAT **1CIL** DOES NOT MOVE UP TO THE COMPLETE CLOSING OF 2CIL.

- CHECK THAT NO TIE ROD IS CAUGHT DURING THE JIB CLOSING.

- NEVER INTERRUPT, IF NOT STRICTLY NECESSARY, THE JIB CLOSING PHASE. IN THIS CASE, AVOID ANY STRUCTURE OSCILLATION.



Picture 4

12.5) WORK BALLAST REMOVAL

BEFORE THE DISASSEMBLY OF THE TOWER, REMOVE THE WORK BALLAST BLOCKS, ONE AT A TIME (N16 BLOCKS OF 1750 kg/each).

- FOR THE REMOVAL OF THE WORK BALLAST BLOCKS, FOLLOW THE POINTS IN PAR. 8.4.1.1) IN REVERSE ORDER.

N.B.: THE CENTRAL BALLAST FOR A TOTAL WEIGHT OF Kg. 5600 MUST NOT BE REMOVED, SEE PAR 4.6.1)
- AFTER REMOVING THE WORK BALLAST, IT IS FORBIDDEN TO LIFT ANY KIND OF LOAD.

12.6) TOWER DISASSEMBLY

- CHECK THAT THE SPACE REQUIRED FOR THE TOWER DISASSEMBLY IS NOT OCCUPIED BY PERSONS OR OBSTACLES.

MAKE SURE THAT YOU ARE IN THE ABSENCE OF WIND IN ACCORDANCE WITH POINT 3.3.6).

POSITION THE “WORK/MOUNTING CONFIGURATION” SELECTOR (SEE PAR 9.1.2.1), LOCATED INSIDE THE SWITCHBOARD, ON **"M1"** WHICH IS THE POSITION FOR THE TOWER DISASSEMBLY.

PRESS AND KEEP PRESSED THE BUTTON **"P** " INSIDE THE ELECTRICAL PANEL PART. A, AND OPERATE THE **"RISE-HOISTING" BUTTON** FOR A FEW SECONDS (10 sec.) UNTIL THE NOISE OF OIL DISCHARGED FROM THE MAXIMUM PRESSURE VALVE IS AUDIBLE.

THIS MANOEUVRE ALLOWS REMOVING ANY AIR BUBBLES FROM THE HYDRAULIC CIRCUIT DEDICATED TO THE TOWER CYLINDER.

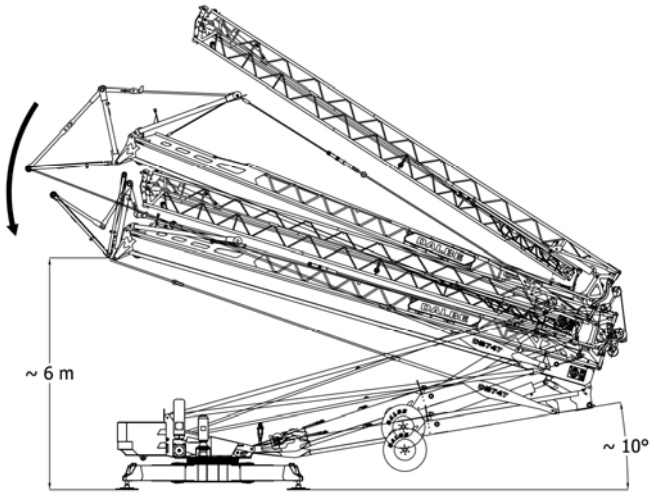
BUTTON “P” CORRESPONDS TO THE DISCONNECTION OF THE LIFTING LIMIT SWITCH DURING THE CRANE ERECTION/DISASSEMBLY.

12.6.1) CLOSING OF SCREW DOWN JACK P3

THE CRANE IS EQUIPPED WITH AN INTELLIGENT SYSTEM TO CLOSE THE LOWER SCREW DOWN JACK “P3” AUTOMATICALLY THROUGH A DEDICATED HYDRAULIC CYLINDER.

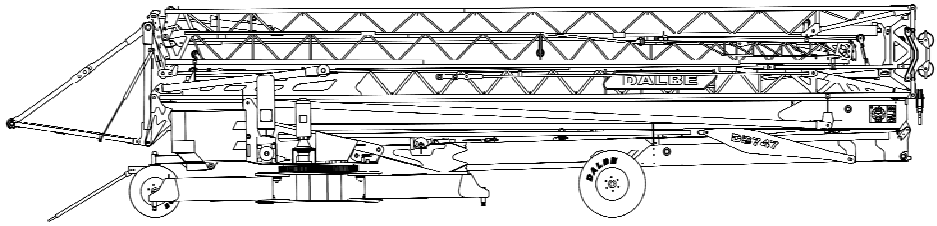
THIS SYSTEM HAS A RANGE IN WHICH THE LOWER SCREW DOWN JACK “P3” CAN BE CLOSED. THIS RANGE IS COMPRISED BETWEEN:

- CRANE IN MOUNTING PHASE AND HEIGHT FROM THE GROUND OF THE SCREW DOWN JACK "P3" OF ABOUT 6m:



Picture 5

- CRANE IN TRANSPORT CONFIGURATION (CRANE DISASSEMBLY COMPLETED):



Picture 6

THE TOWER DISASSEMBLY MUST BE CARRIED OUT BY FOLLOWING THE STEPS BELOW:

CLOSING DURING DISASSEMBLY:

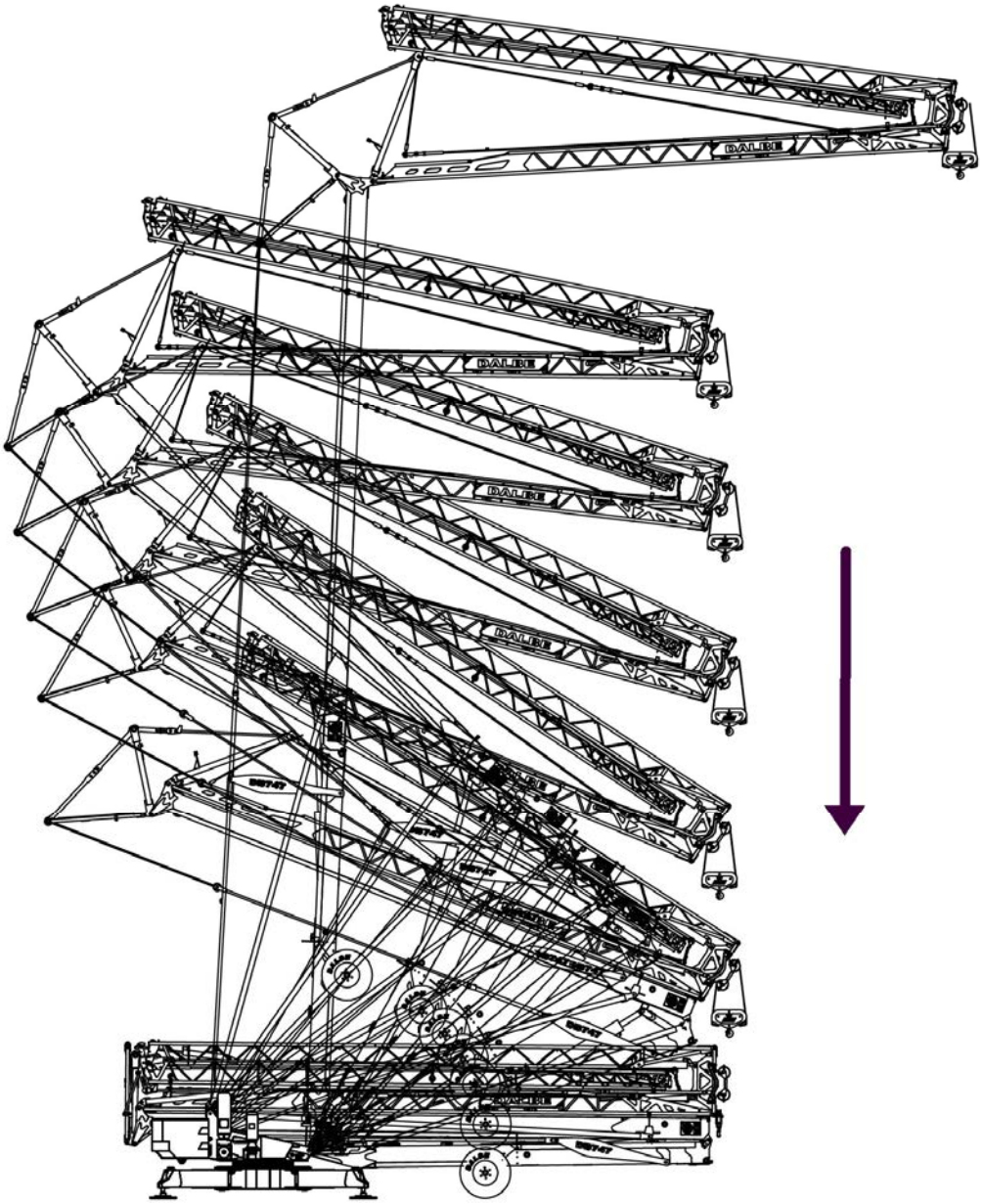
1) PRESS THE **'DESCENT-HOISTING' BUTTON**.
2) AT THE MAXIMUM HEIGHT AT WHICH IT IS POSSIBLE TO CLOSE THE LOWER SCREW DOWN JACK "P3" THE CRANE HORN WILL SOUND 3 WARNINGS AND THE RED AND ORANGE LIGHT INDICATORS WILL FLASH 5 TIMES SIMULTANEOUSLY.
   AT THIS POINT THE DISASSEMBLY MANOEUVRE IS AUTOMATICALLY INTERRUPTED.
   FROM NOW ON, IT IS POSSIBLE TO CLOSE THE LOWER SCREW DOWN JACK 'P3' AT THE POINT YOU CONSIDER MOST APPROPRIATE.
   N.B.: IF YOU INTEND TO CLOSE THE LOWER SCREW DOWN JACK 'P3' AT A LOWER HEIGHT, RESUME THE 'DESCENT' MANOEUVRE AND STOP AT THE DESIRED POINT.
3) OPERATE THE "TROLLEY BACKWARD" CONTROL TO CLOSE THE LOWER SCREW DOWN JACK "P3" AND KEEP IT PRESSED UNTIL IT IS FULLY CLOSED.
4) CHECK THAT THE SCREW DOWN JACK IS FULLY CLOSED AND THAT THE LOWER SCREW DOWN JACK "P3" AND THE MEDIAN SCREW DOWN JACK "P2" ARE ALIGNED.
5) ONCE THE OPERATION IS COMPLETE, THE DISASSEMBLY OF THE TOWERS CAN BE RESUMED USING THE 'DESCENT' CONTROL, RELEASING THE BUTTON ONLY WHEN THE NOISE OF THE OIL BEING DISCHARGED FROM THE MAXIMUM PRESSURE VALVE IS AUDIBLE.

CLOSING ON THE GROUND:

1) PRESS THE **"DESCENT-HOISTING" BUTTON** UNTIL THE TWO TOWERS ARE FULLY FOLDED, RELEASING THE BUTTON ONLY WHEN THE SOUND OF OIL BEING DISCHARGED FROM THE MAXIMUM PRESSURE VALVE IS AUDIBLE.
2) ONCE THE OPERATION IS COMPLETE, PRESS THE "TROLLEY BACKWARD" BUTTON TO CLOSE THE SCREW DOWN JACK "P3" AND KEEP IT PRESSED UNTIL IT IS FULLY CLOSED.
3) CHECK THAT THE SCREW DOWN JACK IS FULLY CLOSED AND ALIGNED WITH THE MEDIAN SCREW DOWN JACK 'P2'.

MAKE SURE THAT NO TIE ROD ENTANGLES DURING THE DISASSEMBLY OF THE TOWERS

DO NOT INTERRUPT, UNLESS STRICTLY NECESSARY, THE DISASSEMBLY PHASE OF THE TOWERS, EXCEPT FOR THE CLOSING OF THE LOWER SCREW DOWN JACK "P3".
IN THE EVENT OF INTERRUPTIONS, AVOID ANY OSCILLATIONS OF THE STRUCTURE AS MUCH AS POSSIBLE.



Picture 7

- CHECK THAT THE SCREW DOWN JACK CLOSES COMPLETELY AND THAT THE TIE RODS BETWEEN THE LOWER SCREW DOWN JACK "P3" AND THE MEDIAL SCREW DOWN JACK "P2" ARE OVERLAPPED IN TRANSPORT POSITION AND THAT THE SCREW DOWN JACKS ARE ALMOST PARALLEL IN VERTICAL POSITION.

12.7) POSITIONING THE SCREW DOWN JACK “FASTENING HOOK”

REPEAT THE PROCEDURE DESCRIBED IN PAR 8.7 IN REVERSE ORDER ("OPENING SCREW DOWN JACK P3") AND POSITION THE HOOK IN SUCH A WAY THAT THE LOWER SCREW DOWN JACK IS FASTENED TO SCREW DOWN JACK P2 DURING THE TRANSPORT OF THE CRANE.

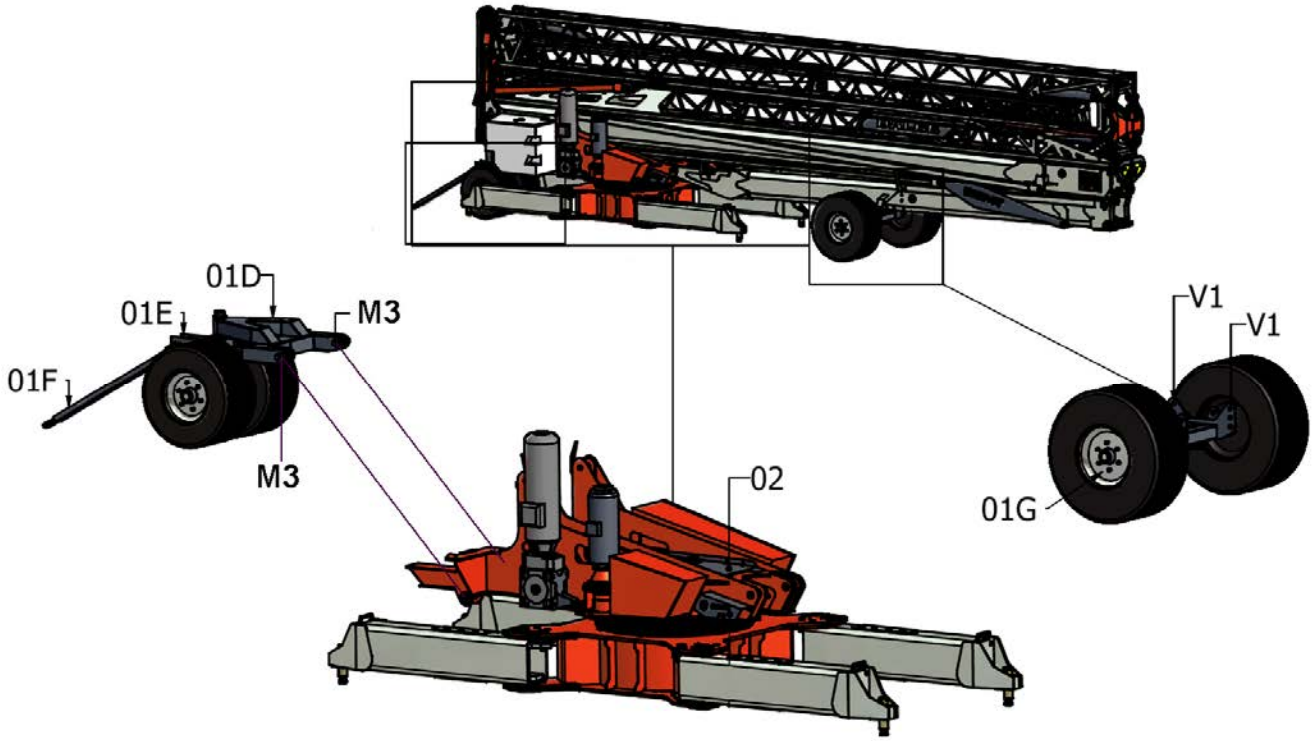
12.8) POSITIONING THE BLOCK FOR TRANSPORT

HOOK THE BLOCK TO THE TELESCOPIC SUPPORT FOR THE CRANE TRANSPORT PHASE, FOLLOWING THE INSTRUCTIONS OF PAR. 6.6 ("INSTRUCTIONS FOR BLOCK HOOKING DURING TRANSPORT ").

12.9) PRE-POSITIONING OF THE UNDERCARRIAGE TO TRANSPORT

- IF THE REAR AXLE (01G) HAS BEEN REMOVED FOR THE WORKING PHASE OF THE CRANE, MOUNT IT AGAIN FIXING IT TO THE LOWER MAST USING THE SPECIAL FASTENING SCREWS (V1).

- MOUNT THE FRONT AXLE (01E) AGAIN AND THE ADAPTER (01D) FASTENING THEM TO THE MOVABLE BASE OF THE CRANE USING THE SPECIAL FASTENING PINS (M3).



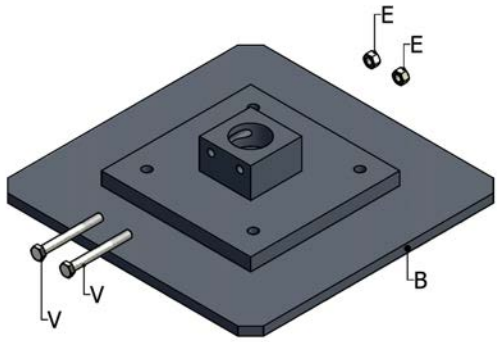
Picture 8

KEY:

01D = FRONT AXLE ADAPTER
01E = FRONT AXLE
01F = DRAWBAR
01G = REAR AXLE
M3 = PIN CONNECTING THE FRONT AXLE WITH THE MOVABLE BASE
V1 = SCREWS M30x80 + NUTS M30

WARNING: THE DRAWBAR+ RUBBER AXLE + ADAPTER ASSEMBLY IS NOT STABLE AND MAY TURN DUE TO THE EFFECT OF THE DECENTRALIZED BARYCENTRE AND TO THE POSSIBILITY OF THE AXLE STEERING, TAKE THE UTMOST CARE WHEN REPOSITIONING THIS ELEMENT ON THE CRANE: KEEP AWAY AND WORK WITH THE MAXIMUM CAUTION.

- REMOVE NUTS "**E**" FROM SCREWS "**V**" AND REMOVE SCREWS "**V**" SO THAT THE JACKS CAN BE TURNED AND RELEASED FROM THE ROUNDED SEAT OF THE STEEL BEARINGS.



