TECHNICAL TRAINING

STAR 8/10 – STAR22/26J

How to use this document?

> **MAINTENANCE AND REPAIR OPERATIONS ON YOUR HAULOTTE MACHINE**
> **MUST BE DONE ONLY BY TRAINED ,EXPERIENCED AND AUTHORIZED TECHNICIANS**

You have between the hands the summary given during the HAULOTTE technical training
It will enable you to find information necessary for the maintenance and the repair of your
HAULOTTE machine .
Thanks to the guide below you will reach the required chapter quickly.

Chapter 1: Main features and functions
It is a resume of the information contained in the user manual delivered with the machine:
components, overall dimensions, working zones, commands, etc…

Chapter 2: Study of the electric schematics
You will find there the elements as following:
- A summary of the standardized symbols used by HAULOTTE Group
- The complete wiring diagram of the studied model
- The non exhaustive list of the electric looms and electronic boards
- Localization of the main safety units (tilt , limit switches, sensors, transducers…)
- Logical equations of operation: by function, to diagnose the main dysfunctions

Chapter 3: Study of the hydraulic schematics
You will find there the elements following:
- a summary of the standardized symbols used by HAULOTTE Group
- the complete hydraulic diagram of the studied model
- a localization of the main hydraulics manifold

Chapter 4: Adjustments
This is the adjustments and calibrations, hydraulics and electric, necessary for the good maintenance
of the material. You will find as well the methods of adjustment with table values.

Chapter 5: Breakdown guide
Quick summary of the step to be followed for possible sources of breakdown.
In case of any defect or any dysfunction you will be able to identify the elements in question,
whatever they are electric or hydraulic.

Chapter 6: Summary of the versions
This manual treats of the latest version, however this summary table enables you to find the former
versions of the material (electric and hydraulics).

Chapter 7: Special functions
This chapter gathers all the functions and adjustment specific to carry out on the machine. There
does not exist for all the materials and depends on the studied model.
It must be the subject of a special attention as an intervention badly carried out can deteriorate the
good performance of the machine and thus consequently the safety of the users.
Only a HAULOTTE technician or approved by HAULOTTE Services is able to carry out this kind of
intervention.
On this chapter, some special adjustment (sensors) are also explained prior to calibration (depends
on the model)

Chapter 8 : List of schematics
This chapter lists all schematics (electric/hydraulic) in A3 size of all versions and some layouts if
required

REVISION

Revision	Edition	Subject	Created by	Validated by	Modified by	Translated by	Language
00	05-15	Creation	MGD				EN

TRAINING MANUAL
4000365480

STAR 8(22J)/Star 10(26J)
E05-15

SUMMARY

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STAR 8(22J)/Star 10(26J)
E05-15

1. MAIN FEATURES AND FUNCTIONS

1.1. CHARACTERISTICS

1.1.1. MAIN COMPONENTS

STAR 8 - STAR 22J - STAR 10 - STAR 26J
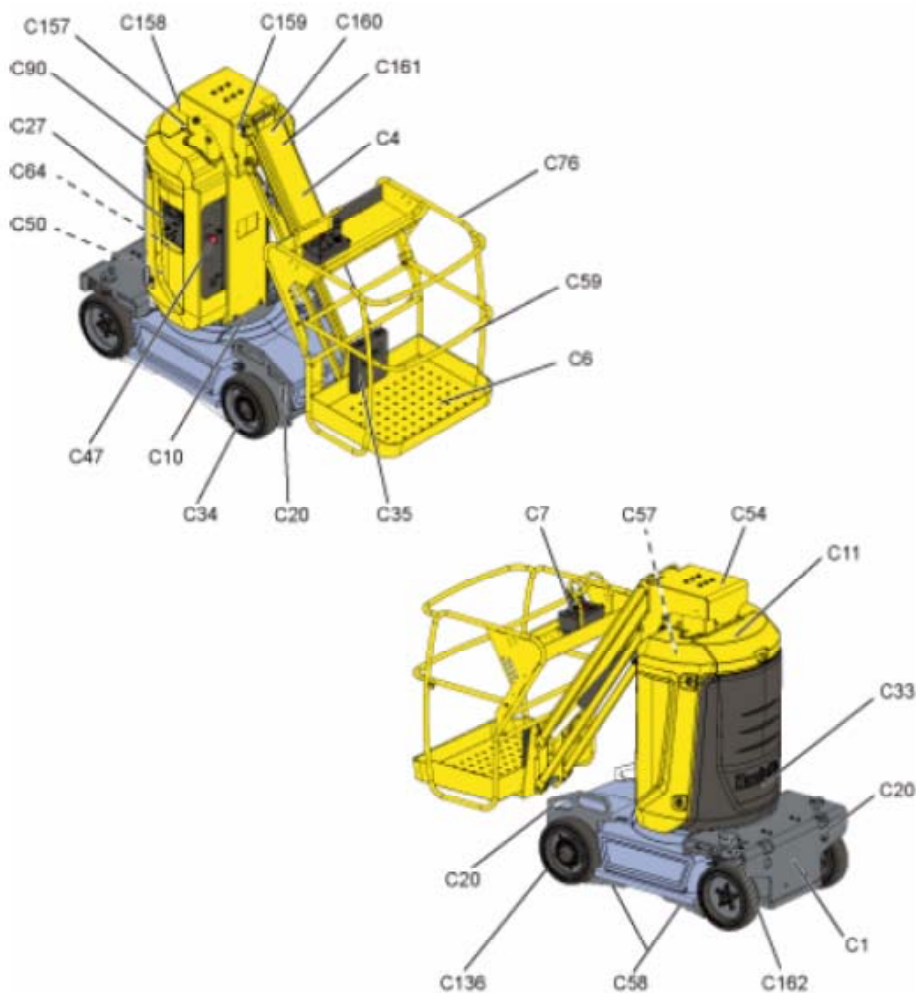
1.1.2. Overall dimensions – Star10

1.1.3. Working zone star 8-star 10

STAR 8 - STAR 22J - STAR 10 - STAR 26J

1.1.4. MAIN CHARACTERISTICS

STAR 8 - STAR 10

CE and AS standards

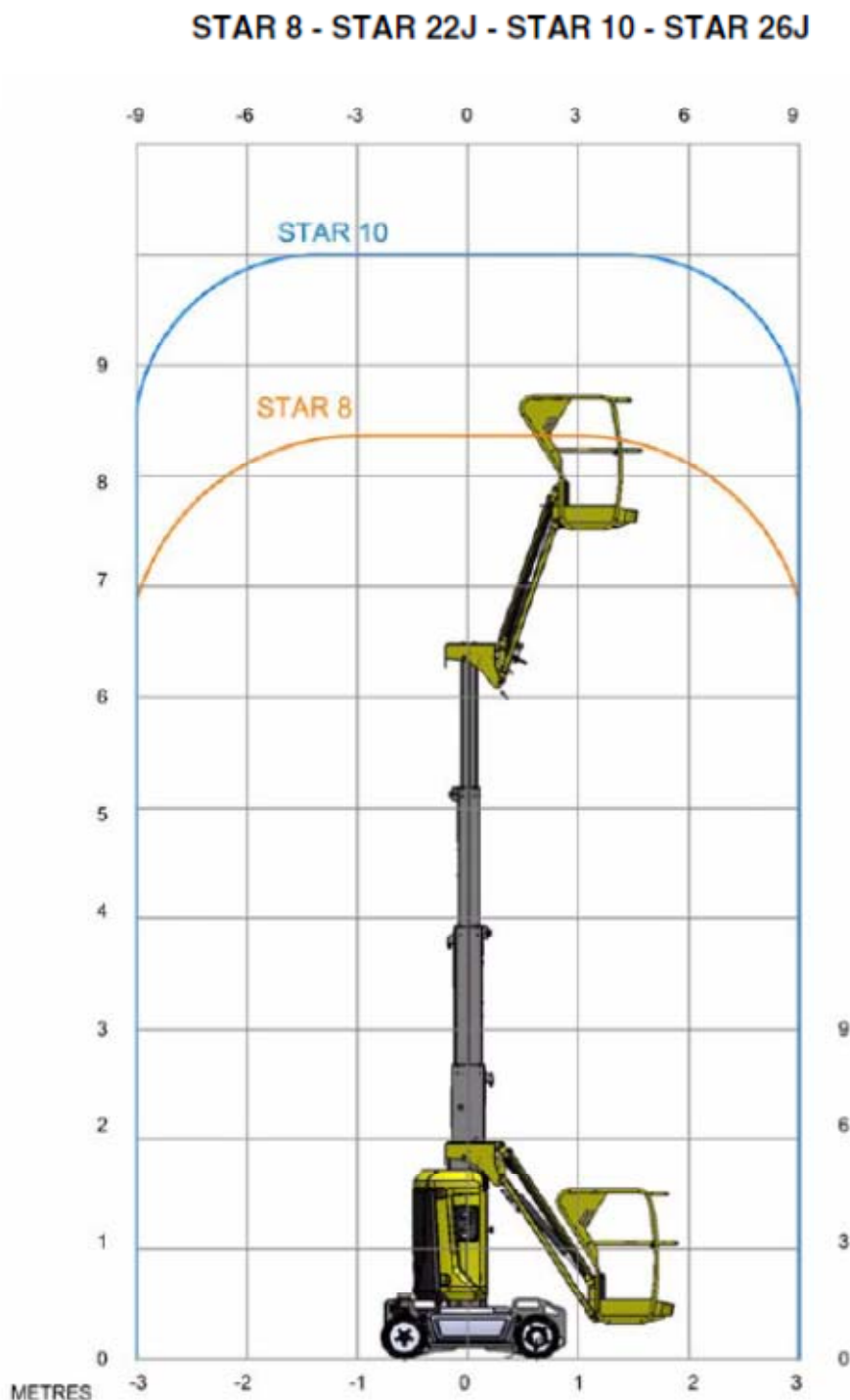| Machine	STAR 8		STAR 10	
Characteristics - Dimensions	SI	Imp.	SI	Imp.
Maximum working height	8,75 m	28 ft 9 in	9,95 m	32 ft 8 in
Maximum platform height	6,75 m	22 ft 2 in	7,95 m	26 ft 1 in
Maximum horizontal reach	3,06 m	10 ft 0 in	3,06 m	10 ft 0 in
Maximum outreach above the ground	2,58 m	8 ft 6 in	2,58 m	8 ft 6 in
Maximum platform height before driving speed restriction	2,65 m	8 ft 8 in	2,65 m	8 ft 8 in
Maximum boom articulation point height	6,20 m	20 ft 4 in	6,83 m	22 ft 5 in
Turret rotation	345 °			
Jib working range	130°			
Total weight	2785 kg	6141 lb	2871 kg	6331 lb
Maximum platform capacity	200 kg	441 lb	200 kg	441 lb
Maximum number of person allowed	Indoor use : 2 Outdoor use : 2		Indoor use : 2 Outdoor use : 1	
Maximum wind speed allowed	45 km/h	28 mph	45 km/h	28 mph
Manual force - CE - AS	Indoor use : 400 N (90 lbf) Outdoor use : 200 N (45 lbf)		Indoor use : 400 N (90 lbf) Outdoor use : 200 N (45 lbf)	
Gradeability - 2WD	25 %			
Maximum rated slope allowed (slope) - CE - AS	3°			
Maximum load on wheel	1346 kg	2967,42 lbs	1396 kg	3078 lbs
Maximum ground pressure of wheel on paved ground	13,93 daN/cm²	2,85 lb/ft²	16,82 daN/cm²	3,44 lb/ft²
Drive speed : • Folded machine maximum speed - High speed	0,6 km/h	0.4 mph	0,6 km/h	0.4 mph
• Unfolded machine maximum speed - Micro-speed	5 km/h	3.1 mph	5 km/h	3.1 mph
Maximum freewheel speed during towed operation	5 km/h	3.1 mph	5 km/h	3.1 mph

ANSI and CSA standards

Machine	STAR 22J		STAR 26J	
Characteristics - Dimensions	SI	Imp.	SI	Imp.
Maximum working height	8,75 m	28 ft 9 in	9,95 m	32 ft 8 in
Maximum platform height	6,75 m	22 ft 2 in	7,95 m	26 ft 1 in
Maximum horizontal reach	3,06 m	10 ft 0 in	3,06 m	10 ft 0 in
Maximum outreach above the ground	2,58 m	8 ft 6 in	2,56 m	8 ft 5 in
Maximum platform height before driving speed restriction	2,65 m	8 ft 8 in	2,65 m	8 ft 8 in
Maximum boom articulation point height	6,20 m	20 ft 4 in	6,83 m	22 ft 5 in
Turret rotation	345 °			
Jib working range	130°			
Total weight	3014 kg	6646 lb	3100 kg	6836 lb
Maximum platform capacity	227 kg	500 lb	227 kg	500 lb
Maximum number of person allowed	Indoor use : 2 Outdoor use : 2		Indoor use : 2 Outdoor use : 2	
Maximum wind speed allowed	45 km/h	28 mph	45 km/h	28 mph
Manual force - ANSI - CSA	666 N - 150 lbf			
Gradeability - 2WD	25 %			
Maximum rated slope allowed (slope) - ANSI - CSA	0°			
Maximum load on wheel	1445 kg	3186 lbs	2270 kg	5004, 49 lbs
Maximum ground pressure of wheel on paved ground	15,46 daN/cm²	3,16 lb/ft²	16,44 daN/cm²	3,36 lb/ft²
Drive speed : • Folded machine maximum speed - High speed	0,6 km/h	0.4 mph	0,6 km/h	0.4 mph
• Unfolded machine maximum speed - Micro-speed	5 km/h	3.1 mph	5 km/h	3.1 mph
Maximum freewheel speed during towed operation	5 km/h	3.1 mph	5 km/h	3.1 mph

1.2. THE CONTROL BOX

1.2.1. LOWER CONTROLS
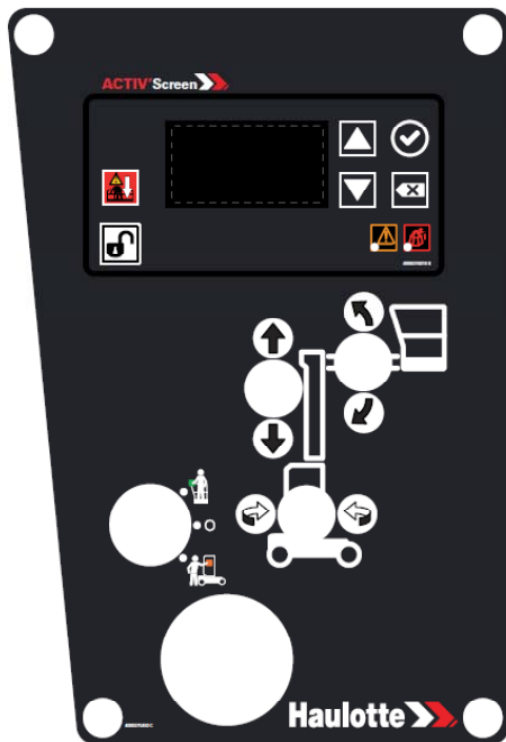
MARK	FUNCTION
1	Activ' Screen display (see detail)
SA620	Jib
SA520	Mast
SA901	Selection lower/upper controls
SA250	Orientation
CN03	Plug for VCI Haulotte Diag /Diag Pad connection

1.2.1. DETAIL ON ACTIV SCREEN

This display located on lower control box a several functions like

- Display of battery state / running hours
- Active Alarms
- Maintenance to be done
- Speeds/ramps/options settings(*)
- Diagnostic per function (*)
- Calibrations (steering/overload) (*)

Note: (*) Some functions are available only through codes of different levels according to their function

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MARK	FUNCTION
1	Keypad for menu scrolling up
2	Keypad for menu scrolling down
3	Keypad validation function/parameters settings
4	Keypad cancel/back return
5	Keypad "overriding" for emergency lowering (ie ucb not working)
6	Keypad lower controls movements (to be pushed permanently during the movement)
7	Fault indicator
8	Overload indicator

1.2.2. UPPER CONTROLS
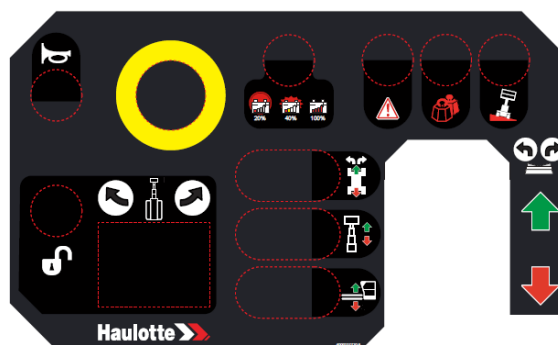
All components are linked to the TILLER CAN slave card
All datas are sent to the variator master (COMBIACX) through CAN-BUS network
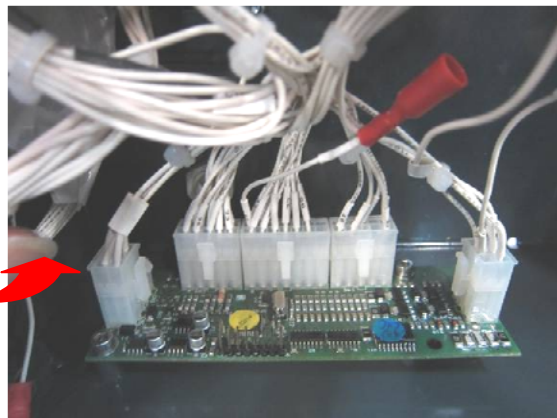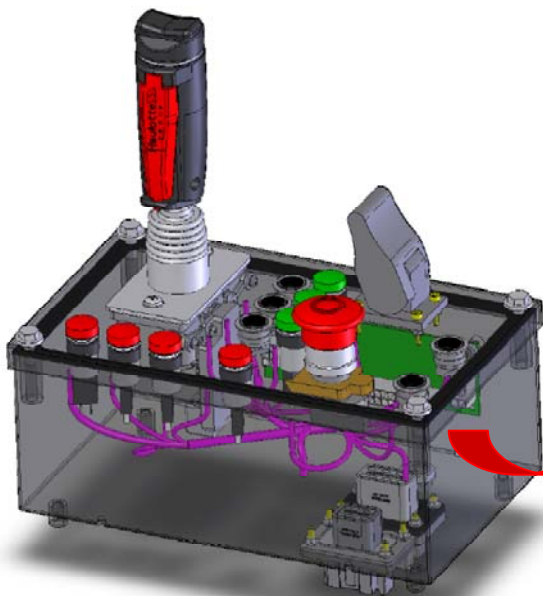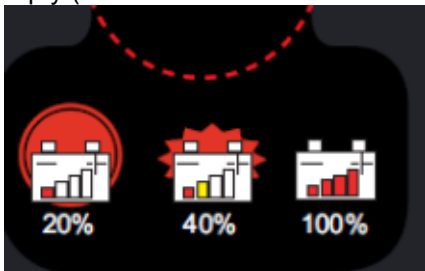
Detail of connectors on TILLER card

This card is a slave and is an interface between upper controls and lower controls , all informations are sent to the variator COMBIACX via can bus connection (it doesn't require any calibration or adjustment)

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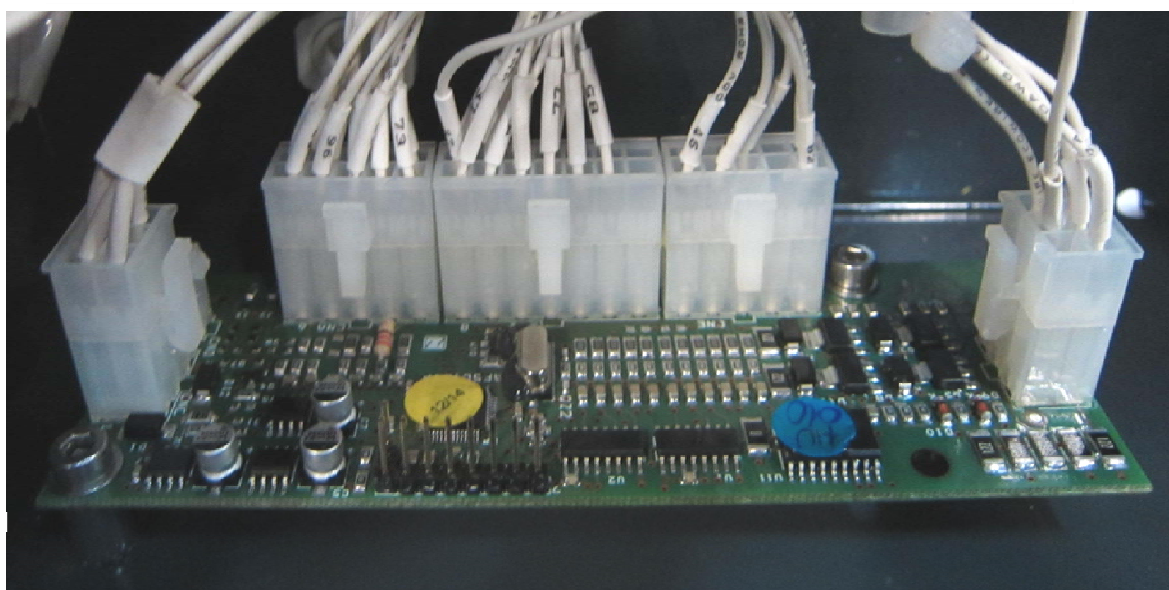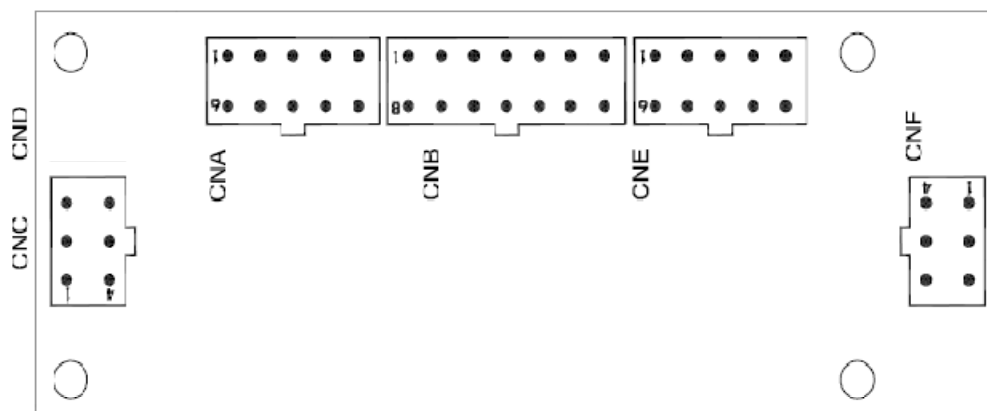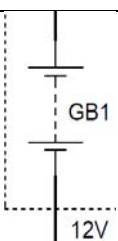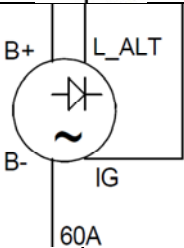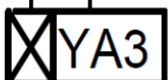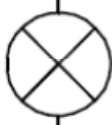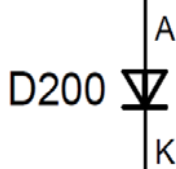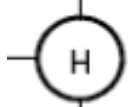
- **Detail of the functions**
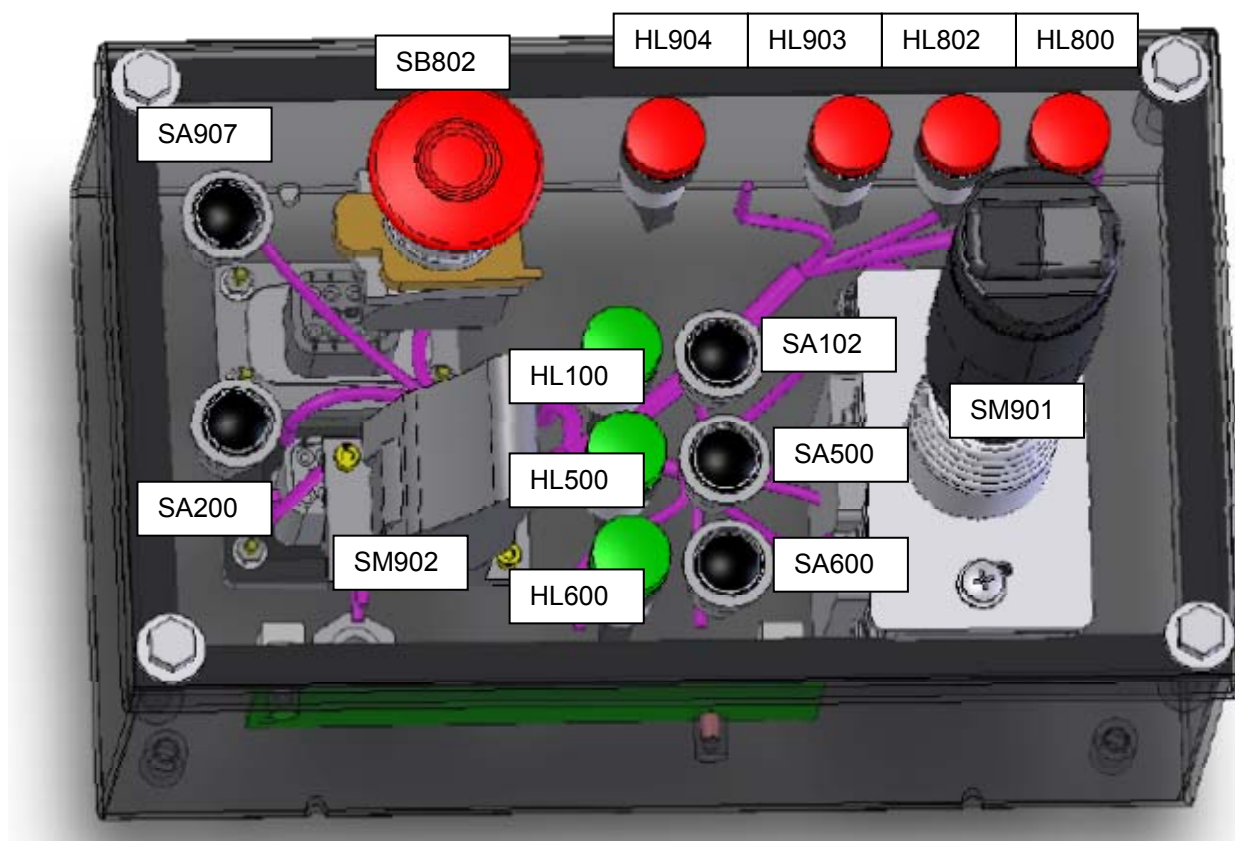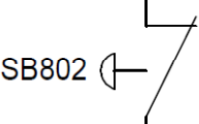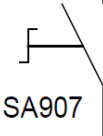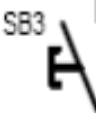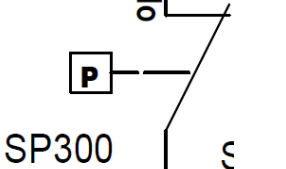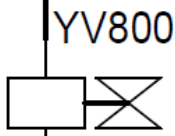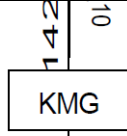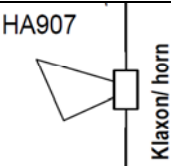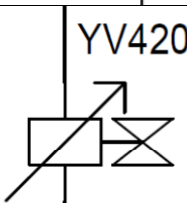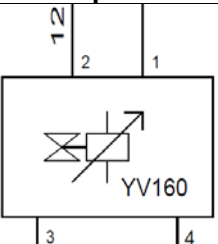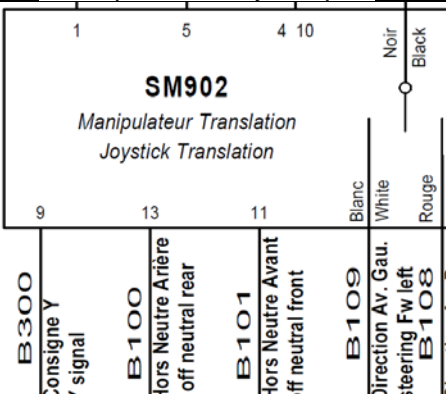
MARK	FUNCTION
SB802	Emergency push button (if activated or faulty : the descent of the mast remains possible through the « overriding button on lower control box)
SM901	Joystick for drive (signal on wire 73 (0.5VDC REV – 2.5VDC Neutral – 4.5VDC FWD)
SM902	Joystick for mast orientation (signal on wire 39 from 0.5VDC to 4.5VDC)
SA200	Enable pushbutton for validation of the orientation (to be pushed permanently during the movement)
SA102	Selection drive mode (function is cancelled after 8 seconds if movement not activated)
SA500	Selection mast (function is cancelled after 8 seconds if movement not activated)
SA600	Selection jib (function is cancelled after 8 seconds if movement not activated)
SA907	Horn switch
HL100	Indicator if drive mode is activated
HL500	Indicator if the movement of mast is activated
HL600	Indicator if the movement of jib is activated
HL800	Indicator machine in slope
HL802	Indicator machine in overload
HL903	Indicator for any other fault
HL904	Indicator batteries are empty (blink if BAT < 40 % and lit ON if BAT <20%
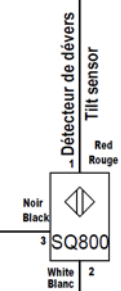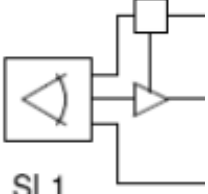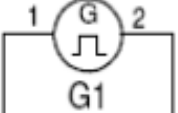
2. THE ELECTRICAL PART
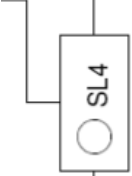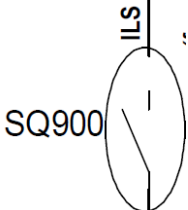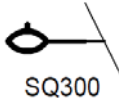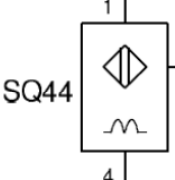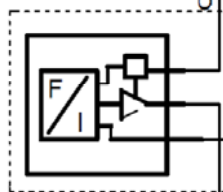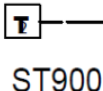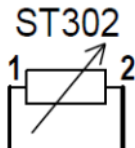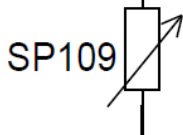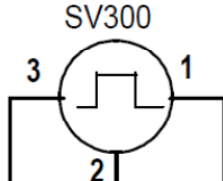
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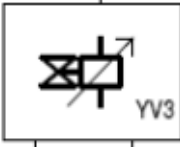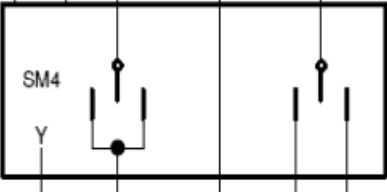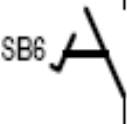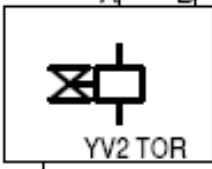
GB1 12V	Battery (2 elements of 6V)
B+ L_ALT B- IG 60A	Alternator
FU4 25A	Fuse (Here 25 amps)
O4 O2 YA3	Coil double roll
M800	Electric motor
EL903	Light/Bulb
D200 A K	Diode
H	Hourmeter
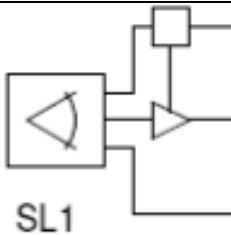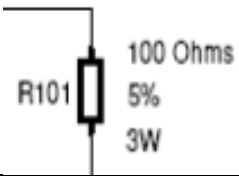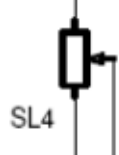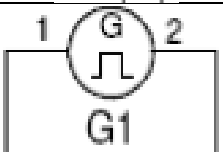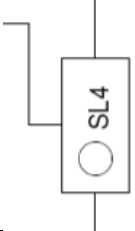
SB802	Standard push-button of safety "mushroom-headed button"
SA907	Rotary knob
SB3	Push-button
SQ2	Limit switch
SP300	Pressure switch
SA1	Key selector with 3 positions (T turret, O neutral, N platform)
SA620 1 Montée Up 3 Descente Down	Toggle switch with 2 positions (here lifting/descent)
YV800	Electrovalve
KMG	relay
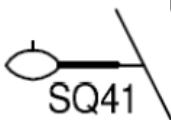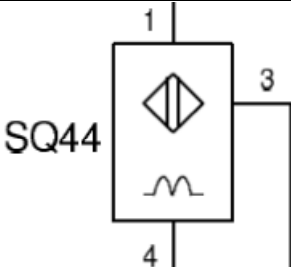
HA907 Klaxon / horn	horn
YV420	Proportional electrovalve (PWM type) Pulse Width Modulation
YV160 12 2 1 3 4	Proportional electrovalve (PVG type)
SM902 *Manipulateur Translation* *Joystick Translation* 1 5 4 10 Noir/Black 9 13 11 Blanc/White Rouge/Red B300 Consigne Y / Y signal B100 Hors Neutre Arière / off neutral rear B101 Hors Neutre Avant / off neutral front B109 Direction Av. Gau. steering Fw left B108 Direction Av. Dr.	Controller/joysticks
SB800	Foot "pedal" switch
HA901	buzzer
⊗ **EL903**	"light"

	Tilt sensor (ramp/slope detection)
	Angle sensor (reach limitation)
	Contact « mercury » (basket angle detection)
	Resistor (here value 220Ω, 1/4 Watts, tolerance of 1%)
	Sensor length (reach limitation)
	Pressure sensor (weighing)
	Angle sensor (weighing)
	Standard light "Led"

SL4	Strain gauge
SQ900 ILS	ILS Switch detection of the magnets on the telescopic boom/arm extension (Interrupteur Lame Souple)
SQ300	Level detector (diesel tank)
SQ44	Proximity detector with impulses (detection teeth slew ring)
F/I	Tranducer F/I Force/intensity for load measurement on basket/Platform
ST900	Temperature detection switch
ST302	Temperature detection sensor
SP109	Pressure detection sensor
SV300	Speed detection sensor

2 YA300 1	Engine coil (start/stop)
YV3	Proportional electrovalve
SM4 Y	Controller/joysticks
SB6	Foot pedal switch
HA4	buzzer
HL4	"light"
A B YV2 TOR	Electrovalve "ON/OFF » (bang-bang)
SQ1	Tilt sensor (ramp detection)

SL1	Angle sensor (reach limitation)
SQ50	Contact « mercury » (angle detection)
R101 100 Ohms 5% 3W	Resistor (here value 100 ohms, 3 Watts, tolerance of 5%)
SL4	Sensor length (reach limitation)
1 G 2 G1	Pressure sensor (weighing)
A1	Angle sensor (weighing)
	Standard light "Led"
SL4	Strain gauge
SQ42	Flexible Blade Switch (ILS) detection of the magnets on the telescopic boom/arm extension

SQ41	Level detector (diesel tank)
SQ44	Proximity detector with impulses (detection teeth slew ring)

2.2. METHODOLOGY OF CONTROL

Note: during an intervention on a component or a loom, it is important to remember to switch OFF the power supply of the machine in order to avoid any risk.