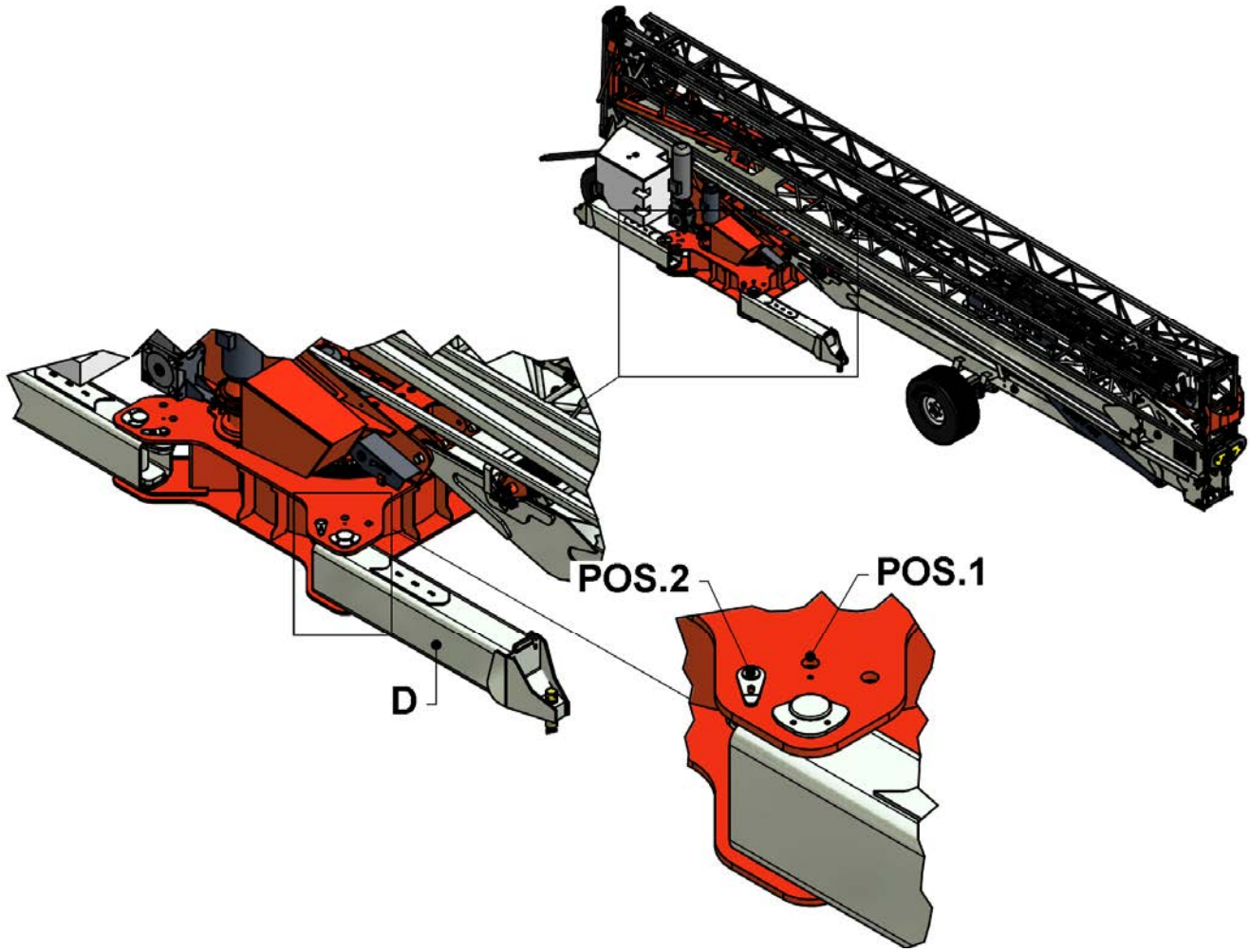
Picture 9

- REMOVE THE STEEL BEARINGS BY INSERTING AGAIN SCREWS "**V**" WITH THE CORRESPONDING NUTS "**E**" IN THE RELATED HOLES TO HAVE THEM AT ONE'S DISPOSAL FOR THE NEXT BUILDING YARD

- PLACE THE MOVABLE ARMS "**D**" IN TRANSPORT POSITION AND FIX THEM TO THE UNDERCARRIAGE WITH THE RELATIVE PINS "**S**" IN **POS. 2** LOCKING THEM BY USING THE SPLIT PINS.

- IF REQUIRED FOR THE POSITIONING OF THE MOVABLE SUPPORTS, IT IS POSSIBLE TO TURN THE UNDERCARRIAGE OF THE CRANE BY TURNING THE SELECTOR TO "WORK" (**L2** OR **L4**) AND GIVING THE RELATIVE COMMAND.

- CHECK THE TRANSPORT CONDITIONS REFERRING TO CHAP.**6**) "INSTRUCTIONS FOR THE CRANE TOWING".



Picture 10

KEY:

" D " = MOVABLE ARM
" POS.1 " = LOCK POSITION OF THE SLEWING LOCKING PIN IN WORK POSITION
" POS.2 " = LOCKING PIN FOR TRANSPORT POSITION

- FIX THE MACHINE THROUGH WEDGES NEAR THE WHEELS TO PREVENT THE MACHINE FROM MOVING ACCIDENTALLY.

- POWER OFF THE CRANE, TURNING THE MAIN SWITCH TO OFF.

- DISCONNECT THE POWER SUPPLY CABLE AND REMOVE THE SERVICE PUSH-BUTTON PANEL (IF CONNECTED).

- DISCONNECT THE EARTHING.

13- MAINTENANCE

WRITE DOWN ANY WORK ON THE CHECK REGISTER OF THE CRANE

ALWAYS CARRY OUT THE ADJUSTMENT OF THE EQUIPMENT Ref. Chap. 11 AND FOLLOW THE PRESCRIPTIONS

TO OBTAIN THE CORRECT WORKING AND A GOOD PRESERVATION OF THE DIFFERENT COMPONENTS OF THE CRANE, THE COMPANY PERSONNEL IN CHARGE OF MAINTENANCE SHALL CARRY OUT A SERIES OF PERIODIC CHECKS, ADDITIONAL TO THOSE FORESEEN BY THE LAW.

-ALL THE CHECK AND MAINTENANCE OPERATIONS SHALL BE CARRIED OUT WITH THE MAIN POWER SUPPLY SWITCH DISCONNECTED.

-THE OPERATIONS WHICH REQUIRE THE CRANE TO BE OPERATING SHALL BE EXECUTED BY A QUALIFIED SUPERVISOR, WHO OBLIGES THE USER TO KEEP TO THE SAFETY MEASURES AND IMPOSES THE USE OF SUITABLE MEANS IN ORDER TO IDENTIFY AND NEUTRALIZE THE DANGERS DUE TO THE REMOVAL OF PROTECTIONS OR SAFETY DEVICES.

-THE GOOD CONDITIONS OF THE CRANE DEPEND ON THE SCHEDULED MAINTENANCE. THANKS TO SUCH OPERATIONS, IT IS POSSIBLE TO OBTAIN A MILD WEAR, A LONGER DURATION AND A CORRECT WORKING OF THE CRANE.

-THE FOLLOWING INDICATIONS ARE NOT RESTRICTIVE SINCE THE USER IS IN CHARGE OF MAINTENANCE MODALITIES AND PROCEDURES.

13.1) CHECKS AND RELATED MAINTENANCE

13.1.1) WITH DAILY FREQUENCY

-LEVELLING OF THE WHOLE ASSEMBLY
-STRUCTURE CONDITIONS
-FIXED OR REMOVABLE JOINTS
-RESISTANCE OF THE BEARING BASE
-RESISTANCE OF THE BEARINGS
-MAKE SURE THAT ALL THE DRAINING SYSTEMS OF THE STRUCTURE (IN PARTICULAR IN WINTER) ARE NOT OBSTRUCTED AND ALLOW THE WATER AND CONDENSATE TO DRAIN.

13.1.2) WITH WEEKLY FREQUENCY

-CONDITIONS OF THE ROPES
-HOOK SAFETY DEVICE
-PINS, SCREWS AND WELDS
-CONNECTIONS ON THE ROPES SIDES
-TIE RODS ON THE ROPES
-WORKING OF THE FLEETING-PROOF DEVICES
-CABLES AND ELECTRIC INSTALLATION
-GASKETS AND MAGNETIC GAP OF THE BRAKES

13.1.3) WITH MONTHLY FREQUENCY

-RING PLATE CLEARANCE

-CONNECTING SCREWS TIGHTENING
-PLATE, ROPES AND REDUCTION GEAR LUBRICATION
-DRUMS AND SUPPORTS
-PULLEYS AND BEARINGS
-LUBRICATION OF THE EXTERNAL GEAR TORQUES
-ELECTRICAL EQUIPMENT
-STRUCTURAL ELEMENTS
-TROLLEY AND BLOCK

13.1.4) BEFORE EACH ERECTION/DISASSEMBLY

-OIL LEVEL OF THE HYDRAULIC POWER UNIT
-HYDRAULIC PISTONS AND RIGID PIPELINES AND/OR HOSES
-DISTRIBUTOR AND VALVES OF THE HYDRAULIC POWER UNIT
-SOUNDNESS OF ALL STRUCTURAL ELEMENTS
-ANTIOXIDANT TREATMENT AND REPAIR WITH TOUCH-UP, IF REQUIRED
-TIGHTENING OF ALL CONNECTING SCREWS
-MOUNTING ARTICULATIONS AND JOINTS
-CORRECT INSTALLATION OF WASHERS BETWEEN SPLIT PINS OR SEEGER RINGS AND SEALING SURFACES

13.1.5) EVERY 1000 WORKING HOURS

-GEARS, SHAFTS AND KEYS OF THE DRUMS
-KEY OR BROACHING CONNECTIONS OF MOTORS AND BRAKES

13.1.6 EVERY 2000 WORKING HOURS

-OVERHAULING OF THE WHOLE ELECTRIC INSTALLATION
-CHECK OF THE SAFETY DEVICES
-OVERHAULING OF THE WHOLE HYDRAULIC INSTALLATION

13.1.7 SYSTEMATICALLY

-GENERAL CONDITIONS DURING THE ERECTION/DISASSEMBLY
-GENERAL CONDITIONS AFTER IMPACTS
-GENERAL CONDITIONS AFTER TESTS WITH OVERLOADS
-SOUNDNESS OF ALL COMPONENTS AFTER TRANSPORTS OR TOWING OPERATIONS
-STABILITY CHECK AFTER OVERSTRESSES DUE TO ACCIDENTAL OVERLOADS

13.2) SCREW CONNECTION MAINTENANCE

TIGHTENING CHECK WITH FREQUENCY ACCORDING TO POINTS 13.1.3 AND 13.1.5.
THE TIGHTENING OF THE SCREWS SHALL BE CARRIED OUT BY USING A DYNAMOMETRIC WRENCH IN ACCORDANCE WITH THE FOLLOWING TABLE:

	"F"						
"M"	M14	M16	M18	M20	M22	M24	
8,8 (8 G)	12.0	19.3	27.0	38.7	52.2	66.6	TORQUE N/m
10,9 (10K)	18.4	27.9	38.7	55.8	74.7	95.4	

Table 1

KEY :

" F " = THREADING
" M " = MATERIAL

FOR THE CORRECT USE OF THE DYNAMOMETRIC WRENCH SEE THE MANUFACTURER'S INSTRUCTIONS.
CHECK THE PLAIN AND/OR SPRING WASHERS UNDER THE HEADS OF SCREWS AND NUTS.

13.3) RING PLATE AND CONNECTING SCREW MAINTENANCE

THE RING PLATE MAINTENANCE SHALL BE CARRIED OUT IN ACCORDANCE WITH THE FOLLOWING PROCEDURES:

-THE RING PLATE HAS AN INITIAL CLEARANCE WHICH ENSURES A SAFE AND REGULAR WORKING. ACCORDING TO POINT 13.1.3, MAKE SURE THAT THE CLEARANCE INCREASE DOES NOT EXCEED 2,0 mm.

-CHECK THE LUBRICATION OF THE EXTERNAL TOOTHING AND OF THE INNER RACES MAX. EVERY 100 WORKING HOURS, AS WELL AS BEFORE AND AFTER A LONG PERIOD OF INACTIVITY.

- LUBRICATION SHALL BE CARRIED OUT IN SUCH A WAY THAT THE GREASE FLOWS OUT OF THE BEARING LABYRINTHS OR OUT OF THE SEALS. THE BEARING SHALL BE TURNING DURING THE GREASING OPERATIONS.
IF IT SHOULD BE NECESSARY TO CLEAN THE INNER RACES, AVOID THAT THE DETERGENT PASSES THROUGH THE ROLLING SYSTEM OR DAMAGES THE SEALS. THE SUITABLE LUBRICANTS ARE INDICATED IN POINT 13.6.

-CHECK AND RESET THE TIGHTENING OF THE CONNECTING SCREWS ACCORDING TO THE TORQUE VALUES INDICATED IN POINT 13.2. TO COMPENSATE THE SETTLING PHENOMENON, MAKE SURE THAT DURING THE TIGHTENING OPERATIONS THE BOLTED CONNECTION IS RELEASED FROM TENSILE STRESSES CAUSED BY EXTERNAL FORCES. THIS CHECK SHALL BE CARRIED OUT WITHIN THE FIRST 100 WORKING HOURS AND THEN AT LEAST EVERY 600 HOURS OR EVERY 3 WORKING MONTHS AND IN ANY CASE BEFORE ANY ERECTION OPERATION.
THE TIGHTENING RESET SHALL BE CARRIED OUT BY QUALIFIED PERSONNEL BY USING THE CROSS PROCEDURE.

13.3.1) REPLACEMENTS: CONNECTING SCREWS

THE CONNECTING SCREWS OF THE RING PLATE ARE HIGH-RESISTANT SCREWS
AND THEIR PRESERVATION IS VERY IMPORTANT IN ORDER TO KEEP THE SAFETY REQUISITES OF THE CRANE

-CHECK THAT NO SCREW OR NUT IS WORN-OUT, DAMAGED, OR OXIDIZED. IF THIS IS THE CASE, IT IS NECESSARY TO REPLACE ALL THE CONNECTING SCREWS AND NUTS.

-ALL THE SCREWS SHALL BE REPLACED, EVEN IF ONLY ONE OF THEM IS LOOSENED OR REMOVED.

-THE SCREWS AND NUTS OF THE RING PLATE SHALL BE REPLACED WITH THE ORIGINAL ONES EVERY 10 WORKING YEARS

-THE SCREWS AND NUTS OF THE RING PLATE SHALL BE REPLACED WITH SCREWS HAVING THE SAME CHARACTERISTICS, AS CONCERNS BOTH GEOMETRY AND THE MATERIAL CLASS AND MUST BE APPROVED BY GRU DALBE.(SEE PAR. 4.5.2).

13.3.2) REPLACEMENTS: PLATE, THAT IS, ROLLING BEARING OF LARGE DIMENSIONS

THE SAFETY OF OPERATION AND THE DURATION OF THE BEARING MAINLY DEPEND ON THE CONNECTION OF THE BOLTS AND THE EVOLUTION OF THE WEAR OF THE BEARING THAT OCCURS WITH THE INCREASE OF THE CLEARANCE.

- THE RIN PLATE MUST BE REPLACED WHEN REACHING THE MAXIMUM CLEARANCE OF THE BEARING, ALTHOUGH THIS CONDITION DOES NOT AFFECT WHOLLY THE SAFETY OF THE OPERATION.

- THE RING PLATE MUST BE REPLACED WHEN REACHING THE MAXIMUM NUMBER OF CYCLES DETERMINED ACCORDING TO THE ACTUAL USE OF THE CRANE AND THE WORKING HOURS. IN THE ABSENCE OF SPECIFIC INFORMATION AND ANALYSIS ON THE USE OF THE BEARING IT IS ESSENTIAL TO PROVIDE FOR ITS REPLACEMENT EVERY 6000 WORKING HOURS THAT APPROXIMATELY CORRESPOND TO 10 YEARS OF OPERATION.

- THE RING PLATE MUST BE REPLACED WITH AN ORIGINAL SPARE PART HAVING THE SAME CHARACTERISTICS (SEE.PAR.4.5.3).

- DUE TO THE IMPORTANCE OF THE COMPONENT AND COMPLEXITY AND QUANTITY OF PARAMETERS TO BE OBSERVED, GRU DALBE SUGGESTS THE USE OF ORIGINAL RING PLATES SUPPLIED BY ITS OWN SPARE PART SERVICE.

13.4) ROPE MAINTENANCE

THE LAWS IN FORCE REQUIRE A CHECK OF THE ROPES AT LEAST EVERY THREE MONTHS WITH A WRITTEN REPORT OF THE RESULTS.
THE OPERATOR IN CHARGE OF THE CHECK SHALL KNOW ALL THE PERIODIC VERIFICATIONS SO AS TO BE ABLE TO IDENTIFY THE REASONS FOR A DAMAGE OF THE ROPE AND DECIDE ON ITS REPLACEMENT IN CASE OF NEED.

THE FOLLOWING INDICATIONS ARE APPROXIMATE SINCE THE RECORD OF CASES IS TOO WIDE.

13.4.1) WHERE TO CARRY OUT THE MAIN CHECKS

-DRUM: CONNECTION POINT OF THE ROPE
DEFECTIVE WINDINGS
-BREAKING OF WIRES, CORROSION
-INTERMITTENT LOAD STRESS
-TRANSMISSION PULLEYS: WOUND ROPE SECTIONS TO DETERMINE BREAKING OF WIRES AND WEAR
-MOVABLE PULLEYS: ROPE SECTION WOUND ON THE PULLEY UNDER LOAD. CORROSION. BREAKING OF WIRES AND SUPERFICIAL WEAR
-CONNECTION POINTS: BREAKING OF WIRES, DEFORMATION. CHECK THE ROPE DIAMETER.

13.4.2) ROPE VERIFICATION AND REPLACEMENT

IN ACCORDANCE WITH STANDARD UNI-ISO 4309/2004, THE WORKING SAFETY OF A ROPE IS GUARANTEED BY THE CORRECT EVALUATION OF:
-NUMBER OF BREAKS AND RELATIVE POSITION
-WEAR OF THE WIRES

-INNER AND OUTER CORROSION
-DAMAGE AND DETERIORATION OF THE ROPE

13.4.2.1) WEAR OF WIRES

BESIDES BROKEN WIRES, REMEMBER THAT THE FLATTENING OF THE WIRES DUE TO WEAR PRECEDES THEIR BREAK IN SHORT TIMES.
THEREFORE, IN CASE OF WORN-OUT ROPE, IT IS NECESSARY TO REDUCE THE INTERVAL OF THE VERIFICATIONS. WHEN CALCULATING THE BROKEN WIRES, TAKE INTO ACCOUNT THE ONES WHICH HAVE SUFFERED A 50% REDUCTION OF THEIR ORIGINAL DIAMETER.

13.4.2.2) INNER AND OUTER CORROSION

THE OUTER CORROSION CAUSES A REDUCTION OF THE WIRE DIAMETER. SEE THE PREVIOUS POINTS, BUT WITH MUCH MORE ATTENTION BECAUSE CORROSION IS A DETERIORATION MORE SERIOUS THAN WEAR.