2.2.1. ELECTRIC CONTINUITY CONTROL

The continuity check of a loom or an electric component determines the resistor of this device, in order to detect a possible interruption of continuity (open circuit, short-circuit…).
This control is carried out with a multimeter commutated in position Ohmmeter (Ω).
First of all, it is necessary to determine the terminals of the component or the cable to control and insulate them.
Then, connect the multimeter in order to record the value.
It must indicate a value of resistor close to 0 Ω if continuity is good.

In the contrary case (resistor which tends towards the infinite one : ∞), continuity presents a defect.

Control of insulation

At the contrary of continuity, insulation represents a non electric connection between the ground and the component
The test of insulation consists in obtaining the opposite result of that described for continuity, i.e. a value of the Ohmmeter which must tend towards the infinite one : ∞
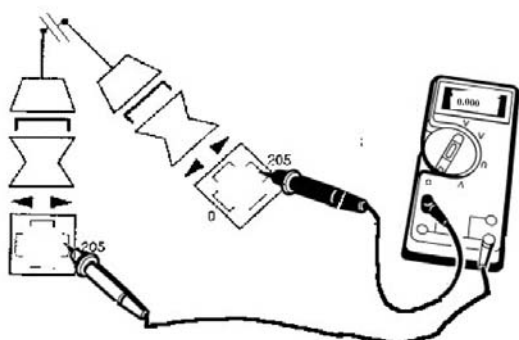
Exemple: test de continuité d'un faisceau électrique
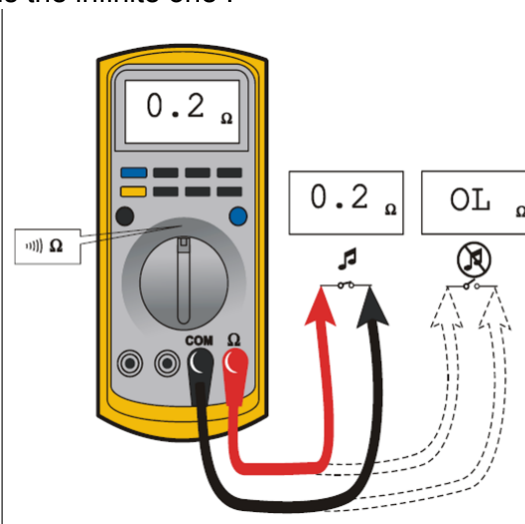
2.2.2. CONTROL OF AN ON/OFF VALVE

Note: These tests are to be carried out when power is ON .
Also control the state of the terminals or any other connectors (oxidation…)

Control supply of the coil

disconnect the plug socket of supply of the valve in order to connect in derivation the multimeter on the terminals of the connector (see below).
select the position to voltmeter (V), then activate the command to the valve which must be tested.
The voltage indicated by the voltmeter must be close to the battery voltage (Vbat)
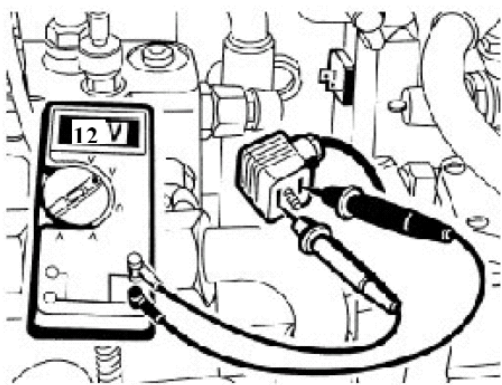
Contrôle de la tension d'alimentation du solénoïde
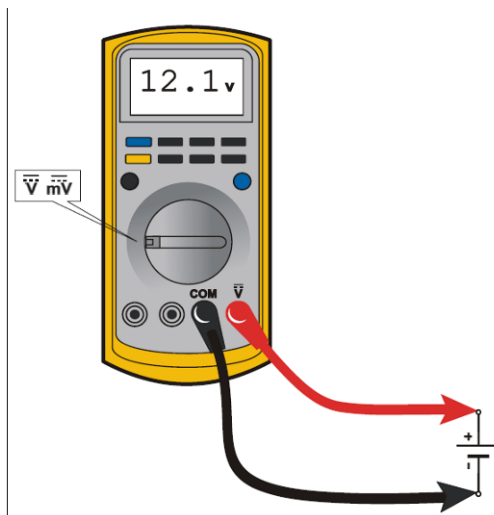
Control intensity of the coil

disconnect the plug socket of supply of the valve in order to connect in series the multimeter on the terminals of the connector (example below).

select the position Ammeter (A), then activate the command to the valve which must be tested.

The intensity indicated by the voltmeter must be of approximately 2A (to be checked according to the data manufacturer)
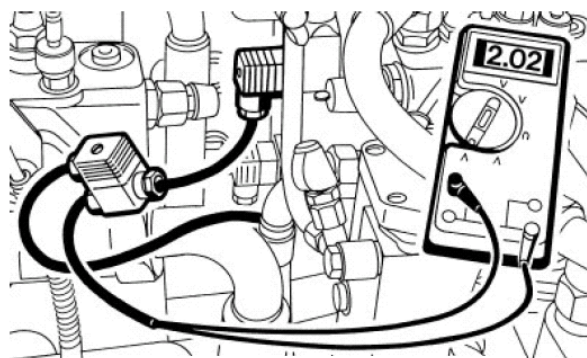
Contrôle de l'intensité du solénoïde
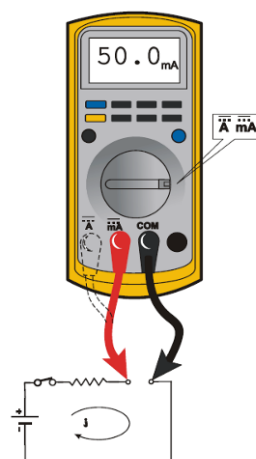
Control resistance of the coil

Disconnect the plug socket of supply of the valve in order to connect the multimeter on the terminals of the connector industry.

Select the position Ohmmeter (Ω), then compare the value measured with that of the data manufacturer.

In the event of nonconformity of the coil, replace it

2.2.3. CONTROL OF COMPONENTS

- **Control of an electric relay**
  Disconnect the relay, then locate its various terminals.
  Control the resistor of the solenoid terminals 85 and 86 (see manufacturer data's) using a multimeter in Ohmmeter position.
  If the resistor is null, change the relay.
  If this test is OK, check continuity between terminals 30 and 87a and insulation between terminals 30 and 87
  In the event of dysfunction, replace the relay.

- **supply control of the relay**
  locate the relay without disconnecting it and locating it its various terminals.
  control the continuity of terminal 86 with the ground
  . (In the event of defect of continuity, check the concerned loom)
  connect the multimeter in position Voltmeter (V) between terminal 30 and the ground and thus control the power supply of the component (It must be close to the battery voltage Vbat)
  select the function of this relay and check the output voltage between terminal 87 and ground.
  In the event of dysfunction, replace the relay.
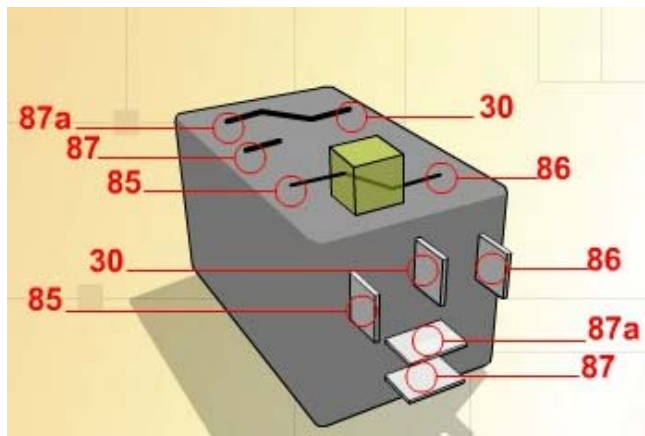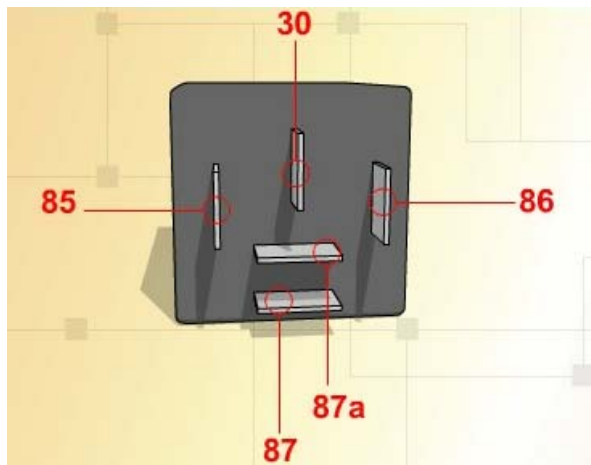
- **Control of a fuse**

Color code

Intensité	Couleur		
	Mini. fusible	Fusible	Maxi. fusible
3 A	Violet	Violet	
5 A	Beige	Beige	
7.5 A	Marron	Marron	
10 A	Rouge	Rouge	
15 A	Bleu	Bleu	
20 A	Jaune	Jaune	
25 A	Blanc	Blanc	
30 A	Vert	Vert	
40 A		Orange	Orange
50 A			Rouge
60 A			Bleu
70 A			Marron

Fuse check
Multimeter in Ω position, it must indicate a value near 0

OK   NOK
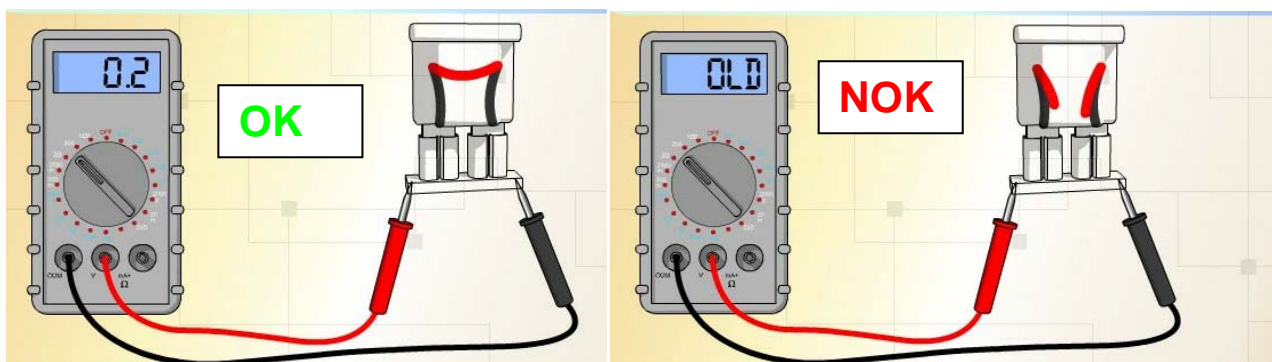
- **Control of a diode**
    Locate the diode and disconnect it from the loom.
    Control must be done with a multimeter in "diode" position.
    Connect the multimeter on each terminal of the diode, in one direction then on the other.
    In a direction, the diode should have no continuity,
    in the other it must beep
If the diode is beeping in both ways, replace it.

Sens de passage

Représentation normalisée d'une diode
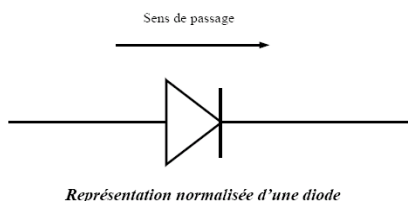
2.3. SCHEMATICS AND HARNESSES

See at the end of this manual
 (for all other details, refer to parts book)

DESIGNATION	REFERENCE
Electric schematics	4000133730
Hydraulic schematics	4000278470
Kit power cables	4000137400
Main Harness	4000136830
Lower control harness	4000136180
LCB harness	4000136190
Internal harness lower control box	4000270290
Jib harness	4000136350
UCB harness	4000136560
Internal harness upper control box	4000135940
Harness chain slackness (SQ801/SQ802)	4000270290
Remote release brakes harness (option)	4000246540

2.4. STRUCTURE OF THE SYSTEM

The whole system is linked by the technology CAN BUS

2.4.1. MAIN STRUCTURE
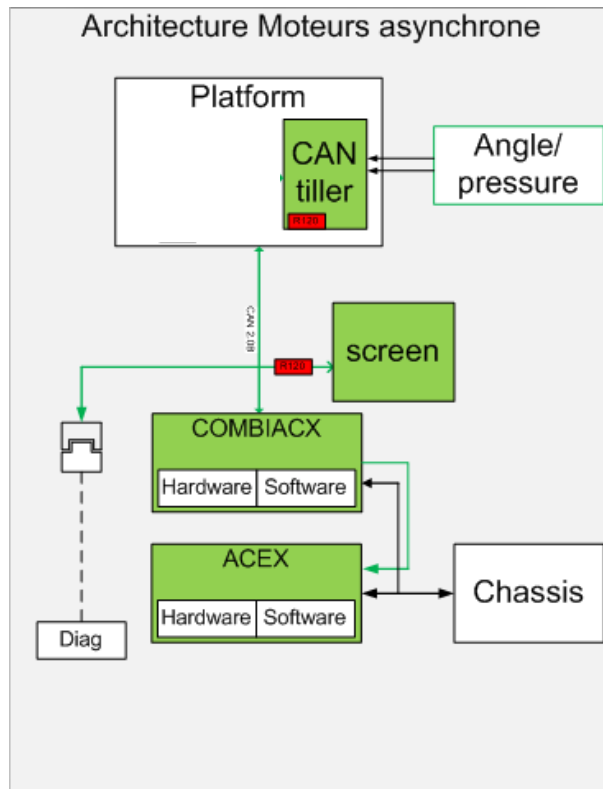
2.4.2. CIRCUIT OF POWER
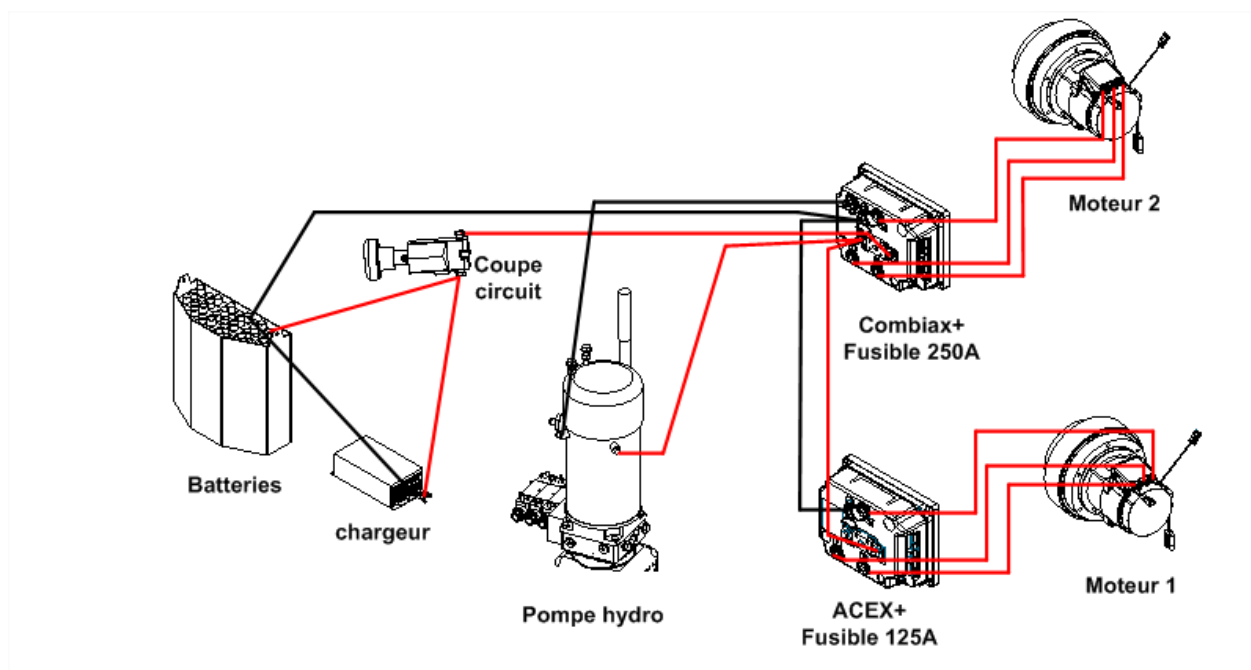
2.4.3. CIRCUIT OF COMMANDS
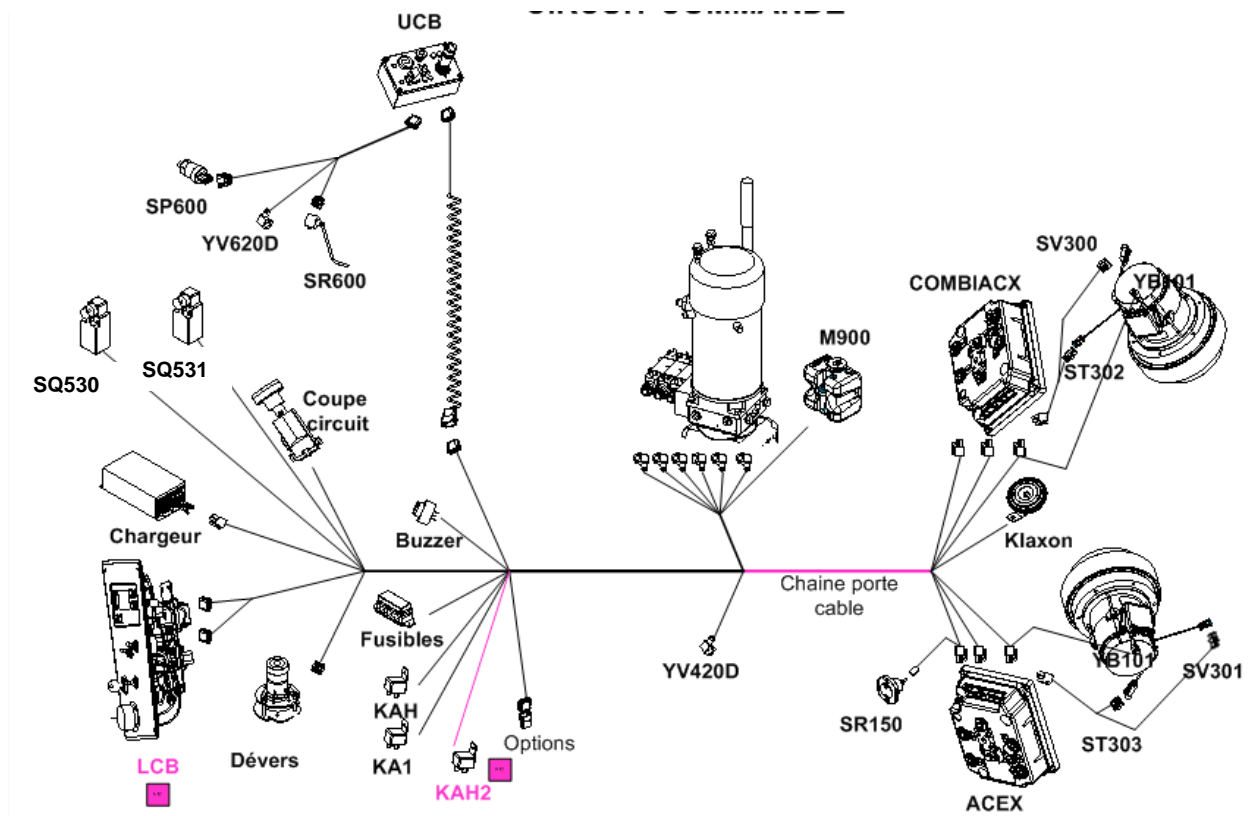
2.4.4. HOW THE SYSTEM WORKS

The traction is done by 2 asynchronous / 3 phases motors (24VAC-1KW) + gear box
Each motor is piloted by one variator (1 COMBIACX master and 1 ACEX slave)

Brake disc
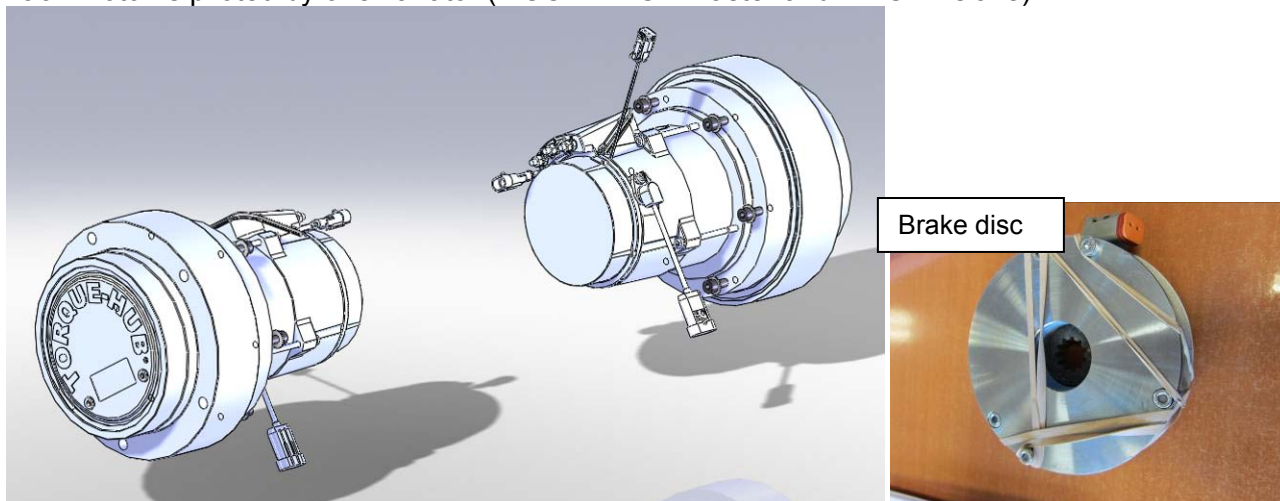
Each variator consists of
- 1 thermistor for temperature control (ST302/ST303)
- 1 encoder for speed control (SV300/SV301)
- 1 electromagnetic brake with negative excitation (YB100/YB101)

All these items are located in the chassis (rear side as shown below)
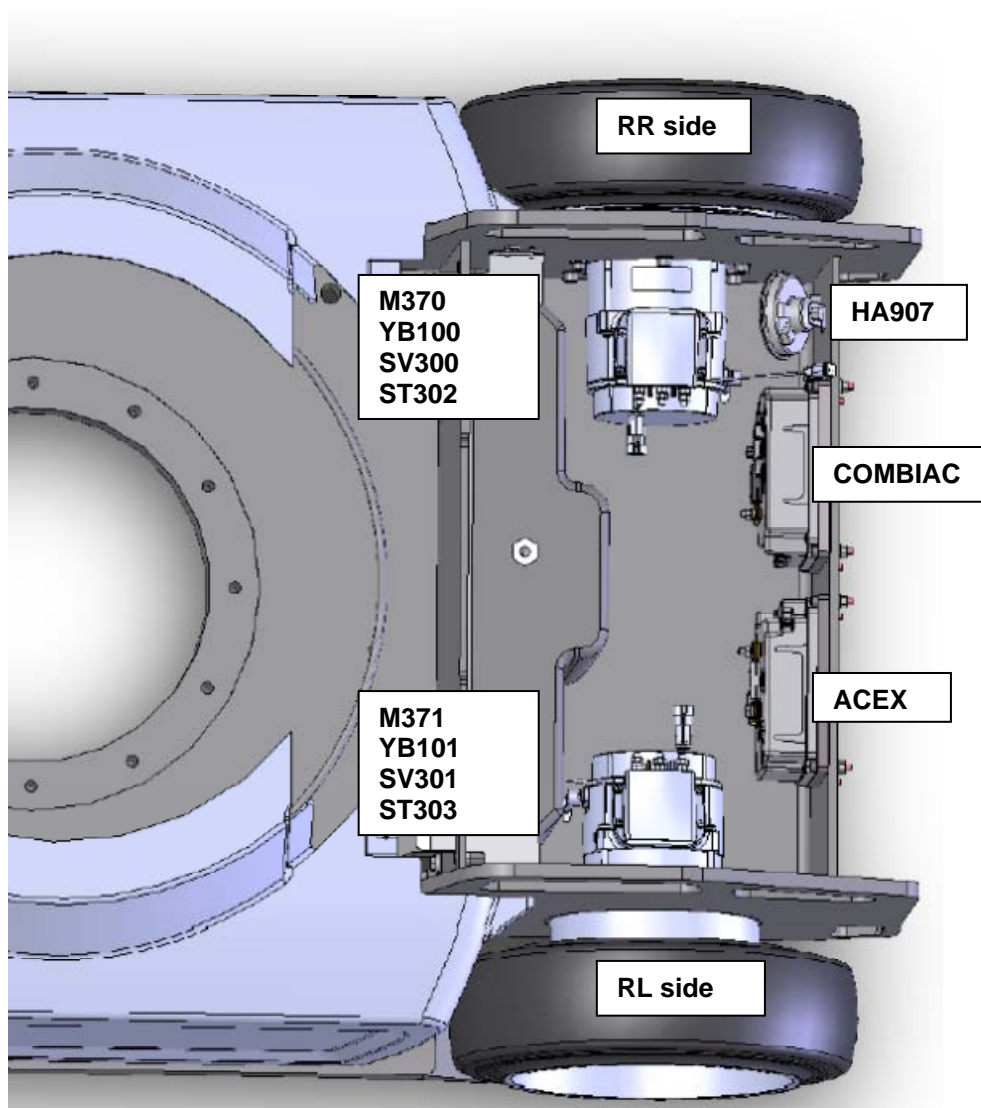
- **Function of the variators**
- The COMBIACX variator is the master and controls the traction of the RR motor and a chopper for the DC pump motor and some I/O too (refer to chapter 6.1)
- The software upload process is done by connecting the DIAG PAD console or HAULOTTE DIAG application (see details chapter 12)
- The ACEX variator (slave) controls the traction of LR motor
(no need to upload software on it)
- The 2 variators has the regenerative braking function (deceleration)
- Each variator is protected with a speed and temperature sensor and electromagnetic brake disc
- In case of low battery charge , the maximum current is reduced to the half of the maximum current programmed (an alarm message is displayed)
- The 2variators are protected against reverse battery polarity

• <u>Overview</u>
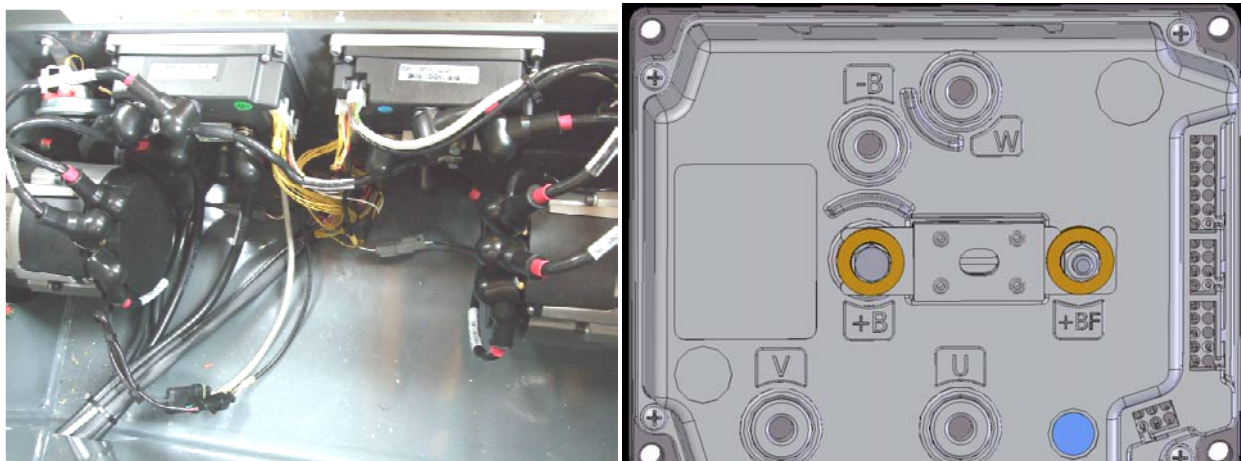
• <u>Control of the traction</u>
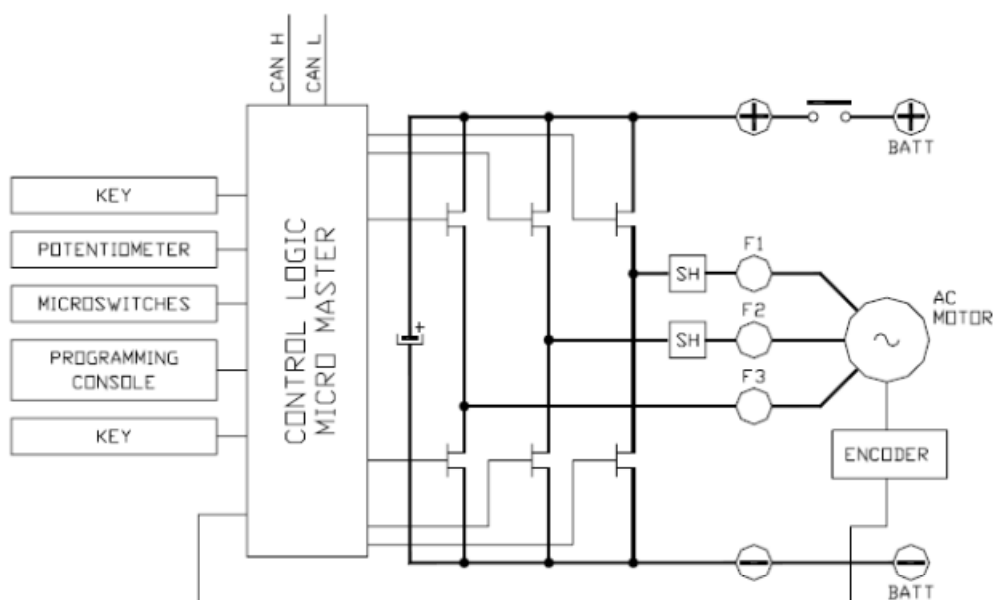
• <u>Control of the pump (other movements)</u>
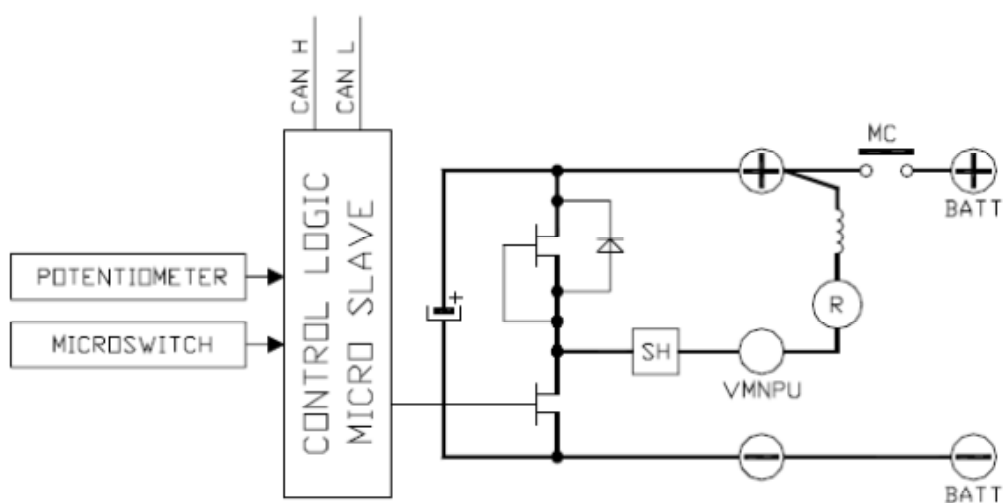
- Details of the sensors locate inside the variators

The speed rotation of each motor is controlled through an encoder with 2 signals shifted at 90° each and 48 impulses per round

The temperature of each motor is controlled through a thermistor located inside the winding (from 85°C the current is reduced in proportion the temperature increases until reaching 105°C where the current is null and traction is stopped)
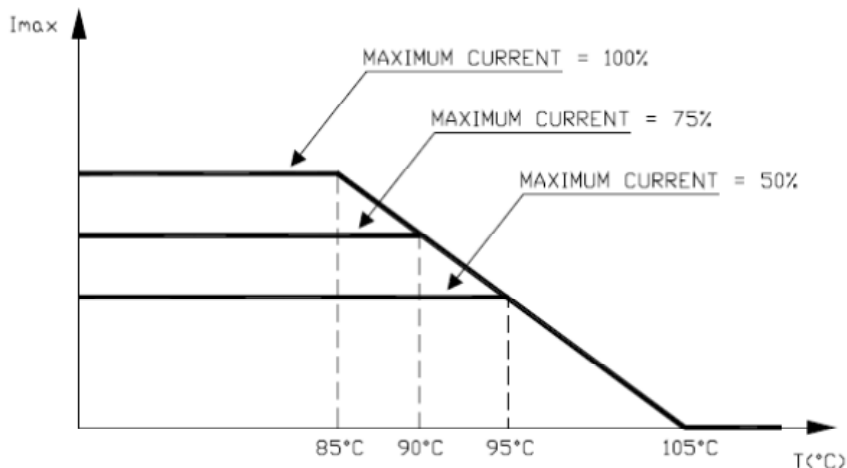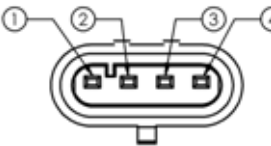
- Location of the sensors
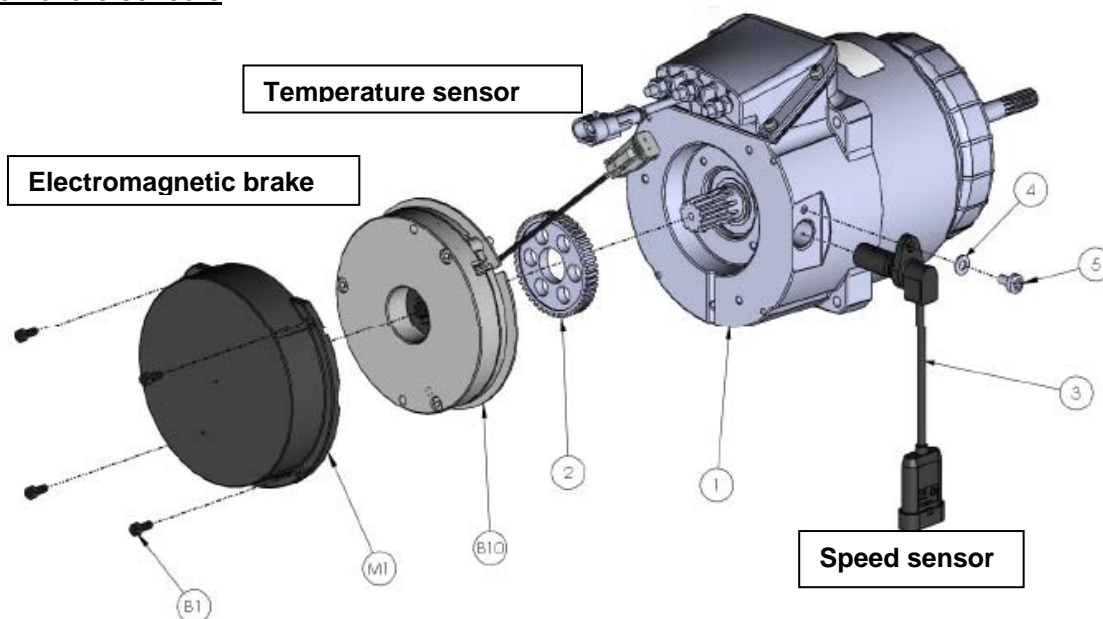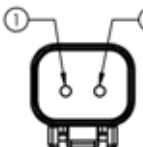
- <u>Detail of sensors connections</u>

CONNECTING INSTRUCTIONS FOR THERMOSENSOR			
CONNECTOR	PIN NO.	DESCRIPTION	COLOR
	1	+ SIGNAL FROM TEMPERATURE SENSOR	PINK
	2	- SIGNAL FROM TEMPERATURE SENSOR	GREEN

THERMOSENSOR CONNECTOR

CONNECTING INSTRUCTIONS FOR SPEED SENSOR			
CONNECTOR	PIN NO.	DESCRIPTION	COLOR
	1	SUPPY 5 - 24V DC	RED
	2	SIGNAL B	BLUE
	3	SIGNAL A	WHITE
	4	0V (GROUND)	BLACK

SPEED SENSOR CONNECTOR

CONNECTING INSTRUCTIONS FOR THERMOSENSOR		
CONNECTOR	PIN NO.	DESCRIPTION
	1	+ SIGNAL FROM BRAKE
	2	- SIGNAL FROM BRAKE

BRAKE CONNECTOR

- <u>Detail of the connectors on variators</u>

For any connector, the pin 1 always start at the lower right corner as shown below
Connector are labelled as follow
CXA/B/C/D for COMBIACX
AXA/B/C/D for ACEX
(see below and refer to electric schematic)
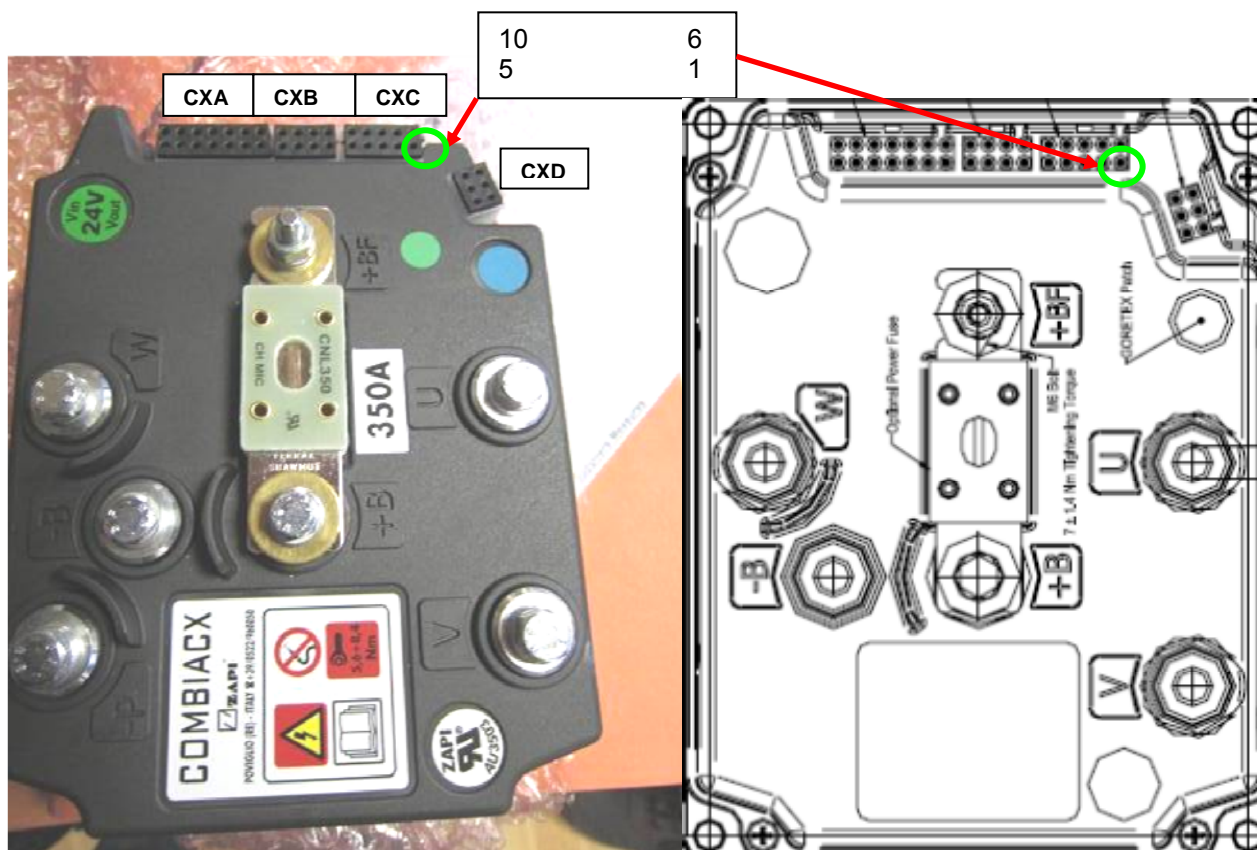
Connectors (power side)
- U/V/W are the 3 motors phases
- B+ Positive of the battery
- BF + positive of the battery protected by a Fuse of 160A
- B- Negative of the battery
- P+ : Output of the pump motor (COMBIACX only)

See below and refer to electric schematics:

VARIATEUR COMBIACX

VARIATEUR ACEX

2.5. LOCATION OF THE SENSORS

SQ534 (mast fully up)

SQ530 (mast stowed)

SR601 (jib angle)

SP600 (jib pressure)

SQ800 (tilt)

SQ801(chain breakdown)

SQ802 (chain breakdown)

SR150 (steering)
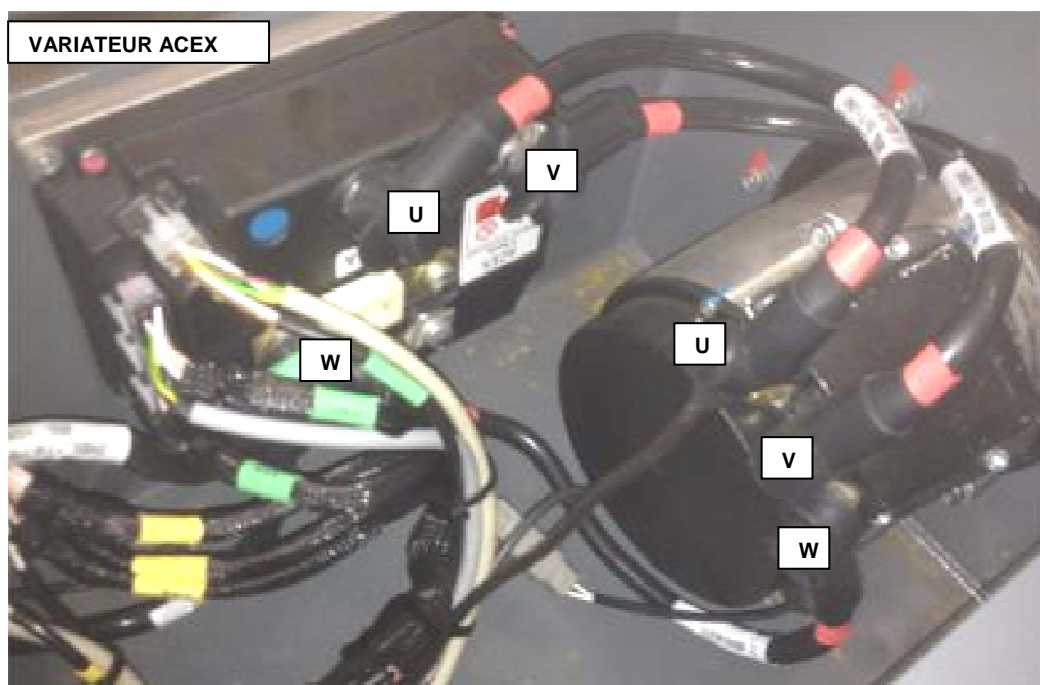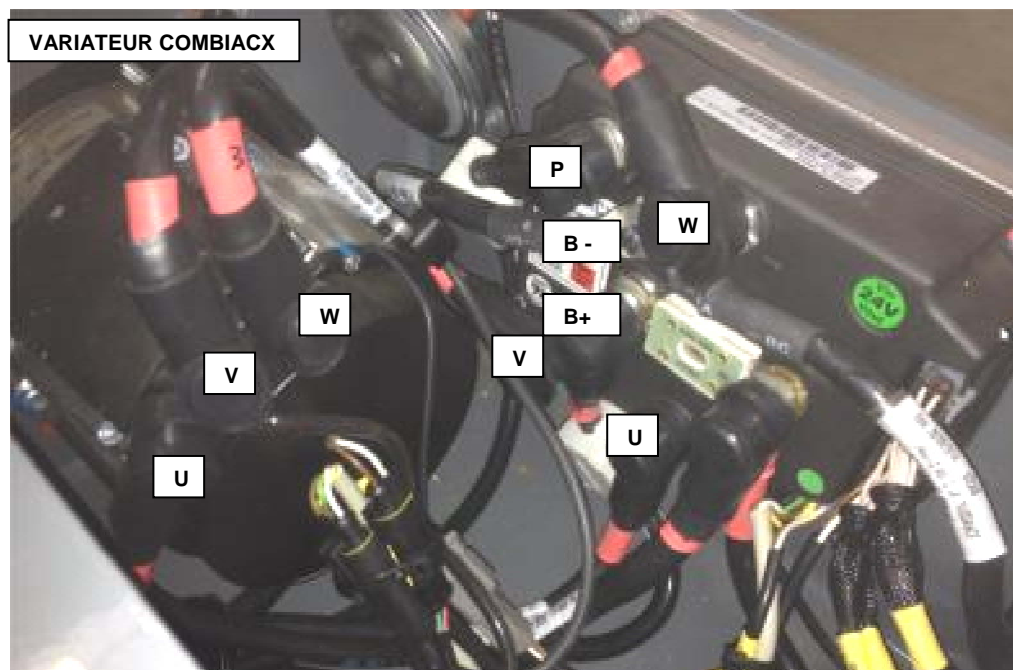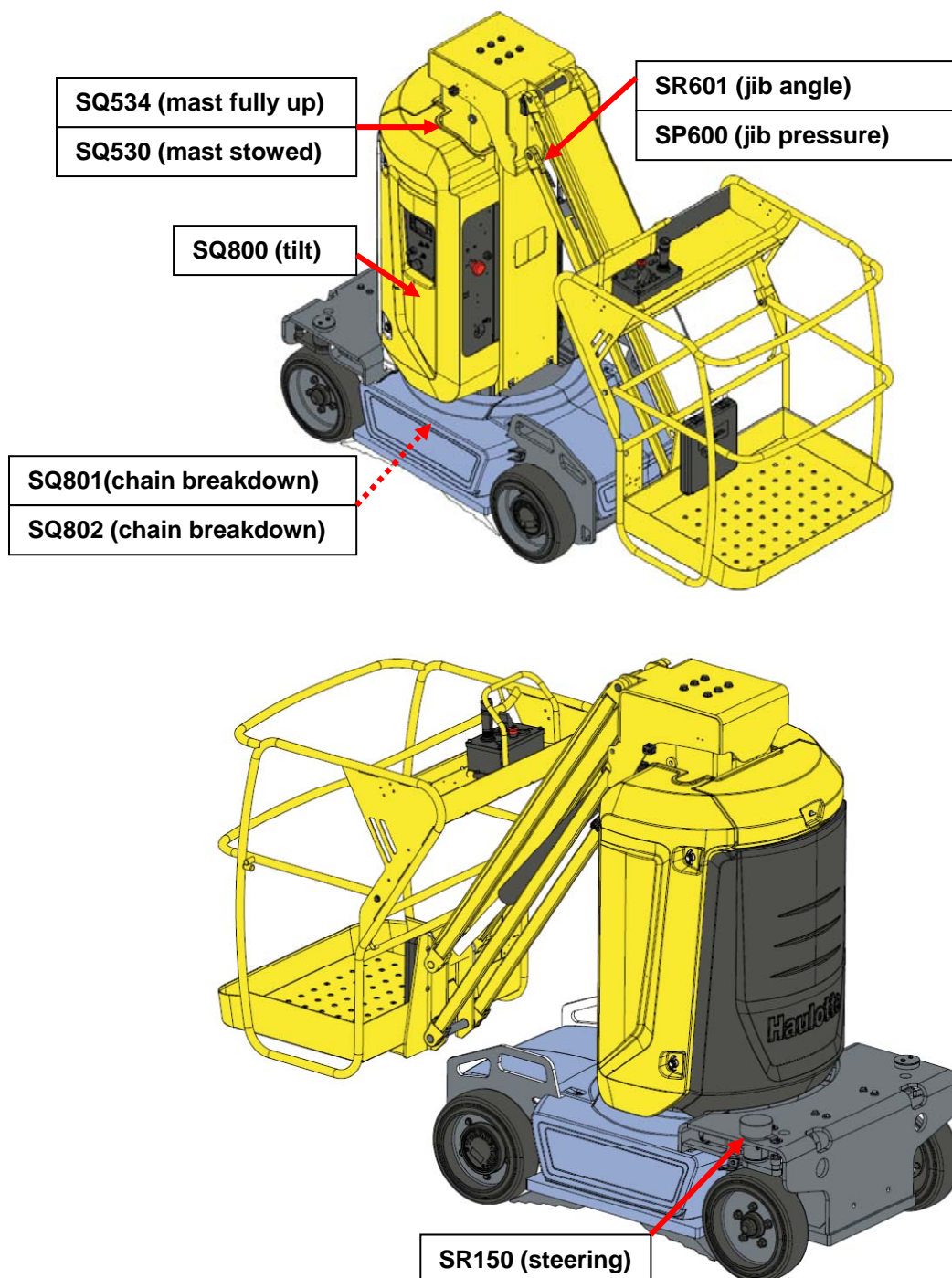
2.5.1. ELECTRIC COMPONENTS IN DETAIL

- **Mast limit switchs**

SQ534
SQ530

Activ'screen display

SB801

SQ800

HA901

Fuses holder

KM900

SA103 brake release
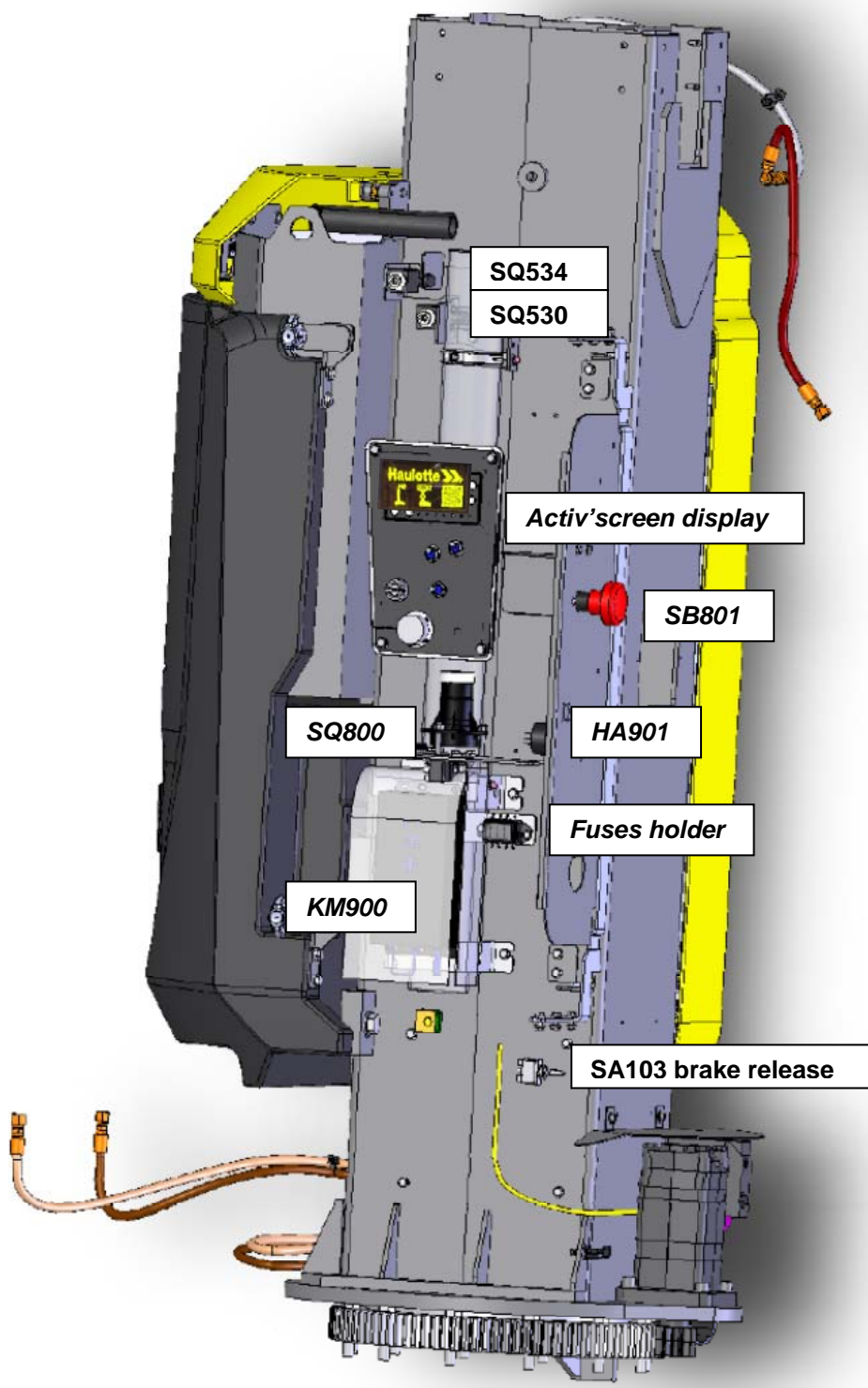
MARK	FUNCTION
SQ530	= 1 if mast retracted
SQ534	= 0 si mast fully extended
SA103	Release brake toggle switch

TRAINING MANUAL
4000365480

STAR 8(22J)/Star 10(26J)
E05-15

- **Steering potentiomer**

SR150

MARK	FUNCTION
SR150	Value 2.5kΩ , supply in <u>12VDC</u> (coming from ACEX variator) Before to launch the calibration, the pre-setting has to be done at mid-range value (steer angle at 0° in console menu) then use the consoles in order to calibrate the system in order to control the current/voltage of the internal motor depends the direction of steering (left/right)

- **Angle transducer**
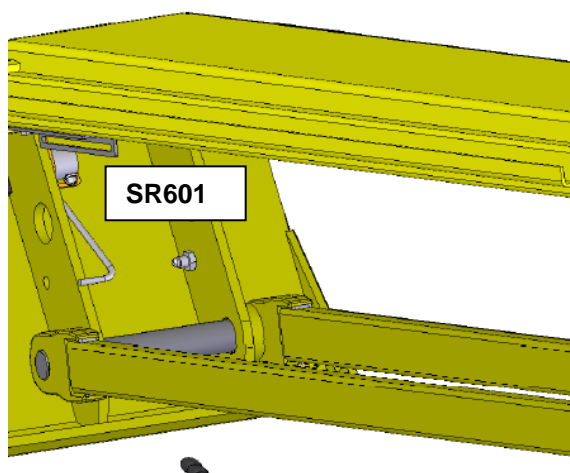
SR601

MARK	FUNCTION
SR601	Analogic angle transducer (4-20mA), value variable depends of jib angle Calibration system angle/pressure required with on-board or external consoles

Power supply	5 to 30	Vdc
Maximum angle measured	270	degrees
Linearity	± 2.0%	FS
Max power draw	0,18	W
Resistance	5	kΩ

- **Pressure transducer**
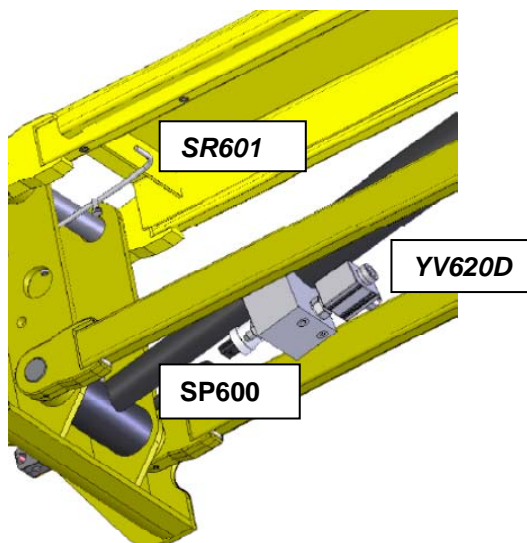
MARK	FUNCTION
SP600	Analogic transducer (4-20mA), value variable depends of the pressure on big chamber of the jib cylinder Calibration system angle/pressure required with on-board or external consoles

- **Slope sensor**
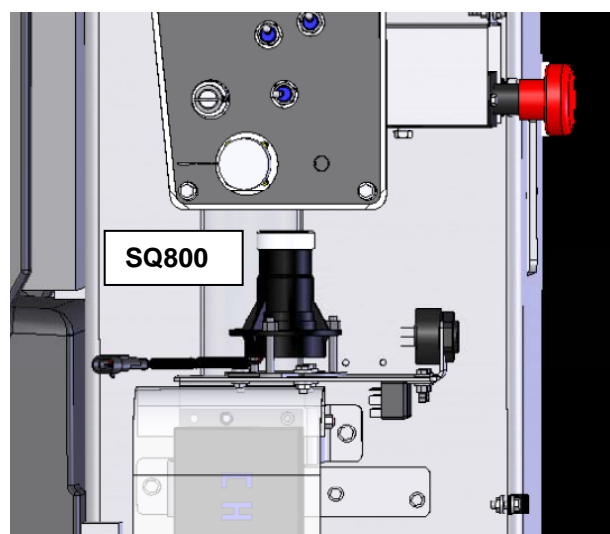
MARK	FUNCTION
SP800	Tilt 3° (wire 12 =Vbat if machine on flat surface)

- **Sensors for detection of chain slackness**

The proximity sensors SQ801/SQ802 detect the tension of the chains inside the mast sections
They are located at the foot of the mast as shown below

Pin 1 power supply
Pin 2 not used
Pin 3 GND
Pin 4 Signal
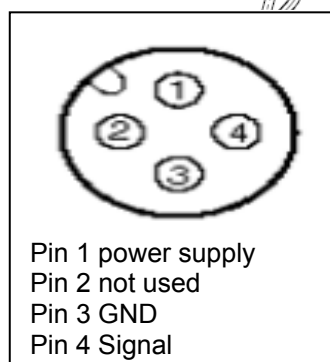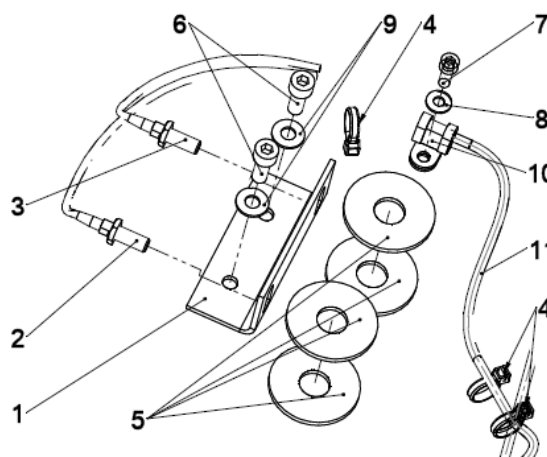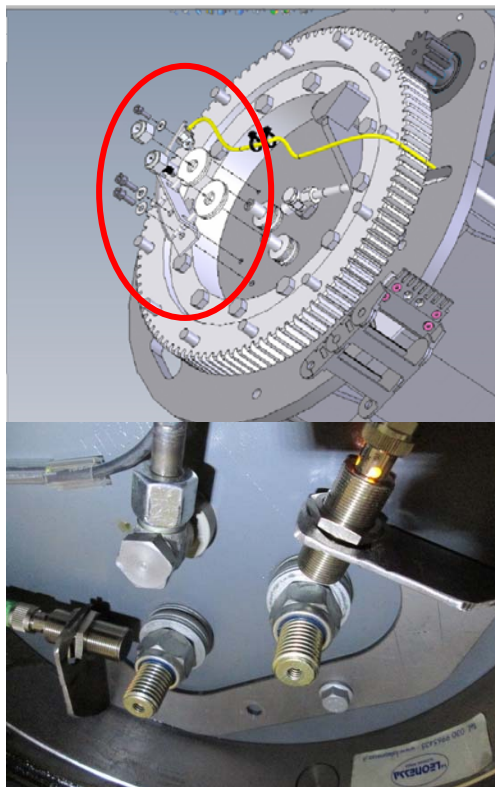
MARK	FUNCTION
SQ801	Detection of tension chain 1 (wire 11 =Vbat if chain is slacked or sensor's gap > 8 mm: it stops all movements if mast unfolded
SQ802	Detection of tension chain 2 (wire 18 =Vbat if chain is slacked : or sensor's gap > 8 mm: it stops all movements if mast unfolded

- **Fuses and relays**

REPERE	FONCTION
FU2	Protection of electro valves circuit (10A)
FU3	Protection of main circuit (10A)
FU4	Protection of accessories circuit (10A)
FU5	Protection of centralized refilling circuit (10A)
KA1	Relay for horn
KAH	Main relay
KAH2	Additional relay (keeps circuit active a few seconds after switching OFF)

- **Battery charger**

Version 230VAC -24V 35A

Version dual voltage 110VAC/230VAC

- **Battery pack 24VDC – 250AH**

The semi-traction batteries in standard version consist of 12 elements of 2VDC each
The level is done through a centralised refilling system
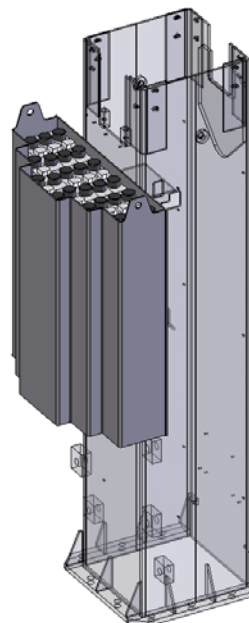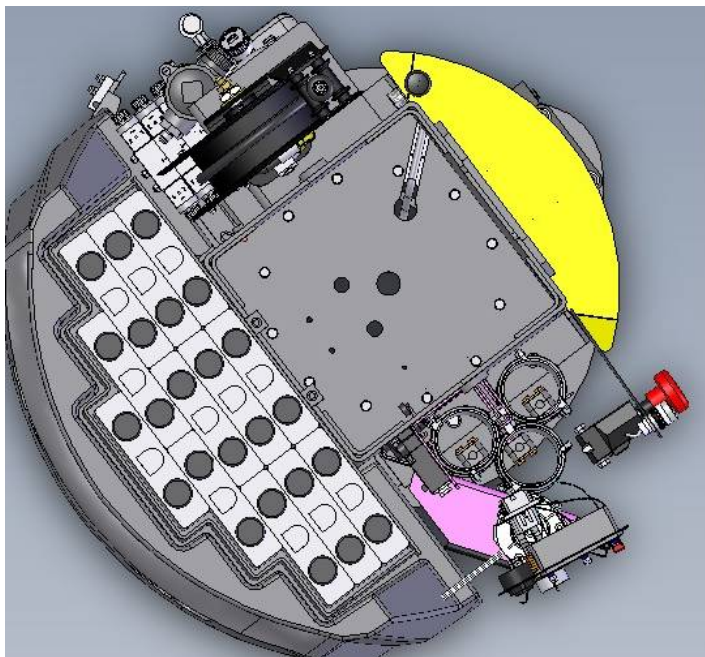
- **Automatic refilling device**

The refilling is done manually and when necessary by using the toggle switch SA911 located near the small plastic tank (see below)
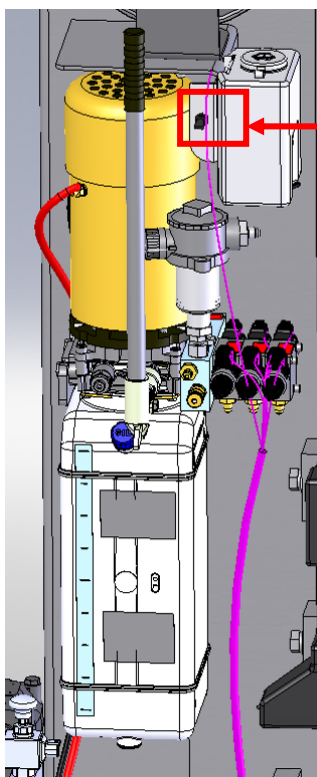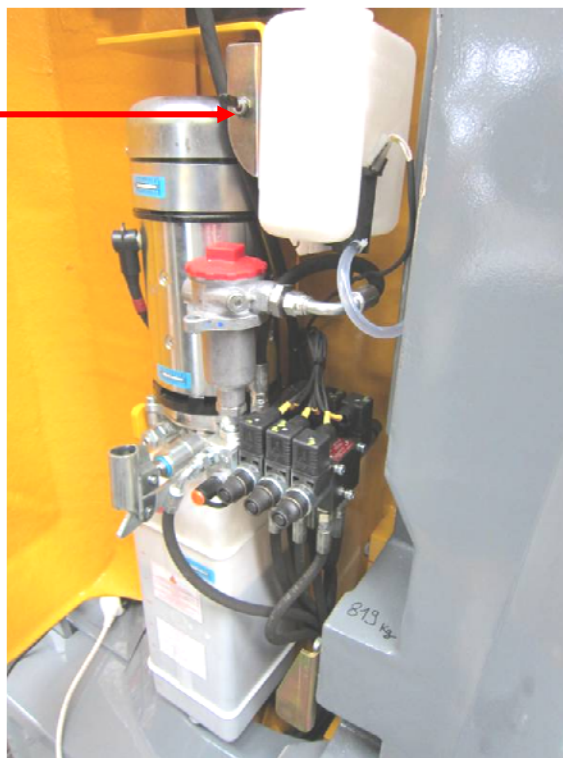
2.6.   LIST OF COMPONENTS

The state noted "0" corresponds to 0V, opened contact or not activated.
The state noted "1" corresponds to the tension of the circuit, closed or activated contact.
The column n°2 indicates the location of the components on different the sheets from the electrical schematics in order to find their position quicker and easier.
The first figure corresponds to the number of page and the second to the column
(generally from 1 to 20) of the corresponding page
The column n°3 indicates the position on the connector of the printed circuit board or the variator if it is necessary.