THE EVALUATION OF THE INNER CORROSION REQUIRES THE INTERVENTION OF HIGHLY QUALIFIED PERSONNEL BECAUSE IT IS NECESSARY TO OPEN THE ROPE BY USING CLAMPS AND CARRY OUT THE DETORSION OPERATION (SEE UNI-ISO 4309/2004)

13.4.2.3) BREAK OF THE WIRES (UNI-ISO 4309/2004)

COUNT THE BROKEN WIRES THAT ARE VISIBLE OUTSIDE THE ROPE IN THE MOST DETERIORATED POINT.
THE TABLE BELOW INDICATES THE MAXIMUM NUMBER OF BROKEN WIRES ALLOWED ON A LENGTH THAT CORRESPONDS TO 6 OR 30 TIMES AS THE ROPE DIAMETER.
THE COUNT SHALL BE DONE ON THE TWO LENGTHS. REPLACE THE ROPE IF THE BREAKS EXCEED THE MAXIMUM NUMBER ALLOWED EVEN ON ONLY ONE OF THE TWO LENGTHS.

N	FR			
	C		P	
	6 d	30 d	6 d	30 d
114	8	16	3	6
150	8	16	3	6
210	14	29	7	14
216	14	29	7	14
222	19	38	//	//
246	18	35	9	18
227	12	26	//	//
275	14	29	//	//
313	14	29	//	//
476	16	32	//	//
109	5	10	//	//
133	5	10	//	//
361	8	18	//	//
238 / 292	5	10	//	//
265	5	10	//	//
152	8	16	//	//

Table 2

KEY :

" N " : NUMBER OF WIRES
" FR " : MAX. NUMBER OF BROKEN WIRES
" C " : ORDINARY LAY
" P " : LANG LAY

13.4.3) ROPE DETERIORATION AND REPLACEMENT

IN ADDITION, IT IS NECESSARY TO REPLACE THE ROPE WHEN:

-THE ROPE DIAMETER IS REDUCED, EVEN IN ONE POINT ONLY, BY 7% COMPARED WITH THE NOMINAL DIAMETER
-THE ROPE SHOWS TORSION, FLATTENING AND/OR PERMANENT BENDING
-THE CORE COMES OUT EVEN IN ONE POINT ONLY
-THE STRANDS ARE SLACKENED AND PROJECT OUT OF THE ROPE, ALTHOUGH IT IS UNDER LOAD.
THE MAIN EXAMPLES OF ROPE DETERIORATION ARE INDICATED AS FOLLOWS. REPLACE THE ROPES IMMEDIATELY:

Picture 1
CORE EXIT AND INCREASE OF THE LENGTH OF LAY

Picture 2
CORE EXIT AND INCREASE OF THE LENGTH OF LAY

Picture 3
DEFORMATION AND WEAR DUE TO "EYE HOLLOW"

Picture 4
SWELLING OF ANTI-ROTATING ROPES DUE TO FORCED ROTATION

Picture 5
EXIT OF THE CORE OF THE ANTI-ROTARY ROPE DUE TO FORCED ROTATION

Picture 6
CORE EXIT DUE TO “TEARING” STRESS

Picture 7
ROPE DEFORMATION WITH CORE EXIT DUE TO STRAIGHTENED "EYE HOLLOW"

Picture 8
ABRASION AND FATIGUE FAILURE OF THE WIRES ALONG A LINE

Picture 9
BREAKING OF THE WIRES IN THE POINTS OF CONTACT AMONG THE STRANDS OR BETWEEN STRANDS AND CORE

Picture 10
RUBBING UNDER LOAD AGAINST A SHARP EDGE

Picture 11
FATIGUE FAILURE OF THE WIRES DUE TO BENDING

Picture 12
REPEATED IMPACTS AGAINST THE STRUCTURE OF THE CRANE DUE TO VIBRATIONS

Picture 13
BREAKING OF THE WIRES ALONG TWO PARALLEL LINES

Picture 14
BREAKING OF WIRES IN THE METAL CORE DUE TO EXCESSIVE TRACTION

Picture 15
ABRASION AND FLATTENING WITH EXIT OF THE TEXTILE CORE

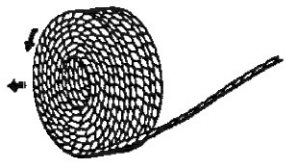
Picture 16
EXIT OF THE INNER WIRES OF THE STRANDS

Picture 17
ABRASION AND ELASTIC FAILURE SET

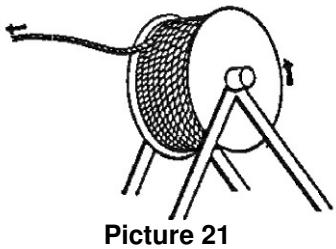
Picture 18
SWELLING OF ANTI-ROTATING ROPE DUE TO FORCED ROTATION

Picture 19
CORROSION

13.4.4) UNWINDING AND INSTALLATION OF THE ROPES

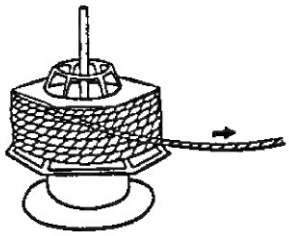


Picture 20



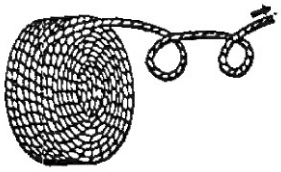
Picture 21

IF THE ROPE IS WOUND ON A REEL OR IF IT IS AN ORDINARY LAY ROPE, INSERT A BAR IN THE CENTRAL HOLE AND PLACE THE RELATIVE ENDS ON TWO STANDS. PULL THE END OF THE ROPE VERY CAREFULLY IN ORDER TO AVOID SLACKENING IT ON THE REEL.



Picture 22

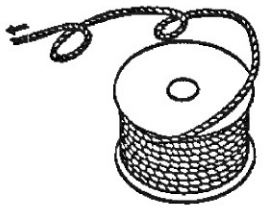
IF THE ROPE IS WOUND ON A ROLL, IT IS NECESSARY TO PLACE IT ON A REEL; PULL THE OUTER END, SO THAT THE REEL TURNS AROUND ITS VERTICAL AXIS.



Picture 23

IF THE ROLL IS SMALL, IT IS POSSIBLE TO UNWIND IT BY FIXING THE OUTER END ON THE GROUND AND UNWINDING THE ROPE TURNING THE ROLL KEPT IN VERTICAL POSITION.

BEFORE MOUNTING A NEW ROPE, MAKE SURE THAT THE RACES OF THE PULLEYS AND OF THE DRUM ARE NOT WORN-OUT OR MARKED. RESET THE PROFILE IF NEEDED.



Picture 24

FOR THE MULTI-LAYER WINDING ON THE DRUM, THE TURNS OF THE FIRST LAYER SHALL BE PERFECTLY TIGHTENED, BY APPLYING ON THE ROPE, FOR THE WHOLE WINDING, SUCH A TENSION AS TO AVOID ANY SUPERPOSITION OF THE TURNS.

IF THE OLD ROPE IS USED TO PULL THE NEW ONE DURING ITS TRAVEL ON THE DIFFERENT PULLEYS, IT IS NECESSARY TO ADOPT PARTICULAR MEASURES TO AVOID TRANSMITTING ANOMALOUS TORSIONS OF THE OLD ROPE TO THE NEW ONE.

THE TERMINAL OF THE ANTI-ROTARY ROPES SHALL BE FREE TO ROTATE ON ITSELF: CHECK IT BEFORE INSTALLING THE NEW ROPE.

13.4.5) ADJUSTMENT OF THE ROPES FOR THE WORKING CONDITIONS

FOR THE FIRST PERIODS THE NEW ROPE SHALL BE USED WITH LOADS LOWER THAN THOSE NORMALLY USED SO AS TO ALLOW THE ADAPTATION OF ALL THE ELEMENTS OF THE ROPE TO THE NORMAL USE CONDITIONS.

OTHERWISE THE ROPE, IMMEDIATELY EXPOSED TO LOAD STRESSES, MAY PRODUCE PREMATURE BREAKS OR LAST LESS THAN EXPECTED.

IF THE CRANE IS FITTED WITH FOUR-FALL ROPE, EVEN IF IT IS NOT USED, IT IS ADVISABLE TO USE IT FOR SOME HOISTING OPERATIONS WITH MEDIUM LOADS APPROXIMATELY EVERY WEEK, IN ORDER TO PRESERVE THE ROPE THAT, IN THIS WAY, CAN DISCHARGE TURNS AND TENSION ON ALL ITS LENGTH.

13.5) CHECKS AND REPLACEMENTS

IT IS NECESSARY TO REPLACE THE COMPONENTS IN THE FOLLOWING CONDITIONS:

-BRAKES GASKETS	THICKNESS NOT GREATER THAN 2 mm
-ELECTROMAGNETIC SWITCHES	EVIDENT MARKS OF FLAMING
-BEARINGS	ANOMALOUS NOISE
-PINS, ARTICULATED JOINTS	SEIZURE MARKS, OXIDATION, OVALIZATION
-REDUCTION GEARS	WORN-OUT TOOTHING-KEYS MARKED IRON AND/OR BRONZE FILINGS IN THE LUBRICANT SEDIMENT

-MOTORS	ECCENTRICITY OF THE SHAFT (MOTOR OR BRAKE SIDE)-PARTIAL LOSS OF INSULATION ON ONE OF THE WINDINGS
-ELECTRICAL CABLES	THROTTLING, DAMAGES TO THE PROTECTING SHEATHS
-SCREWS	OXIDATION-THREAD STRIPPING
-PULLEYS	MARKS ON THE WINDING SEAT OF THE ROPE-BURST EDGES
-ELECTRICAL COMPONENTS	LIMIT SWITCHES WITH ECCENTRIC SPINDLES, MICROSWITCHES WITH DEFECTIVE CONTACT OR INNER OXIDATION-CABLE CLAMPS WITH WORN OUT GASKETS
-HYDRAULIC INSTALLATION	PUMP AND VALVES WITH INITIAL LEAKAGE OR WITH SEAL DIFFERENT FROM THE PREVIOUS ONE. HYDRAULIC HOSES WITH BENDING OR DAMAGES OF THE PROTECTING SHEATH

13.6) LUBRICATION

13.6.1) LUBRICATION FREQUENCY AND TYPE

(a) REDUCTION GEARS - OIL - CHECK THE LEVEL EVERY 100 WORKING HOURS. TOP UP IF NEEDED, CHANGE THE OIL EVERY 600 WORKING HOURS

(b) ROPES, TIE RODS - GREASE - CHECK THE PROTECTING FILM WEEKLY. BEFORE EVERY ERECTION OPERATION REMOVE INCRUSTATIONS BY USING NAPHTHA

(c) BEARINGS, PINS - GREASE - GREASE AT LEAST EVERY 100 WORKING HOURS

(d) UNCOVERED GEARS - GREASE - CHECK EVERY 100 WORKING HOURS AND TOP UP IF NEEDED

(e) HYDRAULIC POWER UNIT - OIL - CHECK AND TOP UP BEFORE EVERY ERECTION/DISASSEMBLY

(f) INNER RACES OF THE PLATE - GREASE - CLEAN AND TOP UP EVERY 100 WORKING HOURS

13.6.2) LUBRICATION MATERIALS

THE NAMES OF SOME LUBRICANTS ARE SUPPLIED AS EXAMPLES. IN CASE OF USE OF OTHER LUBRICANTS, MAKE SURE THAT THEY HAVE THE SAME CHARACTERISTICS AS THOSE INDICATED IN THE FOLLOWING TABLE.

" E "	" T "	AGIP	ESSO	SHELL	MOBIL	BP	CASTROL
" R "	(a)	BLASIA S 320	///	Omala S4 WE 320	SCH 632	ENERGOL SGXP320	Alpha Synt 320
" FT "	(b)	FIN – 360 EP / F	SHIELD GREASE N.2 FLUID	CADMIUM COMPOUND D	Mobilgear OGL 007	BP Energol WRL	GRIPPA 33
" CS "	(c)	Grease MU EP 2	BEACON EP 2	Retinax EP2	Mobilux EP 2	Energrease LS-EP 2	Spheerol AP 2
" IS "	(d)	Grease MU EP 2 Longtime Grease 2	Cazar K 2	Gadus S2 OGH NLGI 0/00	Mobilgear OGL 461	Energrease LC 2	Castrol Molub-Alloy OG 9790/2500-0
" CI "	(e)	ARNICA 46	HYDRAULIKO EL HE 46	Naturelle HF-E 46	Syndraulic 46	Biohyd SE-S 46	BIOTEC HVX
" PRI "	(f)	Grease MU EP 2	BEACON EP 2	Gadus S2 V220 2	Mobilux EP 2	Energrease LS-EP 2	Spheerol EPL 2

Table 3

KEY:

" E " : ELEMENT
" T " : TYPE
" R " : REDUCTION GEARS
" FT " : ROPES AND TIE RODS
" CS " BEARINGS/PINS
" IS " : UNCOVERED GEARS/PLATE TOOTHING
" CI " : HYDRAULIC POWER UNIT
" PRI " : INNER RACES OF THE RING PLATE

(a) = SYNTHETIC LUBRICANT FOR GEARS WITH VERY HIGH VISCOSITY INDEX
(AT 40°= 320 mm²/s).

13.7) STORAGE

IN CASE OF LONG INACTIVITY OF THE CRANE, IT IS NECESSARY TO STORE IT IN A SUITABLE PLACE, IN A COVERED AND CLOSED WAREHOUSE.

IF SUCH SOLUTION SHOULD NOT BE POSSIBLE, IT WOULD BE NECESSARY TO PROTECT THE CRANE FROM ATMOSPHERIC AGENTS, BY COVERING IT WITH PLASTIC TARPAULINS WHICH PROTECT ALL MECHANISMS, PINS, SCREWS, HYDRAULIC PISTON, RATIO-MOTORS, DRUMS, ETC., ENSURING A GOOD AIR CHANGE TO LIMIT HUMIDITY AND CORROSION.

A PARTICULAR CARE SHALL BE RESERVED TO THE PROTECTION OF THE ELECTRIC CABINET, WHICH SHALL BE WATERPROOFED BEFORE EVERY STORAGE.

IN ADDITION, CARRY OUT A GENERAL PREVENTIVE GREASING AND REMOVE THE WHEELS COMPLETE WITH TIRES FROM THE AXLES TO KEEP THEM IN A DRY PLACE AND AVOID THEIR DETERIORATION BY LETTING THEM STEADY FOR A LONG TIME IN THE SAME POSITION UNDER LOAD.

14 ORDINARY REPAIRS

WARNING

WRITE DOWN ANY REPAIR ON THE CHECK REGISTER OF THE CRANE

"ORDINARY REPAIRS" INCLUDE A SERIES OF SMALL REPAIRS TO REMEDY FAILURES WHICH MAY NORMALLY OCCUR DURING THE CRANE WORKING. THE MOST FREQUENT CASES AND THE CORRECT INTERVENTION MODALITIES ARE SUMMARIZED AS FOLLOWS.

14.1) BRAKE LOCKING

- UNLOCK THE PROTECTION COVER, PUT A TOOL UNDER THE BRAKE DISC AND THEN LEVER IT, WITH THE MAIN SWITCH DISCONNECTED. THE OPERATION CAN BE EASILY CARRIED OUT ON THE GROUND FOR THE 3 BRAKES.

PAY ATTENTION TO THE WEAR DUST OF THE BRAKES THAT MAY BE DANGEROUS FOR HEALTH. WEAR GLOVES, MASK AND USE SUITABLE EQUIPMENT.

14.2) PROTECTION FUSES

- THE CRANE IS EQUIPPED WITH MAGNETO-THERMAL SWITCHES: RESET THEM, WITH THE MAIN SWITCH DISCONNECTED.

14.3) ELECTRONIC BOARDS

- WHEN THE ELECTRIC INSTALLATION IS DISCONNECTED, REPLACE THE ELECTRONIC BOARD WITH AN ORIGINAL ONE, TESTING THE MOVEMENT WITH REPEATED MANOEUVRES THAT WILL CONFIRM THE INITIAL ACTIVATION TIMES.

14.4) ELECTRICAL BRAKES

- PLACE THE HOOK ON THE GROUND, IN CASE OF HOISTING BRAKE. WITH THE MAIN SWITCH DISCONNECTED, REPLACE THE ELEMENT WITH AN ORIGINAL ONE, REFERRING TO POINT 10) FOR THE ADJUSTMENT AND THEN TEST THE CALIBRATION UNDER LOAD.

IN CASE OF HOISTING BRAKE, REWIND THE ROPE ON THE DRUM VERY CAREFULLY SO THAT THE TURNS CAN BE WOUND REGULARLY, WITHOUT ANY SUPERPOSITION (SEE POINT 13.4.4)

14.5) ELECTRICAL MOTORS

- TURN OFF THE POWER AND REPLACE THE ELECTRIC MOTOR WITH AN ORIGINAL ONE, HAVING THE SAME CHARACTERISTICS. MAKE SURE THAT THE ROTATION DIRECTION OF THE MOTOR AND THE SPEED CORRESPOND TO THOSE OF THE MOVEMENT CONTROLLED THROUGH THE PUSH-BUTTON PANEL.

WARNING

WARNING: IF THE ROTATION DIRECTION IS CHECKED BEFORE MOUNTING THE MOTOR ON THE WINCH, LOCK OR REMOVE THE KEY FROM THE SHAFT TO AVOID THAT DURING THE SHAFT ROTATION IT COMES OUT, THUS CAUSING DAMAGES AND INJURIES.

14.6) ROPES

- THE REPLACEMENT OF THE ROPES CAN BE CARRIED OUT WHEN THE CRANE IS DISASSEMBLED AND WITH THE MAIN SWITCH DISCONNECTED, ACCORDING TO POINT 13.4.6. THE ROPE SHALL BE WOUND BY APPLYING A SLIGHT TENSION IN ORDER TO OBTAIN A REGULAR WINDING AND AVOID THE SUPERPOSITION OF THE TURNS. IN THE SPECIFIC CASE OF THE TROLLEY ROPE, MAKE SURE THAT THE TWO DIFFERENT LENGTHS CORRESPOND TO THOSE OF THE FRONT AND REAR SECTIONS, AS PER DIAGRAM IN POINT 8.6.

IN THE OTHER CASES, CONTACT OUR AFTER-SALES SERVICE, ALWAYS SPECIFYING, BESIDES THE TYPE AND SERIAL NUMBER OF THE MACHINE, THE KIND OF REPAIR REQUIRED SO AS TO DETERMINE THE REAL NEED FOR THE REPLACEMENT AND THE TYPE OF NECESSARY SPARE PARTS.

15 - RESIDUAL RISKS

15.1) DEFINITION OF RESIDUAL RISK AND PROTECTIVE MEASURES

THE RESIDUAL RISK IS A DANGER AGAINST WHICH THE REDUCTION THROUGH DESIGN AND PROTECTION METHODS IS NOT COMPLETELY EFFECTIVE, SINCE THE CRANE - DESIGNED IN ACCORDANCE WITH DIRECTIVE 2006 / 42 / CE - WORKS IN AN ENVIRONMENT POTENTIALLY APT TO TRANSFORM IT INTO A MACHINE SUBJECT TO RISKS OF DIFFERENT KIND, WHICH CAN BE REDUCED ONLY BY USING SUITABLE PERSONAL PROTECTION EQUIPMENT AND ADEQUATE BEHAVIOR RULES.

THE REFERENCES ARE RELATIVE TO STANDARD EN 12100-1, EN 12100-2.

15.2) SUSPENDED LOADS

THE SLING AND PICK-UP COMPONENTS OF THE LOADS SHALL BE ADEQUATE, IN TERMS OF BOTH CAPACITY AND SAFETY.
DO NOT MOVE THE LOADS IN AREAS OCCUPIED BY THE PERSONNEL OF THE BUILDING YARD, AVOID ACCIDENTAL IMPACTS AGAINST SCAFFOLDINGS OR BUILDING STRUCTURES AND ALWAYS SIGNAL THE START OF EACH MANOEUVRE BY USING THE PROPER HORN IN ORDER TO CALL THE PERSONNEL'S ATTENTION.
ALWAYS CHECK THE CORRESPONDENCE OF THE LOADS TO THE RADIUS INDICATED IN THE LOAD DIAGRAM AND THE REGULARITY OF THE RELATIVE (VERTICAL AND HORIZONTAL) TRAJECTORIES SINCE THE LOAD LIMITING DEVICES ARE SAFETY, NOT MANEUVERING DEVICES - POINT 9 -
BEFORE THE BEGINNING OF THE SHIFT OR THE START OF THE ERECTION/DISASSEMBLY OPERATIONS, MAKE SURE THAT NO OBJECT, SUCH AS TOOLS, STONES, REPLACED PARTS ETC. IS PLACED ON THE CRANE STRUCTURE.
THE STRUCTURE IN TRANSITORY CONFIGURATION SHALL BE CONSIDERED AS AN OVERHUNG LOAD DURING THE ERECTION PHASES.
EXHIBIT WARNING LABELS PROVIDED BY THE LAW.

15.3) ELECTRICAL CABLES

THE ELECTRICAL CABLE CONNECTING THE CRANE WITH THE ELECTRICAL CABINET OF THE BUILDING YARD SHALL BE SIGNALED AND HOUSED IN A TRENCH DUCT OR, IF IT IS PLACED ON THE GROUND, IT MUST BE ARMOR-PLATED AND MUST NOT PASS THROUGH AREAS POTENTIALLY OCCUPIED BY PERSONNEL OR MEANS.

THE GROUND PLATES MUST NOT BE POSITIONED WITH THE PART PROJECTING FROM THE GROUND WITHOUT A SUITABLE PROTECTION.

15.4) STATIC ELECTRICITY

AN ACCUMULATION OF STATIC ELECTRICITY, NOT DISCHARGED FROM THE EARTHING SYSTEM, MAY TAKE PLACE ON THE PARTS OF THE CRANE INSTALLED CLOSE TO POWERFUL ELECTRICAL HIGH-FREQUENCY TRANSMITTERS.
THE METAL PARTS OF THE CRANE ARE CHARACTERIZED BY POTENTIALS DIFFERENT FROM THE GROUND POTENTIAL, THEREFORE THEY EXPOSE THE PERSONNEL COMING INTO CONTACT WITH THE HOOK, THE LOAD, THE HOISTING ROPE OR WITH ANY METAL PART OF THE CRANE TO THE RISK OF ELECTRIC SHOCKS.
CONSEQUENTLY IT IS NECESSARY:

-TO INFORM THE PERSONNEL ABOUT THE RISK
-TO PREVENT THE PERSONNEL FROM COMING INTO CONTACT WITH THE LOAD BEFORE IT TOUCHES THE GROUND AND DISCHARGES, IF IN SUITABLE CONDITIONS, THE STATIC ELECTRICITY ACCUMULATED.
-REMIND THE PERSONNEL THAT THE STATIC ELECTRICITY MAY ACCUMULATE AGAIN IN SHORT TIMES.
-PROVIDE THE PERSONNEL WITH PERSONAL INSULATING EQUIPMENT - GLOVES AND SHOES -
-USE SUITABLE TEXTILE SLINGS TO LIFT THE LOADS

15.5) PROJECTING AND/OR MOVING PARTS

IT IS FORBIDDEN TO ENTER THE AREA OF THE CRANE IN WORKING CONDITIONS AND THE AREA CONCERNED WITH THE PLATFORM SLEWING SHALL BE OBLIGATORILY SEGREGATED - POINT 3.3.8.
IN CASE OF ACCESS TO THE LOWER PARTS OF THE CRANE, IN INACTIVITY CONDITIONS, FOR ROUTINE MAINTENANCE OPERATIONS, WEAR SUITABLE SAFETY EQUIPMENT - HELMET, OVERALLS, SAFETY BELT, GLOVES AND SHOES - AND PAY ATTENTION TO THE PROJECTING PARTS AND TO THE DANGERS OF FALL AND ENTANGLEMENT.
DO NOT CARRY OUT MAINTENANCE OPERATIONS UNDER STORM CONDITIONS: EVEN IF THE CRANE IS IN QUIESCENT POSITION, IT MIGHT SLEW SUDDENLY DUE TO A WIND GUST.
THE CRANES INTERFERING RECIPROCALLY OR WITH EXTERNAL OBSTACLES MAY CAUSE RISKS, EVEN IF THEY ARE EQUIPPED WITH PROXIMITY LIMIT SWITCHES.

15.6) ACCESS TO THE UPPER PARTS OF THE CRANE

THE ACCESS IS NOT GENERALLY ALLOWED - POINT 7 - WHEN THE MACHINE IS MOUNTED.
IN CASE OF ACCESS TO THE UPPER PARTS OF THE CRANE FOR EXTRAORDINARY MAINTENANCE, IT IS NECESSARY TO PROVIDE FOR AN OVERHEAD PLATFORM

15.7) RISKS OF FALL FROM THE LOWER PARTS OF THE CRANE

THE UPPER LEVEL OF THE CRANE COUNTERWEIGHT IS SITUATED AT MORE THAN 2,50 mt. OF HEIGHT AND IT IS NOT PROVIDED WITH PARAPET.
THEREFORE, IT IS COMPULSORY TO WEAR A SAFETY BELT, EQUIPPED WITH AUTOMATIC LOCK PARACHUTE, FIXED ON A SUITABLE SAFETY ROPE.

16 - PERSONNEL'S TRAINING

FOR ERECTION AND MAINTENANCE OPERATIONS THE COMPANY DOES NOT SUPPLY ANY PARTICULAR NOTIONS FOR THE PERSONNEL'S TRAINING SINCE THESE OPERATIONS ARE EXCLUSIVELY RESERVED TO A SPECIALIZED PERSONNEL.

ANYWAY, TRAINING SHALL BE CARRIED OUT IN ACCORDANCE WITH STANDARDS UNI-ISO 9926/1 AND UNI-ISO 9926/3.

REFER TO THE LAWS IN FORCE.

IN COMPLIANCE WITH THE ABOVE RULES, KEEP TO THE FOLLOWING INDICATIONS:

16.1) OPERATOR'S ATTITUDES

16.2) TRAINING OBJECTIVES

16.3) TRAINING PROCEDURES

16.4) LIST OF THE THEORETICAL ELEMENTS THE TRAINEE SHALL ACQUIRE:

- PROFESSIONAL FIGURE AND ROLES
- TECHNOLOGY OF THE HOISTING DEVICES
- ACTIVATION/DEACTIVATION OF THE DEVICES
- USE OF THE DEVICES AND SAFETY RULES
- WORKING PRINCIPLES
- COMMUNICATION
- MATERIAL HANDLING
- INSPECTION, MAINTENANCE, ACCIDENTS
- KNOWLEDGE OF THE CONTENTS OF THIS MANUAL

16.5) LIST OF THE PRACTICAL ABILITIES THE TRAINEE SHALL ACQUIRE:

- OPERATIONAL PRACTICE
- HANDLING PRACTICE
- USE PRACTICE, EMERGENCY TESTS AND SIMULATIONS
- MAINTENANCE AND REPAIR PRACTICE

17 - MACHINE DISMANTLING

DISMANTLING AND FINAL DISASSEMBLY, OR TRANSFER FOR THE MACHINE DEMOLITION AND SIMULTANEOUS RECOVERY OF THE CRANE MATERIALS.
THESE PHASES MUST BE CARRIED OUT IN COMPLIANCE WITH THE LAWS IN FORCE.

THE MOST FREQUENT CAUSES OF THE MACHINE DEMOLITION ARE:

1-WHEN IT IS NO MORE ECONOMICALLY ADVANTAGEOUS TO USE THE MACHINE

2- WHEN IT IS NO MORE ECONOMICALLY ADVANTAGEOUS TO RESELL IT ON THE SECOND-HAND MARKET

3-WHEN THE MACHINE HAS COMPLETED ITS OPERATIONAL LIFE DETERMINED BY THE NUMBER OF WORKING CYCLES FORESEEN DURING THE DESIGN PHASE

4-WHEN A PRIMARY COMPONENT OF THE MACHINE HAS COMPLETED ITS OPERATIONAL LIFE, AND ITS REPLACEMENT IS NOT ECONOMICALLY JUSTIFIED.

5-WHEN THE GENERAL WEAR OF THE DEVICE DOES NOT ALLOW ITS ACTIVATION IN SAFETY CONDITIONS

6-WHEN THE CONDITIONS OF ONE OF THE MAIN COMPONENTS DO NOT ALLOW THE ACTIVATION OF THE DEVICE IN SAFETY CONDITIONS

7-WHEN THE WEAR OF ONE OR MORE ELEMENTS DOES NOT ALLOW JUSTIFYING ECONOMICALLY ITS MAINTENANCE AND CHECK.

THE CRANE IS SUPPLIED WITH ALL THE NECESSARY DOCUMENTATION FOR ITS REGISTRATION IN THE PUBLIC OFFICES.
THE DEMOLITION SHALL BE COMMUNICATED TO THE COMPETENT OFFICES AND TO GRU DALBE IN ACCORDANCE WITH THE LAWS AND MODALITIES IN FORCE IN THE RELATIVE COUNTRIES.
THE IDENTIFYING MATERIAL OF THE MACHINE, SUCH AS PLATES, INSTRUCTIONS FOR USE AND ANY OTHER RELATIVE DOCUMENT SHALL BE DESTROYED OR DELIVERED TO THE COMPETENT AUTHORITIES ACCORDING TO THE LAWS IN FORCE.
BEFORE THE DISMANTLING, IT IS NECESSARY TO REMOVE ALL THE IDENTIFYING MATERIAL AND KEEP IT AT DISPOSAL FOR THE DELIVERY.

THE CRANE IS MAINLY COMPOSED OF:

-METAL BEARING STRUCTURE
-WIRE ROPES
-ELECTRICAL MOTORS
-ELECTRICAL CABLES
-ELECTRICAL EQUIPMENT
-MECHANIC SPEED REDUCERS
-HYDRAULIC EQUIPMENT
-METAL CONNECTING COMPONENTS

THE MAIN COMPONENTS OF THE CRANE ARE MADE UP OF THE FOLLOWING MATERIALS:

-METAL:	ALUMINIUM-ZINC-COPPER-ANTIMONY
-ALLOYS:	STEEL-BRONZE-CAST IRON
-PLASTIC MATERIALS:	POLYMERS, TEFLON
-OTHER MATERIALS:	PAINTS-TYRE RUBBER
-OILS:	HYDRAULIC OILS-MINERAL LUBRICANTS
-GREASES:	GRAPHITIZED AND LITHIUM GREASES

OILS, GREASES, CABLES, ELECTRICAL COMPONENTS, PLASTIC MATERIALS AND LUBRICANTS SHALL BE DISPOSED OF SEPARATELY.

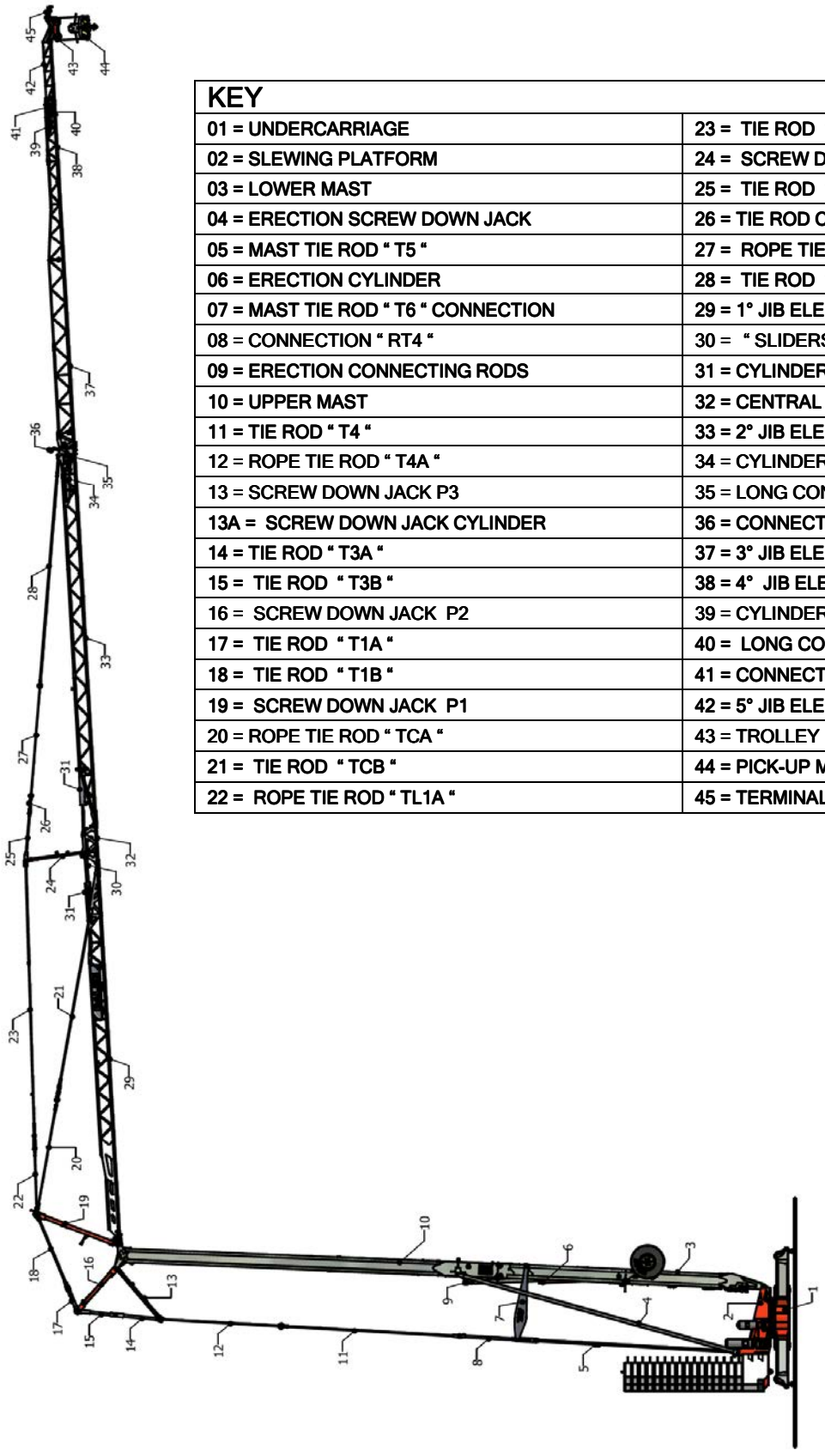
THE MATERIALS CLASSIFIED AS POLLUTING BY THE LAWS IN FORCE SHALL BE ASSIGNED TO SPECIALIZED COMPANIES, AUTHORIZED FOR DISPOSAL.

SHOULD THE MACHINE DEMOLITION BE ASSIGNED TO THIRD PARTIES, IT IS COMPULSORY TO ASCERTAIN THEIR AUTHORIZATION TO DISPOSAL, DIRECTLY OR INDIRECTLY THROUGH CERTIFIED COMPANIES, OF THE COMPONENTS CONTAINING POLLUTING ELEMENTS.

NOTE: REMEMBER TO CHECK AND OBSERVE THE IMPLICATIONS AND TAX PROCEDURES RELATED TO THE DEMOLITION OF THE MACHINE.