2.6.1. FUSES

FUSES		
FU1A	01 - 03	Variator slave ACEX (165A)
FU1C	01 - 08	Variator master COMBIACX (350A)
FU2	01 - 10	Protection electro valves power supply (10A)
FU3	01 - 05	Protection of main circuit commands line (10A)
FU4	01 - 10	Protection of Accessories supply (10A)
FU5	01 - 04	Protection of the automatic refilling device motor M900 (10A)

2.6.2. INPUTS

INPUTS			
SA901	01 - 11		Key selector LCB (lower control box /UCB upper control box)
SA102	03 – 16	CNB 13	Selection drive mode (function is cancelled after 8 seconds if movement not activated)
SA103	02 - 14	AXC.2	Brake release function
SA200	03 - 18	CNB.11	Enable pushbutton for validation of the orientation (to be pushed permanently during the movement)
SA250	02 - 19	AXA.6/12	Mast orientation (right/left)
SA500	03 - 17	CNB.9	Selection mast (function is cancelled after 8 seconds if movement not activated)
SA520	02 - 20	AXA.5/11	Mast (down/lift)
SA600	03 - 17	CNB.12	Selection jib (function is cancelled after 8 seconds if movement not activated)
SA620	02 - 06	CXA6/13	Jib (lift/down)
SA904	03 - 01		Working lights (option)
SA907	03 - 16	CNB.4	Horn (upper control box)
SA907T	02 - 18	AXB.4	Horn (RUS option on lower control box)
SA911	01 - 04		Command of the electrical pump for the automatic refilling system for battery pack
SB100	02 - 15	AXC.2	Brake release

40/123

SB800	03 - 14	CNB.1	Option foot switch (US only)
SB801	01 - 03		Main battery cut out
SB802	03 - 15		Emergency stop button upper controls
SB900	03 - 05	CNA.9	Active shield bar reset (option)
SM901	03 - 12		Joystick for drive/lifting with control of the neutral position on wire 75 + steering + trigger (signal on wire 73 (0.5VDC REV – 2.5VDC Neutral – 4.5VDC FWD)
SM902	03 - 08		Joystick for mast orientation with control of the neutral position on wire 05 (signal on wire 39 from 0.5VDC to 4.5VDC)

MODULES			
KM900	01 -06		Battery charger (machine can't be used during battery charging)
COMBIACX	02		Variator master controls all movements and RR driving motor
ACEX	02		Variator slave controls some movements and RL driving motor
ACTIV' SCREEN	01 - 21		On-board console with integrated menus /settings/calibration through codes level (see details on chapter 4)
U4			CAN TILLER CARD (slave) controls all items on upper control and send all informations to COMBIACX variator through CAN BUS link

SENSORS			
SP601	03 - 20	CNA.5	Pressure transducer (~ 700pts jib position min to ~ 1400 pts jib position maxi)
SQ530	02 - 07	CXA.11	= 1 if Mast in stowed position
SQ534	02 - 08	CXA.5	= 0 if Mast fully elevated
SQ800	02 - 02	CXA.12	Tilt /slope sensor 3° (wire 12 = Vbat when machine is on flat surface
SQ801	02 -16	AXB.8	Detection of tension chain 1 (wire 11 =Vbat if chain is slacked or sensor's gap > 8 mm: it stops all movements if mast unfolded
SQ802	02 - 17	AXA.4	Detection of tension chain 2 (wire 18 =Vbat if chain is slacked : or sensor's gap > 8 mm: it stops all movements if mast unfolded
SR150	02 - 14	AXC.4	potentiometric sensor controls the current/voltage on internal driving motor when steering (calibration required)
SR601	03 - 09	CNA.8	Jib angle transducer (~ 1340 pts jib position min to ~ 2660 pts jib position maxi)
ST903	02 - 18	AXC.7	Detection of low temperature (UKR option) machine is stopped
AB	03 - 04	CNA.4	Anti entrapment device (ASB : Active Shield Bar) stops some dangerous movements from upper controls if activated

2.6.3. OUTPUTS

RELAYS			
KA1	02 - 17	AXB.7	Relay for horn
KAC	03 - 04	CNE.5	Relay for ASB option (energised when ASB is activated)
KAH	01 - 05		Main relay for COMBIACX hold/supply
KAH2	01 - 10		Additional relay (keeps circuit active a few seconds after switching OFF)
KM900	01 - 06		Internal contactor inside the battery charger (if ON , machine can't be used as it's charging the batteries
SB801	01 - 13		Main line contactor

VALVES			
YV150R	02 - 03	CXA.1	Right steering
YV150L	02 - 04	CXA.8	Left steering
YV250R	02 - 20	AXA.1	Mast rotation (towards right)
YV250L	02 - 19	AXA.8	Mast rotation (towards left)
YV520U	02 - 19	AXA.2	Mast lift
YV520D	02 - 17	AXB.3	Mast descent
YV620U	02 - 05	CXA.2	Jib lift
YV620D	03 - 08	CNE.10	Jib descent

BUZZER AND LIGHTS			
HA901	02 - 05	CXA.9	Buzzer on turret
HA907	01 - 12		Main horn
HL100	03 - 12	CNE.6	Indicator if drive mode is activated
HL500	03 - 13	CNE.7	Indicator if the movement of mast is activated
HL600	03 - 13	CNF.2	Indicator if the movement of jib is activated
HL800	03 - 11	CNF.3	Indicator machine in slope
HL802	03 - 10	CNF.1	Indicator machine in overload
HL903	03 - 09	CNF.5	Indicator for any other fault
HL904	03 - 10	CNF.4	Indicator batteries are empty (blink if BAT < 40 % and lit ON if BAT <20%
HL901	03 - 04		Indicates if option ASB has been activated
HL902 HL905	03 - 05	CNE.3	Indicates if option ASB has been activated

M			Pump motor unit 24VDC/3000 W coupled to an hydraulic gear pump of with a cubic capacity of 3.6 cc (10l/min)
M370	02 - 06		RR AC drive motor controlled by COMBIACX variator
M371	02 - 16		RL AC drive motor controlled by ACEX variator
ST302	02 - 08		Thermistor located inside the winding of RR drive motor (from 85°C the current is reduced in proportion the temperature increases until reaching 105°C where the current is null and traction stopped)
ST303	02 - 15		Thermistor located inside the winding of RL drive motor (from 85°C the current is reduced in proportion the temperature increases until reaching 105°C where the current is null and traction stopped)
SV300	02 - 09		The speed rotation of RR motor is controlled through an encoder with 2 signals shifted at 90° each and 48 impulses per round
SV301	02 - 13		The speed rotation of RL motor is controlled through an encoder with 2 signals shifted at 90° each and 48 impulses per round
YB100	02 - 11		Electric brake for RR motor (always energised during drive mode)
YB101	02 - 12		Electric brake for RL motor (always energised during drive mode)

2.7. CONDITIONS PER MOVEMENT

The failures list below will gather all possible dysfunctions
(an open circuit will be detected but without displaying a failure number)
- For the validation of the movement (status = 1 actuator is energised)
- For the cutting conditions (status = 1 movement is prohibited)
- For any movement there is 3 phases (validation /cutting / slowdown)
  Note: Depends of the movement it could have several cutting conditions written on screen
  (as shown below)
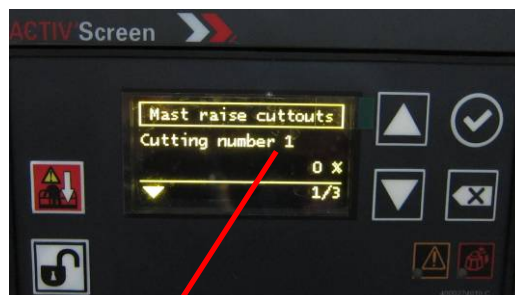
2.7.1. MAST

- Validation

CTRL	YV520D	YV520U
RAISE	0	1
NEUTRAL	0	0
DESCENT	1	0

- Cutting conditions

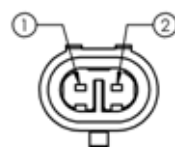| Cut-offs			Raise	Descent	Cut-offs condition of the movement
1	General	1	1	0	Pump not ready
		2	1	0	Broken Chain
		3	1	0	Low Battery
2	Simultaneous Movements		1	1	Jib, Orientation, Drive, Steering or Brake Release is running.
3	Overload	1	1	1	Overload alarm and no Overriding activated
		2	1	1	Overload failure and unfolded and no Overriding activated
4	Tilt	1	1	0	Machine tilt and Tilt Cut activated and machine unfolded
5	Reach limit	1	1	0	Machine totally unfolded
6	Failure	1	1	0	Pump failure
		2	1	0	Mast lift valve failure
		3	1	1	Mast descent valve failure
		4	1	1	Main Contactor failure
7	Extra	1	0	1	ASB Mast Descent Active
		2	1	0	ASB Mast Lift Active
		3	1	0	Extreme temperature activated and machine unfolded
		4	1	1	Foot pedal switch configured and activated and not valid and upper control box selected

- Slowdown conditions

RAISE		Movement SETP limit conditions
50%	1	Overload failure
50%	2	Machine tilt and unfolded
85%	3	Chassis control box selected
50%	4	Overriding Activated

2.7.2.   MAST ROTATION

- Validation

CTRL	YV250L	YV250R
RIGHT	0	1
NEUTRAL	0	0
LEFT	1	0

- Cutting conditions

Cut-offs			Left	Right	Cut-offs condition of the movement
1	General	1	1	1	Pump not ready
2	Simultaneous Movements		1	1	Mast, Jib, Drive, Steering or Brake Release is running.
3	Overload	1	1	1	Overload alarm and no Overriding activated
		2	1	1	Overload failure and unfolded and no Overriding activated
4	Tilt				
5	Reach limit				
6	Failure	1	1	1	Orientation valve failure
		2	1	1	Pump failure
		3	1	1	Main Contactor failure
7	Extra	1	0	1	ASB Orientation Right Active
		2	1	0	ASB Orientation Left Active
		3	1	1	Extreme temperature activated and machine unfolded
		4	1	1	Foot pedal switch configured and activated and not valid and upper control box selected

- Slowdown conditions

Right/Left		Movement SETP limit conditions
50%	1	Overload failure
50%	2	Machine tilt and unfolded
85%	3	Chassis control box selected
50%	4	Overriding activated

Screen display of slowdown condition (LCB has been selected)

TRAINING MANUAL   **STAR 8(22J)/Star 10(26J)**
4000365480   **E05-15**

2.7.3.JIB

- Validation

CTRL	YV620D	YV620U
RAISE	1	1
NEUTRAL	0	0
DESCENT	1	0

- Cutting conditions

Cut-offs			Raise	Descent	Cut-offs condition of the movement
1	**General**	1	**1**	**0**	Pump not ready
		2	**1**	**0**	Broken Chain and machine unfolded
		3	**1**	**0**	Low Battery
2	**Simultaneous Movements**		**1**	**1**	Mast, Orientation, Drive, Steering or Brake Release is running.
3	**Overload**	1	**1**	**1**	Overload alarm and no Overriding activated
		2	**1**	**1**	Overload failure and unfolded and no Overriding activated
4	**Tilt**	1	**1**	**0**	Machine tilt and Tilt Cut and machine unfolded
5	**Reach limit**	1	**0**	**1**	Jib Electrical Down Limit and no Overload Calibration running
		2	**1**	**0**	Jib Electrical Up Limit and no Overload Calibration running
6	**Failure**	1	**1**	**0**	Pump failure
		2	**1**	**0**	Jib lift valve failure
		3	**1**	**1**	Jib valve failure
		4	**1**	**1**	CAN High Failure
		5	**1**	**1**	Main Contactor failure
7	**Extra**	1	**1**	**0**	Raise Cut Jib asked and Calibration Overload activated
		2	**0**	**1**	Descent Cut Jib asked and Calibration Overload activated
		3	**1**	**0**	ASB Jib Raise Active
		4	**0**	**1**	ASB Jib Descent Active
		5	**1**	**0**	Extreme temperature activated and machine unfolded
		6	**1**	**1**	Foot pedal switch configured and activated and not valid and upper control box selected

- Slowdown conditions

RAISE		Movement SETP limit conditions
50%	1	Overload failure and machine unfolded
50%	2	Machine tilt and unfolded
85%	3	Chassis control box selected
50%	4	Overriding Activated

- Cutting conditions

Cut-offs				FWD	REV	Cut-offs conditions of the movement
1	General		1	1	1	Broken Chain and unfolded machine
			2	1	1	Low Battery and machine unfolded
			3	1	1	Steering cut except if it's reach limit cut or failure on SM901 rocker
			2	1	1	Low Battery and unfolded machine
2	Simultaneous Movements					Mast, Orientation, Jib or Brake Release is running.
3	Overload		1	**1**	**1**	Overload detected and country selected Europe, Australia, Russia
			2	**1**	**1**	Overload failure and country selected Europe, Australia, Russia activated and machine unfolded
4	Tilt		1	**1**	**1**	Machine tilt and Tilt Cut and machine unfolded
5	Reach Limit		1	**1**	**1**	Option Cut Unfolded activated & machine unfolded
6	Failure		1	**1**	**1**	Detected power supply failure F08.10
			2	**1**	**1**	Detected Main Contactor Failure F02.04
7	Extra		1	**1**	**0**	ASB Forward Active
			2	**0**	**1**	ASB Reverse Active
			3	**1**	**1**	Extreme temperature activated and machine unfolded
			4	**1**	**1**	Foot pedal switch configured and activated and not valid and upper control box selected

2.7.5. STEERING

- Validation

CTRL	YV105L	YV105R
LEFT	1	0
NEUTRAL	0	0
RIGHT	0	1

- Cutting conditions

Cut-offs				Left	Right	Cut-offs conditions of the movement
1	General		1	1	1	Pump not ready
			2	1	1	Broken Chain and unfolded machine
			3	1	1	Low Battery and unfolded machine
2	Simultaneous Movements					Mast, Orientation, Jib is running.
3	Overload		1	**1**	**1**	Overload detected and country selected Europe, Australia, Russia
			2	1	1	Overload failure and country selected Europe, Australia, Russia and machine unfolded
4	Tilt		1	**1**	**1**	Machine tilt and Tilt Cut and machine unfolded
5	Reach Limit		1	**1**	**0**	Left limit position and calibration of steering OK
			2	**0**	**1**	Right limit position and calibration of steering OK
			3	**1**	**1**	Option Cut Unfolded activated & machine unfolded
6	Failure		1	**1**	**1**	Steering valve failure
			2	**1**	**1**	Pump failure
			3	**1**	**1**	Main Contactor failure

7	Extra	1	1	1	ASB Steering Active
		2	1	1	Extreme temperature activated and machine unfolded
		3	1	1	Foot pedal switch configured and activated and not valid and upper control box selected

2.7.6. ACTIV SHIELD BAR

The ASB (Active Shield Bar) is an entrapment device once activated will stop some movements from upper control box (from lower controls all movements remain active)

- Cutting conditions

When the option is activated, the system checks the state of the SQ902 input (SQ902=1) to raise the cut-offs' alarm as following
To reset ASB device: the bar is at rest position (SQ902=0) and the reset button is pressed (SB900=1)

Movements cut-offs when platform control box:		Running Movements when active bar is detected in active state					
		Drive		Orientation		Mast or Jib	Others
		FWD	REV	Left	Right		
Drive	Forward	1	0	1	1	1	1
	Reverse	0	1	1	1	1	1
Orientation	Left	0	0	1	0	0	0
	Right	0	0	0	1	0	0
Mast	Raise	1	1	1	1	1	1
	Descent	0(*)	0(*)	0(*)	0(*)	0(*)	0(*)
Jib	Raise	1	1	1	1	1	1
	Descent	0(*)	0(*)	0(*)	0(*)	0(*)	0(*)
Others		0(*)	0(*)	0(*)	0(*)	0(*)	0(*)

1	Movement from upper control box is cut-off until ASB reset has been detected
0(*)	Movement from upper control box is cut-off until all movements' joysticks and switches are detected in neutral position
0	Movement from upper control box is authorized

2.8.   LIST OF FAILURES

- The notification (N) of failures on the lights and displays of the machine is managed in the following way:
  - ⇨ A : the failure is notified only if it is active
  - ⇨ D : the failure is notified if it has been detected after the power on, even if it is not active anymore
  - ⇨ N : the failure is never notified (it is visible only with the console)
- In all cases, active and detected failures are always visible with the console.
- The alarms list is dispatched per category (F01 /F02 until F16)
- An internal code (C) with 5 digits, visible only with the console allows specifying the condition(s) of the failure
- Each condition is associated with a single code number (16 possible single codes multiple of 2 in decimal format corresponding to a single bit in binary format):
- If several conditions are active at the same time, the single codes are added in order to get the resulting code displayed (ex code 007 = 004 + 002 +001)

Example1
Alarm on display (F0702-3) so both sensors SQ801 and SQ802 are defective

Example 2
The failure is displayed on the on-board Activ' screen console (see below)
Example below F0204-16 (that's mean problem on main contactor and variator COMBIACX)
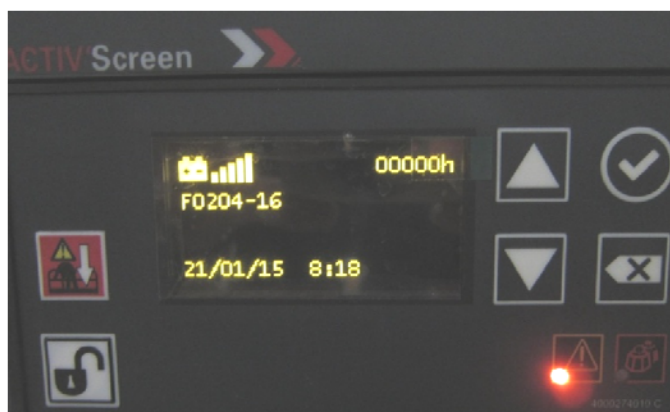
2.8.1. DETAIL PER CATEGORY

F01 - VARIATOR	F01.01 - Variator Hardware (D)	1	COMBIACX - Zapi code 17: Failure in high current Hardware protection circuit
		2	COMBIACX - Zapi code 23: When no current is applied to the traction motor, the current feedbacks are out of permitted standby range
		4	COMBIACX - Zapi code 31: Driver of LC coil is damaged (not able to close)
		8	COMBIACX - Zapi code 40: The driver of the electromechanical brake coil is not able to drive the load
		16	COMBIACX - Zapi code 59: Pump current sensor out of range (at start-up or standby)
		32	COMBIACX - Zapi code 67: At start-up, the amplifiers voltage (used to measure the motor voltage) is too low or too high (<2 V or >3 V)
	F01.05 - Motor/Pump Power (D)	1	COMBIACX - Zapi Code 44: The software waits for the motor pump to stop at startup
		2	COMBIACX - Zapi Code 51: Vmn (pump driving voltage) different from the expected one
		4	COMBIACX - Zapi Code 55: The pump motor output voltage is lower than expected, considering the PWM applied
		8	COMBIACX - Zapi Code 56: The pump motor output voltage is higher than expected, considering the PWM applied
		16	COMBIACX - Zapi Code 57: The pump current sensor feedback is always 0A, even if pump motor is running
	F01.06 - Controller temperature security (A)	1	COMBIACX - Zapi code 32: The controller has reached thermal cutout (temperature of the controller base plate is higher than 85°C)
		2	ACEX - Zapi code 32: The controller has reached thermal cutout (temperature of the controller base plate is higher than 85°C)
	F01.08 - Battery Low (D)	1	COMBIACX - Zapi code 33: Low battery (lower than 10%)
	F01.09 - Electrical park brake 1 (D)	1	COMBIACX - Zapi code 16: Short circuit on main contactor or electric brake coil
		2	COMBIACX - Zapi code 26: The driver of the electromechanical brake is shorted to -Vbatt
		4	COMBIACX - Zapi code 29: The driver of the electromechanical brake is shorted to +Vbatt
		8	COMBIACX - Zapi code 45: A short circuit on the power outputs of the controller has been detected
		16	COMBIACX - Zapi code 66: Voltage on PEB (Power Electric Brake) present but not expected
		32	COMBIACX - Zapi code 38⊗and no failure 38 on ACEX) Connection problem of electric brake 1
	F01.10 - Electrical park brake 2 (D)	1	ACEX - Zapi code 16: Short circuit on main contactor or electric brake coil
		2	ACEX - Zapi code 26: The driver of the electromechanical brake is shorted to -Vbatt
		4	ACEX - Zapi code 29: The driver of the electromechanical brake is shorted to +Vbatt
		8	ACEX - Zapi code 45: A short circuit on the power outputs of the controller has been detected
		16	ACEX - Zapi code 66: Voltage on PEB (Power Electric Brake) present but not expected
		32	ACEX - Zapi code 38 (and no failure code 38 on COMBIACX : Connection problem of electric brake 2

	F01.11 - Slave inverter hardware (D)	1	ACEX - Zapi code 17: Failure in high current Hardware protection circuit
		2	ACEX - Zapi code 23: When no current is applied to the traction motor, the current feedbacks are out of permitted standby range
		4	ACEX - Zapi code 31: Driver of LC coil is damaged (not able to close)
		8	ACEX - Zapi code 40: The driver of the electromechanical brake coil is not able to drive the load
		16	ACEX - Zapi code 67: At start-up, the amplifiers voltage (used to measure the motor voltage) is too low or too high (<2 V or >3 V)
	F01.12 - Wrong controller hardware D)	1	COMBIACX is not a power version
		2	ACEX is not a power version
F02 - CONTACTOR	F02.04 - Power Contactor (D)	1	COMBIACX - Zapi code 20: The driver of Main Contactor Drive coil is shorted, or its coil is disconnected
		2	COMBIACX - Zapi code 24: The main contactor coil has been driven but main contactor does not close
		4	COMBIACX - Zapi code 46: Main contactor contact is stuck (always closed)
		8	Supervisor status = alarm or wait reset and main contactor is not forced at open status by a ZAPI failure

F04 - ELECTROVALVES	F04.01 - Steering valve (D)	1	Steering front left valve YV150L failure (short circuit) and steering setpoint active ⇨ YV150L = FAIL & STP(Steering)
		2	Steering front right valve YV150R failure (short circuit) and steering setpoint active ⇨ YV150R = FAIL & STP(Steering)
	F04.03 - Turntable Orientation valve (D)	1	Turret rotation left valve YV250L failure (short circuit) and orientation setpoint active ⇨ YV250L = FAIL & STP(Orientation)
		2	Turret rotation right valve YV250R failure (short circuit) and orientation setpoint active ⇨ YV250R = FAIL & STP(Orientation)
	F04.07 - Jib valve (D)	1	Jib lift valve YV620U failure (short circuit) and jib setpoint active ⇨ YV620U = FAIL & STP(Jib)
		2	Jib valve YV620 open circuit failure or Jib valve YV620 short circuit failure and jib setpoint active ⇨ YV620 = OPEN-CIRCUIT || (YV620 = SHORT-CIRCUIT & STP(Jib))
	F04.39 - Mast valve (D)	1	Mast lift valve YV520U failure (short circuit) and mast setpoint active ⇨ YV520D = FAIL & STP(Mast)
		2	Mast descent valve YV520D open circuit failure or Mast descent valve YV520D short circuit failure and mast setpoint active ⇨ YV520U = OPEN-CIRCUIT || (YV520U = SHORT-CIRCUIT & STP(Mast))

F05 - JOYSTICKS	F05.01 - Drive Joystick (D)	1	Drive joystick SM901Y failure: out of range [0.2; 4.8]V
		2	Drive joystick failure: analogue signal and out of neutral incoherence - (SM901N = ON) AND (2.45V < SM901Y < 2.55V) - or SM901N = OFF AND SM901Y < 2V - or SM901N = OFF AND SM901Y > 3V
	F05.05 - Turntable Joystick (D)	1	Turntable orientation joystick SM902 failure: out of range [0.2; 4.8]V
		2	Turntable joystick failure: analogue signal and out of neutral incoherence: - SM902N = ON AND (2.45V < SM902X < 2.55V) - or SM902N = OFF AND (SM902X < 2.00V OR SM902X > 3.00V)

	F05.11 - Joystick Neutral (A)	1	No detection of joystick neutral position at machine power ON - SM901Y < 2.35 OR SM901Y > 2.65V
	F05.12 - Joystick Neutral 2 (A)	2	No detection of joystick neutral position at machine power ON - SM902X < 2.35 OR SM902X > 2.65V

F06 - OVERLOAD	F06.01 - Load Management System not calibrated (A)	1	Load Management System not calibrated
F07 - SENSORS	F07.02 - Chain break sensor (D)	1	Mast chain broken SQ801
		2	Mast chain broken SQ802
	F07.05 - Motor temperature sensor (D)	1	COMBIACX - Zapi code 61: The drive motor temperature sensor is not correctly connected or damaged
		2	ACEX - Zapi code 61: The drive motor temperature sensor is not correctly connected or damaged
	F07.21 - Bore Pressure Sensor (D)	1	Open circuit or jib mechanical stop: SP601 < 730pts
		2	Short circuit: SP601 > 4000pts
	F07.22 - Relative angle sensor Error (D)	1	Analogue signal calibrated SR601of arm angle sensor calibrated and out of range [-58.40° to 71.50°] $\Rightarrow$ (SR601 <min(pts)-500	SR601 >max(pts+500) & calibrated)
	F07.33 - steering angle sensor (D)	1	Analogue signal calibrated SR150 of steer angle sensor calibrated and out of range [-44.1° to 75.0°] $\Rightarrow$ (SR150 < -54.1° | SR150 > +85°) & calibrated
	F07.35 - Motor encoder (D)	1	COMBIACX - Zapi code 47: Problem on the encoder
		2	ACEX - Zapi code 47: Problem on the encoder
	F07.36 - Internal ECU temperature (D)	1	COMBIACX - Zapi Code 37: The internal thermal sensor is out of range
		2	ACEX - Zapi Code 37: The internal thermal sensor is out of range

F08 - ELECTRIC CIRCUIT	F08.04 - ECU input supply (D)	1	COMBIACX - Zapi code 18: Power capacitors voltage does not increase at startup
		2	COMBIACX - Zapi code 27: The controller detects an overvoltage or undervoltage condition: - Overvoltage threshold is 35V - Undervoltage threshold is 9.5V
		4	COMBIACX - Zapi code 36: At start-up, the battery voltage is too low or too high (<0,8 Vbatt or >1,2 Vbatt)
		8	COMBIACX - Zapi code 60: A low logic level of Key-Off has been detected during start-up diagnosis
		4	ACEX - Zapi code 18: Power capacitors voltage does not increase at startup
		8	ACEX - Zapi code 27: The controller detects an overvoltage or undervoltage condition: - Overvoltage threshold is 35V - Undervoltage threshold is 9.5V
		16	ACEX - Zapi code 36: At start-up, the battery voltage is too low or too high (<0,8 Vbatt or >1,2 Vbatt)
		32	ACEX - Zapi code 60: A low logic level of Key-Off has been detected during start-up diagnosis
	F08.09 - Common outputs supply (D)	1	COMBIACX - Zapi code 50: Low voltage of the electrovalves common (B2)
		2	ACEX - Zapi code 50: Low voltage of the electrovalves common (B2)
	F08.10 - High power supply (D)	1	COMBIACX & ACEX - Zapi Code 38: Internal Smart driver KO
		2	ACEX - Zapi Code 24: Low voltage on power line
		4	ACEX - Zapi Code 46: Main contactor contact is stuck (always closed)
F10 - FUNCTIONS	F10.14 - Steering angle calibration (D)	1	Steering angle sensor not calibrated
	F10.15 - Jib angle calibration (D)	1	Jib angle sensor not calibrated

F12 - INTERNAL FAULTS	F12.01 - CAN Fault (A)	1	CAN failure detected with platform ECU (CAN Tiller)
		2	CAN failure detected with turret ECU (Activ' Screen)
		4	COMBIACX - Zapi code 39: Module does not receive any CAN messages from ACEX
		8	ACEX - Zapi code 39: Module does not receive any CAN messages from COMBIACX
		16	Failure on date and time update (Activ' Screen)
	F12.02 - Read/Write error into EEPROM (D)	1	Internal failure of COMBIACX: access to EEPROM (read or write).
		2	Internal failure of COMBIACX: EEPROM stack full
		4	COMBIACX - Zapi code 25: Eeprom failure
		8	COMBIACX - Zapi code 69: Eeprom failure
		16	ACEX - Zapi code 25: Eeprom failure
		32	ACEX - Zapi code 69: Eeprom failure
	F12.04 - Parameters reset into EEPROM (D)	1	ID of software loaded into machine is different from the ID stored into EEPROM: all machine parameters have been reset and must then be set again (speeds, ramps, options, configuration, access code level 2, failure counters and calibration data)
		2	Detected change in machine speeds and ramps: settings forced to default values
		4	Detected change in machine options: settings forced to default values
		8	Detected change in machine configurations: settings forced to default values
		16	Detected change in machine maintenances: settings forced to default values
		32	Detected change in machine daily logs: settings forced to default values
		64	Detected change in machine events counters: settings forced to default values
		128	Detected change in machine events logs: settings forced to default values
	F12.05 - Machine not set (A)	1	Machine model is not set
		2	Machine country is not set
		4	Machine serial number is sot set
		8	Speed or ramp parameters used and are not set
		16	Machine options used and are not set
	F12.07 - ECU software version incoherence (A)	1	Zapi software version different on COMBIACX and on ACEX
		2	Wrong version of Haulotte software on the ACEX
		4	Wrong Haulotte code software on the ACEX
	F12.08 - ECU fault (Master) (D)	1	COMBIACX - Zapi code 34: Client software watchdog
		2	COMBIACX - Zapi code 41: Problem on the A/D conversion of µChip
		4	COMBIACX - Zapi code 42: Watchdog circuit output became high due to hw or sw problem
		8	COMBIACX - Zapi code 43: Watchdog circuit outputs became high due to hw or sw problem
		16	COMBIACX - Zapi code 54: Current gain acquisition has not been performed or eeprom damaged
		32	COMBIACX - Zapi code 63: Wrong client software

		64	COMBIACX - Zapi code 68: RAM checksum failed (RAM warning)
		128	COMBIACX - Zapi code 73: Timeout of client function (execution time exceed maximum allowable time)
	F12.09 - ECU fault (Slave) (D)	1	ACEX - Zapi code 34: Client software watchdog
		2	ACEX - Zapi code 41: Problem on the A/D conversion of uC
		4	ACEX - Zapi code 42: Watchdog circuit output became high due to hw or sw problem
		8	ACEX - Zapi code 43: Watchdog circuit outputs became high due to hw or sw problem
		16	ACEX - Zapi code 54: Current gain acquisition has not been performed or eeprom damaged
		32	ACEX - Zapi code 63: Wrong client software
		64	ACEX - Zapi code 68: RAM checksum failed (RAM warning)
		128	ACEX - Zapi code 73: Timeout of client function (execution time exceed maximum allowable time)

F13 - SWITCHES	F13.01 - Lower Controls Switches (D)	1	Incoherence between the 2 signals of jib lifting switch of turret box (both active) ⇨ SA620U = 1 **&** SA620D = 1
		2	Incoherence between the 2 signals of mast orientation switch of turret box (both active) ⇨ SA250L = 1 **&** SA250R = 1
		4	Incoherence between the 2 signals of mast lifting switch of turret box (both active) ⇨ SA520U = 1 **&** SA520D = 1
	F13.02 - Upper Controls Switches (D)	1	Incoherence between the 2 signals of front steering switch of platform box (both active) ⇨ SM901L = 1 **&** SM901R = 1
	F13.10 - Neutral switch (A)	1	Neutral position of jib lifting switch of turret box not detected after power on ⇨ SA620U = 1 **|** SA620D = 1
		2	Neutral position of mast orientation switch of turret box not detected after power on ⇨ SA250L = 1 **|** SA620R = 1
		4	Neutral position of mast lifting switch of turret box not detected after power on ⇨ SA520U = 1 **|** SA520D = 1
		8	Neutral position of enable switch of turret box not detected after power on ⇨ SA905 = 1
		16	Neutral position of unbraking of turret box not detected after power on ⇨ SB100 = 1
		32	Neutral position of horn option switch of turret box not detected after power on ⇨ SA907T = 1
	F13.11 - Neutral switch 2 (A)	1	Neutral position of front steering switch of platform box not detected after power on ⇨ SM901L = 1 **|** SM901R = 1
		2	Neutral position of foot pedal of platform box not detected after power on ⇨ SM901DM = 1
		4	Neutral position of orientation selection of platform box not detected after power on and no foot switchpedal configuration activated. ⇨ (SA200 = 1 && CFG[foot switchPedal]=0)
		8	Neutral position of horn switch of platform box not detected after power on ⇨ SA907 = 1
		16	Neutral position of jib selection switch of platform box not detected after power on ⇨ SA102 = 1
		32	Neutral position of mast selection switch of platform box not detected after power on ⇨ SA500= 1
		64	Neutral position of orientation selection switch of platform box not detected after power on ⇨ SA600 = 1
		128	Neutral position of orientation selection of platform box not detected after power on and foot pedal configuration activated. ⇨ (SB800 = 1 && CFG[foot Pedal]=1)
F15 - J1939 PROTOCOL	F15.06 – CAN bus: Cycle unit (D)	1	Timeout detected on J1939 CAN_2.0

F16 - ELECTRICAL MOTOR	F16.01 - Motor Overheat (A)	1	COMBIACX - Zapi code 35: Motor maximum temperature reached
		2	ACEX - Zapi code 35: Motor maximum temperature reached
	F16.02 - Motor Speed Problem (A)	1	COMBIACX - Zapi code 52: The drive motor has been detected stalled or the encoder is not working
		2	ACEX - Zapi code 52: The drive motor has been detected stalled or the encoder is not working
	F16.03 - Motor supply failure (A)	1	COMBIACX - Zapi Code 19: Motor output voltage is lower than expected while running
		2	COMBIACX - Zapi Code 22: Motor output voltage is higher than expected while running
		4	COMBIACX - Zapi Code 28: Motor voltage feedback circuits are damaged
		8	COMBIACX - Zapi Code 71: The motor output voltage is lower than expected, before main contactor drive switch is ON
		16	COMBIACX - Zapi Code 72: The motor output voltage is higher than expected, before main contactor drive switch is ON
		32	ACEX - Zapi Code 19: Motor output voltage is lower than expected while running
		64	ACEX - Zapi Code 22: Motor output voltage is higher than expected while running
		128	ACEX - Zapi Code 28: Motor voltage feedback circuits are damaged
		256	ACEX - Zapi Code 71: The motor output voltage is lower than expected, before main contactor drive switch is ON
		512	ACEX - Zapi Code 72: The motor output voltage is higher than expected, before main contactor drive switch is ON

2.9. BATTERY CHARGER

The function of the charger to provide a good charge to all batteries, in the quickest practical time, without damaging the batteries To achieve this, it incorporates a complex « charge curve », consisting of several different phases; each with a specific task. The phases are typically as follow :-

Phase I1- This is the premier phase, and its purpose is to put as much charge into the batteries as quick as possible. The charger supplies a constant current (the maximum output from the charger), and continues until the battery voltage reaches a preset voltage value. This is the red LED phase of charging

Phase U – In this phase the task is to now stabilise the batteries.
 During the I1 stage, the strongest batteries will charge quicker than the weakest, with the result being an uneven charge level across all the batteries. In the U phase, we control this by providing a constant voltage, and the charger monitors the current demanded by the batteries.
When the current demand of the batteries reduces to a preset value (12A in our example) for the same voltage, the charger knows that the demand for all the batteries should now be about equal. This is the Yellow phase of charging

Phase I2- Now we have stabilised the batteries with a good even level of charge, we can again provide a constant current charge, effectively a « boost » or overcharge phase, to bring the batteries up to their maximum charge The charger now provides a constant current (12A in our example) and monitors the charger voltage, continuing the charge unit a peak voltage is reached (in our example, 32volts for the 24V charger, and 65volts for the 48V unit). When the target voltage is reached, the charger again progressively reduces the current output to a low level (while maintaining the voltage), before switching off. This is the Yellow phase of charging

Equalisation Phase- After the I2 phase, the battery voltage is artificially high. So the charger is stopped, and the batteries are left to naturally discharge the excess surface charge. At the same time, as the surface charge disappears, the batteries are left to balance their charges eventually between the cells. Then, after this short break, the charger re-starts, supplying a very low current (5-6A in our example) , and again monitoring the battery voltage. When the target voltage is reached (slightly less than the I2 peak voltage), the charger switches off and the charge is complete. During this phase the green LED will flash, and at the completion, the green LED will be on

Maintaining phase- In order compensate for any natural discharge that the batteries experience, every 24 hours the battery charger launches a very short, condensed version of the phases I1, U and I2, called the Maintaining phase. As the battery voltage is already high, and the batteries have a good charge level already, the 3 phases pass very fast from one to the other, and the whole process may only take minutes. As this is a compete mini charge cycle, the red, then the yellow LEDs will be on during this phase

• Values & curves are for reference only, for the specific charge curve, refer to the charger specifications
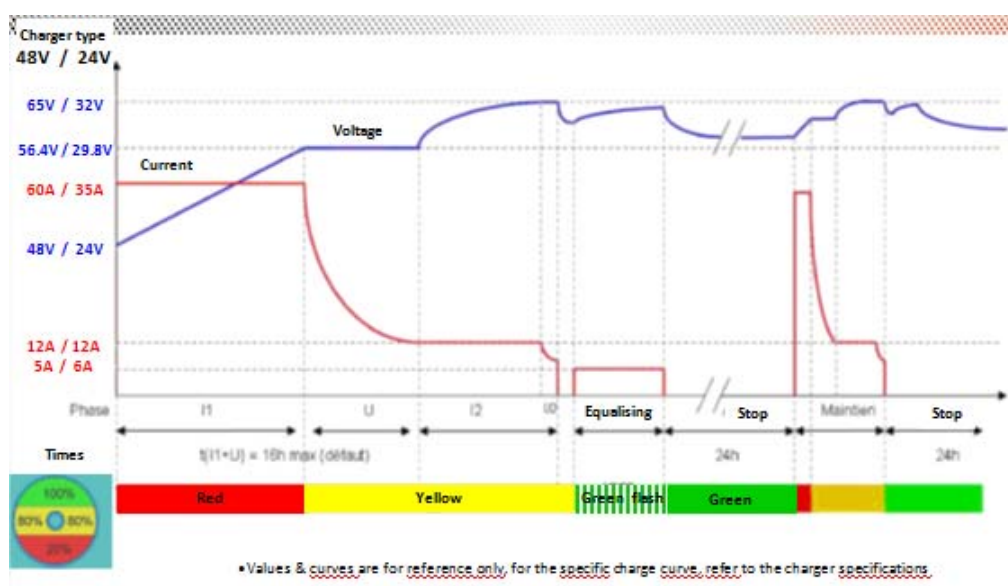
In resume
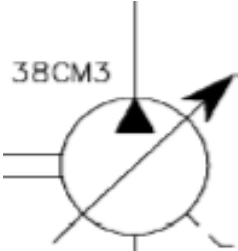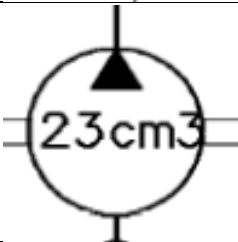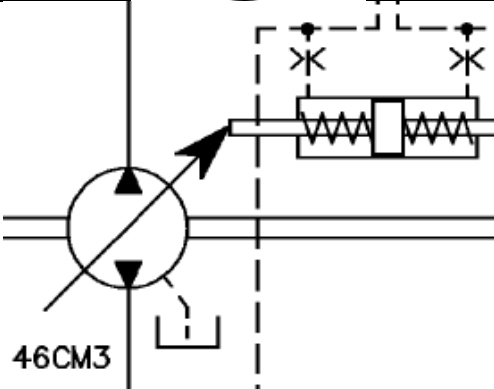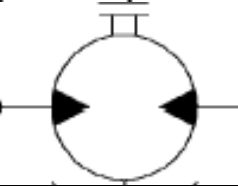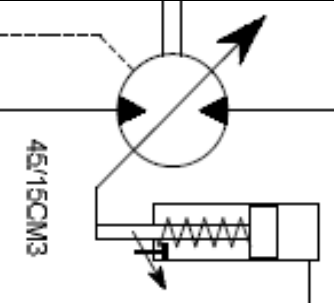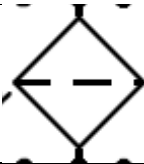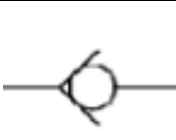
Red led	phase 1
Blinking red	in case of failure (disconnect and reconnect the battery charger for reset
Yellow led	phase U, I2 and stop before equalisation
Green led	at the end of this phase
Blinking green led	in equalisation phase
OFF	no power
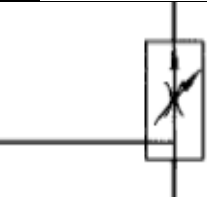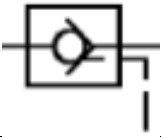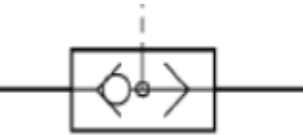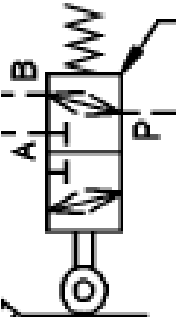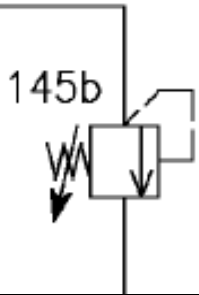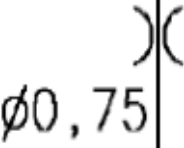
State	Description
RED on	Machine charging
YELLON on	80% charged
GREEN on	Machine charging complete
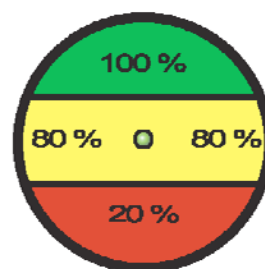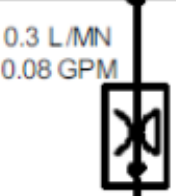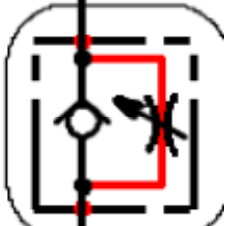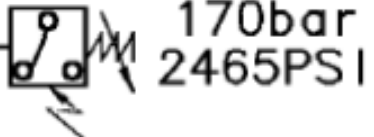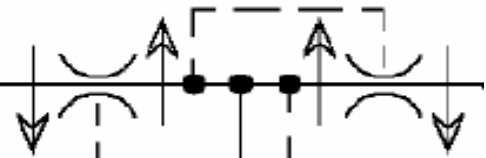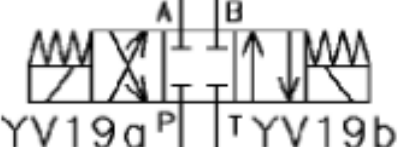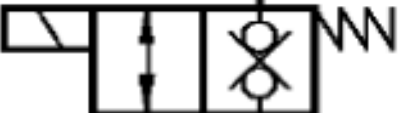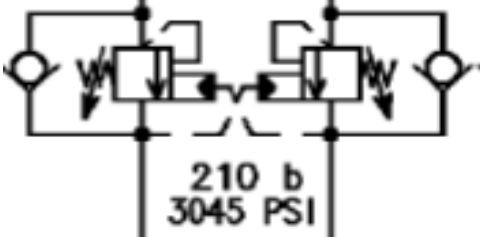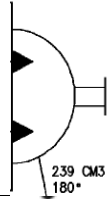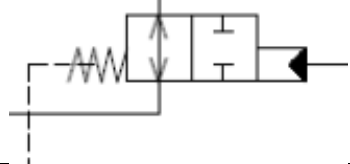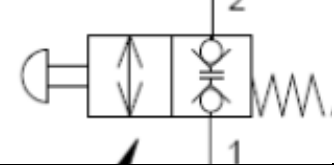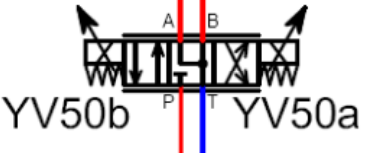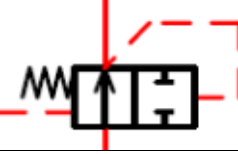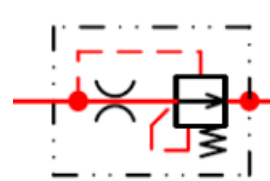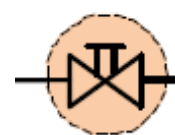
3. THE HYDRAULIC PART
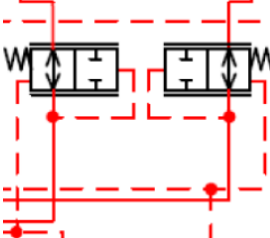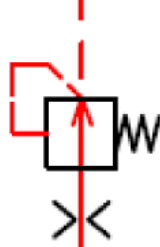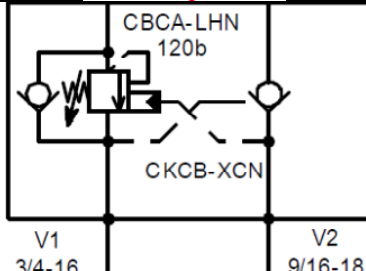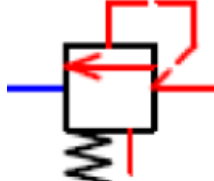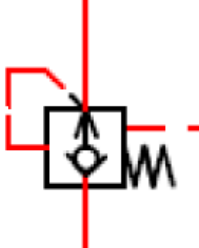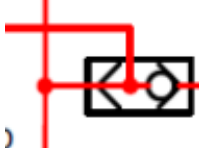
3.1.   SYMBOLS USED

	Pump with variable cubic capacity flow (here maximum 38 cc /rpm)
	Pump with fixed cubic capacity flow (here 23 cc/rpm)
	Pump with bi-directional variable flow (used for the hydrostatic transmission in closed circuits on HAULOTTE booms like HA32PX, HA41PX, H28TJ+, H43TPX, and HT23RTJ…
	Hydraulic motor with 2 directions of drive (ex FWD/REV)
	Variable cubic capacity drive motor with 2 directions of drive 15cc for High speed drive 45 cc for Low speed drive
	Filter (normally 10 microns)
	Check valve

4.5b	Check valve calibrated at 4.5b
	Priority valve /shuttle valve
	Piloted check valve
	Circuit selector switch/shuttle valve
	Position hydraulic valve(used for the HA32PX/HA41PX)
145b	Adjustable pressure relief valve (here set at 145 bars/2104 psi)
ø0,75	Fixed flow restrictor (here diameter of 0.75 mm)

0.3 L/MN 0.08 GPM	Fixed fow restrictor (0.3 L/mn)
3.5 L/MN 0.9 GPM	Adjustable flow restrictor
P/U	Pressure sensor (Pressure /Voltage)
170bar 2465PSI	Adjustable pressure switch (here set at 170 bars)
	Flow divider
A B YV19a P T YV19b	Position valve 4 ways, 3 positions in closed center
	Distribuitor/ safety valve
210 b 3045 PSI	Counter balance valve with piloting the opposite line (here set at 210bars)

	Position valve proportional 5/3 with piloting manual by lever
	Rotary cylinder /jack (here range at 180°)
	Piloted valve
	Manual valve with automatic return (used to readjust the part of compensation on HA32/41PX)
	proportional valve 4 ways/3 positions
	Pressure balance/flow control valve
	Flow regulator
	Tap valve

	Double transmission pressure regulator used in drive circuit
	Pressure regulator
	Counterbalance valve hydraulically piloted by opposite line (used for protection the movement in descent mode)
	Piloted pressure regulator
	Compensator valve
	Circuit selection

3.2.   HYDRAULIC SCHEMATICS

See at the end of this manual

3.3.   DETAILS OF HYDRAULIC BLOCK

- **Main block**
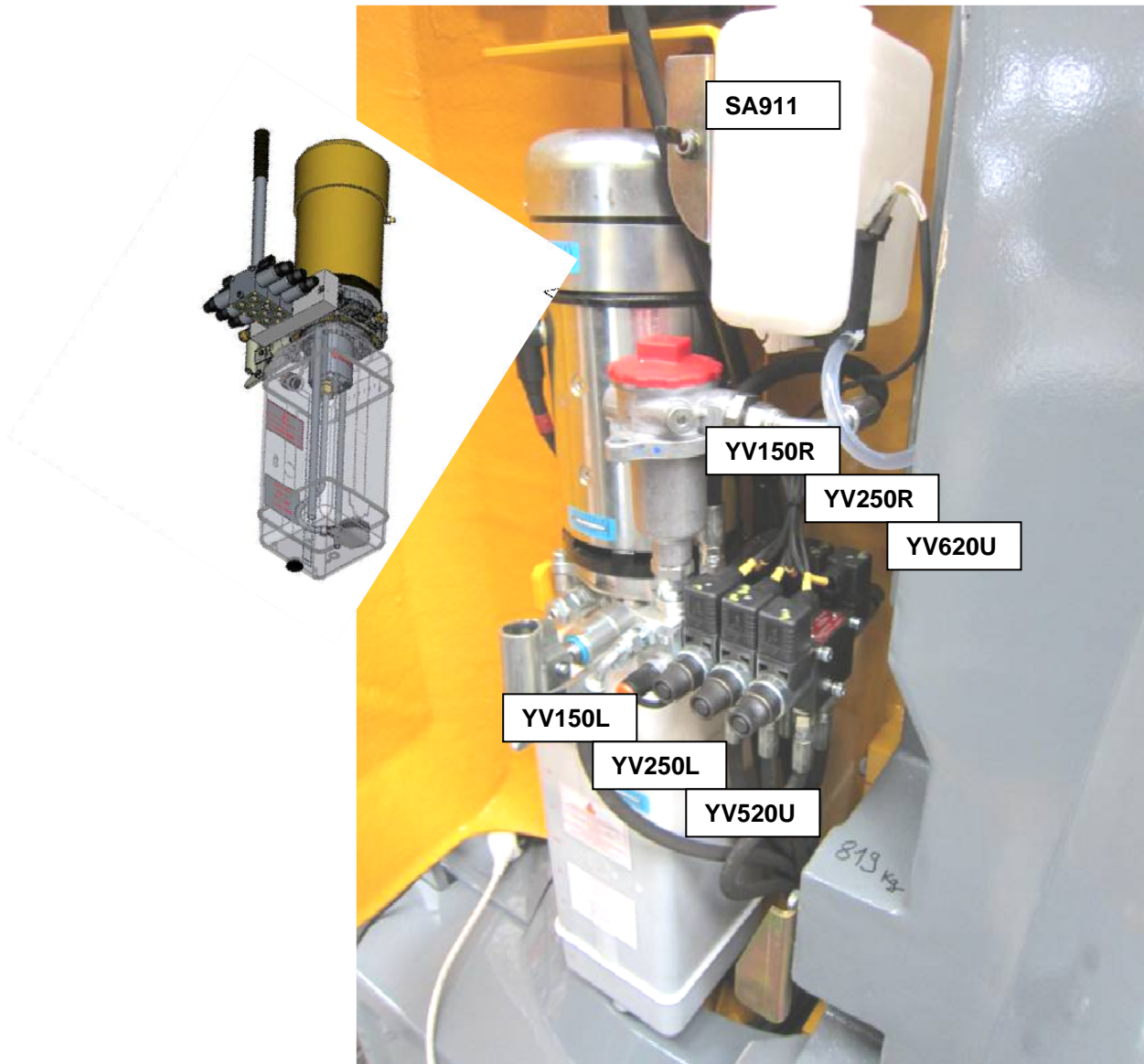
MARK	FUNCTION
SA911	Toggle switch for activating the centralized refilling system for batteries
YV150R	Right steering valve
YV150L	Left steering valve
YV250R	Mast rotation valve (towards right)
YV250L	Mast rotation valve (towards left)
YV620U	Jib lift valve
YV520U	Mast lift valve
YV520D	Mast descent valve

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STAR 8(22J)/Star 10(26J)
E05-15

- **Mast descent valve**

YV520D

- **Jib descent valve**

SP600

YV620D

AX 03 02
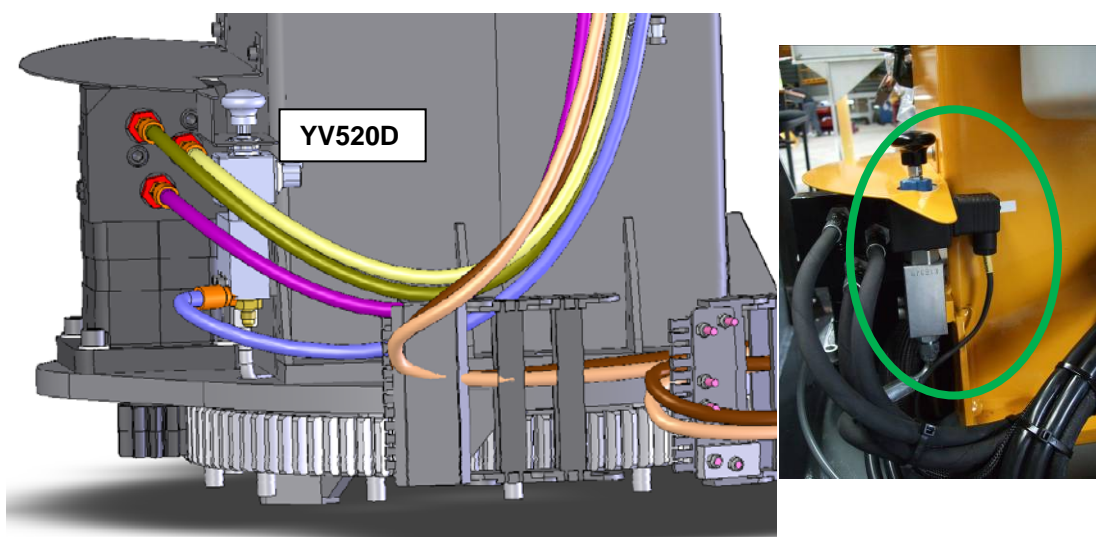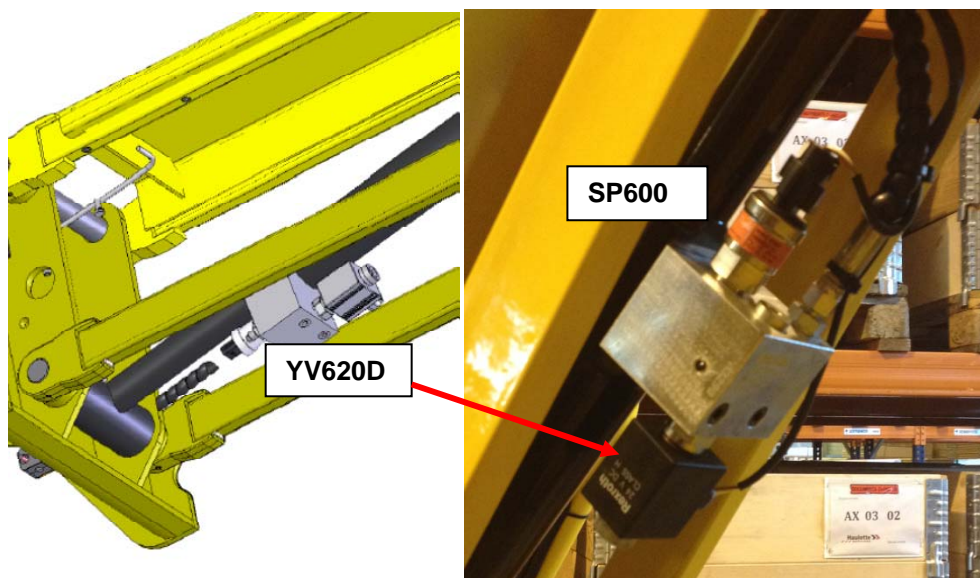
3.4. HYDRAULIC HOSES ASSEMBLY

This is an overview of the hoses location/length/reference in case of necessity
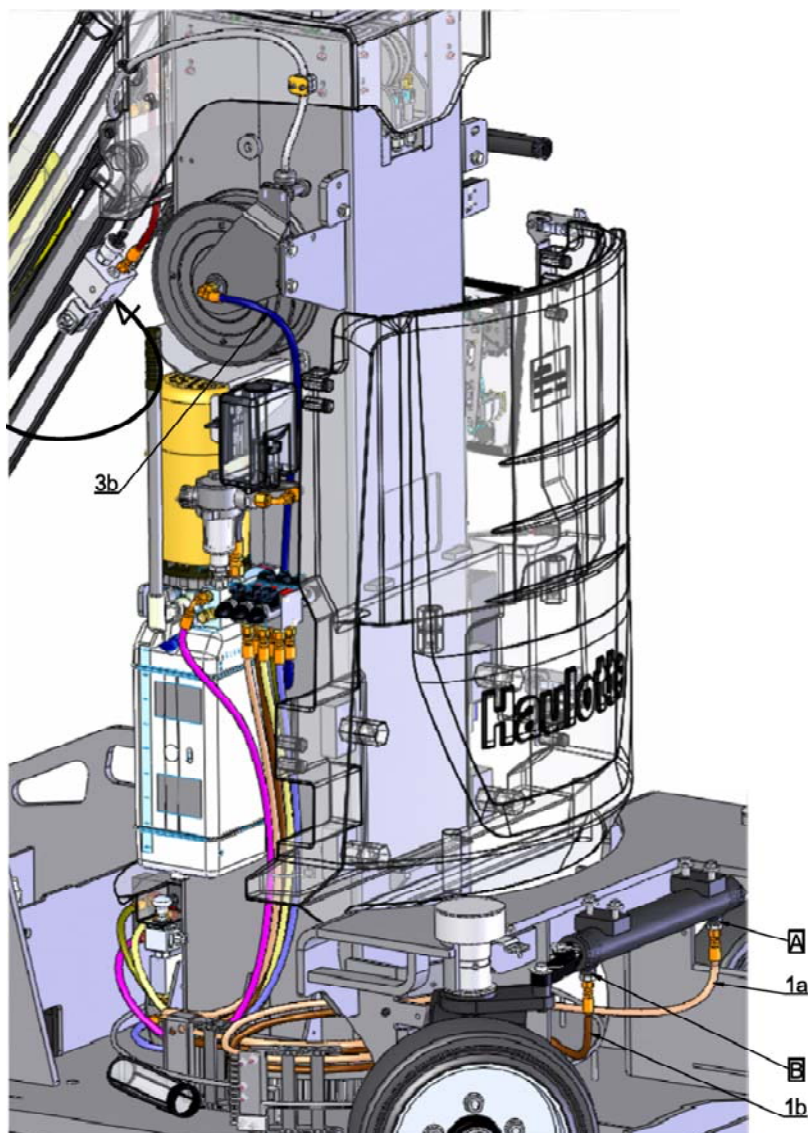
- **Reference of hoses**

Haulotte PN	Item	Quality	Hose Ø	Length	Nipple 1	Thread 1	Torque 1
2369059690	1a	1SC	1/4"	3500	F	1/4"	15-21 Nm
2369059690	1b	1SC	1/4"	3500	F	1/4"	15-21 Nm
2369071370	2a	1SC	1/2"	1130	F	1/4"	15-21 Nm
2369071370	2b	1SC	1/2"	1130	F	1/4"	15-21 Nm
2369071790	3a	1SC	3/4"	1030	F	1/4"	15-21 Nm
2369071790	3b	1SC	3/4"	1030	F	1/4"	15-21 Nm
2369073770	4a	1SC	1/4"	1200	F90°	1/4"	15-21 Nm
2369076510	5a	R6	3/8"	360	F	3/8"	30-42 Nm
2369071800	6a	1SC	1/4"	530	F	1/4"	15-21 Nm

- **Detail per item**

- Main hydraulic block

Out

T1

T3

1A 2A 3A 1B 2B 3B

5a

Hose 5

4a

1b
1a

2a 2b

3b

3a

1B	2B	3B
1A	2A	3A

- Reel

3B

68/123

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STAR 8(22J)/Star 10(26J)
E05-15

- <u>Mast</u>

Hose 2B

Electric power cable for electropump unit

To valves block

Hose 2A

YV520D

Hose 3A

Hose 4A

Hose 1A

Hose 1B

TRAINING MANUAL
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STAR 8(22J)/Star 10(26J)
E05-15

- Jib

Hose 6A
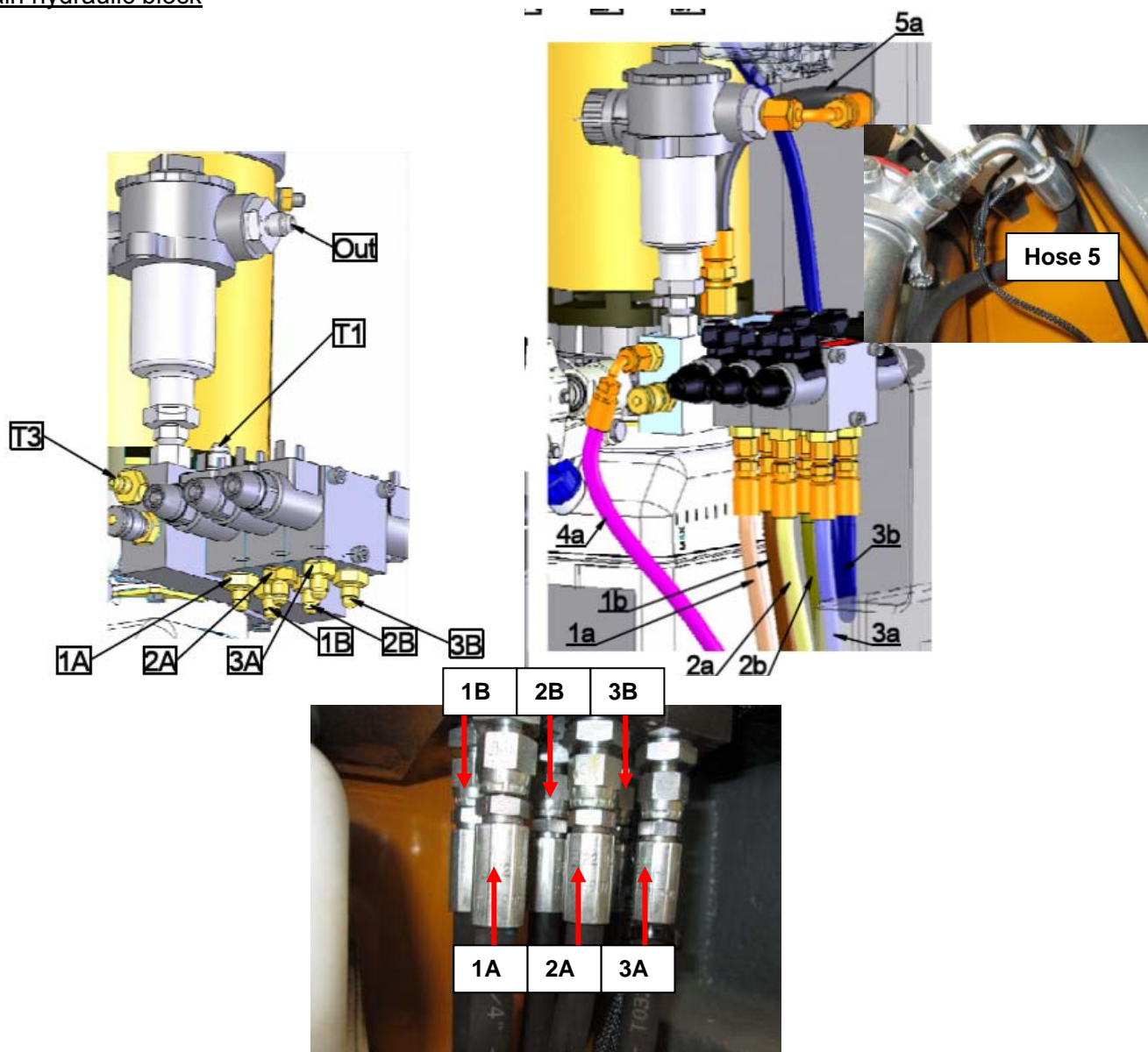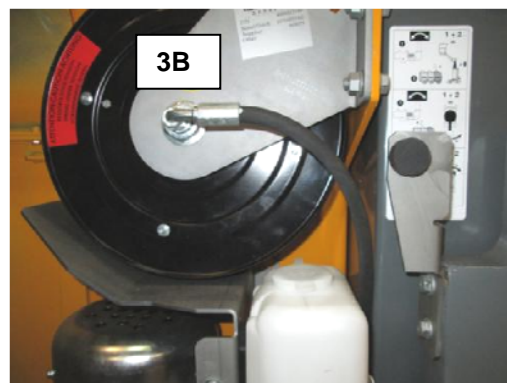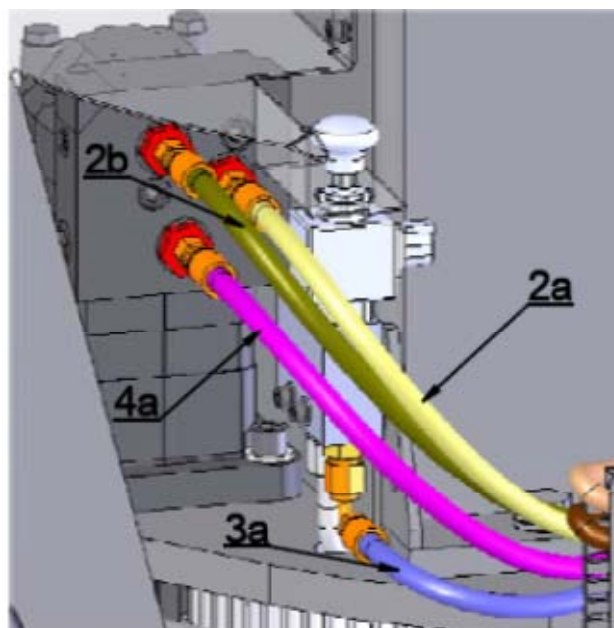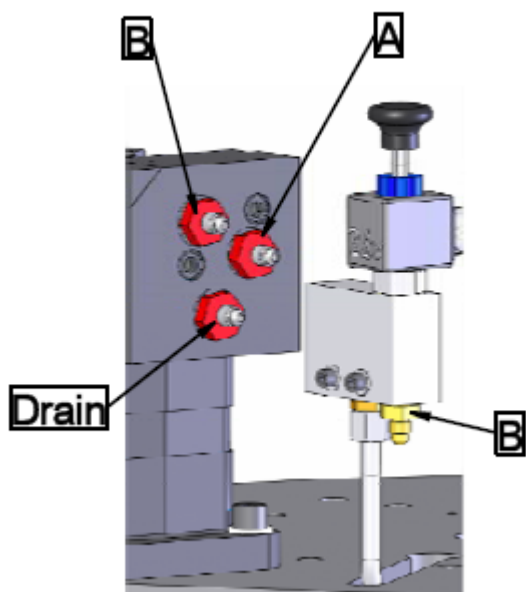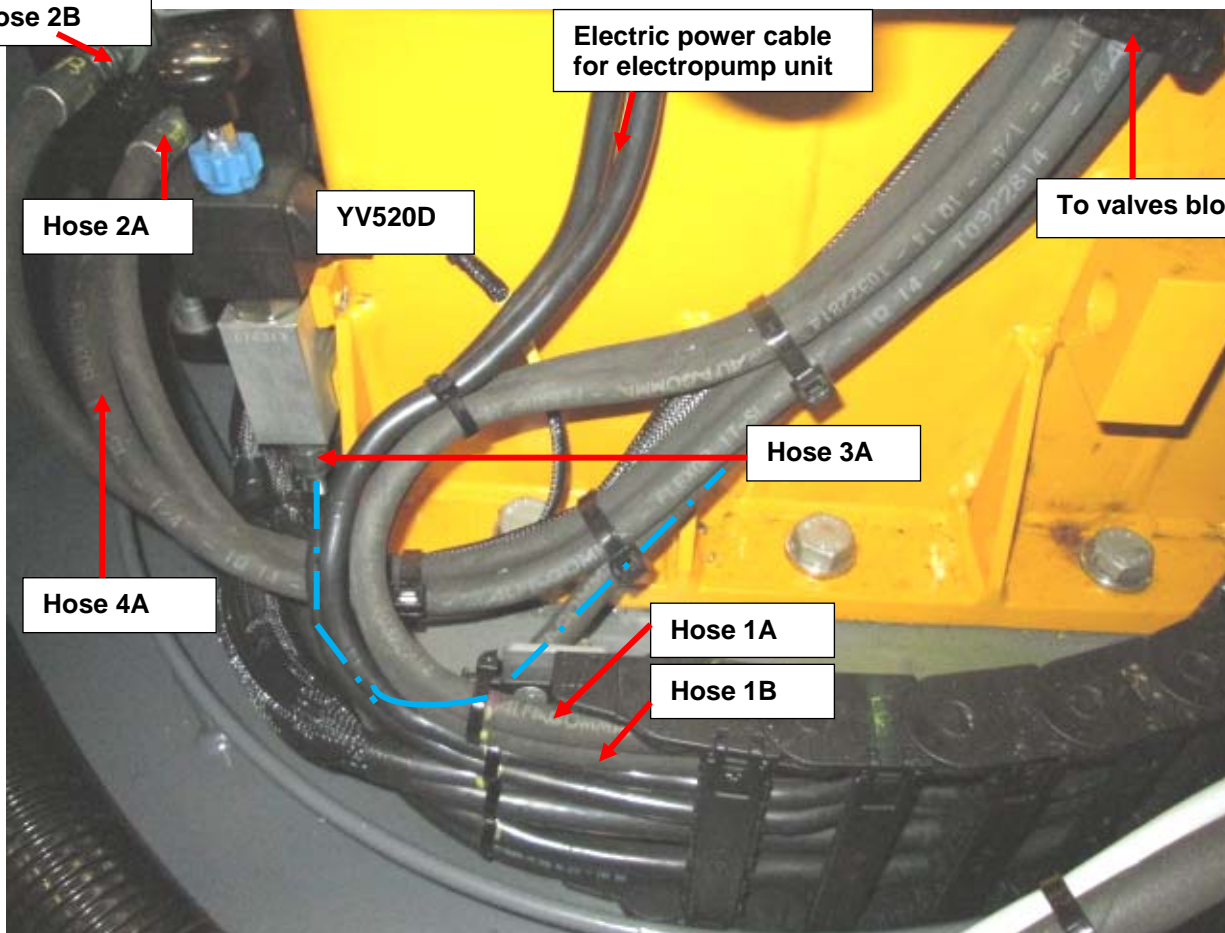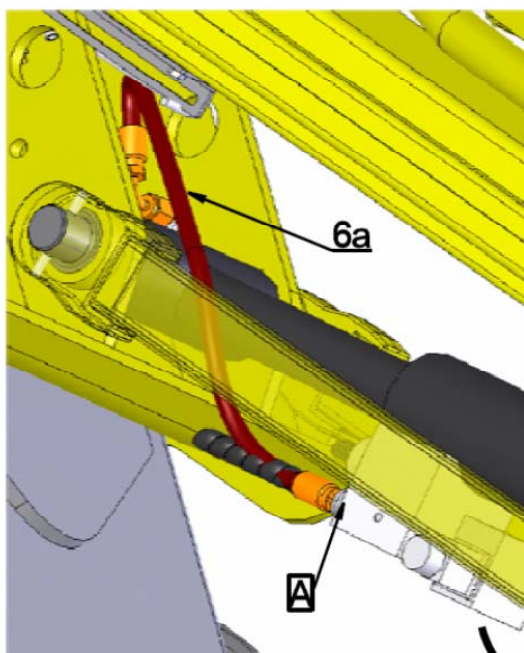
4. ADJUSTMENTS