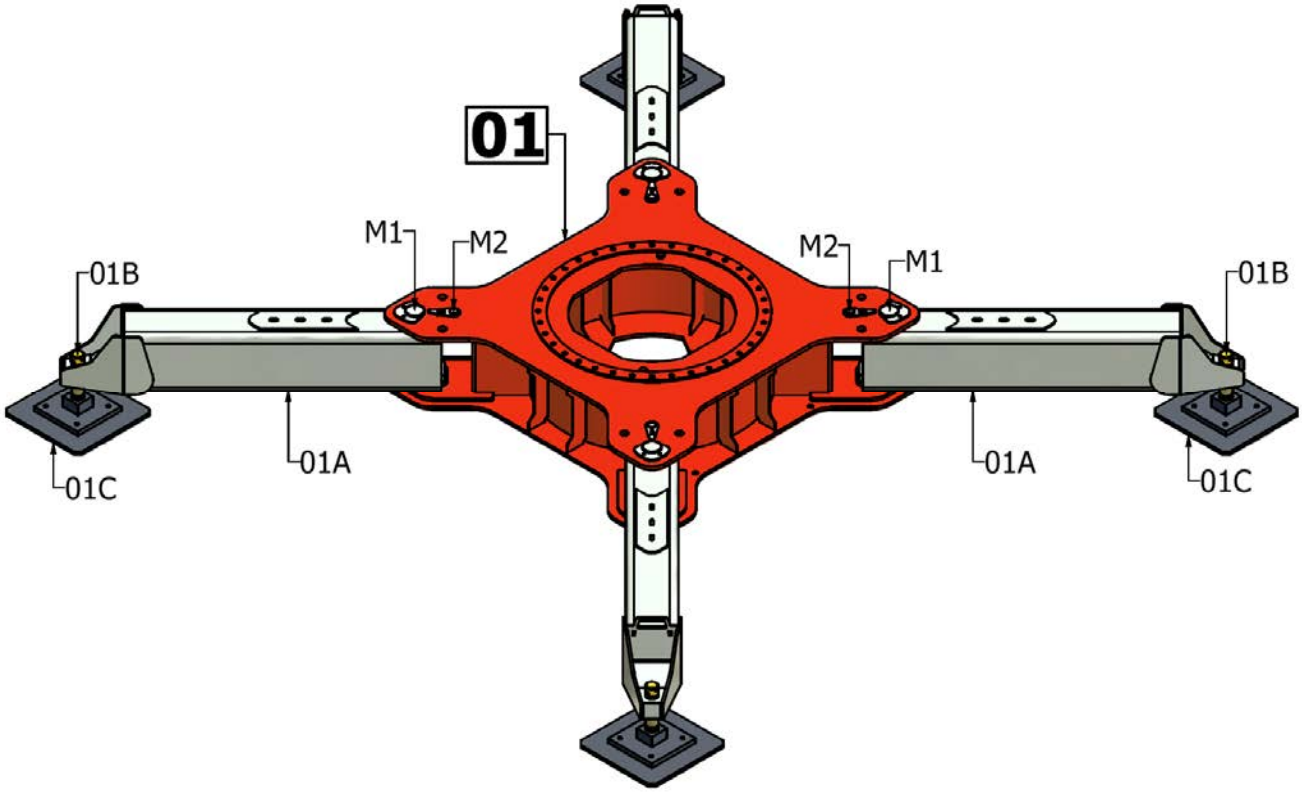
18 - LIST OF COMPONENTS

18.0 STRUCTURAL COMPONENTS



KEY	
01 = UNDERCARRIAGE	23 = TIE ROD " TL1B "
02 = SLEWING PLATFORM	24 = SCREW DOWN JACK P4
03 = LOWER MAST	25 = TIE ROD " TL2A "
04 = ERECTION SCREW DOWN JACK	26 = TIE ROD CONNECTION " TL2B "
05 = MAST TIE ROD " T5 "	27 = ROPE TIE ROD " TL2C "
06 = ERECTION CYLINDER	28 = TIE ROD " TL2D "
07 = MAST TIE ROD " T6 " CONNECTION	29 = 1° JIB ELEMENT
08 = CONNECTION " RT4 "	30 = " SLIDERS " EXTENSIBLE TIE RODS
09 = ERECTION CONNECTING RODS	31 = CYLINDER 1°/2° JIB ELEMENT
10 = UPPER MAST	32 = CENTRAL JIB ADAPTER
11 = TIE ROD " T4 "	33 = 2° JIB ELEMENT
12 = ROPE TIE ROD " T4A "	34 = CYLINDER 2°/3° JIB ELEMENT
13 = SCREW DOWN JACK P3	35 = LONG CONNECTING ROD 2°/3°
13A = SCREW DOWN JACK CYLINDER	36 = CONNECTING ROD 2°/3°
14 = TIE ROD " T3A "	37 = 3° JIB ELEMENT
15 = TIE ROD " T3B "	38 = 4° JIB ELEMENT
16 = SCREW DOWN JACK P2	39 = CYLINDER 4°/5° JIB ELEMENT
17 = TIE ROD " T1A "	40 = LONG CONNECTING ROD 4°/5°
18 = TIE ROD " T1B "	41 = CONNECTING ROD 4°/5°
19 = SCREW DOWN JACK P1	42 = 5° JIB ELEMENT
20 = ROPE TIE ROD " TCA "	43 = TROLLEY
21 = TIE ROD " TCB "	44 = PICK-UP MEMBER
22 = ROPE TIE ROD " TL1A "	45 = TERMINAL NOSE

18.01 - FIXED BASE (UNDERCARRIAGE)

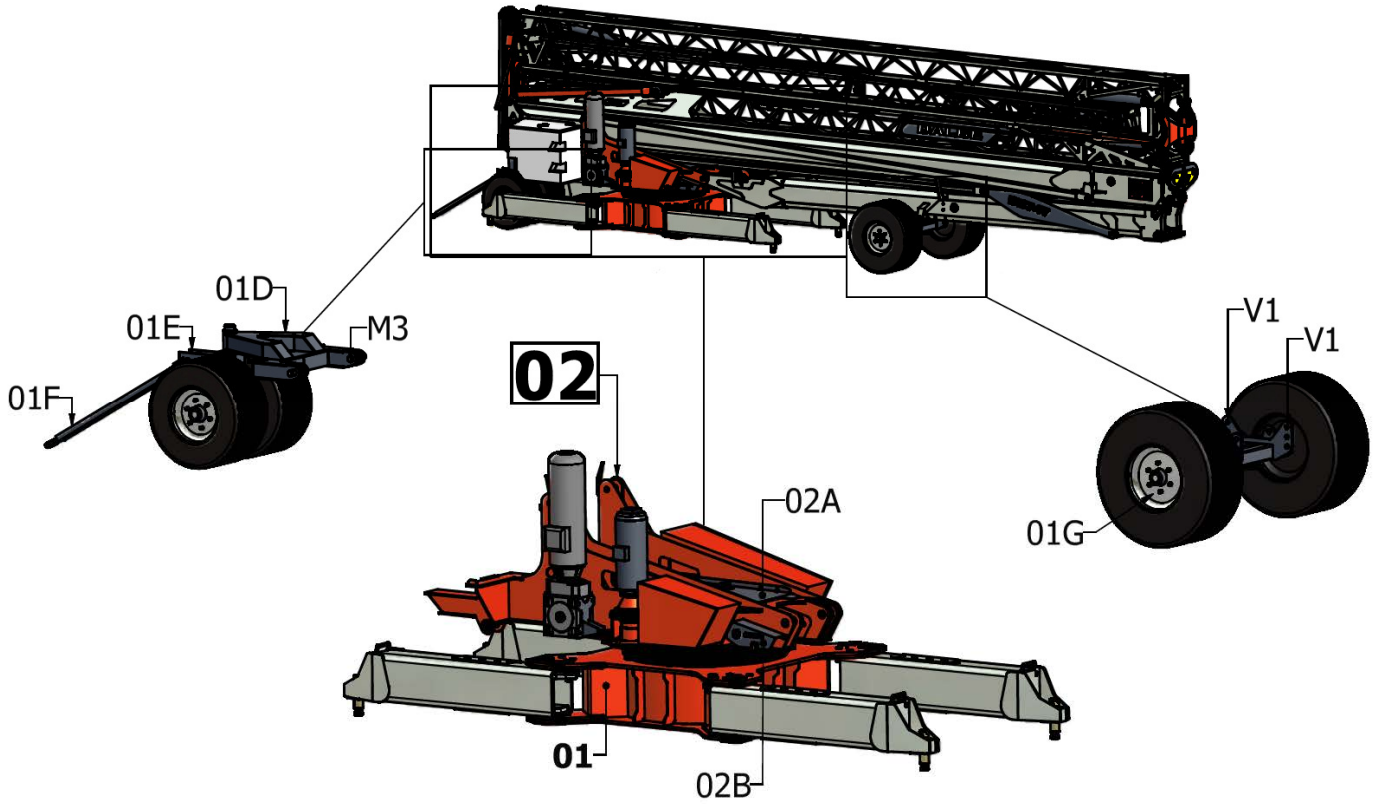


Picture 1

KEY:

01A = ROTARY ARM (SUPPORT)
01B = SCREW JACK (THREADED STABILISER)
01C = STEEL BEARING
M1 = ROTARY ARM PIN (SEE TABLE)
M2 = ROTARY ARM LOCK PIN (SEE TABLE)

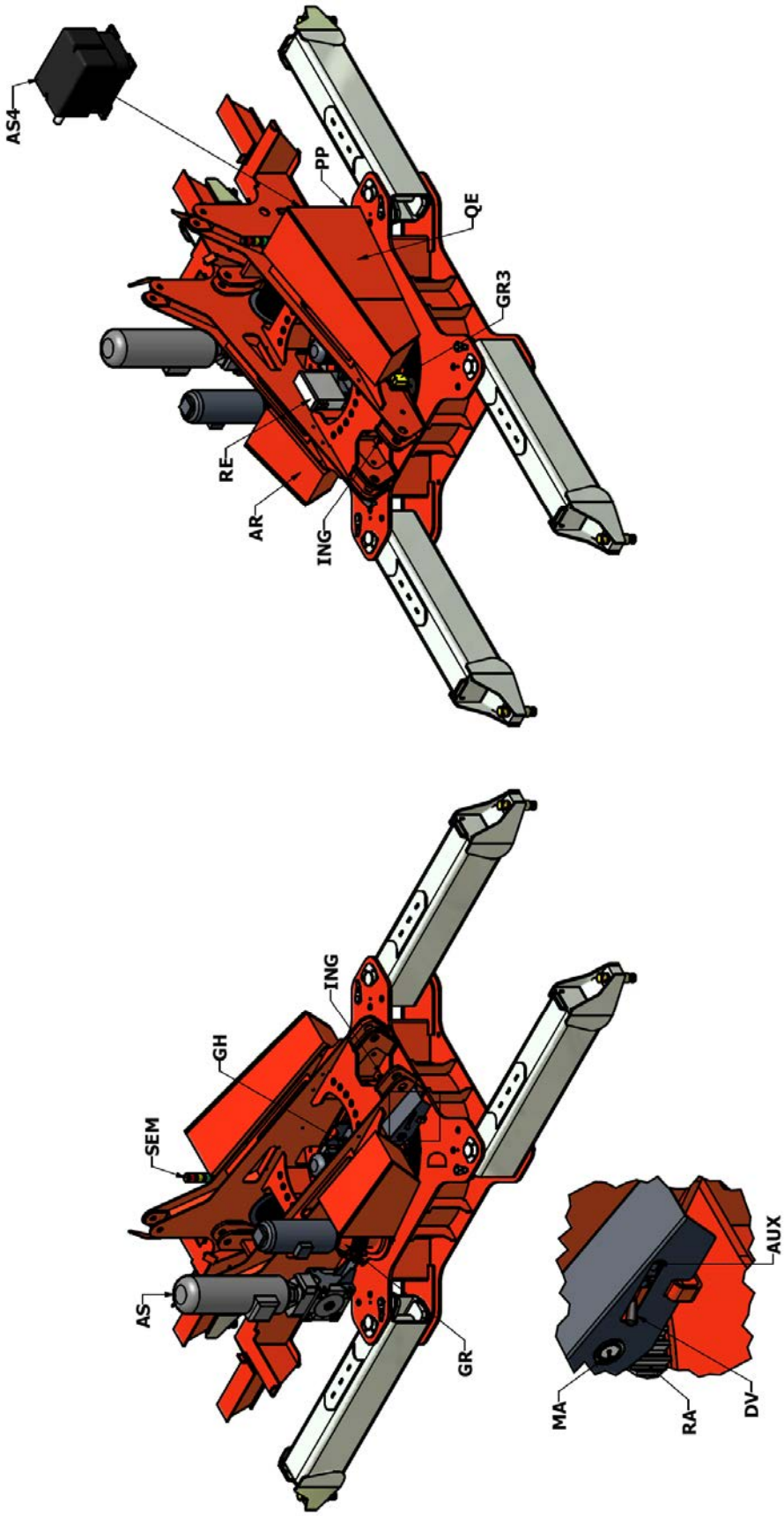
18.02 - SLEWING PLATFORM



Picture 2

KEY:

01 = FIXED BASE
01D = FRONT AXLE ADAPTER
01E = FRONT AXLE
01F = DRAWBAR
01G = REAR AXLE
02A = CENTRAL COVER
02B = DIVERTER AND PRESSURE GAUGE COVER
M3 = FRONT AXLE CONNECTING PIN WITH MOVABLE BASE
V1 = SCREWS M30x80 + NUTS M30



Picture 3

KEY:

GR = SLEWING GROUP
- GR1 = SLEWING REDUCTION GEAR
- GR2 = SLEWING MOTOR
- GR3 = SLEWING LIMIT SWITCH
- GR4 = PROTECTIVE COVER FOR SLEWING PINION

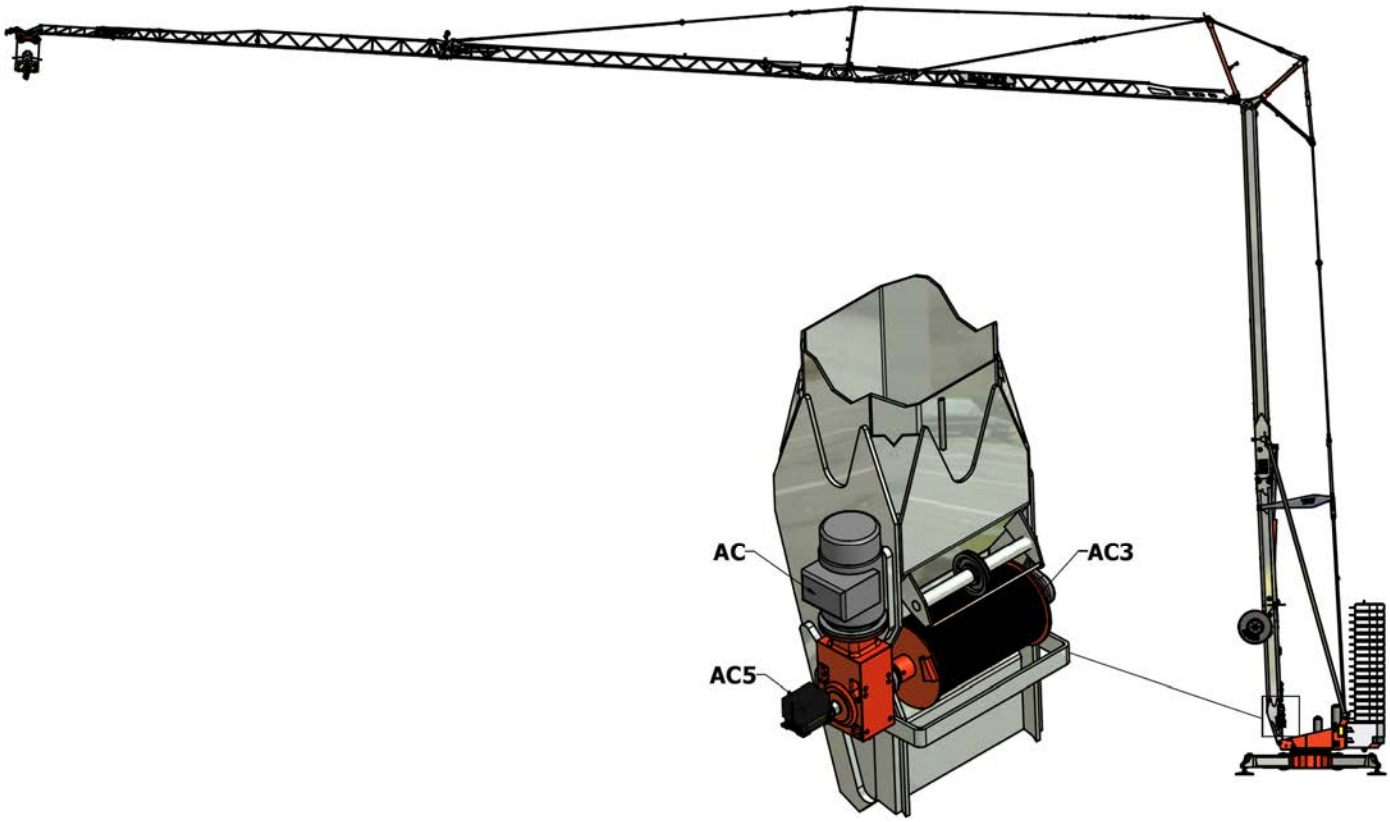
GH = HYDRAULIC GROUP
- GH1 = MOTOR
- GH2 = CENTRAL UNIT COMPLETE WITH ELECTRO-WELDED SHEET TANK
- GH3 = SOLENOID VALVE (x4)
- GH4 = HYDRAULIC PIPES

RA = RING PLATE
- RA1 = SLEWING RING PLATE
- RA2 = RING PLATE SCREWS

AS = HOISTING WINCH
- AS1 = HOISTING REDUCTION GEAR
- AS2 = HOISTING MOTOR
- AS3 = HOISTING DRUM
- AS4 = HOISTING LIMIT SWITCH (SEE PAR. 9.11)
- AS5 = PLATE FOR HOISTING LIMIT SWITCH
- AS6 = SUPPORT (x2) - " UCF "
- AS7 = HOISTING ROPE (SEE PAR.4.3.1)
- AS8 = ROPE-GUIDING ROLL

AR = SERVICE ELECTRICAL CABINET
AUX = QUICK CONNECTORS FOR AUXILIARY CONTACTS
DV = DIVERTER
RE = RESISTOR GROUP
ING = RING PLATE LUBRICATORS
MA = PRESSURE GAUGE
PP = PUSH-BUTTON PANEL/RADIO CONTROL SOCKET
QE = ELECTRICAL CABINET
SEM = LIGHTS

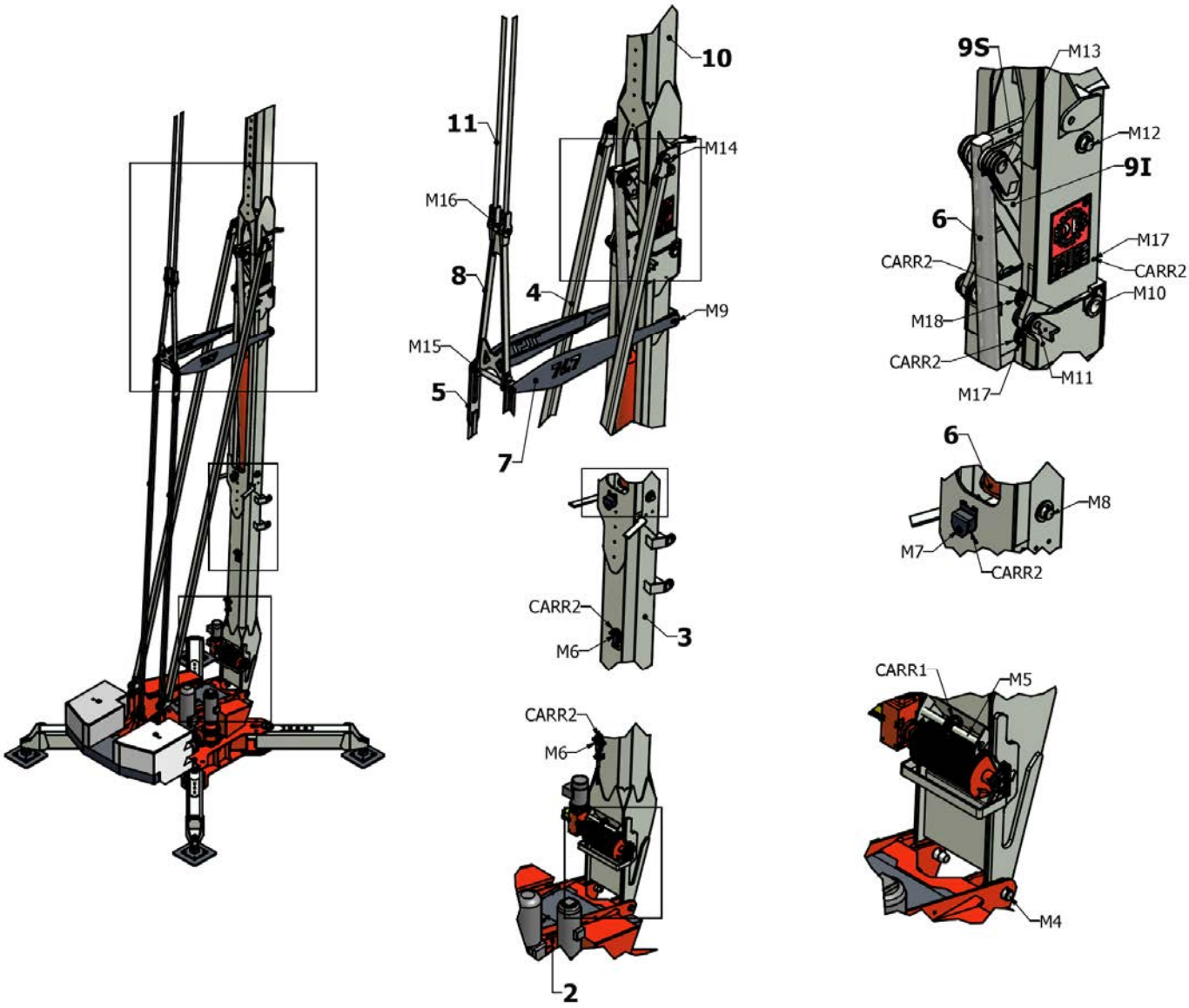
18.03 - MAST GROUP



Picture 4

KEY:

AC = TROLLEY WINCH
- AC1 = TROLLEY REDUCTION GEAR
- AC2 = TROLLEY MOTOR
- AC3 = TROLLEY DRUM
- AC4 = SUPPORT
- AC5 = TROLLEY LIMIT SWITCH (SEE PAR.9.12)
- AC6 = TROLLEY ROPE (SEE PAR.4.3.2)



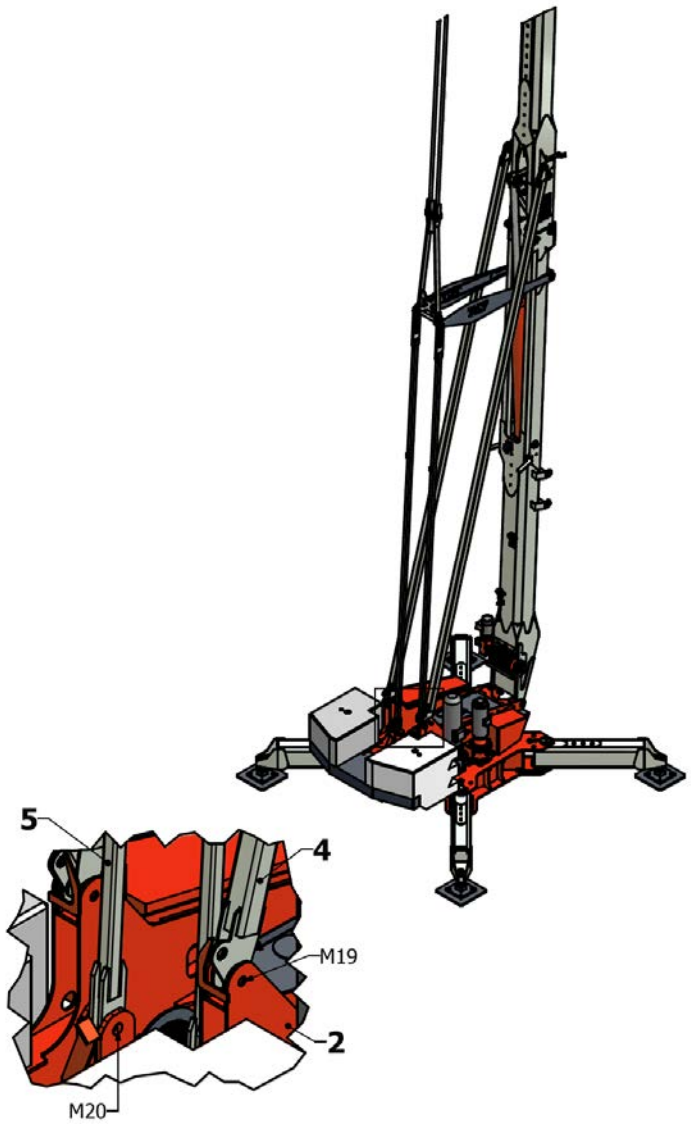
Picture 5

KEY:

02 = MOVABLE BASE
03 = LOWER MAST
04 = ERECTION SCREW DOWN JACK
05 = MAST TIE ROD " T5 "
06 = ERECTION CYLINDER
07 = MAST TIE ROD CONNECTION " T6 "
08 = CONNECTION " RT4 "
09I = LOWER CONNECTING ROD
09S = UPPER CONNECTING ROD
10 = UPPER MAST
11 = TIE ROD " T4 "

M4 = MOVABLE BASE /LOWER MAST PIN (SEE TABLE)
M5 = PULLEY PIN ON LOWER MAST (SEE TABLE)
M6 = PULLEY PIN ON LOWER MAST (SEE TABLE)
M7 = PULLEY PIN ON LOWER MAST (SEE TABLE)
M8 = ERECTION CYLINDER /LOWER MAST PIN (SEE TABLE)

M9 = LOWER MAST/MAST TIE ROD " T6 " CONNECTION PIN (SEE TABLE)
M10 = LOWER MAST/LOWER CONNECTING ROD PIN (SEE TABLE)
M11 = LOWER MAST/UPPER MAST PIN (SEE TABLE)
M12 = UPPER MAST/UPPER CONNECTING ROD PIN (SEE TABLE)
M13 = CONNECTING ROD/ERECTION CYLINDER PIN (SEE TABLE)
M14 = UPPER MAST/ERECTION SCREW DOWN JACK PIN (SEE TABLE)
M15 = MAST TIE ROD " T6 CONNECTION "/MAST TIE ROD " T5 " /CONNECTION " RT4 " PIN (SEE TABLE)
M16 = MAST TIE ROD " T4 " /CONNECTION " RT4 " PIN (SEE TABLE)
M17 = LOWER MAST/UPPER MAST PULLEY PIN (SEE TABLE)
M18 = UPPER MAST PULLEY PIN (SEE TABLE)
CARR1 = PULLEY ON LOWER MAST (SEE PAR.)
CARR2 = PULLEYS ON LOWER AND UPPER MASTS (SEE PAR.)



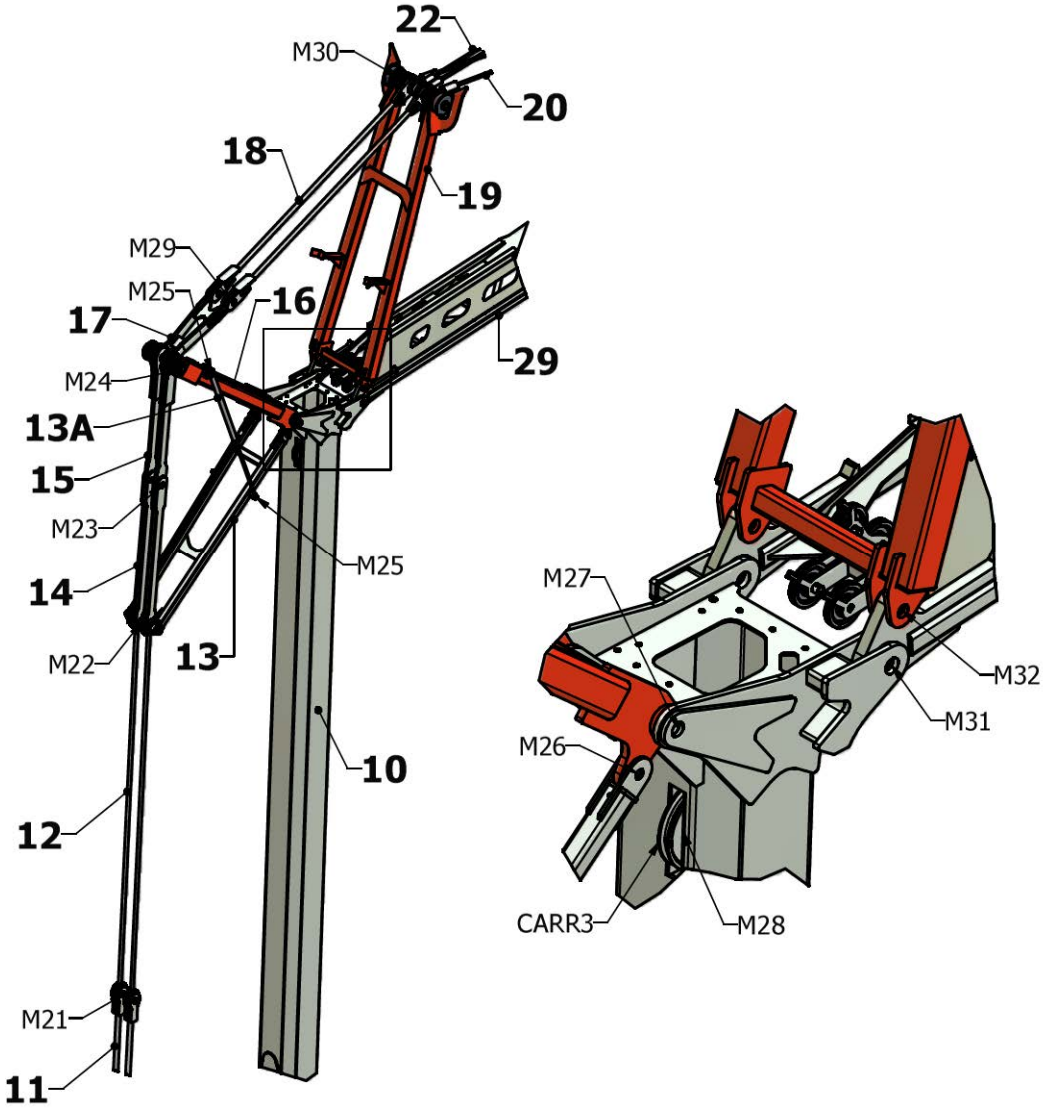
Picture 6

KEY:

02 = MOVABLE BASE
04 = ERECTION SCREW DOWN JACK
05 = MAST TIE ROD " T5 "

M19 = ERECTION SCREW DOWN JACK /MOVABLE BASE PIN (SEE TABLE)
M20 = MAST TIE ROD " T5 "/MOVABLE BASE PIN (SEE TABLE)

18.04 - TIE RODS AND SCREW DOWN JACKS



Picture 7

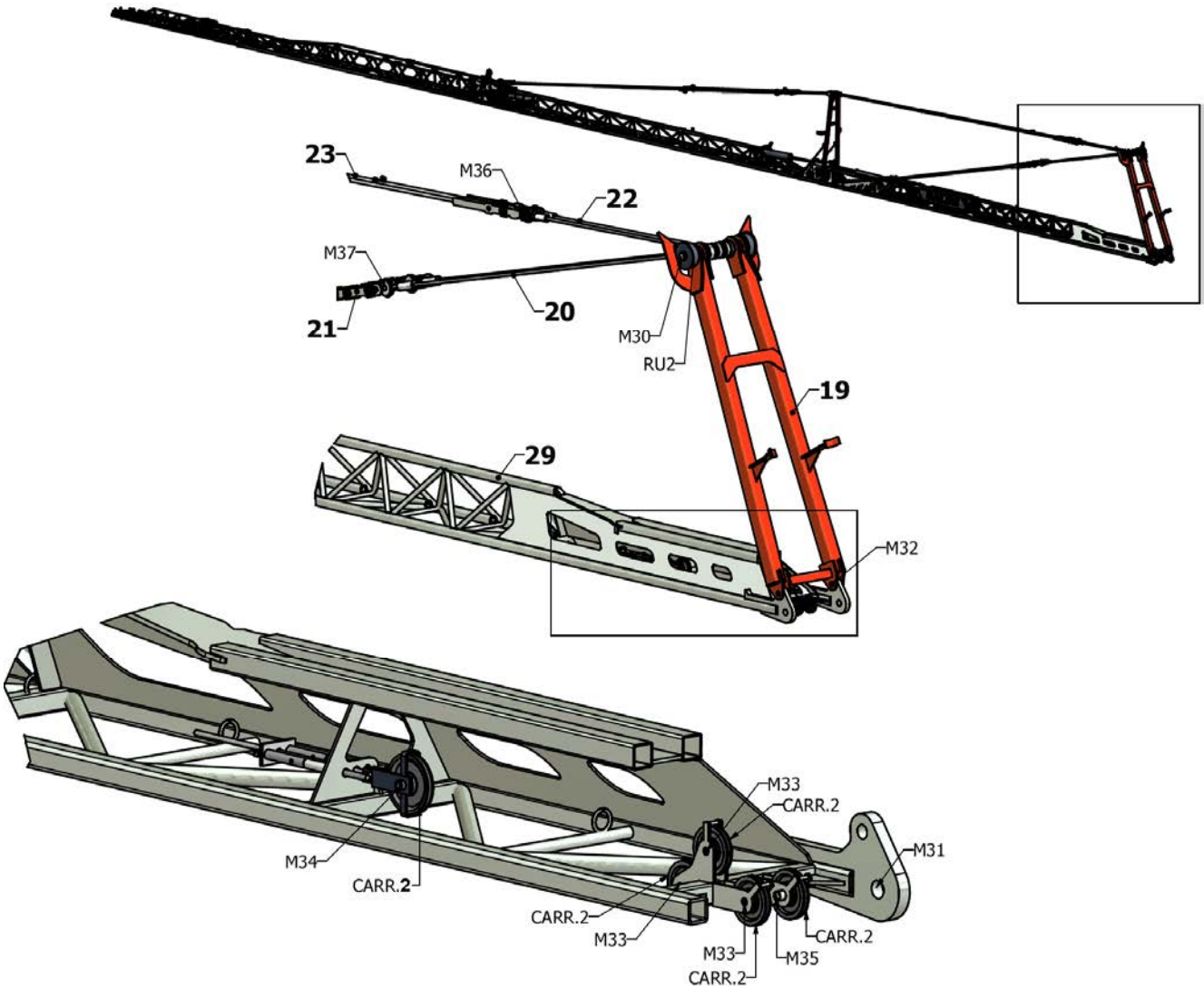
KEY:

10 = UPPER MAST
11 = TIE ROD " T4 "
12 = ROPE TIE ROD " T4A "
13 = SCREW DOWN JACK P3
13A = SCREW DOWN JACK CYLINDER
14 = TIE ROD " T3A "
15 = TIE ROD " T3B "
16 = SCREW DOWN JACK P2
17 = TIE ROD " T1A "
18 = TIE ROD " T1B "
19 = SCREW DOWN JACK P1
20 = ROPE TIE ROD " TCA "
22 = ROPE TIE ROD " TL1A "
29 = 1° JIB ELEMENT

M21 = MAST TIE ROD " T4 "/ ROPE TIE ROD " T4A " PIN (SEE TABLE)
M22 = ROPE TIE ROD " T4A " / SCREW DOWN JACK P3 PIN (SEE TABLE)
M23 = TIE ROD " T3A "/ TIE ROD " T3B " PIN (SEE TABLE)

M24 = TIE ROD " T3B "/ SCREW DOWN JACK P2 PIN (SEE TABLE)
M25 = SCREW DOWN JACK CYLINDER/ SCREW DOWN JACK P3/ SCREW DOWN JACK P2 PIN (SEE TABLE)
M26 = SCREW DOWN JACK P3 / SCREW DOWN JACK P2 PIN (SEE TABLE)
M27 = UPPER MAST / SCREW DOWN JACK P2 PIN (SEE TABLE)
M28 = PULLEY PIN ON UPPER MAST (SEE TABLE)
M29 = TIE ROD " T1A "/ TIE ROD " T1B " PIN (SEE TABLE)
M30 = TIE ROD " T1B "/ SCREW DOWN JACK P1 PIN (SEE TABLE)
M31 = UPPER MAST/ 1° JIB ELEMENT PIN (SEE TABLE)
M32 = 1° JIB ELEMENT / SCREW DOWN JACK P1 PIN (SEE TABLE)
CARR3 = PULLEYS ON UPPER MAST (SEE PAR.)