4.1. MENUS OF THE ACTIV'SCREEN

This on-board console is used for diagnostic /settings/calibration

4.1.1. DESCRIPTION OF THE KEYPADS

This display located on lower control box has several functions like
- Display of battery state / running hours
- Active Alarms
- Maintenance to be done
- Speeds/ramps/options settings(*)
- Diagnostic per function (*)
- Calibrations (steering/overload) (*)

Note: (*) Some functions are available only through codes of different levels according to their function

MARK	FUNCTION
1	Keypad for menu scrolling up
2	Keypad for menu scrolling down
3	Keypad validation function/parameters settings
4	Keypad cancel/back return
5	Keypad "overriding" for emergency lowering (ie ucb not working)
6	Keypad lower controls movements (to be pushed permanently during the movement)
7	Fault indicator
8	Overload indicator

4.1.2. STRUCTURE OF THE MENUS

MENUS			CODE
0. FRONT MENU			**0**
0b. INFORMATIONS			**0**
0c. INFORMATIONS			**0**
0d. ACCESS CODE SETTINGS			**0**
1. FAILURES	1.1 Current Failures		**1**
	1.2 Failure log		**1**
	1.3 Erase		**2-3**
2. ACCESS CODE			**1**
3. MACHINE SETTINGS	3.1 SPEEDS & RAMPS		**2**
	3.2 CALIBRATION	Overload	**2-3**
		Steering	**2-3**
		Battery Voltage	**2-3**
		Basket Low position	**2-3**
	3.3 MACHINE CONFIGURATION	Options settings	**1-3**
		Country selection	**2-3**
		ECU Date & Hour	**3**
4. DIAGNOSTIC	4.1 MACHINE STATE		
	4.2 INPUTS-OUTPUTS	Digital Inputs	**1**
		Digital outputs	**1**
		Analog Inputs	**1**
		Analog Outputs	**1**
5. MAINTENANCE	5.1 Maintenance to be done		**1**
	5.2 Maintenance log		**1**
	5.3 Usage log		**1**
	5.4 Software versions		**1**
6. TOOLS	6.1 Language		**1**
	6.2 Brightness		**0**
	6.3 Date & Time Format		**1**
	6.4 Failures format		**1**
	6.5 Units format		**1**

Note :

- Code level 1 <u>1250</u>
- Code level 2 <u>2031</u>
- Code level 3 (daily and available through website https://www.e-machines-codes.com)

- **Menu speeds and ramps settings**

Movement	Parameter	[Target]	Factory tolerance	Configuration
Drive forward	Min speed		[-100 ; +10]	
Drive forward	Max speed	[7.000000 ; 9.000000]	[-100 ; +0]	High speed selected, drive on 10m/33ft length
Drive forward	Max speed micro	[30.000000 ; 33.000000]	[-100 ; +0]	Machine unfolded, drive on 5m/16ft
Drive forward	Acceleration		[-5 ; +5]	
Drive forward	Deceleration		[-5 ; +5]	1 m/3.3 ft ± 0,2 m/0.66 ft in high speed
Drive reverse	Min speed		[-100 ; +10]	
Drive reverse	Max speed	[7.000000 ; 9.000000]	[-100 ; +0]	High speed selected, drive on 10m/33ft length
Drive reverse	Max speed micro	[30.000000 ; 33.000000]	[-100 ; +0]	Machine unfolded, drive on 5m/16ft
Drive reverse	Acceleration		[-5 ; +5]	
Drive reverse	Deceleration		[-5 ; +5]	1 m/3.3 ft ± 0.2 m/0.66 ft in high speed
Steering	Max speed	[4.000000 ; 6.000000]	[-100 ; +0]	2WS selected, from lock to lock
Turntable orientation	Min speed		[-100 ; +10]	
Turntable orientation	Max speed	[56.000000 ; 64.000000]	[-100 ; +0]	Platform controls, from stop to stop, 360° rotation
Turntable orientation	Acceleration		[-5 ; +5]	
Turntable orientation	Deceleration		[-5 ; +5]	
Mast Raise	Min speed		[-100 ; +10]	
Mast Raise	Max speed	[28.000000 ; 32.000000]	[-100 ; +0]	Platform controls, from lower to upper stop
Mast Raise	Max speed	[30.000000 ; 34.000000]	[-100 ; +0]	Platform controls, from lower to upper stop
Mast Raise	Acceleration		[-5 ; +5]	
Mast Raise	Deceleration		[-5 ; +5]	
Jib Raise	Min speed		[-100 ; +10]	
Jib Raise	Max speed	[25.000000 ; 29.000000]	[-100 ; +0]	Platform controls, from lower to upper stop
Jib Raise	Acceleration		[-5 ; +5]	
Jib Raise	Deceleration		[-5 ; +5]	

- **Menu Country /model**

Country	Model 1	Model 2
Standard	STAR8	STAR10
USA	STAR22J	STAR26J
Australia	STAR8	STAR10
Russia/Ukraine	STAR8	STAR10

- **Menu options**

Name	Description & Values	Code level
Buzzer	*Choose for which movements the buzzer must be activated*	1
	OFF	
	Down movements	
	All Movements	
	Drive	
	Drive + All Movements	
Flashing light		1
	OFF	
	All Movements	
	Drive	
	Drive + All Movements	
	ON	
Activ'Shield bar		2
	OFF	
	ON	
Tracking system		1
	OFF	
	ON	
Emergency Mode not reset	*Allows to disable warning at machine startup if emergency mode has been used*	3
	OFF	
	ON	

- **Menu Configuration**

Name	Description & Values
Enable Pedal	
	OFF
	ON
Remote unbraking	
	OFF
	ON

- **Menus Inputs/Outputs**

Type:	Name	Diagnostic instructions:
[DIGITAL_INPUTS]	**SB801 - Emergency stop (turntable/frame)**	If both emergency stops are pulled, input must be ON (+VBAT). If not: - check frame emergency stop function (SB801) - check platform emergency stop function (SB802) - check input wire continuity
	SQ534 - Mast extended detector	If mast is not fully extended, input must be ON (+VBAT). If not: - check sensor adjustment - check sensor supply fuse (FU3-10A) - check sensor supply (wire 109=+VBAT) - check input wire continuity
	SQ530 - Mast retracted detector	If mast is not fully retracted, input must be ON (+VBAT). If not: - check sensor adjustment - check sensor supply fuse (FU3-10A) - check sensor supply (wire 109=+VBAT) - check input wire continuity
	SQ800 - Tilt sensor	If tilt < 3°, input must be ON (+VBAT). If not: - check sensor adjustment - check sensor supply fuse (FU3-10A) - check sensor supply (wires 0=0V and 109=+VBAT) - check input wire continuity
	SA620U - Jib switch (turret) - Raise	If jib raise function is activated from turret control box, input must be ON (+VBAT). If not: - check switch function - check switch supply fuse (FU3-10A) - check switch supply (wire 109=+VBAT) - check input wire continuity
	SA620D - Jib switch (turret) - Descent	If jib descent function is activated from turret control box, input must be ON (+VBAT). If not: - check switch function - check switch supply fuse (FU3-10A) - check switch supply (wire 109=+VBAT) - check input wire continuity
	SA901TU - Control box selector - Turret	If turret control box is selected, input must be ON (+VBAT). If not: - check switch function - check switch supply fuse (FU3-10A) - check switch supply (wire 98(CN01.7)=+VBAT) - check input wire continuity
	SA907TU - Horn switch - Turret	If horn function is activated from turret control box, input must be ON (+VBAT). If not: - check switch function - check switch supply fuse (FU3-10A) - check switch supply (wire 109=+VBAT) - check input wire continuity
	SA520D - Mast switch (turret) down - Descent	If mast up function is activated from turret control box, input must be ON (+VBAT). If not: - check switch function - check switch supply fuse (FU3-10A) - check switch supply (wire 109=+VBAT) - check input wire continuity
	SA520U - Mast switch (turret) up - Raise	If mast down function is activated from turret control box, input must be ON (+VBAT). If not: - check switch function - check switch supply fuse (FU3-10A) - check switch supply (wire 109=+VBAT) - check input wire continuity

	SQ801 - Chain break 1	If mast chain 1 tension is not low, input must be ON (+VBAT). If not: - check sensor adjustment - check sensor supply fuse (FU3-10A) - check sensor supply (wires 0=0V, 109=+VBAT) - check input wire continuity
	SA250L - Turntable orientation switch (turret) - Left	If turntable orientation to the left function is activated from turret control box, input must be ON (+VBAT). If not: - check switch function - check switch supply fuse (FU3-10A) - check switch supply (wire 109=+VBAT) - check input wire continuity
	SA250R - Turntable orientation switch (turret) - Right	If turntable orientation to the right function is activated from turret control box, input must be ON (+VBAT). If not: - check switch function - check switch supply fuse (FU3-10A) - check switch supply (wire 109=+VBAT) - check input wire continuity
	ST903 - Extreme ambiant temperature sensor	If ambient temperature is outside normal working conditions [-20;+40]°C, input must be ON (+VBAT). If not: - check sensor - check sensor supply fuse (FU3-10A) - check sensor supply (wires 0=0V and 109=+VBAT) - check input wire continuity
	SB100 - Brake release switch	If brake release switch is activated, input must be ON (+VBAT). If not: - check switch function - check switch supply fuse (FU3-10A) - check switch supply (wire 109=+VBAT) - check input wire continuity
	SQ902 - Activ' Shield Bar detector	If Activ' Shield Bar function is not activated, input must be ON (+VBAT). If not: - check sensor adjustment (refer to Activ' Shield Bar manual) - check sensor supply fuse (FU3-10A) - check sensor supply (0=0V and 109=+VBAT) - check input wire continuity
	SB800 - SM901EN - Enable pedal - Enable switch	If platform enable pedal is activated, input must be ON (+VBAT). If not: - check pedal function - check pedal supply fuse (FU3-10A) - check pedal supply (wire 109=+VBAT) - check input wire continuity If platform enable switch is activated, input must be ON (+VBAT). If not: - check switch function - check switch supply fuse (FU3-10A) - check pedal supply (wire 109=+VBAT) - check input wire continuity
	SM902N - Turntable joystick - Out of Neutral	If orientation joystick is pushed left or right, out of neutral input must be ON (+VBAT). If not: - check joystick function - check joystick supply fuse (FU3-10A) - check joystick supply (wire 109=+VBAT) - check input wire continuity

	SM901L - Drive/Mast/Jib joystick - Left	If steering left function is activated from joystick rocker, input must be ON. If not: - check rocker function - check rocker supply fuse (FU3-10A) - check rocker supply (wire 109=+VBAT) - check input wire continuity
	SA907 - Horn switch	If horn function is activated from platform control box, input must be ON (+VBAT). If not: - check switch function - check switch supply fuse (FU3-10A) - check switch supply (wire 109=+VBAT) - check input wire continuity
	SM901N - Drive/Mast/Jib joystick - Out of Neutral	If drive joystick is pulled, out of neutral input must be ON (+VBAT). If not: - check joystick function - check joystick supply fuse (FU3-10A) - check joystick supply (wire 109=+VBAT) - check input wire continuity
	SM901R - Drive/Mast/Jib joystick - Right	If steering right function is activated from joystick rocker, input must be ON. If not: - check rocker function - check rocker supply fuse (FU3-10A) - check rocker supply (wire 109=+VBAT) - check input wire continuity
	SA500 - Mast selection switch	If mast selection switch is activated from platform control box, input must be ON (+VBAT). If not: - check switch function - check switch supply fuse (FU3-10A) - check switch supply (wire 109=+VBAT) - check input wire continuity
	SA200 - Turntable orientation selection switch	If orientation selection switch is activated from platform control box, input must be ON (+VBAT). If not: - check switch function - check switch supply fuse (FU3-10A) - check switch supply (wire 109=+VBAT) - check input wire continuity
	SA600 - Jib selection switch	If jib selection switch is activated from platform control box, input must be ON (+VBAT). If not: - check switch function - check switch supply fuse (FU3-10A) - check switch supply (wire 109=+VBAT) - check input wire continuity
	SWITCH2 - Overriding switch	If Activ' Screen overriding switch is activated, input must be ON. If not: - check Activ' Screen supply fuse (FU3-10A) - check Activ' Screen supply (wires 0=0V and 02=+VBAT)
	SWITCH3 - Enable switch	If Activ' Screen enable switch is activated, input must be ON. If not: - check Activ' Screen supply fuse (FU3-10A) - check Activ' Screen supply (wires 0=0V and 02=+VBAT)
	SWITCH5 - Navigation Up	If Activ' Screen navigation up switch is activated, input must be ON. If not: - check Activ' Screen supply fuse (FU3-10A) - check Activ' Screen supply (wires 0=0V and 02=+VBAT)

	SWITCH6 - Navigation Down	If Activ' Screen navigation down switch is activated, input must be ON. If not: - check Activ' Screen supply fuse (FU3-10A) - check Activ' Screen supply (wires 0=0V and 02=+VBAT)
	SWITCH7 - Navigation Confirm	If Activ' Screen navigation confirm switch is activated, input must be ON. If not: - check Activ' Screen supply fuse (FU3-10A) - check Activ' Screen supply (wires 0=0V and 02=+VBAT)
	SWITCH8 - Navigation Cancel	If Activ' Screen navigation cancel switch is activated, input must be ON. If not: - check Activ' Screen supply fuse (FU3-10A) - check Activ' Screen supply (wires 0=0V and 02=+VBAT)
[DIGITAL_OUTPUTS]	**EL901 - Flashing light**	If flashing light function is requested, output must be ON (+VBAT). If not, check Function Diagnostic. If status is not OK: - check flashing light - check power supply fuse (FU2-10A) - check power supply (109=+VBAT) - check output wire continuity
	KAH - Supply holding relay	If machine is powered on with key and no emergency stop is pressed, output must be ON (0V). If not: - check supply fuses (FU3-10A) - check key position selector (SA901) - check output wire continuity
	YV150L - Steering front left valve	If steering left function is requested, output must be ON (0V). If not, check Function Diagnostic. If status is not OK: - check power supply fuse (FU2-10A) - check power supply (103=+VBAT) - check output wire continuity
	YV150R - Steering front right valve	If steering right function is requested, output must be ON (0V). If not, check Function Diagnostic. If status is not OK: - check power supply fuse (FU2-10A) - check power supply (103=+VBAT) - check output wire continuity
	YV620U - Jib raise valve	If jib raise function is requested, output must be ON (0V). If not, check Diagnostic/Function. If status is not OK: - check power supply fuse (FU2-10A) - check power supply (103=+VBAT) - check output wire continuity
	KA1 - Horn relay	If horn function is requested, output must be ON (0V). If not, check Function Diagnostic. If status is not OK: - check relay - check power supply fuse (FU3-10A) - check power supply (103=+VBAT) - check output wire continuity
	YV250R - Turntable orientation right valve	If turntable orientation to the right function is requested, output must be ON (0V). If not, check Function Diagnostic. If status is not OK: - check power supply fuse (FU2-10A) - check power supply (103=+VBAT) - check output wire continuity

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	YV250L - Turntable orientation left valve	If turntable orientation to the left function is requested, output must be ON (0V). If not, check Function Diagnostic. If status is not OK: - check power supply fuse (FU2-10A) - check power supply (103=+VBAT) - check output wire continuity
	YV520U - Mast raise valve	If mast raise function is requested, output must be ON (0V). If not, check Diagnostic/Function. If status is not OK: - check power supply fuse (FU2-10A) - check power supply (wire 103=+VBAT) - check output wire continuity
	YV620 - Jib valve	If jib raise function is requested, output must be ON (0V). If not, check Diagnostic/Function. If status is not OK: - check power supply fuse (FU2-10A) - check power supply (103=+VBAT) - check output wire continuity
	HL901 - Light Activ' shield bar activated	If Activ' Shield Bar activated lamp is not active while Activ' Shield Bar option is set to ON: - check relay KAC - check lamp HL901 - check power supply fuse (FU3-10A) - check power supply (109=+VBAT) - check output wire continuity
	EL905 - Flashing light Activ' shield bar	If crushing is detected, flashing light EL905 and lamp HL902 must be active. If not: - check power supply fuse (FU3-10A) - check power supply (109=+VBAT) - check flashing light - check lamp - check output wire continuity
	HL100 - Light Drive selection	If lamp is not active at power ON or if status is not OK: - check LED PCB - check LED supply fuse (FU3-10A) - check LED supply (wire 109=+VBAT) - check output wire continuity
	HL500 - Light mast selection	If lamp is not active at power ON or if status is not OK: - check LED PCB - check LED supply fuse (FU3-10A) - check LED supply (wire 109=+VBAT) - check output wire continuity
	HL802 - Light overload - platform	If lamp is not active at power ON or if status is not OK: - check LED PCB - check LED supply fuse (FU3-10A) - check LED supply (wire 109=+VBAT) - check output wire continuity
	HL600 - Light jib selection	If lamp is not active at power ON or if status is not OK: - check LED PCB - check LED supply fuse (FU3-10A) - check LED supply (wire 109=+VBAT) - check output wire continuity
	HL800 - Light tilt	If lamp is not active at power ON or if status is not OK: - check LED PCB - check LED supply fuse (FU3-10A) - check LED supply (wire 109=+VBAT) - check output wire continuity

	HL904 - Light Low Battery	If lamp is not active at power ON or if status is not OK: - check LED PCB - check LED supply fuse (FU3-10A) - check LED supply (wire 109=+VBAT) - check output wire continuity
	KAH2 - Overriding relay	If emergency mode is active, output must be ON (0V). If not: - check Activ' Screen supply fuse (FU3-10A) - check Activ' Screen supply (wires 0=0V and 02=+VBAT) - check output wire continuity
ANALOG INPUTS	**ECU_TEMP - ECU internal temperature**	ECU COMBIACX internal sensor. Temperature must be close to ambient temperature when machine has just been started.
	MOT_D_I - Right engine current	ECU COMBIACX internal sensor.
	ST302 - Engine temperature sensor 1	Motor 1 (M370) temperature sensor. Temperature must be close to ambient temperature when machine has just been started.
	SV300 - Engine speed sensor 1	If drive forward is ongoing, value must be greater than 0Hz. If drive reverse is ongoing, value must be lower than 0Hz. If no movement is ongoing, value must be equal to 0Hz.
	SR150 - Front wheels angle sensor	Steering angle sensor input must be between [0.5 /11.5]V and increase when wheels are turned on the right. If not: - check sensor mounting (ref. instructions) - check sensor supply (wires 49=0V and 48=+12V) - check input wire continuity
	ECU_TEMP - ECU internal temperature	ECU ACEX internal sensor. Temperature must be close to ambient temperature when machine has just been started.
	SV301 - Engine speed sensor 2	If drive forward is ongoing, value must be greater than 0Hz. If drive reverse is ongoing, value must be lower than 0Hz. If no movement is ongoing, value must be equal to 0Hz.
	ST303 - Engine temperature sensor 2	Motor 2 (M371) temperature sensor. Temperature must be close to ambient temperature when machine has just been started.
	SR601 - Overload angle sensor	Overload angle sensor input must be between [0;5]V, and value must increase during jib raise. If not: - check sensor mounting (ref. instructions) - check sensor supply (wires 0(CNB01.9)=0V and 51(CNB01.4)=+5V) - check input wire continuity
	SB900 - Activ' Shield Bar switch	If Activ' Shield Bar function reset is activated from platform control box, input must be ON (~20mA). If not: - check switch function - check switch supply fuse (FU3-10A) - check switch supply (wire 109=+VBAT) - check input wire continuity
	SM902X - Turntable joystick - Axis X	If turntable joystick is OK, input is variable between [0.5;4.5]V. If not: - check joystick function - check joystick 5V supply (wires 0=0V and 51=+5V) - check joystick center position (approx. 2.5V) - check input wire continuity

	SP601 - Overload pressure sensor	Overload pressure sensor input must be between [4;20]mA, and value must increase when load is added into the basket. If not:
		  - check sensor mounting (ref. instructions)
		  - check sensor supply (wire 412 around +12V)
		  - check input wire continuity		

	INCLINO_X - Inclinometer X axis	TBD		
	INCLINO_Y - Inclinometer Y axis	TBD		
	INCLINO_Z - Inclinometer Z axis	TBD		

	AU_INFO - Emergency stop (platform) status	If emergency stops are not pressed, input must be ON (+VBAT). If not:
		  - check supply fuse (FU3-10A)
		  - check input wire continuity		

- **Menus Functions**

[Function]	Item 1	Item 2	[Number]	Description / References
Drive	**[Setpoints cut outs]**	Turret		
		Platform	1	Control box or function is not active
			2	Joystick neutral position has not been detected after power ON
				[REF_FAIL] F05.12 - Joystick Neutral 2 = Active
			3	Joystick is failing (neutral incoherence or signal out of range)
				[REF_FAIL] F05.01 - Drive Joystick
			4	Joystick neutral position has not been detected after engine start
				[REF_IO_MAIN] SM901Y - Drive/Mast/Jib joystick - Axis Y
			5	Joystick must be released into neutral position in order to continue the movement (Enable switch/pedal has been released during movement)
				[REF_IO_MAIN] SM901Y - Drive/Mast/Jib joystick - Axis Y
			6	Enable switch/pedal not valid (not active or active during more than 8s without movement)
				[REF_VARIABLE] Platform enable pedal state <> Active and valid
	[Setpoint value]	%		
	[Movement slowdowns]		1	Drive in micro speed because machine is unfolded
				[REF_VARIABLE] Machine unfolded = ON
			2	Drive in micro speed because steering sensor is not calibrated
				[REF_VARIABLE] Steering angle calibration performed = ON
	[Control cut outs]	0 - [ENABLE]	1	Drive mode not selected from platform control box
				[REF_VARIABLE] Platform control box
				[REF_VARIABLE] Movement selection

			2	Machine not powered on for more than 3s
			3	Machine not configured
				[REF_CONFIG] Enable Pedal
		1 - [GENERAL]	1	Broken chain and machine is unfolded
				[REF_VARIABLE] Machine unfolded
				[REF_IO] SQ801 - Chain break 1
				[REF_IO] SQ802 - Chain break 2
			2	Low battery and machine unfolded
				[REF_VARIABLE] Machine unfolded
				[REF_VARIABLE] Battery level
			3	Steering cut active
				[REF_VARIABLE] Steering left cuttings
				[REF_VARIABLE] Steering right cuttings
				[REF_FAIL] F13.02 - Upper Controls Switches
				[REF_FAIL] F13.11 - Neutral switch 2
		2 - [SIMULTANEOUS FUNCTIONS]	3	Simultaneous movement with mast is not allowed, for all countries
				[REF_VARIABLE] Mast movement control
			4	Simultaneous movement with jib is not allowed, for all countries
				[REF_VARIABLE] Jib movement control
			5	Simultaneous movement with turntable orientation is not allowed, for all countries
				[REF_VARIABLE] Turntable orientation movement control
			7	Simultaneous movement with brake releasing is not allowed, for all countries
				[REF_VARIABLE] Brake release control (drive)
				[REF_VARIABLE] Brake release control (drive)
		3 - [OVERLOAD]	1	Overload alarm (can be canceled by overriding control box)
				[REF_VARIABLE] Overload Alarm
			2	Overload failure detected while machine is unfolded
				[REF_VARIABLE] Machine unfolded
		4 - [TILT]	1	Tilt is active and machine is unfolded
				[REF_VARIABLE] Tilt
				[REF_VARIABLE] Machine unfolded
		5 - [REACH LIMIT]		
		6 - [FAILURE]	1	Failure F08.10 is detected
				[REF_FAIL] F08.10 - High power supply
			2	Failure F02.04 is detected
				[REF_FAIL] F02.04 - Power Contactor
		7 - [SPECIFIC]	1	Activ' Shield Bar safety is active
				[REF_VARIABLE] Activ' Shield Bar function
			2	Activ' Shield Bar safety is active
				[REF_VARIABLE] Activ' Shield Bar function
			3	Ambient temperature is out of normal operational range [-20;+40]°C while machine is unfolded, for Russia/Ukraine countries.
				[REF_IO] ST903 - Extreme ambient temperature sensor
	[Control value]	%		

Steering	[Setpoints cut outs]	Turret		
		Platform	1	Control box or function is not active
			2	Joystick neutral position has not been detected after power ON
				[REF_FAIL] F05.12 - Joystick Neutral 2 = Detected
			3	Joystick is failing (neutral incoherence or signal out of range)
				[REF_FAIL] F05.01 - Drive Joystick = Detected
			4	Joystick neutral position has not been detected after engine start
				[REF_IO_MAIN] SM901L - Drive/Mast/Jib joystick - Left
				[REF_IO_MAIN] SM901R - Drive/Mast/Jib joystick - Right
			5	Joystick must be released into neutral position in order to continue the movement (Enable switch/pedal has been released during movement)
				[REF_IO_MAIN] SM901L - Drive/Mast/Jib joystick - Left
				[REF_IO_MAIN] SM901R - Drive/Mast/Jib joystick - Right
			6	Enable switch/pedal not valid (not active or active during more than 8s without movement)
				[REF_VARIABLE] Platform enable pedal state <> Active and valid
	[Setpoint value]	%		
	[Movement slowdowns]			
	[Control cut outs]	0 - [ENABLE]	1	Drive mode not selected from platform control box
				[REF_VARIABLE] Platform control box
				[REF_VARIABLE] Movement selection
			2	Machine not powered on for more than 3s
			3	Machine not configured
				[REF_CONFIG] Enable Pedal
		1 - [GENERAL]	1	Pump not ready
				[REF_VARIABLE] Power part state
			2	Broken chain and machine is unfolded
				[REF_VARIABLE] Machine unfolded
				[REF_IO] SQ801 - Chain break 1
				[REF_IO] SQ802 - Chain break 2
			3	Low battery and machine unfolded
				[REF_VARIABLE] Machine unfolded
				[REF_VARIABLE] Battery level
		2 - [SIMULTANEOUS FUNCTIONS]	3	Simultaneous movement with mast is not allowed, for all countries
				[REF_VARIABLE] Mast movement control
			4	Simultaneous movement with jib is not allowed, for all countries
				[REF_VARIABLE] Jib movement control
			5	Simultaneous movement with turntable orientation is not allowed, for all countries

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				[REF_VARIABLE] Turntable orientation movement control
			7	Simultaneous movement with brake releasing is not allowed, for all countries
				[REF_VARIABLE] Brake release control (drive)
				[REF_VARIABLE] Brake release control (drive)
		3 - [OVERLOAD]	1	Overload alarm (can be cancelled by overriding control box)
				[REF_VARIABLE] Overload Alarm
			2	Overload failure detected while machine is unfolded
				[REF_VARIABLE] Machine unfolded
		4 - [TILT]	1	Tilt is active and machine is unfolded
				[REF_VARIABLE] Machine unfolded
				[REF_VARIABLE] Tilt
		5 - [REACH LIMIT]	1	Left limit position reached
				[REF_VARIABLE] Steering left limit
				[REF_VARIABLE] Steering angle calibration performed
			2	Right limit position reached
				[REF_VARIABLE] Steering right limit
				[REF_VARIABLE] Steering angle calibration performed
		6 - [FAILURE]	1	Failure F04.01 is active
				[REF_FAIL] F04.01 - Steering
			2	Failure F01.05 is active
				[REF_FAIL] F01.05 - Motor/Pump Power
			3	Failure F02.04 is active
				[REF_FAIL] F02.04 - Power Contactor
		7 - [SPECIFIC]	1	Activ' Shield Bar safety is active
				[REF_VARIABLE] Activ' Shield Bar function
			2	Ambient temperature is out of normal operational range [-20;+40]°C while machine is unfolded, for Russia/Ukraine countries.
				[REF_IO] ST903 - Extrem ambiant temperature sensor
	[Control value]	%		
Mast	**[Setpoints cut outs]**	Turret	1	Control box or function is not active
			2	Switch neutral position has not been detected after power ON
				[REF_FAIL] F13.10 - Neutral switch = Detected
			3	Switch is failing (signals incoherence)
				[REF_FAIL] F13.01 - Lower Controls Switches = Detected
			4	Switch neutral position has not been detected after engine start
				[REF_IO_MAIN] SA520U - Mast switch (turret) up - Raise
				[REF_IO_MAIN] SA520D - Mast switch (turret) down - Descent
			5	Switch must be released to neutral position in order to continue the movement (enable pedal has been released during the

				movement)
				[REF_IO_MAIN] SA520U - Mast switch (turret) up - Raise
				[REF_IO_MAIN] SA520D - Mast switch (turret) down - Descent
			6	Enable switch is not valid (not active or active for more than 8s without any movement)
				[REF_VARIABLE] Turret enable switch state <> Active and valid
		Platform	1	Control box or function is not active
			2	Joystick neutral position has not been detected after power ON
				[REF_FAIL] F13.11 - Neutral switch 2 = Detected
			3	Joystick is failing (neutral incoherence or signal out of range)
				[REF_FAIL] F13.02 - Upper Controls Switches = Detected
			4	Joystick neutral position has not been detected after engine start
				[REF_IO_MAIN] SM901Y - Drive/Mast/Jib joystick - Axis Y
			5	Joystick must be released to neutral position in order to continue the movement (enable pedal has been released during the movement)
				[REF_IO_MAIN] SM901Y - Drive/Mast/Jib joystick - Axis Y
			6	Enable switch/pedal not valid (not active or active during more than 8s without movement)
				[REF_VARIABLE] Platform enable pedal state <> Active and valid
	[Setpoint value]	%		
	[Movement slowdowns]		1	Overload failure
			2	Tilt is active and machine is unfolded
				[REF_VARIABLE] Tilt = ON
				[REF_VARIABLE] Machine unfolded = ON
			3	Turret control box is active
				[REF_VARIABLE] Turret control box = Active
			4	Overriding control box is active
				[REF_VARIABLE] Turret control box = Active
	[Control cut outs]	0 - [ENABLE]	1	Turret and platform control box are not in mast mode
				[REF_VARIABLE] Movement selection
			2	Machine not powered on for more than 3s
			3	Machine not configured
				[REF_CONFIG] Enable Pedal
		1 - [GENERAL]	1	Pump not ready
				[REF_VARIABLE] Power part state
			2	Broken chain
				[REF_IO] SQ801 - Chain break 1
				[REF_IO] SQ802 - Chain break 2
			3	Low battery
				[REF_VARIABLE] Battery level

		2 - [SIMULTANEOUS FUNCTIONS]	1	Simultaneous movement with drive is not allowed, for all countries
				[REF_VARIABLE] Drive movement control
			2	Simultaneous movement with steering is not allowed, for all countries
				[REF_VARIABLE] Steering movement control
			4	Simultaneous movement with jib is not allowed, for all countries
				[REF_VARIABLE] Jib movement control
			5	Simultaneous movement with turntable orientation is not allowed, for all countries
				[REF_VARIABLE] Turntable orientation movement control
			7	Simultaneous movement with brake releasing is not allowed, for all countries
				[REF_VARIABLE] Brake release control (drive)
				[REF_VARIABLE] Brake release control (drive)
		3 - [OVERLOAD]	1	Overload alarm (can be canceled by overriding control box)
				[REF_VARIABLE] Overload Alarm
			2	Overload failure detected while machine is unfolded
				[REF_VARIABLE] Machine unfolded
		4 - [TILT]	1	Tilt is active and machine is unfolded
				[REF_VARIABLE] Tilt
				[REF_VARIABLE] Machine unfolded
		5 - [REACH LIMIT]	1	Machine totally unfolded
				[REF_IO_MAIN] SQ534 - Mast extended detector
		6 - [FAILURE]	1	Failure F01.05 is active
				[REF_FAIL] F01.05 - Motor/Pump Power
			2	Failure F04.39.1 is active
				[REF_FAIL] F04.39 - Mast
			3	Failure F04.39.2 is active
				[REF_FAIL] F04.39 - Mast
			4	Failure F02.04 is active
				[REF_FAIL] F02.04 - Power Contactor
		7 - [SPECIFIC]	1	Activ' Shield Bar safety is active (cut out active only from platform control box)
				[REF_VARIABLE] Activ' Shield Bar function
				[REF_VARIABLE] Platform control box
			2	Activ' Shield Bar safety is active (cut out active only from platform control box)
				[REF_VARIABLE] Activ' Shield Bar function
				[REF_VARIABLE] Platform control box
			3	Ambient temperature is out of normal operational range [-20;+40]°C while machine is unfolded, for Russia/Ukraine countries.
				[REF_IO] ST903 - Extrem ambiant temperature sensor
	[Control value]	%		
Jib	[Setpoints cut outs]	Turret	1	Control box or function is not active