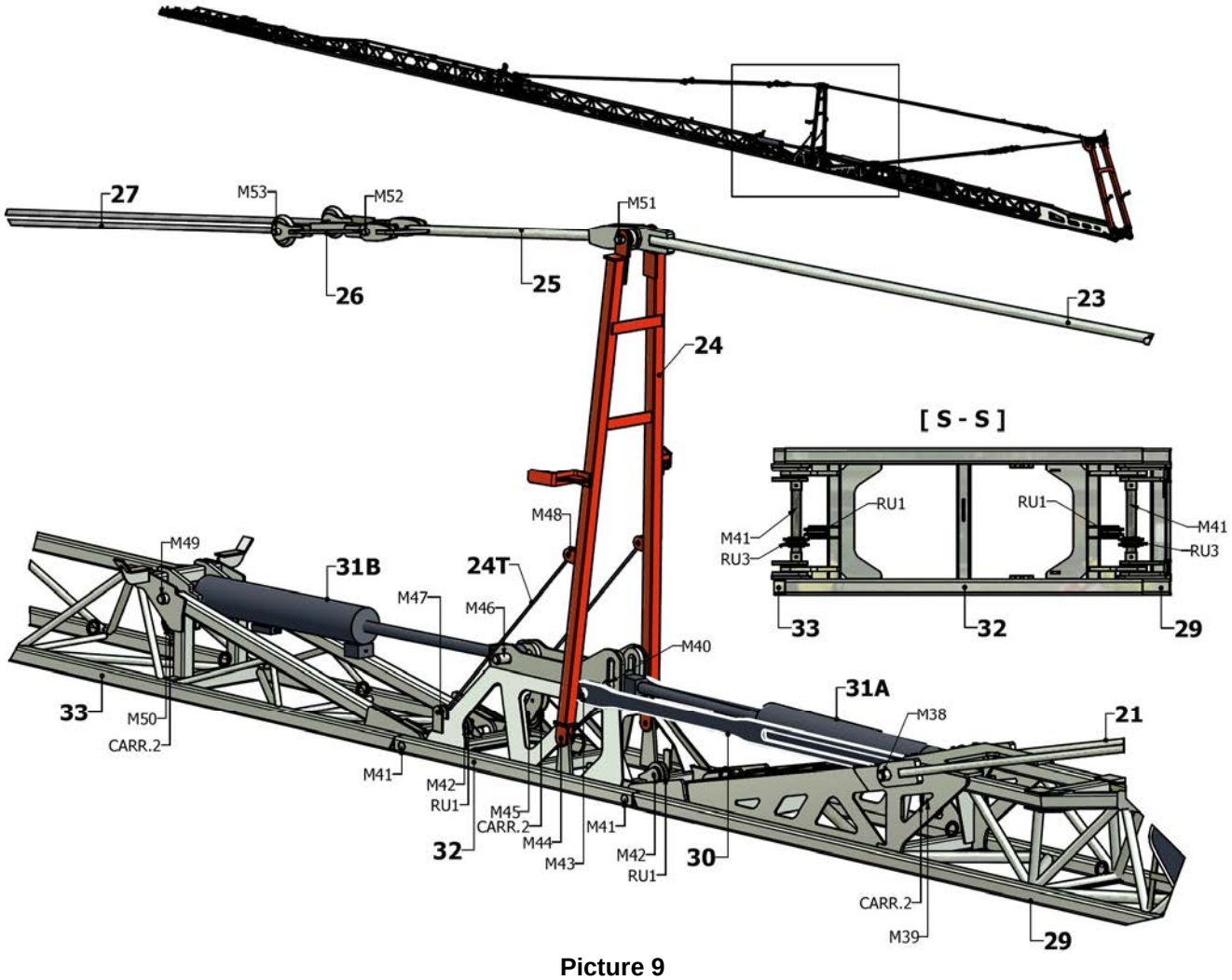
18.05- JIB GROUP



Picture 8

KEY:

19 = SCREW DOWN JACK P1
20 = ROPE TIE ROD " TCA "
21 = TIE ROD " TCB "
22 = ROPE TIE ROD " TL1A "
23 = TIE ROD " TL1B "
29 = 1° JIB ELEMENT



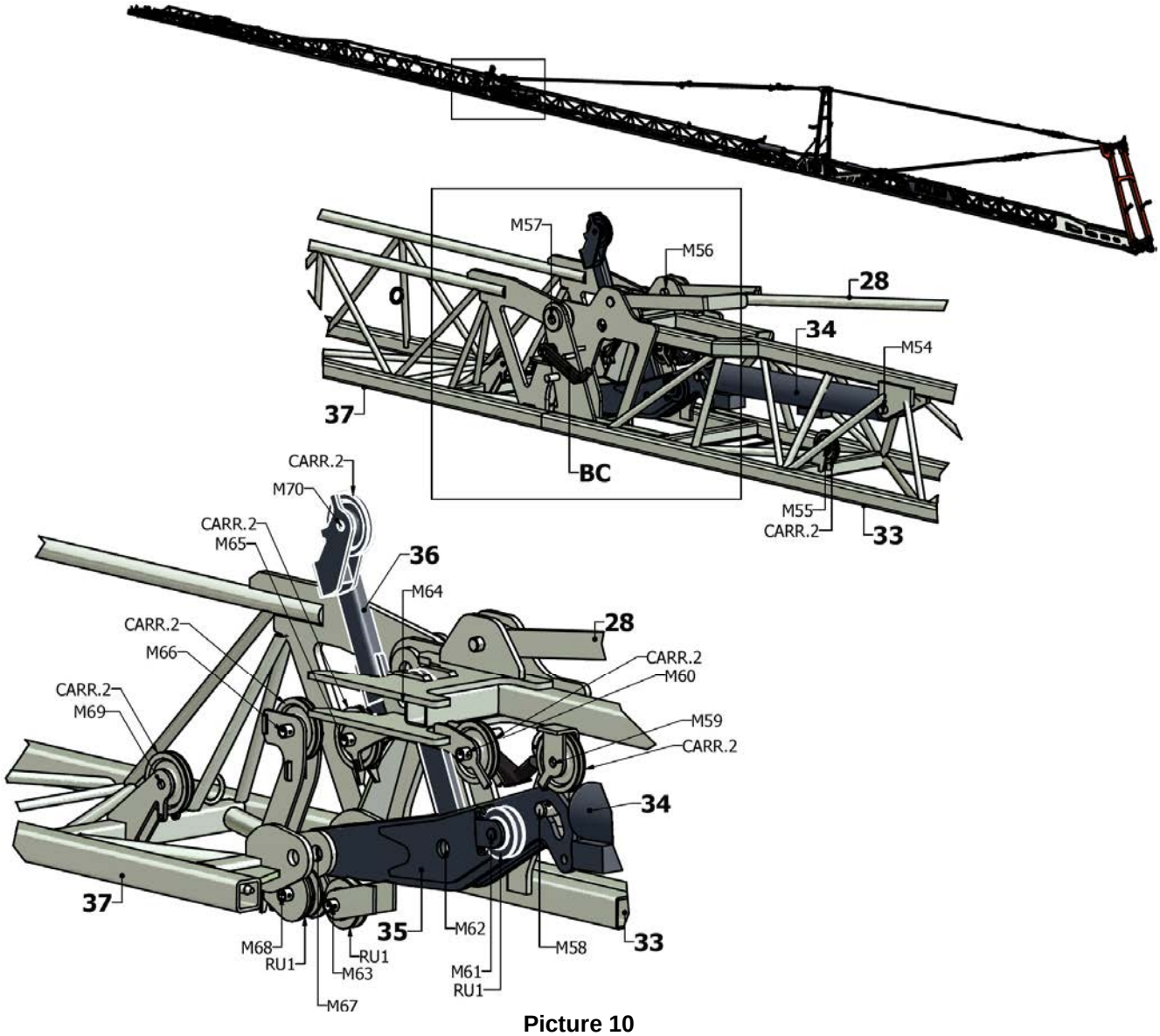
Picture 9

KEY:

21 = TIE ROD " TCB "
23 = TIE ROD " TL1B "
24 = SCREW DOWN JACK P4
24T = ROPE TIE ROD P4 / ADAPTER
25 = TIE ROD "TL2A"
26 = TIE ROD "TL2B" CONNECTION
27 = ROPE TIE ROD "TL2C"
29 = 1° JIB ELEMENT
30 = "SLIDERS" EXTENSIBLE TIE RODS
31A = 1° JIB ELEMENT / ADAPTER CYLINDER
31B = ADAPTER / 2° JIB ELEMENT CYLINDER
32 = CENTRAL JIB ADAPTER
33 = 2° JIB ELEMENT

M38 = TIE ROD "TCB "/ 1° JIB ELEMENT/ CYLINDER PIN (SEE TABLE)
M39 = PULLEY PIN ON 1° JIB ELEMENT (SEE TABLE)
M40 = 1°JIB ELEMENT CYLINDER/ CENTRAL JIB ADAPTER PIN (SEE TABLE)
M41 = ADAPTER/ 1° JIB ELEMENT - ADAPTER/ 2° JIB ELEMENT PIN (SEE TABLE)
M42 = ROLL PIN ON ADAPTER (SEE TABLE)
M43 = "SLIDERS" EXTENSIBLE TIE RODS / ADAPTER PIN (SEE TABLE)
M44 = SCREW DOWN JACK P4 / ADAPTER PIN (SEE TABLE)

M45 = PULLEY PIN ON ADAPTER (SEE TABLE)
M46 = 2° JIB ELEMENT CYLINDER / ADAPTER PIN (SEE TABLE)
M47 = ROPE TIE ROD P4 / ADAPTER PIN (SEE TABLE)
M48 = ROPE TIE ROD P4 / SCREW DOWN JACK PIN P4 (SEE TABLE)
M49 = 2° JIB ELEMENT/ CYLINDER PIN (SEE TABLE)
M50 = PULLEY PIN ON 2° JIB ELEMENT (SEE TABLE)
M51 = TIE ROD " TL1B "/ SCREW DOWN JACK P4 / TIE ROD " TL2A " PIN (SEE TABLE)
M52 = TIE ROD " TL2A" / TIE ROD TL2B " CONNECTION PIN (SEE TABLE)
M53 = TIE ROD " TL2B " CONNECTION/ ROPE TIE ROD " TL2C " PIN (SEE TABLE)
CARR2 = 1°JIB ELEMENT- ADAPTER - 2° JIB ELEMENT PULLEYS (SEE PAR.)
RU1 = ROLLS ON ADAPTER (SEE PAR.)
RU3 = ROLLS ON ADAPTER (SEE PAR.)



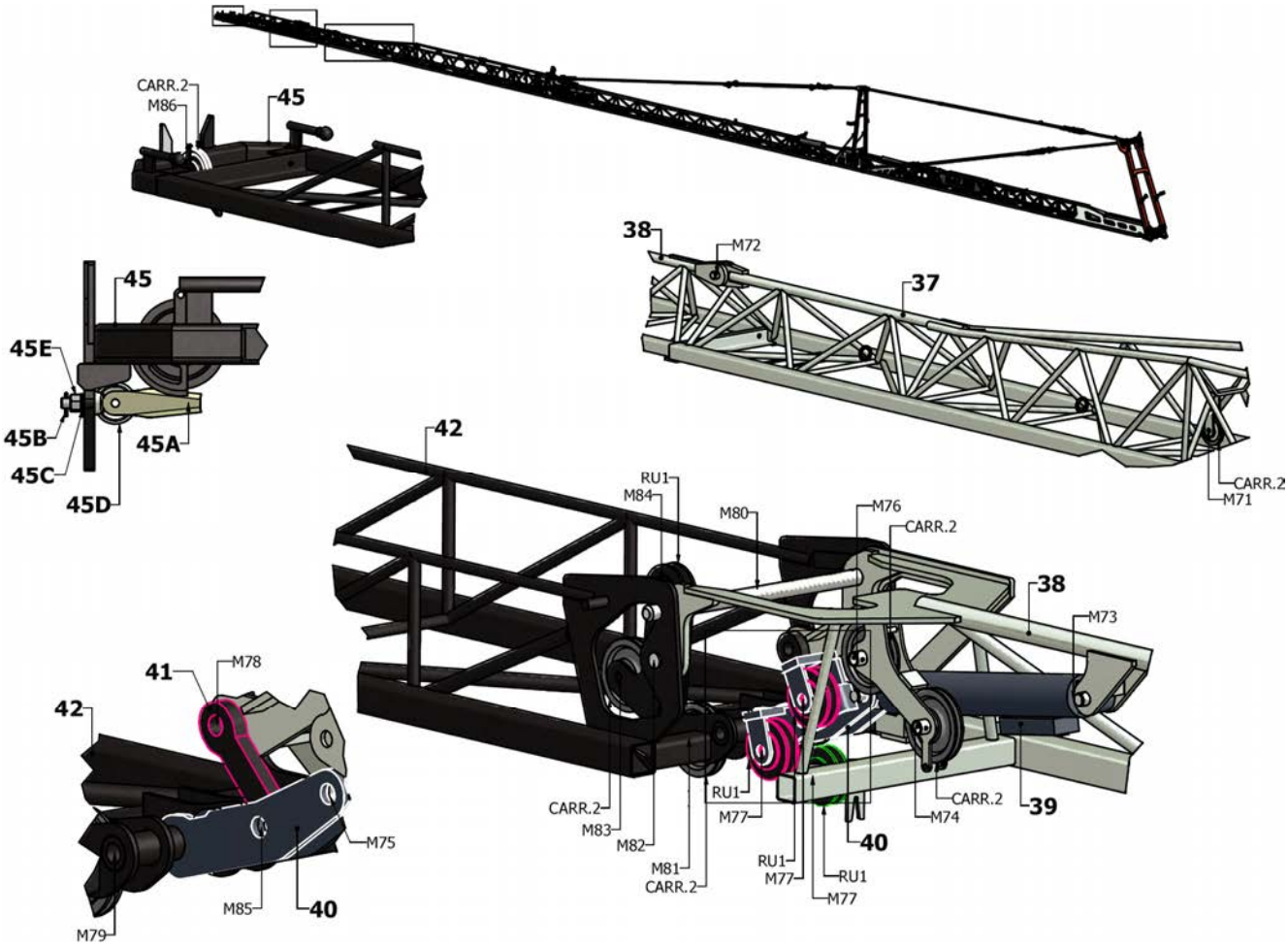
Picture 10

KEY:

28 = TIE ROD " TL2D "
33 = 2° JIB ELEMENT
34 = 2°/ 3° JIB ELEMENT CYLINDER
35 = LONG CONNECTING ROD 2°/ 3°

36 = CONNECTING ROD 2°/ 3°
37 = 3° JIB ELEMENT
BC = TROLLEY LOCK

M54 = 2°/ 3° JIB ELEMENT / 3° JIB ELEMENT CYLINDER PIN (SEE TABLE)
M55 = PULLEY PIN ON 3° JIB ELEMENT (SEE TABLE)
M56 = TIE ROD CYLINDER " TL2D "/ 3° JIB ELEMENT PIN (SEE TABLE)
M57 = 2° JIB ELEMENT / 3° JIB ELEMENT PIN (SEE TABLE)
M58 = 2°/3° JIB ELEMENT CYLINDER / LONG CONNECTING ROD 2°/3° PIN (SEE TABLE)
M59 = PULLEY PIN ON 2° JIB ELEMENT (SEE TABLE)
M60 = PULLEY PIN ON 2° JIB ELEMENT (SEE TABLE)
M61 = ROLL PIN ON LONG CONNECTING ROD 2° / 3° (SEE TABLE)
M62 = LONG CONNECTING ROD 2° / 3° - CONNECTING ROD 2° / 3° PIN (SEE TABLE)
M63 = ROLL PIN ON 2° JIB ELEMENT (SEE TABLE)
M64 = 2° JIB ELEMENT / CONNECTING ROD 2° /3° PIN (SEE TABLE)
M65 = PULLEY PIN ON 2° JIB ELEMENT (SEE TABLE)
M66 = PULLEY PIN ON 3° JIB ELEMENT (SEE TABLE)
M67 = 3° JIB ELEMENT / LONG CONNECTING ROD 2°/ 3° PIN (SEE TABLE)
M68 = ROLL PIN ON 3° JIB ELEMENT (SEE TABLE)
M69 = PULLEY PIN ON 3° JIB ELEMENT (SEE TABLE)
M70 = PULLEY PIN ON CONNECTING ROD 2° / 3° (SEE TABLE)
CARR2 = PULLEYS 2° JIB ELEMENT - 3° JIB ELEMENT - CONNECTING ROD 2° / 3° (SEE PAR.)
RU1 = ROLLS ON 2° JIB ELEMENT / 3° JIB ELEMENT / LONG CONNECTING ROD 2° / 3° (SEE PAR.)



Picture 11

KEY:

37 = 3° JIB ELEMENT
38 = 4° JIB ELEMENT
39 = 4°/ 5° JIB ELEMENT CYLINDER
40 = LONG CONNECTING ROD 4°/ 5°
41 = CONNECTING ROD 4° / 5°
42 = 5° JIB ELEMENT
45 = TERMINAL NOSE WITH ROPE TERMINAL

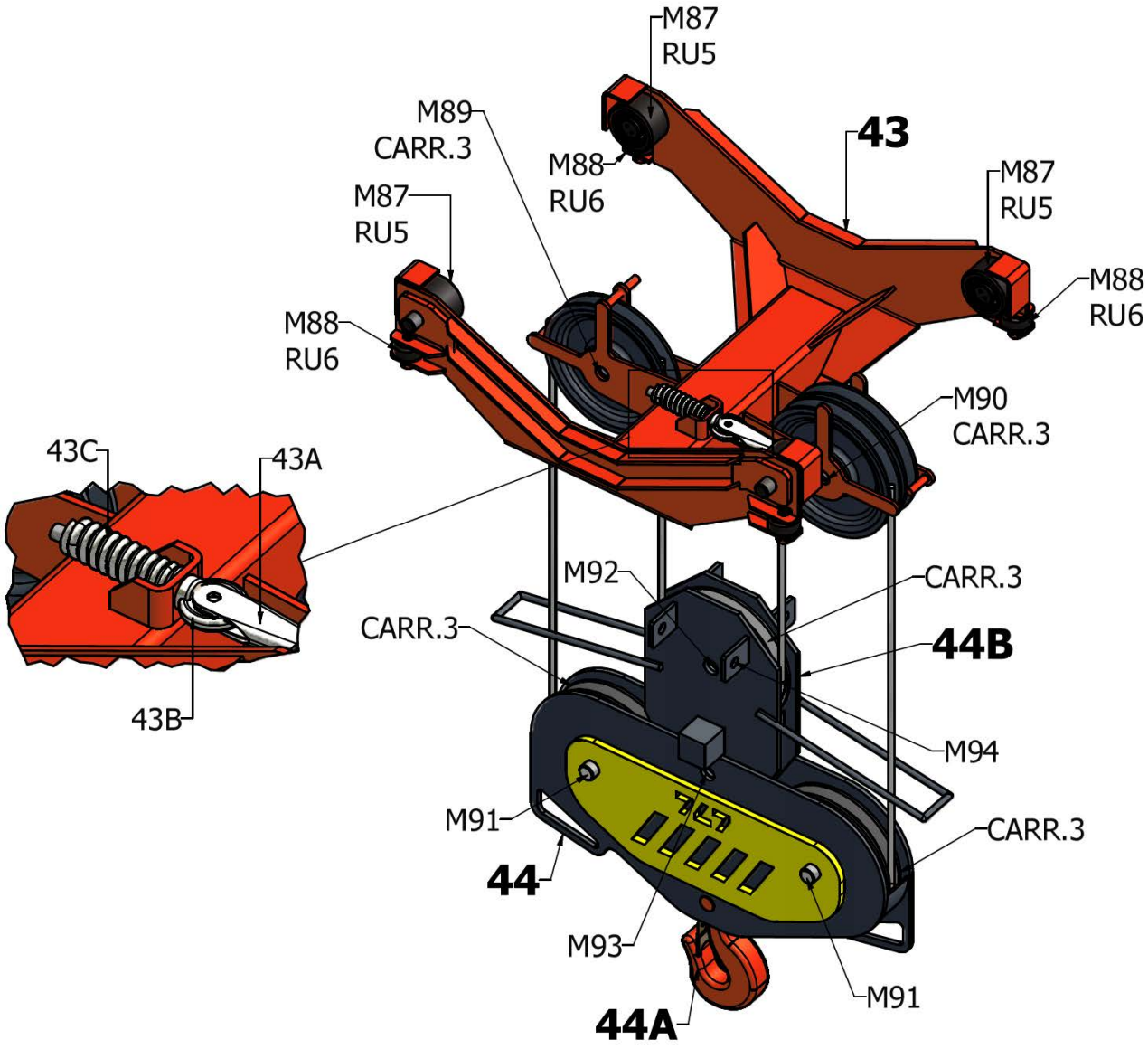
VERSION " R ":
-45A = TERMINAL R11- EN 13411-7 C.R.58 KN galvanised
-45B = SPLIT PIN
-45C = THRUST BEARING 51105 Øint.25 Øest.42 H=11
-45D = EYE TIE ROD UNI M24 galvanised
-45E = SELF-LOCKING NUT M24 (NOTE: if it must be disassembled, replace it with a new one)

VERSION " V ":
-45A = TERMINAL R11 - EN 13411-7 C.R.58 KN galvanised
-45B = SPLIT PIN
-45C = THRUST BEARING 51105 Øint.25 Øest.42 H=11
-45D = EYE TIE ROD UNI M24 galvanised
-45E = SELF-LOCKING NUT M24 (NOTE: if it must be disassembled, replace it with a new one)

VERSION " T ":
-45A = TERMINAL EN 13411-7 C.R. 115 KN galvanised
-45B = SPLIT PIN
-45C = THRUST BEARING 51206 Øint.30 Øest.52 H=16
-45D = EYE TIE ROD UNI M30 galvanised
-45E = SELF-LOCKING NUT M30 (NOTE: if it must be disassembled, replace it with a new one)

M71 = PULLEY PIN ON 3° JIB ELEMENT (SEE TABLE)
M72 = PIN 3° JIB ELEMENT / 4° JIB ELEMENT PIN (SEE TABLE)
M73 = 4° JIB ELEMENT / 4°-5° JIB ELEMENT CYLINDER PIN (SEE TABLE)
M74 = PULLEY PIN ON 4° JIB ELEMENT (SEE TABLE)
M75 = LONG CONNECTING ROD 4°-5°/ 4°-5° JIB ELEMENT CYLINDER PIN (SEE TABLE)
M76 = PULLEY PIN ON 4° JIB ELEMENT (SEE TABLE)
M77 = ROLL PIN ON 4° JIB ELEMENT - ROLL ON LONG CONNECTING ROD 4°/ 5° (SEE TABLE)
M78 = CONNECTING ROD 4° - 5° / 4° JIB ELEMENT PIN (SEE TABLE)
M79 = LONG CONNECTING ROD 4°- 5°/ 5° JIB ELEMENT PIN (SEE TABLE)
M80 = 4° JIB ELEMENT / 5° JIB ELEMENT PIN (SEE TABLE)
M81 = PULLEY PIN ON 5° JIB ELEMENT (SEE TABLE)
M82 = 4° JIB ELEMENT / 5° JIB ELEMENT PIN (SEE TABLE)
M83 = PULLEY PIN ON 5° JIB ELEMENT (SEE TABLE)
M84 = ROLL PIN ON 5° JIB ELEMENT (SEE TABLE)
M85 = LONG CONNECTING ROD 4°-5°/ CONNECTING ROD 4°-5° PIN (SEE TABLE)
M86 = PULLEY PIN ON TERMINAL NOSE (SEE TABLE)
CARR2 = PULLEYS 3° JIB ELEMENT /4° JIB ELEMENT /5° JIB ELEMENT / TERMINAL NOSE (SEE PAR.)
RU1 = ROLLS ON 4° JIB ELEMENT / 5° JIB ELEMENT (SEE PAR.)

18.06- TROLLEY AND PICK-UP MEMBER GROUP:



Picture 12

KEY:

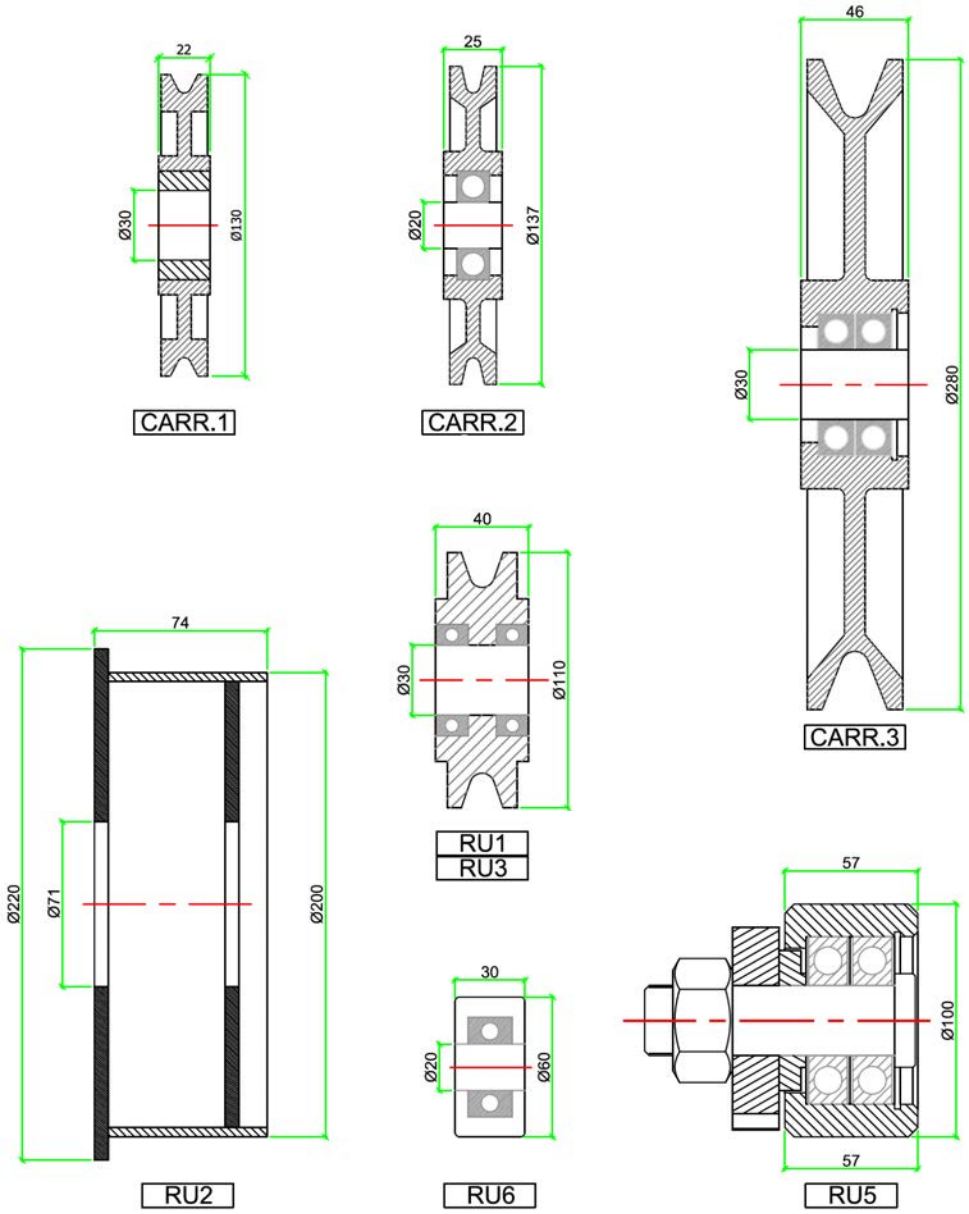
43 = TROLLEY
- 43A = TERMINAL R8 - EN 13411-7
- 43B = EYEBOLT WITH THREADED BAR
- 43C = SPRING D40 FOR BACKWARDS TROLLEY ROPE

44 = MAIN BLOCK (FOR TWO-FALL ROPE)
44A = PICK-UP MEMBER HOOK
44B = INTERMEDIATE BLOCK (FOR FOUR-FALL ROPE)

M87 = TROLLEY WHEEL PIN (SEE TABLE)
M88 = TROLLEY SIDE WHEEL PIN (SEE TABLE)
M89 = PULLEY/TROLLEY PIN (SEE TABLE)
M90 = PULLEY/TROLLEY PIN (SEE TABLE)
M91 = PICK-UP MEMBER PIN (SEE TABLE)
M92 = PIN ON BLOCK WITH FOUR-FALL ROPE (SEE TABLE)

M93 = PICK-UP MEMBER/ FOUR-FALL ROPE BLOCK PIN
M94 = BLOCK CONNECTION PIN FOR TRANSPORT
CARR.3 = PULLEYS ON TROLLEY AND PICK-UP MEMBER (SEE PAR.)
RU5 = TROLLEY WHEELS (SEE PAR.)
RU6 = TROLLEY SIDE WHEELS (SEE PAR.)

18.07 - ROLLS AND PULLEYS

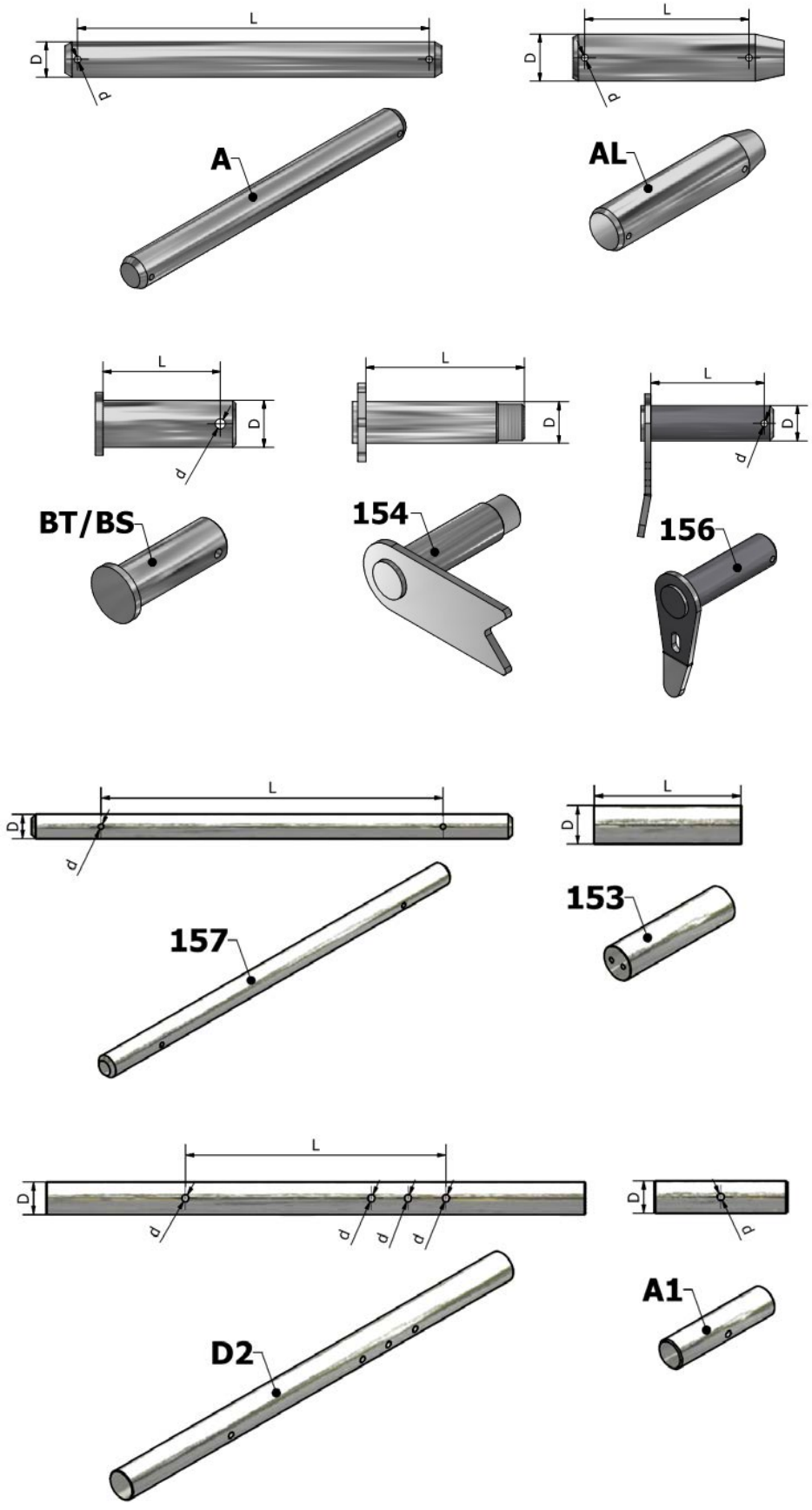


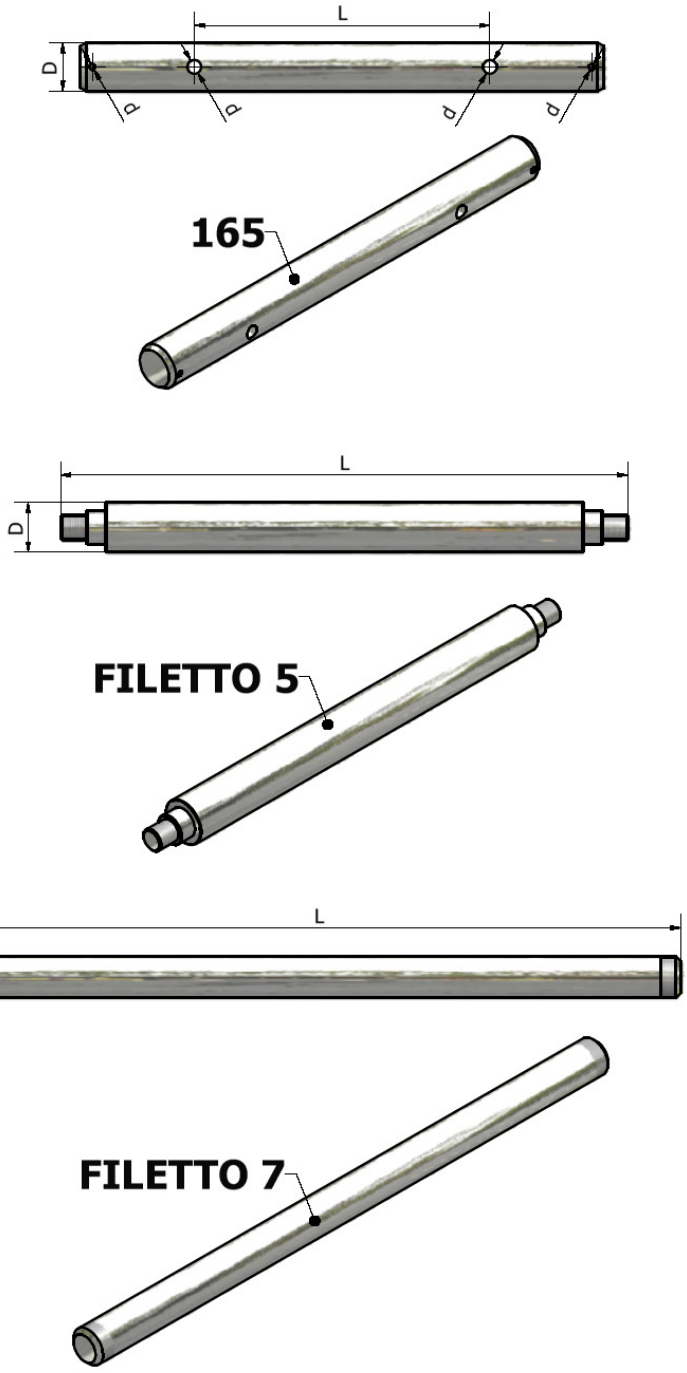
Picture 13

KEY:

CARR.1 = PULLEY WITH BUSHING Øint.30
CARR.2 = POLYAMIDE PULLEY WITH N°1 BEARING 6204 - 2RS
CARR.3 = CAST IRON PULLEY WITH N°2 BEARINGS 6206 - 2RS
RU1 = NYLON ROLL WITH N°2 BEARINGS 6204 - 2RS
RU2 = ROLL P1
RU3 = NYLON ROLL
RU5 = TROLLEY SIDE WHEELS WITH N°1 BEARING - SKF 6204 - 2RS
RU6 = TROLLEY WHEELS WITH N°2 BEARINGS - SKF 6306 - 2RS

18.08 - PINS




L
D
d
d
d
d
165
L
D
FILETTO 5
L
D
FILETTO 7

RIF.	N° PIECES	D	L	TYPE	d	RIF.	N° PIECES	D	L	TYPE	d
M1	4	110	550	---	---	**M48**	2	20	55	BT	6
M2	4	45	145	156	8,5	**M49**	1	45	150	A	8,5
M3	2	50	208	AL	8,5	**M50**	1	20	60	D	6
M4	2	60	210	AL	8,5	**M51**	1	40	202	A	8,5
M5	1	30	470	BS	6	**M52**	2	30	63	A	6
M6	1	20	60	D	6	**M53**	2	30	75	BT	6
M7	1	20	60	D	6	**M54**	1	35	120	A	8,5
M8	1	70	605	A	8,5	**M55**	1	20	60	D	6
M9	1	40	656	G	---	**M56**	2	30	75	BS	6
M10	1	70	640	A	8,5	**M57**	2	40	148	A	8,5
M11	2	40	152	154	---	**M58**	1	35	120	A	8,5
M12	1	70	558	A	8,5	**M59**	1	20	60	D	6
M13	1	70	272	153	M12	**M60**	1	20	60	D	6
M14	2	40	98	A	8,5	**M61**	1	20	60	D	6
M15	1	60	682	THREAD 5	---	**M62**	1	40	202	A	8,5
M16	1	50	278	A	8,5	**M63**	1	20	40	D	6
M17	2	20	60	D	6	**M64**	1	40	118	A	8,5
M18	2	20	60	D	6	**M65**	1	20	60	D	6
M19	2	40	164	A1	8,5	**M66**	1	20	60	D	6
M20	2	50	178	A	8,5	**M67**	1	35	280	A	8,5
M21	2	50	100	A	8,5	**M68**	1	20	60	D	6
M22	1	60	400	A	8,5	**M69**	1	20	60	D	6
M23	1	50	250	A	8,5	**M70**	1	20	60	D	6
M24	1	70	486	144	19	**M71**	1	20	60	D	6
M25	2	20	60	D	6	**M72**	1	35	120	A	8,5
M26	2	30	91	A	6	**M73**	1	25	75	BT	6
M27	2	45	153	A	8,5	**M74**	1	20	60	D	6
M28	PIN LOAD CELL					**M75**	1	25	75	BT	6
M29	1	50	300	A	8,5	**M76**	1	20	60	D	6
M30	1	70	755	165	19	**M77**	3	20	60	D	6
M31	2	50	150	A	8,5	**M78**	1	25	71	A	6
M32	2	40	118	A	8,5	**M79**	1	25	276	A	6
M33	2	20	60	D	6	**M80**	1	30	590	157	8,5
M34	1	20	60	D	6	**M81**	1	20	60	D	6
M35	1	20	60	D	6	**M82**	2	SCREWS M24x110			
M36	2	40	148	A	8,5	**M83**	1	20	60	D	6
M37	1	35	212	A	8,5	**M84**	1	20	60	D	6
M38	1	45	635	A	8,5	**M85**	1	25	75	BT	6
M39	1	20	60	D	6	**M86**	1	20	60	D	6
M40	1	45	200	A	8,5	**M87**	4	PIN M30 – TROLLEY WHEELS			
M41	2	40	662	D2	8,5	**M88**	4	20	60	D	6
M42	2	20	60	D	6	**M89**	1	30	85	D	8,5
M43	1	40	335	A	8,5	**M90**	1	30	135	D	8,5
M44	2	20	55	BT	6	**M91**	2	PARTIALLY THREADED SCREW M30x190			
M45	1	20	60	D	6	**M92**	1	30	75	BS	8,5
M46	1	45	200	A	8,5	**M93**	1	30	110	BS	8,5
M47	2	20	55	BT	6	**M94**	1	20	190	Dwg.082	8,5

DB747

www.grudalbe.com