			2	Switch neutral position has not been detected after power ON
				[REF_FAIL] F13.10 - Neutral switch = Detected
			3	Switch is failing (signals incoherence)
				[REF_FAIL] F13.01 - Lower Controls Switches = Detected
			4	Switch neutral position has not been detected after engine start
				[REF_IO_MAIN] SA620U - Jib switch (turret) - Raise
				[REF_IO_MAIN] SA620D - Jib switch (turret) - Descent
			5	Switch must be released to neutral position in order to continue the movement (enable pedal has been released during the movement)
				[REF_IO_MAIN] SA620U - Jib switch (turret) - Raise
				[REF_IO_MAIN] SA620D - Jib switch (turret) - Descent
			6	Enable switch is not valid (not active or active for more than 8s without any movement)
				[REF_VARIABLE] Turret enable switch state <> Active and valid
		Platform	1	Control box or function is not active
			2	Joystick neutral position has not been detected after power ON
				[REF_FAIL] F13.11 - Neutral switch 2 = Detected
			3	Joystick is failing (neutral incoherence or signal out of range)
				[REF_FAIL] F13.02 - Upper Controls Switches = Detected
			4	Joystick neutral position has not been detected after engine start
				[REF_IO_MAIN] SM901Y - Drive/Mast/Jib joystick - Axis Y
				[REF_IO_MAIN] SM901N - Drive/Mast/Jib joystick - Out of Neutral
			5	Joystick must be released to neutral position in order to continue the movement (enable pedal has been released during the movement)
			6	Enable switch/pedal not valid (not active or active during more than 8s without movement)
				[REF_VARIABLE] Platform enable pedal state <> Active and valid
	[Setpoint value]	%		
	[Movement slowdowns]		1	Overload failure and machine is unfolded
				[REF_VARIABLE] Machine unfolded = ON
			2	Tilt is active and machine is unfolded
				[REF_VARIABLE] Tilt = ON
				[REF_VARIABLE] Machine unfolded = ON
			3	Turret control box is active

				[REF_VARIABLE] Turret control box = Active
			4	Overriding control box is active
				[REF_VARIABLE] Turret control box = Active
	[Control cut outs]	0 - [ENABLE]	1	Turret and platform control box are not in jib mode
				[REF_VARIABLE] Movement selection
			2	Machine not powered on for more than 3s
			3	Machine not configured
				[REF_CONFIG] Enable Pedal
		1 - [GENERAL]	1	Pump not ready
				[REF_VARIABLE] Power part state
			2	Broken chain and machine is unfolded
				[REF_IO] SQ801 - Chain break 1
				[REF_IO] SQ802 - Chain break 2
				[REF_VARIABLE] Machine unfolded
			3	Low battery
				[REF_VARIABLE] Battery level
		2 - [SIMULTANEOUS FUNCTIONS]	1	Simultaneous movement with drive is not allowed, for all countries
				[REF_VARIABLE] Drive movement control
			2	Simultaneous movement with steering is not allowed, for all countries
				[REF_VARIABLE] Steering movement control
			3	Simultaneous movement with mast is not allowed, for all countries
				[REF_VARIABLE] Mast movement control
			5	Simultaneous movement with turntable orientation is not allowed, for all countries
				[REF_VARIABLE] Turntable orientation movement control
			7	Simultaneous movement with brake releasing is not allowed, for all countries
				[REF_VARIABLE] Brake release control (drive)
				[REF_VARIABLE] Brake release control (drive)
		3 - [OVERLOAD]	1	Overload alarm
				[REF_VARIABLE] Overload Alarm
			2	Overload failure detected while machine is unfolded
				[REF_VARIABLE] Machine unfolded
		4 - [TILT]	1	Tilt is active and machine is unfolded
				[REF_VARIABLE] Tilt
				[REF_VARIABLE] Machine unfolded
		5 - [REACH LIMIT]	1	Low jib electrical limit reached
				[REF_VARIABLE] Electrical jib down limit
			2	High jib electrical limit reached
				[REF_VARIABLE] Electrical jib high limit
		6 - [FAILURE]	1	Failure F01.05 is active
				[REF_FAIL] F01.05 - Motor/Pump Power
			2	Failure F04.07.1 is active
				[REF_FAIL] F04.07 - Jib
			3	Failure F04.07.2 is active
				[REF_FAIL] F04.07 - Jib
			4	Failure F12.01.1 is active

				[REF_FAIL] F12.01 - CAN Fault
			5	Failure F02.04 is active
				[REF_FAIL] F02.04 - Power Contactor
		7 - [SPECIFIC]	1	Jib raise cut
				[REF_VARIABLE] Jib raise cuttings
			2	Jib Descent cut
				[REF_VARIABLE] Jib descent cuttings
			3	Activ' Shield Bar safety is active
				[REF_VARIABLE] Activ' Shield Bar function
			4	Activ' Shield Bar safety is active
				[REF_VARIABLE] Activ' Shield Bar function
			5	Ambient temperature is out of normal operational range [-20;+40]°C while machine is unfolded, for Russia/Ukraine countries.
				[REF_IO] ST903 - Extrem ambiant temperature sensor
	[Control value]	%		
Turntable orientation	**[Setpoints cut outs]**	Turret	1	Control box or function is not active
			2	Switch neutral position has not been detected after power ON
				[REF_FAIL] F13.10 - Neutral switch = Detected
			3	Switch is failing (signals incoherence)
				[REF_FAIL] F13.01 - Lower Controls Switches = Detected
			4	Switch neutral position has not been detected after engine start
				[REF_IO_MAIN] SA250L - Turntable orientation switch (turret) - Left
				[REF_IO_MAIN] SA250R - Turntable orientation switch (turret) - Right
			5	Switch must be released to neutral position in order to continue the movement (enable pedal has been released during the movement)
				[REF_IO_MAIN] SA250L - Turntable orientation switch (turret) - Left
				[REF_IO_MAIN] SA250R - Turntable orientation switch (turret) - Right
			6	Enable switch is not valid (not active or active for more than 8s without any movement)
				[REF_VARIABLE] Turret enable switch state <> Active and valid
		Platform	1	Control box or function is not active
			2	Joystick neutral position has not been detected after power ON
				[REF_FAIL] F13.11 - Neutral switch 2 = Detected
			3	Joystick is failing (neutral incoherence or signal out of range)
				[REF_FAIL] F13.02 - Upper Controls Switches = Detected
			4	Joystick neutral position has not been detected after engine start

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				[REF_IO_MAIN] SM902X - Turntable joystick - Axis X
				[REF_IO_MAIN] SM902N - Turntable joystick - Out of Neutral
			5	Joystick must be released to neutral position in order to continue the movement (enable pedal has been released during the movement)
				[REF_IO_MAIN] SM902X - Turntable joystick - Axis X
				[REF_IO_MAIN] SM902N - Turntable joystick - Out of Neutral
			6	Enable switch/pedal not valid (not active or active during more than 8s without movement)
				[REF_VARIABLE] Platform enable pedal state <> Active and valid
	[Setpoint value]	%		
	[Movement slowdowns]		1	Overload failure
			2	Tilt is active and machine is unfolded
				[REF_VARIABLE] Tilt = ON
				[REF_VARIABLE] Machine unfolded = ON
			3	Turret control box is active
				[REF_VARIABLE] Turret control box = Active
			4	Overriding control box is active
				[REF_VARIABLE] Turret control box = Active
	[Control cut outs]	0 - [ENABLE]	1	Turret and platform control box are not in orientation mode
				[REF_VARIABLE] Turret orientation validation
			2	Machine not powered on for more than 3s
			3	Machine not configured
				[REF_CONFIG] Enable Pedal
		1 - [GENERAL]	1	Pump not ready
				[REF_VARIABLE] Power part state
		2 - [SIMULTANEOUS FUNCTIONS]	1	Simultaneous movement with drive is not allowed, for all countries
				[REF_VARIABLE] Drive movement control
			2	Simultaneous movement with steering is not allowed, for all countries
				[REF_VARIABLE] Steering movement control
			3	Simultaneous movement with mast is not allowed, for all countries
				[REF_VARIABLE] Mast movement control
			4	Simultaneous movement with jib is not allowed, for all countries
				[REF_VARIABLE] Jib movement control
			7	Simultaneous movement with brake releasing is not allowed, for all countries
				[REF_VARIABLE] Brake release control (drive)
				[REF_VARIABLE] Brake release control (drive)

		3 - [OVERLOAD]	1	Overload alarm (can be canceled by overriding control box)
				[REF_VARIABLE] Overload Alarm
			2	Overload failure detected while machine is unfolded
				[REF_VARIABLE] Machine unfolded
		4 - [TILT]		
		5 - [REACH LIMIT]		
		6 - [FAILURE]	1	Failure F04.03 is active
				[REF_FAIL] F04.03 - Turntable Orientation
			2	Failure F01.05 is active
				[REF_FAIL] F01.05 - Motor/Pump Power
			3	Failure F02.04 is active
				[REF_FAIL] F02.04 - Power Contactor
		7 - [SPECIFIC]	1	Activ' Shield Bar safety is active
				[REF_VARIABLE] Activ' Shield Bar function
			2	Activ' Shield Bar safety is active
				[REF_VARIABLE] Activ' Shield Bar function
			3	Ambient temperature is out of normal operational range [-20;+40]°C while machine is unfolded, for Russia/Ukraine countries.
				[REF_IO] ST903 - Extrem ambiant temperature sensor
	[Control value]	%		
Brake release	[Setpoints cut outs]	Turret		
		Platform	1	Control box or function is not active
			2	Switch neutral position has not been detected after power ON
				[REF_FAIL] F13.11 - Neutral switch 2 = Active
			4	Switch neutral position has not been detected after engine start
				[REF_IO_MAIN] SB100 - Brake release switch
	[Setpoint value]	OFF/ON		
	[Movement slowdowns]			
	[Control cut outs]	0 - [ENABLE]	1	Another movement is running
			2	Machine not powered on for more than 3s
			3	Machine is unfolded
		1 - [GENERAL]		
		2 - [SIMULTANEOUS FUNCTIONS]		
		3 - [OVERLOAD]		
		4 - [TILT]		
		5 - [REACH LIMIT]		
		6 - [FAILURE]		
		7 - [SPECIFIC]		
	[Control value]	OFF/ON		

4.2. DESCRIPTION OF THE CONSOLE

This diagnostic console could be used in WIFI using a VCI adapter (Vehicle Computer Interface)
The full description of how to use that console and their menus is explained in an other technical note (refer to your nearest HAULOTTE SERVICES of your area)
With the Haulotte Diag console or diag pad application, it's possible to have a better diagnostic and more details on failures compared to the on-board console
It's also possible to upload softwares (refer to your nearest Haulotte Services for more details)
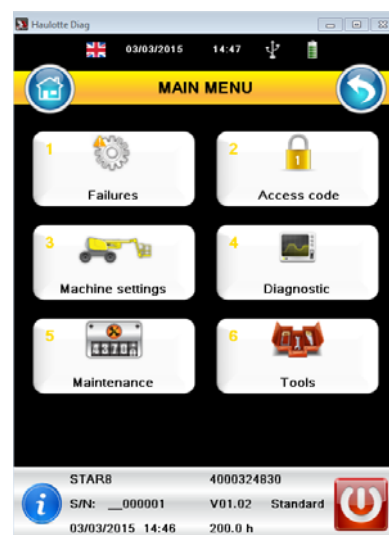
- **Where to connect it (CN03 on front panel)**

- **<u>Diagnostic mode</u>**

Thanks to theses kind of devices , the technician could check every function
As far as the console's version is compatible with the model of the machine to be checked , a picture
or drawing of the faulty component will be displayed on screen as shown below

<u>*Example taken from other model :*</u> boom safety valve doesn't respond (in red on display)

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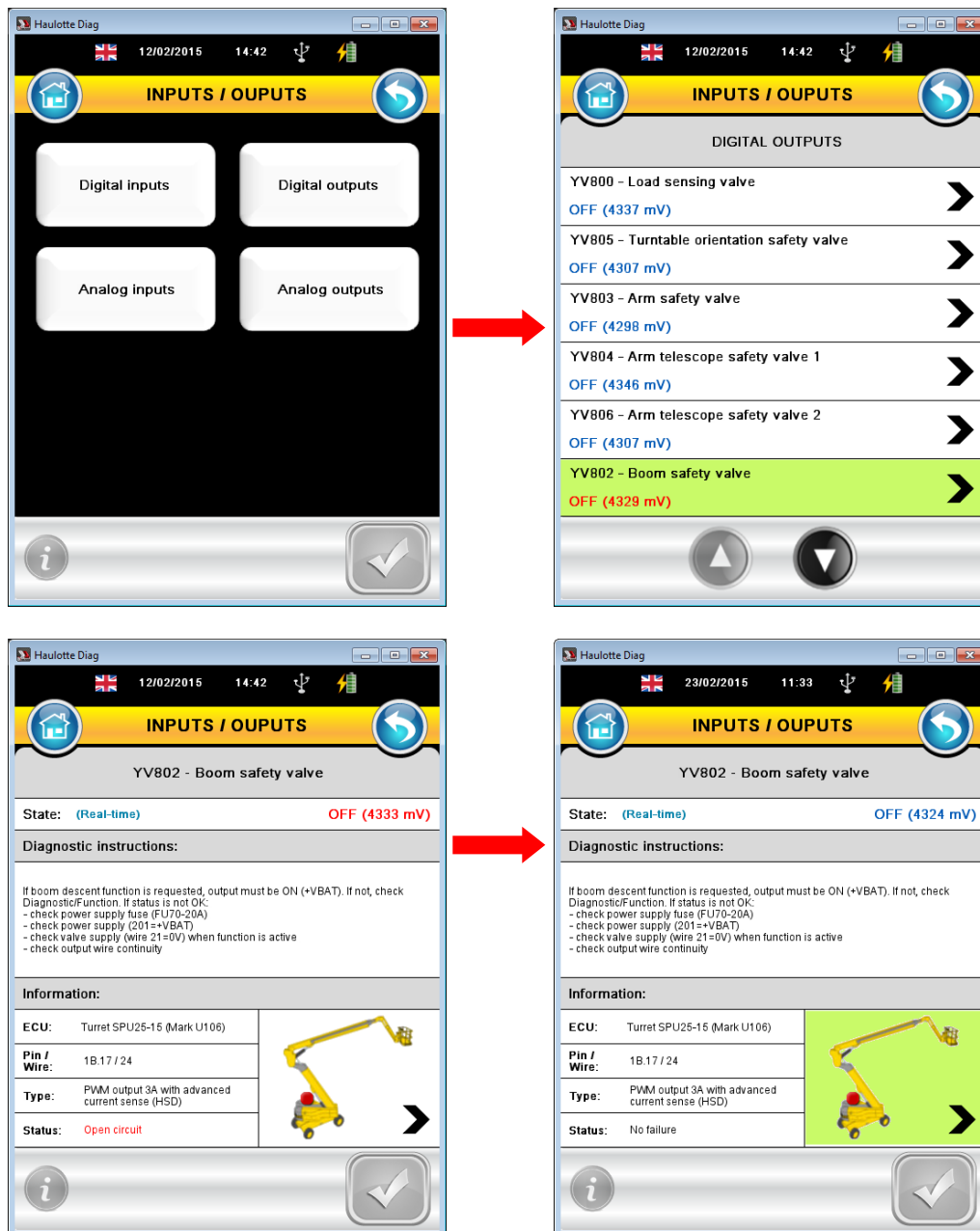
It's possible to see more details by navigating in the menu using the arrow as shown below
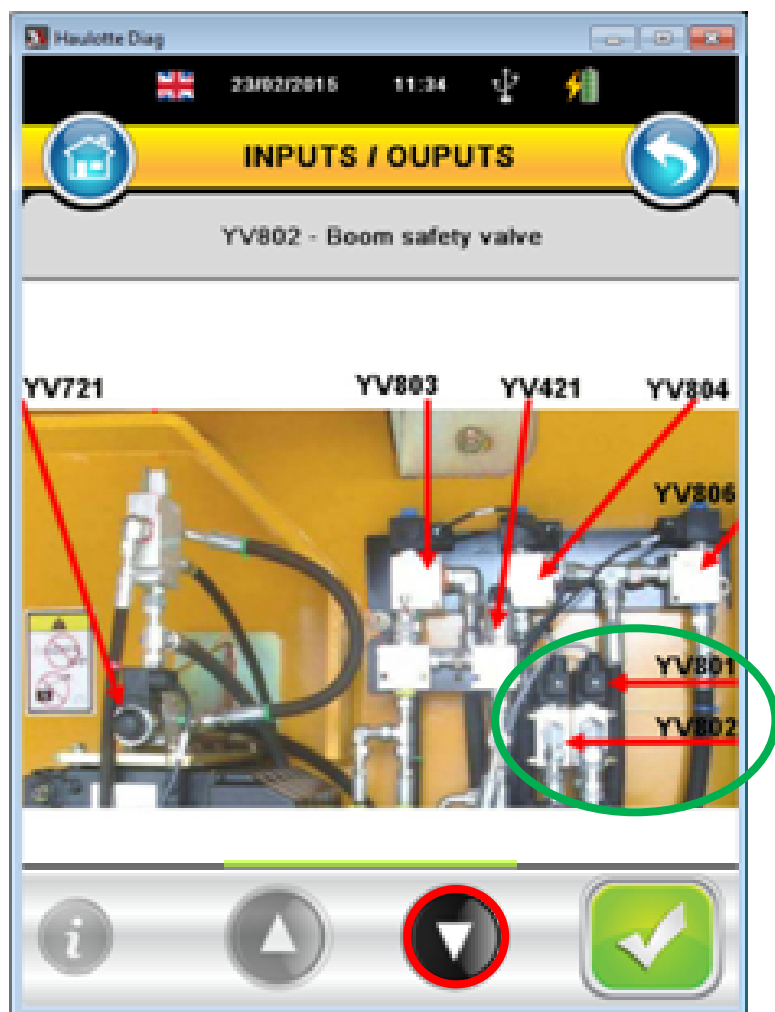
4.3. CALIBRATION OF THE STEERING

Note : All calibration could be made either with the Activ'screen lower board console either with external consoles (Haulotte DIAG or DIAG PAD)

Principle
When steering, the pump unit must stopped running, when the wheels reach their full lock to lock position (right or left)
If not, the variator is badly set compared to the steering potentiometer and over current/voltage occur in the internal drive motor when in curve
Solution:
The variator needs the values of the steering potentiometer SR150 in case the wheels are going from lock to lock position as well as in the middle of the steering stroke

4.3.1. HOW TO PRESET THE STEERING TRANSDUCER SR150

Take the part 4000246640 and fit it inside the chassis as shown below

Fit the potentiometer on the bracket as shown below (wrench of Ø 12mm)
(Check that the 2 CHC screw 6x 16 are well tight)

Then preset the potentiometer so in order to have "steer angle" at 0° on Activ' screen display

4.4.1. STEERING CALIBRATION PROCESS

The calibration is required for multiple reasons

When the variator COMBIACX or any component linked to the steering has been changed.

When the pump doesn't stop when steering at full lock (left or right)

Machine must be in stowed position and on flat surface (SQ800 not activated)

STEERING

Wheels in straight position
Display the value of the angle
Put the wheels straight, if the angle displayed is not 0±1°, adjust the sensor mechanically

Error: Calibration not allowed
Machine tilted

Error: Calibration not allowed
Machine unfolded

Step 1: Left mechanical limit
Turn the wheels to the left and maintain until the step is finished

Error: Calibration not allowed
Sensor not OK or wheels not straight

Out of Range

Step 2: Right mechanical limit
Turn the wheels to the right and maintain until the step is finished

Error: Calibration failed
Validate to restart calibration

Out of Range

Calibration OK

Error: Calibration failed
Validate to restart calibration

Calibration OK and data saved into EEPROM
Calibration data saved !

Error: Calibration data not saved into EEPROM
Validate to restart calibration

4.5. LOAD MANAGEMENT SYSTEM

The load management system (LMS) has as a function to detect the overload and inform the operator and prohibit certain movements.

For that, the jib cylinder of the machine is equipped with 1 angle transducer and 1 pressure transducer.
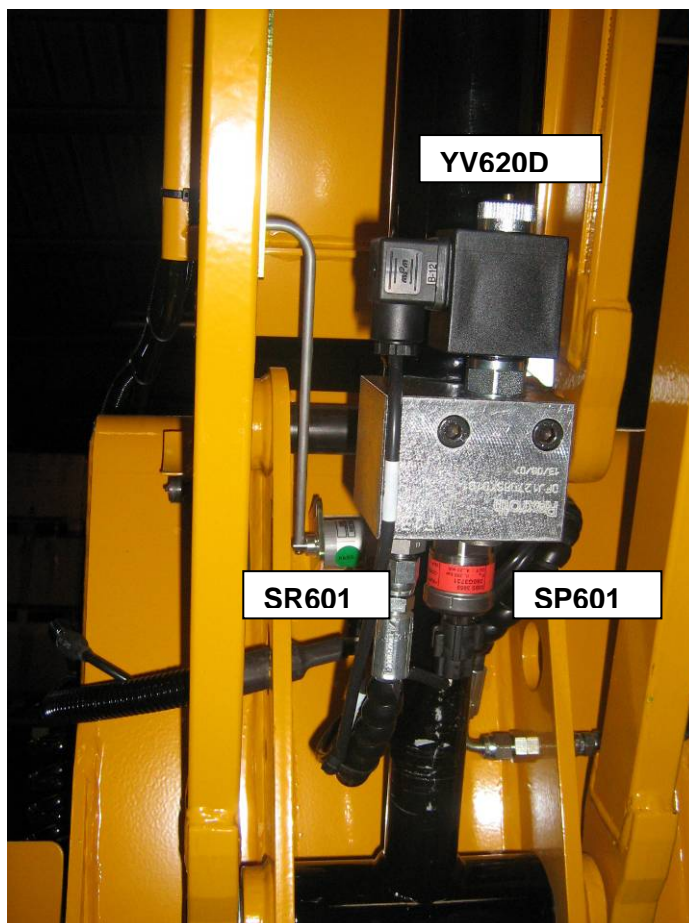
4.5.1. PRINCIPLE

The system uses two sensors:

- A pressure sensor who measures the pressure in the large chamber the jib cylinder (SP601)
- A relative angle sensor who measures the angle between the jib and the higher part of the mast (SR601)

The ECU module compares the current resulting pressure with the maximum pressure authorized in the position given by the relative angle sensor.

In the event of overload , ,it informs the variator of the machine.

The variator machine manages the actuators and forbid some movement.

The authorized maximum pressure is determined by a calibration carried out in factory, or during maintenance routine check.

One jib cycle with slightly raised nominal load carries out.

Several stops are automatically carried out, during which the BPE board records the angle and the static pressure.

The software limits the clearance of jib to its two strokes so that the cylinder never reaches the mechanical full lock

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The Load Management system must be calibrated when the variator COMBIACX has been changed or when any component linked to Load Management System has been changed
Machine must be in stowed position and on flat surface

Load Management System

Load platform with 220 kg
Machine Folded (jib under 0° and mast folded)

VAR[Tilt] = 1**|** VAR[Machine Unfolded] = 1 | VAR[ControlBox] = LCB

Descend the jib and maintain the control until the low stop is detected. Then release the switch

Error: Calibration not allowed
Machine tilted

Error: Calibration not allowed
Machine unfolded

Error: LCB not selected

Correct low position

Step 2: High Stop detection
Raise the jib and maintain the control until the low stop is detected. Then release the switch

Error: Calibration failed
Validate to restart calibration

Out of Range

Correct high position

Out of Range

Step 3: Return to the low position

Error: Calibration failed
Validate to restart calibration

Low angle   **USA**

Step 4: Recording static points
Raise the jib and maintain the control until the jib reaches its maximum position

If one point is out of range   Command not maintained

All the points are correct

Calibration OK

Error: Calibration failed
Validate to restart calibration
(out of range)

Error: Calibration failed
Validate to restart calibration
(Command not maintained)

Calibration OK and data saved into EEPROM
Calibration data saved !

Error: Calibration data not saved into EEPROM
Validate to restart calibration

4.6. PARAMETER SETTINGS

FUNCTION	STAR 8 EUR	STAR 22 US	STAR 10EUR	STAR 26 US
High drive speed value (travel speed for machine)	5 km/h	5 km/h	5 km/h	5 km/h
Maximum freewheel speed during towed operation	5 km/h	5 km/h	5 km/h	5 km/h
Mast rising	28s	28s	32	32
Mast lowering	38s	38s	34	34
Jib rising	27s	27s	27s	27s
Jib lowering	25s	25s	25s	25s
Time to reach maximum height	59s	59s	63s	63s
Time to lower stowed height	64s	64s	60s	60s
Continuous turret rotation time	60s/180°	60s/180°	60s/180°	60s/180°
Steering lock to lock	4s	4s	4s	4s

4.7. PRESSURES

4.7.1. TABLE OF THE PRESSURES

Values to be checked with maximum load (according to model) but not at full stroke

Designation	in Bars
Main pressure	130 +-5
Mast lifting pressure	130 +-5
Turret slewing pressure	50 +-5
Jib lifting pressure	130 +-5
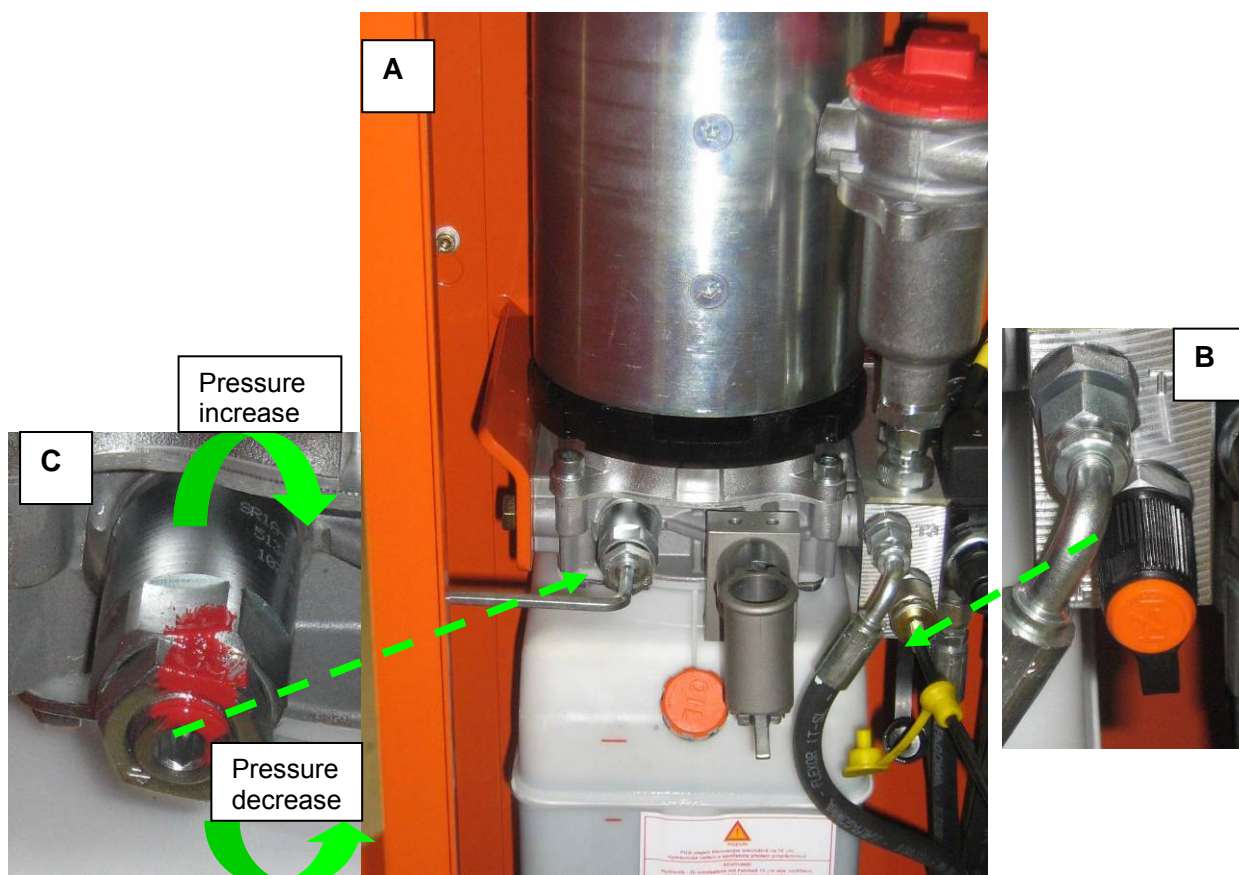
- **Process**

- disconnect YV520 (jib valve)
- put 200 kg/441lbs on basket
- loose the counter nut and insert the Allen wrench as shown on photo A.
- remove the cap and fit the pressure gauge as shown on photo B
- from lower controls , move the jib continuously
- set the pressure at 130 bars by turning CW or CCW .the Allen screw
- once it's OK , tight the counter nut and point it with red paint (see photo C)
- remove the pressure gauge and put back the cap.
- connect the valve YV520 (and remove the load)

5. BREAKDOWN SERVICE GUIDE

This help guide will give a logical step of breakdown to the technician, detailing the successive step to be followed, starting from main points until the particular point.
The checking of the electric part is carried out in priority compared to the hydraulics part because it is less sensitive to the external parameters being able to influence the diagnosis (temperature, pollution, viscosity…).
The functions described below implies both ways (ie mast lift/down)
All fuses have been checked and no alarm displayed on LCB Activ' screen

5.1.   NO POWER

- Discharged or defective batteries
- Contactor SB801
- Relay KAH

5.2.   NO MOVEMENT (BOTH CONTROLS)

- Relay battery charger KM900
- Relay KAH2
- Defective Variators (COMBIACX or ACEX) or not loaded with the compatible version between theses modules and Activ 'screen
- Machine not set correctly
- Discharged or defective batteries (drive OK)
- Defective pump M
- Main relief valve not adjusted at the correct value
- Proximity sensors for chain SQ801/SQ802 if machine unfolded

5.3.   NO MOVEMENTS FROM UPPER CONTROLS

- Emergency stop SB802
- Control box selection SA901
- Joysticks SM901/SM902 defective or out of range
- Foot pedal switch SB800 (US only)
- Slope sensor SQ800 (except US)
- Machine in overload (calibration or transducers SR601/SP601 out of range)
- CAN Tiller board
- Defective cables

5.4.   NO MOVEMENTS FROM LOWER CONTROLS

- Emergency stop SB801
- Control box selection SA901
- Defective variator

5.5.   NO MAST FUNCTION

- Button for movement validation SA500
- Limit switches SQ530/SQ534
- Defective variator
- Actuators YV520U/D

5.6. NO JIB FUNCTION

- Button for movement validation SA600
- Defective variator
- Actuators YV620U/D

5.7. NO MAST ROTATION

- Button for movement validation SA200
- Joysticks SM902 defective or out of range
- Defective variator
- Actuators YV250L/R

5.8. NO DRIVE

- Proximity sensors for chain SQ801/SQ802
- Defective variator
- Defective cabling/connections
- Electromagnetic brakes YB100/YB101
- Defective speed sensors SV300/SV301
- Defective temperature sensors ST302/ST303
- Defective motors M370/M371

5.9. NO STEERING

- Rocker of joystick SM901 is defective or out of range
- Adjustment of steering potentiometer SR150
- Actuators YV150L/R

5.10. NO TURRET ROTATION FROM LOWER CONTROLS

- Defective cables
- Defective SB7
- Defective SQ10
- Defective variator
- Electrovalve YV250L/R

5.11. NO DRIVE

- Defective cables
- Defective selector
- Defective joystick SM901
- Defective foot switch (pedal)
- Defective CAN tiller card
- Defective variator

5.12. MICROSPEED ONLY

- Defective cables
- Defective variator
- Badly adjusted or defective SQ534
- Badly adjusted or defective SQ

5.13.   <u>NO STEERING</u>

- Defective cables
- Defective selector
- Defective joystick SM901
- Defective foot switch (pedal)
- Defective variator
- Electrovalve YV150L/R

6. SUMMARY OF THE STAR VERSIONS

STAR 8 /10 – STAR 22/26J with Activ'screen		Wiring diagram	Hydraulic diagram
	All countries	4000133730	4000278470

STAR 8 /10P – STAR 22/26J		Wiring diagram	Hydraulic diagram
Version without Load Management System	All countries	E 555 A	B16457
Version with Load Management System (BPE) (starting from May 2003)	All countries	E 555 B	P23343C

STAR 8 /10NG – STAR 22/26J		Wiring diagram	Hydraulic diagram
Version with Load Management System (BPE)	EC+AUS	E 621	P23343F
Version with Load Management System (BPE) and ASB (Activ' Shield Bar)	EC+AUS	E621G	P23343F
Version without Load Management System	USA	E 621 / 155P287090	P23343F

STAR 9/11/12		Wiring diagram	Hydraulic diagram
Star 9	EC	E 597	B16367
Star 11 - 12	EC	E 597	B16367

7. SPECIAL FUNCTIONS

7.1.   STEERING POTENTIOMETER

Overview of the system
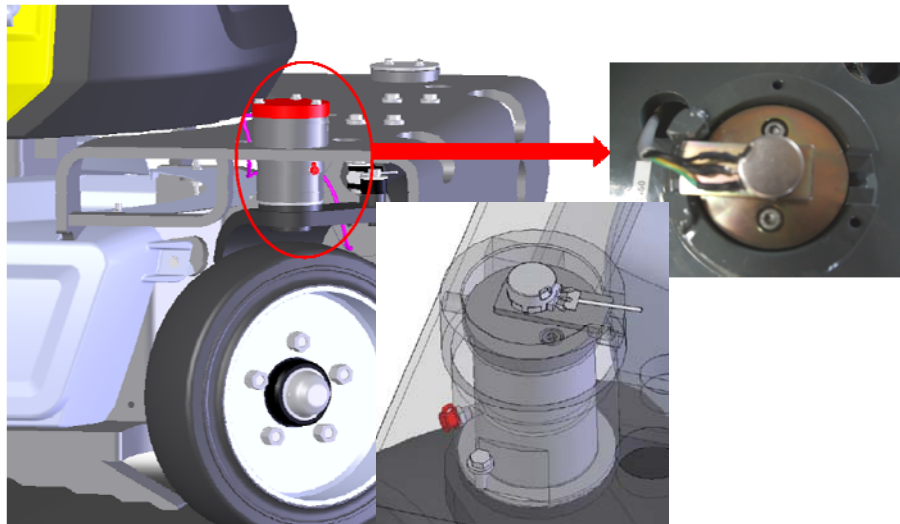
Procedure to install the steering device
Take the part and fit it inside the chassis

Fit the potentiometer on the bracket as shown below (wrench of Ø 13 mm)
(Check that the 2 CHC screws Ø6x 16 are well tight)

Then preset the potentiometer so in order to have "steer angle" at 0° on Activ' screen display
Once done the steering calibration must be done see chapter "Steering calibration"

7.2. ANGLE SENSOR

In case of replacement of this transducer, the adjustment must be done as follow:

Power supply	5 to 30	Vdc
Maximum angle measured	270	degrees
Linearity	± 2.0%	FS
Max power draw	0,18	W
Resistance	5	kΩ

Put the jib in horizontal position and install the sensor as follow

Adjust its position in order that the rod is inside its guide

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7.3.   PRESSURE TRANSDUCER

In case of replacement of this transducer, the new item must be fitted and tight with a torque wrench (30-35Nm)

7.4.   PROXIMITY SENSORS FOR MAST CHAIN

The proximity sensors SQ801/SQ802 detect the tension of the chains inside the mast sections
They are located at the foot of the mast as shown below
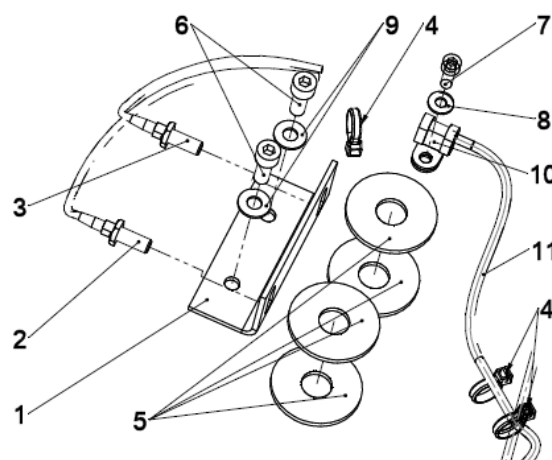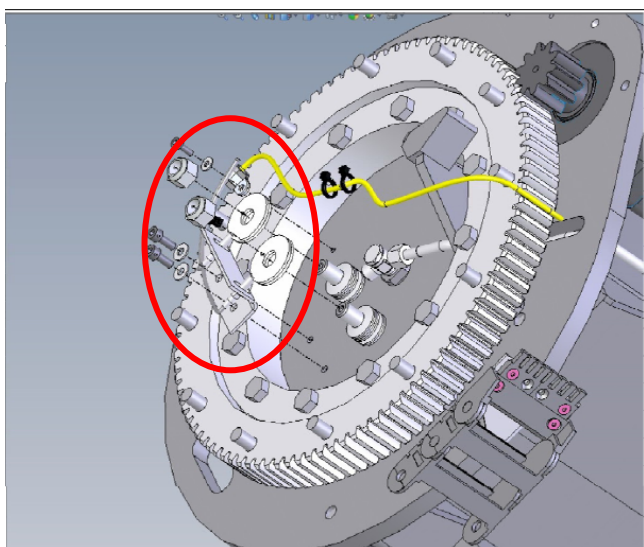
Procedure :
For the adjustment, it's necessary to lift the whole machine (crane/slings of 2.5Tons /5500lbs) or put machine on an inspection pit in order to have an easy access to the sensors

- With a wooden hammer , fit the 2 filet rods at full lock of the Ø20 hole (see below)
- Set the sensors' gap at 5mm
- With the hammer , slightly push in the opposite way in order to center the rods until getting a gap of around 3mm.

Pay attention : when mounting the sensors ,put them in the higher position sot they will detect the washers and not the nuts.

If the chain is broken , the chain's rod will fall down by gravity and the washers will not be detected
Failure F07.02 on display
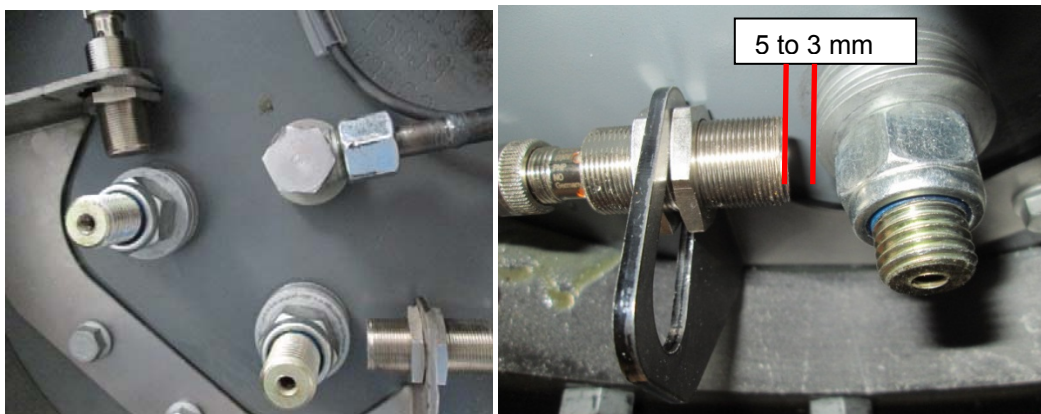
7.5.   EMERGENCY SYSTEMS

1- For turret /steering : fit the bar in its location, press the push button valve in order to activate the desired movement and pump using the lever (as shown below)
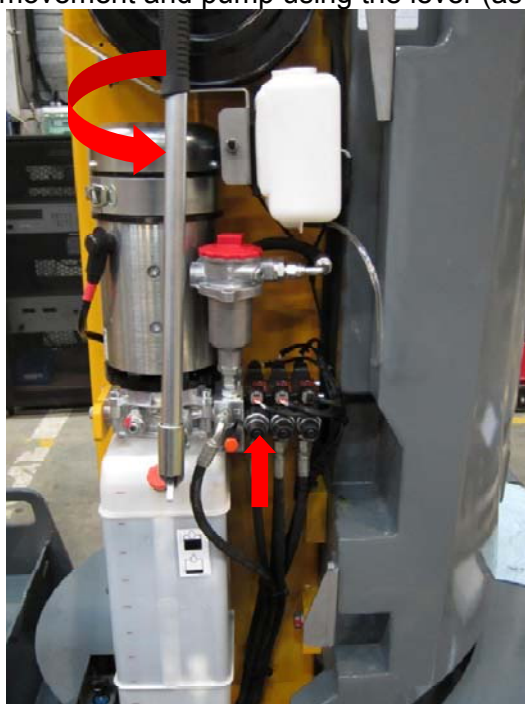
2- For mast descent , pull the knob (as shown below)

3- For jib descent , use a screwdriver and push the spool in the center as shown below:

7.6.   BRAKE RELEASE FUNCTION

The electro magnetic brakes are at negative excitation (remains stuck if not energised or by lack of current)

In case of necessity, it's possible to release the brakes

- either electrically using the toggle switch SA103 on turret (or the remote control pushbutton SB100 in option)

- either mechanically by following the procedure described below

MANUAL RELEASE HOLES

M1

B1
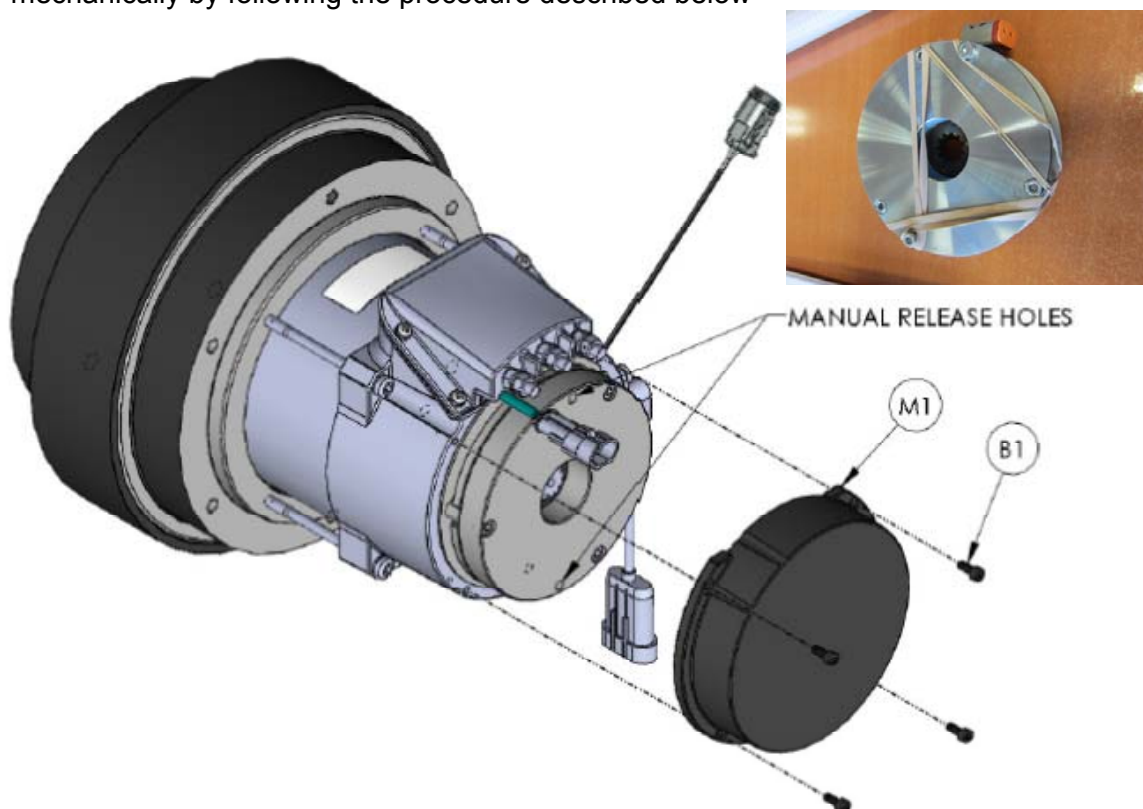
NOTE: In the event of a power loss to the Torque-Hub®, the parking brake will engage as a safety precaution. Should the unit need to be towed or pushed to an area where it can be serviced or recharged the operator will need to manually disengage the parking brakes. The following procedure outlines how this is to be done.

CAUTION: If the machine is on any incline, the wheels must be adequately blocked prior to manually disengaging the brakes. Failure to do so may result in injury or even death.

1. Make sure the E-stop plunger is pushed in and the key is removed from the ignition Switch.

2. Remove the Back Cover Bolts (B1).

3. Remove the Brake Cover (M1).

4. Insert two M5x0.8x20 mm bolts into the two Manual Release holes in the brake housing.

5. Tighten down bolts and the brake will disengage.

6. Repeat this procedure for the other wheel drive.

CAUTION: The disengage bolts must be removed from the brake housing after the machine is towed or pushed to its servicing location. The brakes cannot be engaged with the disengage Screws in the brake housing. This will cause the machine to roll when parked on an incline.

7.7. MAST ADJUSTMENT

- **STEP 1 Pads adjustment on mast section**
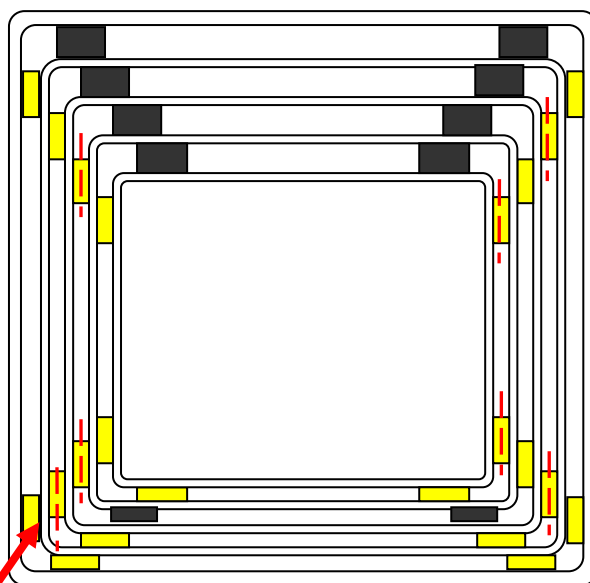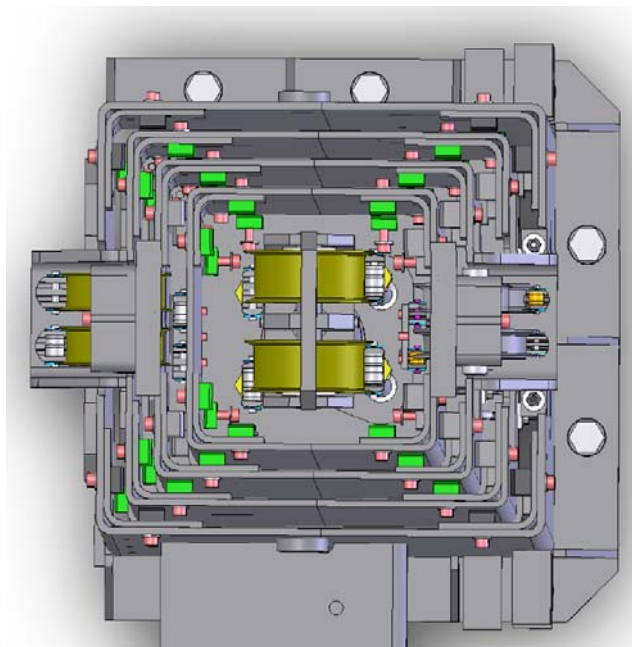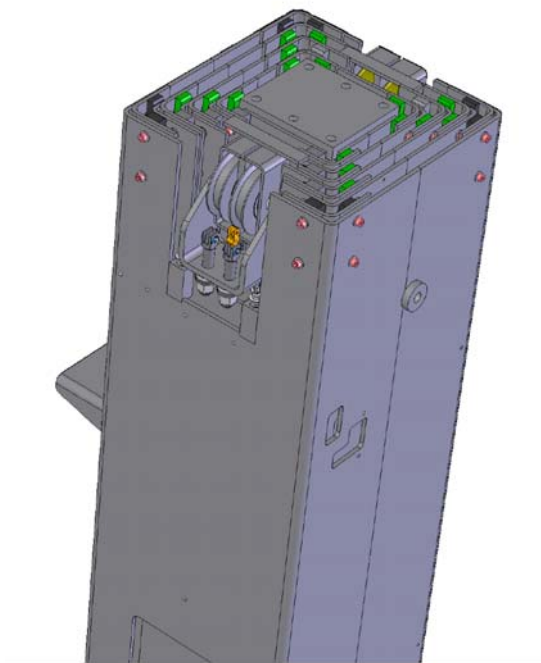
Lateral pads adjustment
(functional gap 1 mm)
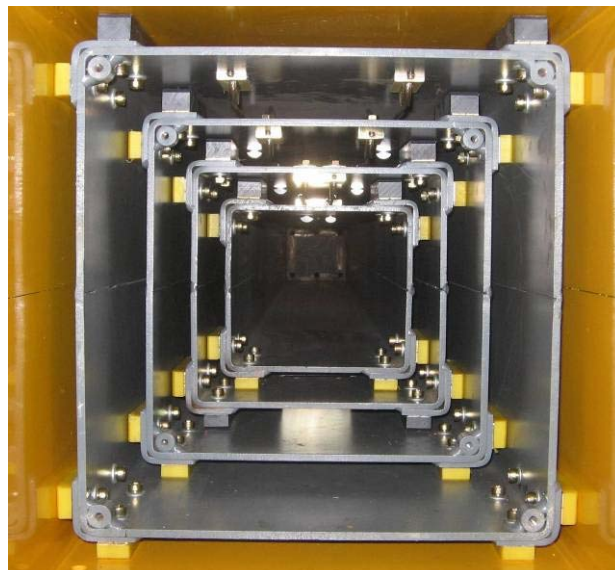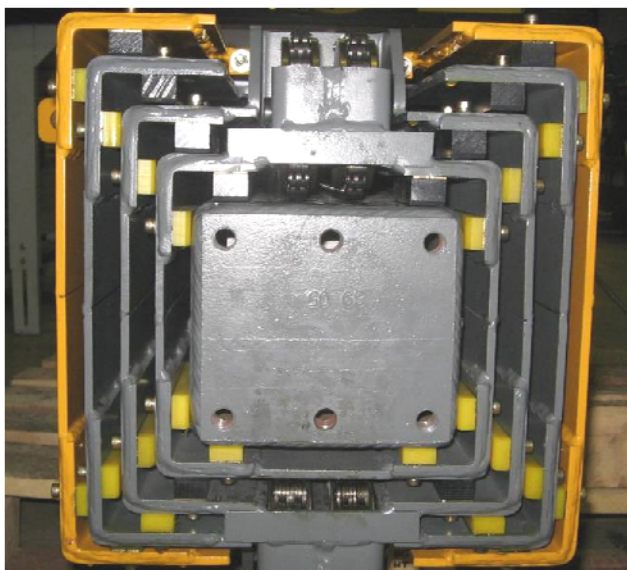
- **STEP2 : synchronisation of mast section**

The system is based with steel rope, pulley + chains

All mast's section should be entered by holding the steel rope then adjust them as follow

16.5 mm filet

17mm filet
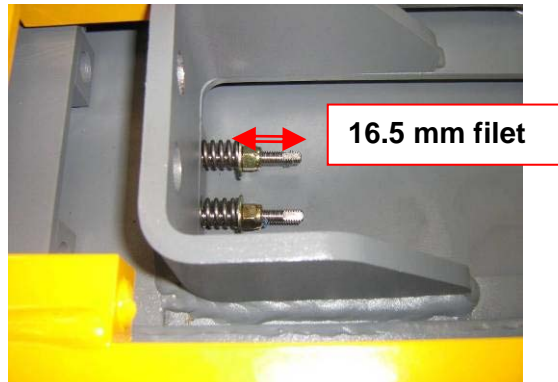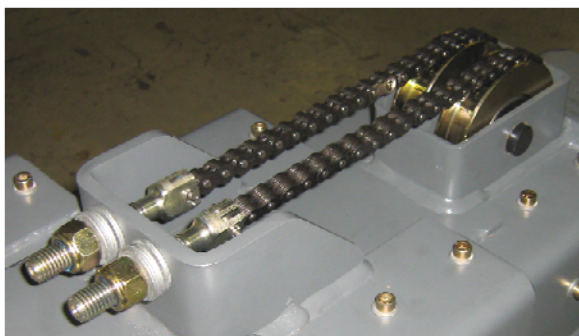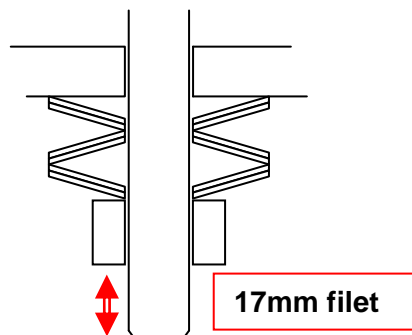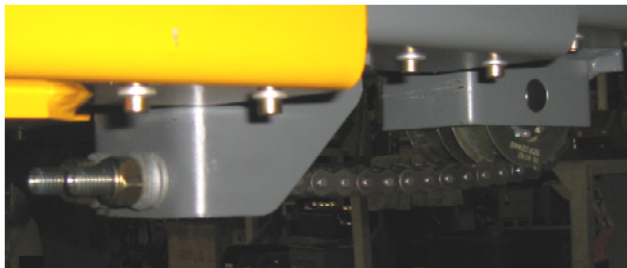
Washers mounted in opposing

Once mounted push all mast sections

Step 3 Chains and ropes adjustment

Lift the mast until the tube section 1 is above 300 ± 2mm from mast foot

For the other tubes section 2nd / 3rd and 4th, adjust at 300mm/300mm and 306 mm by screwing (up) or unscrewing (down) the nuts of the clevis of the chain
Adjust the chains of the tube section 2 for adjusting the height of the tube section 3 and adjust the chain of tube 3 for adjusting the height of tube 4

Then lower the mast until the tube section are out of 100 ± 20 mm

Then remove the left chain in order to have access to the rope then adjust them (6 for Star 10) ,the gap must be 2 mm
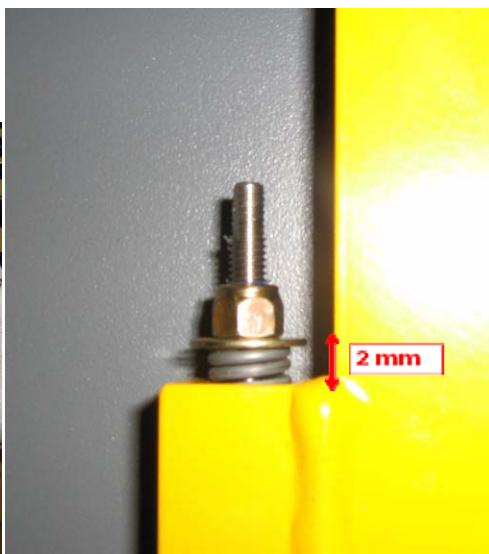
Put back the chain and check that there is neither tension nor noise by lifting/lowering the mast several times
Check that with full load that all mast section are synchronised without any noise

- **Final checkings**

Thanks to the different inspection hatches, it's possible to see if there is no misalignment or any others visual discrepancies

TRAINING MANUAL
4000365480

STAR 8(22J)/Star 10(26J)
E05-15
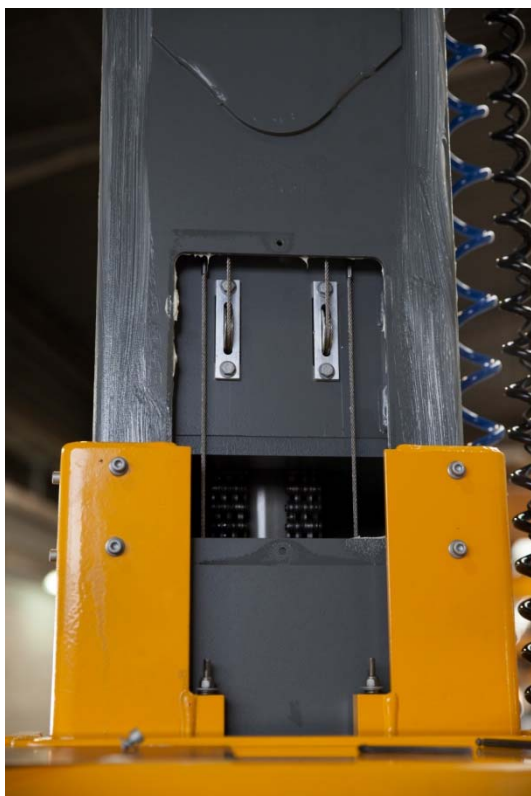
8. LIST OF SCHEMATICS

See below all schematics (electric/hydraulic) of the studied model

8.1. HYDRAULIC FUNCTIONS

JIB – MAST FUNCTIONS

MAST LIFT
(levage mât)
60/40 S1260

JIB LIFT : YV620U + YV620D
JIB DESCENT : YV620D
MAST LIFT : YV520U
MAST DESCENT : YV520D

JIB LIFT
(levage pendulaire)
60/40 S495

Pressure sensor
(capteur pression)

Rigid pipe
(tuyauterie rigide)

Hold the load of
the mast
cylinder

Hose drum
(enrouleur)

PUMP TANK

TRAINING MANUAL   **STAR 8(22J)/Star 10(26J)**
4000365480   **E05-15**

ELECTRIC SCHEMATICS 1/3

ELECTRIC SCHEMATICS 3/3

220V - 110V

KM900
Chargeur

FU3 10A
104
KM900
01-6
98
98
CN01 7

Key position Selector
133 → 02-3 Basket sel
113
T • B
SA901
135 → 02-3 Turret sel
CN01 3

98
CN03
Diag connector
A 98
B
G
F

D KAH
hold rel ECU
KAH
01-5

FU5 10A
D1 KAH2
hold rel screen

SB801
01-13

SB801
01-13

SB801
01-13

L1
L3

SA911
136
M900
Watering pump

02
KAH2
01-10
02 → 03-15 ES platform in
Basket Emergency Stop
114 D2 K A
109 → 03-14 ES platform out
01-7

109 ES sig+all supply → 02-1
CN01 6 109

SB801

02-1
ecu Main Contactor LS Output
L1/L3 opening

CN01 9
CN01 10
CN01 11

X2.4 SUPPLY X2.7 CAN_L X2.8 CAN_H
ACTIV SCREEN
X2.3 AU_info
S_REL X2.6 GND X2.1

CN01 8 CN01 12

1001
1002

02-11
02-12
03-17
03-16
1001

118

115 ecu LS output
114 Vhold/Supply of ecu
114 → 01-10

101
0

02-1
02-9

1
1
1
1

VAccess 107 → 03-3
FU4 10A
103 FU2 10A
VYV → 02-1

GB1

+BF U2
FU1A 165A
+B
ACEX
B-

A2
M Pump
A1
-P
B- U1
+BF
FU1C 350A
+B
COMBIAX

KA1 02-17
184 Klaxon/horn
HA907

KA2 02-3
32
EL901 CNO 8
feu à éclat/flashing light
OPTION

Gnd access
00 → 03-2
Bridge

02-1

MODIF	IND	DATE	MODIFICATION	VISA
LDF	F	07/04/2015	KAH before KM900. M900 after KM900	ITR
LDF	E	26/03/2015	suppression SQ620	ITR
LDF	D	20/03/2015	sup diode D3	ITR
LDF	C	09/02/2015	1k ohm on A.9	ITR

NBRE TOTAL DE FOLIOS 03
4000133730 01

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20

01-22   OPTION   OPTION   03-21

01-17   109   109   09-10   02

SQ800   SA620   SQ530 SQ534   02-21   103   SA103   SB100   CNO   SQ801   SQ802   ST903   SA907T   SA250   SA520

01-15   CNO1 CNO1   01-22   01-22   R120   SR150

Montée pendulaire / Jib up
Descente pendulaire / Jib down
Mat teles rentré / Mast teles detector in 1
Mat sorti / Mast teles detector out
Dévers 3° / Tilt sensor 3°
déreinage / Brake reease
Mou de chaine 1 / Chain strard 1
Mou de chaine 2 / Chain strard 2
Capteur temp Ukraine / Ukraine temp sensor
Klaxon poste bas / Horn LCB
Orientation gauche / Orientation left
Orientation droite / Right orientation
Montée mat / Mast up
Descente mat / Mast down

CXA.10 GND | CXC.3 GND | CXA.12 E_TOR | CXC.2 E_TOR | CXC.7 E_TOR | CXA.4 E_TOR | CXB.4 E_TOR | CXA.6 E_TOR | CXA.13 E_TOR | CXA.11 E_TOR | CXA.5 E_TOR | CXB.8 E_TOR | CXC.1 +24 KEY | CXB.2 +24 YV | CXC.10 CAN_L | CXC.5 CAN_H

AXC.10 CAN_L | AXC.5 CAN_H | AXB.2 +24 YV | AXC.1 +24 KEY | AXC.8 PPOT_12V | AXC.4 SIGNAL | AXC.3 NPOT | AXC.2 E_TOR | AXB.8 E_TOR | AXA.4 E_TOR | AXC.7 E_TOR | AXB.4 E_TOR | AXA.12 E_TOR | AXA.6 E_TOR | AXA.11 E_TOR | AXA.5 E_TOR | AXA.10 GND

Angle roues
Wheels angle

Platform selection
Turret selection
ES info

COMBI-ACEX

ACEX

temp moteur analog. / engine temp analog.
vitesse moteur / engine speed
Frein / Brake
Frein / Brake
vitesse moteur / engine speed
temp moteur analog. / engine temp analog.

OPTION

PPOT_12V CXC.8 | MC_LS CXB.6 | LS_HORN CXB.7 | PWM_LS PWM.3 | LS_3 CXA.1 | LS_4 CXA.8 | LS_5 CXA.2 | LS_6 CXA.9 | U. | V. | W. | P_TH CXD.3 | N_TH CXD.6 | P_ENC CXD.2 | ENC_B CXD.4 | ENC_A CXD.1 | N_ENC CXD.5 | P_EB CXB.1 | N_EB CXB.5

N_EB AXB.5 | P_EB AXB.1 | P_ENC AXD.2 | ENC_B AXD.4 | ENC_A AXD.1 | N_ENC AXD.5 | P_TH AXD.3 | N_TH AXD.6 | U. | V. | W. | LS_HORN AXB.7 | LS_LED AXA.9 | PWM_LS AXB.3 | LS_5 AXA.2 | LS_4 AXA.8 | LS_3 AXA.1 | LS_TOR AXB.6

12 VOLTS
Commande relais AU chassis / ES frame relay command
Commande maintient / Holding relay
relais Feu à éclat / Flashing light relay
Direction droite / Steering right
Direction gauche / Steering left
Montée pendulaire / Jib up
Bruiteur / Buzzer

M 3~ M370
ST302
SV300
YB100
YB101
SV301
ST303
M 3~ M371

Commande klaxon / Horn command
Rentrée mat / Mast teles in
Sortie mat / Mast teles out
Orientation gauche / Orientation left
Orientation droite / Orientation right

KA2
YV150R (YV1a)
YV620U (YV3a)
HA901
YV150L (YV1b)
KA1
YV520D (YV4)
YV520U (YV3b)
YV250L (YV2a)
YV250R (YV2b)

412   03-18
01-13   84
01-5   115
01-17   103   103   103   02-10

01-14   01-12

OPTION

OPTION

(12V)
03-18

109

109

CNAC
7

CNAC
6

SM902

G

CNB01
9

SM901   13   16   4

CNB01
2

SP601

AB

SB900

O5   O5

51

CNB01
4

51

SR601

SA907 SA102 SA500 SA600 SA200

SB800

CNAC
5

CNAC
2

R1
1k ohm

E   F
O5

D   C   B
51   51

CNB01
5

10   9

14   1
75   75   75

6   3   5

34   85   76   78   77

CNAC
1

91a

79

CNB01
11

90   91

52   39   51   81   918   73   74   35   36   37

RAZ écrasement / Reset crushing
RAZ écrasement / Reset crushing
Hors neutre gauche / Null position left
Hors neutre droit / Null position right
Orientation tourelle / turntable orientation
Angle / Angle
Translation/levage / Driving/lifting
Hors neutre AV/montée / Null position FW/up
Hors neutre AR/descrcet / Null position REV Down
Direction gauche / Left steering
Direction droite / Right steering
Homme mort / Dead man
Klaxon / Horn
Sel translation / Driving sel
Sel mat / Mast sel
Sel pendulaire / Jib sel
Validation orientation / Orientation Validation
Pression / Pressure

| A.4 | A.9 | B.2 | A.6 | A.1 | A.2 | A.8 | A.7 | A.10 | A.3 | B.5 | B.8 | B.3 | B.1 | C.1 | B.4 | B.13 | B.9 | B.12 | B.11 | B.10 | A.5 |
| E_TOR | EANA_4,20mA | E_TOR | GND | EANA_0,5V | ALIM_5V | EANA_0,5V | ALIM_5V | EANA_0÷6V | GND | E_TOR | E_TOR | E_TOR | E_TOR | ALIM_24V | E_TOR | E_TOR | E_TOR | E_TOR | E_TOR | E_TOR | EANA_4,20mA |

CAN TILLER

R120

U4

| STOR_LS | STOR_LS | STOR_LS | STOR_LS | STOR_LS | STOR_LS | STOR_LS | STOR_LS | STOR_LS | STOR_LS | CAN_L | CAN_H | GND_ |
| E.5 | E.3 | E.10 | F.5 | F.4 | F.1 | F.3 | E.6 | E.7 | F.2 | C.4 | C.6 | C.2 |

Phare travail / Working light

Option active / Option active

93   CNAC 4   92

HL901

CNAC
3
B609

HL902   EL905

KAC
03-4   KAC

Écrasement / Crushing
Écrasement / Crushing

SA904

EL904

CNB01 10
82

YV620

CNB01 3

43   42   44   45   46   94   95

HL903 HL904 HL802 HL800 HL100 HL500 HL600

montée/descente pendul. / Jib up and down
Défauts / Alarm
décharge batterie / Battery discharge
Surcharge / Overload
Dévers / Tilt
Sel translation / Driving selection
selection mat / mast selection
selection pendulaire / jib selection

A.U / E.S plateform
SB802

02

1002

03-20

(12V)

134

CNB02 7   CNB02 8

CNB02 1   CNB02 3   CNB02 5   6 CNB02   CNB02 2   CNB02 4

WIRE 6   WIRE 51   WIRE 1   109   WIRE 3   02   WIRE BLUE   1001   1002   WIRE RED   WIRE 2   412   WIRE 4

01-19   01-17   01-16   01-16   01-22   01-22   02-1   02-21

| DESSINE PAR | I TRONCY | DATE DE CREATION | 05/09/2013 | 4000133730 BASKET STAR 10 AC | MODIF | IND | DATE | MODIFICATION | VISA | NBRE TOTAL DE FOLIOS 03 |
| VERIFIE PAR | L. DIFLORIO | DATE DE VERIFICATION | | F | | | | | | 4000133730   03 |

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Haulotte SERVICES

MAST LIFT
(levage mât)
60/40 S1260

JIB LIFT
(levage pendulaire)
60/40 S495

Pressure sensor
(capteur pression)

Ø1,2

YV620D

G1/4

G1/4

Hose drum
(enrouleur)

Rigid pipe
(tuyauterie rigide)

5b

Ø1,4

0,5b

YV520D

G1/4

A
G1/4

B
G1/4

YV620U   YV520U

A
G1/4

B
G1/4

YV250R   YV250L

G3/8   G3/8   G3/8

50b   50b

A
G1/4

B
G1/4

YV150D   YV150L

2,5b

STEERING
(direction)
50/30 S180

G3/8   G3/8

315
cc

TURRET ROTATION
(rotation tourelle)

T1
G3/8

T2
G3/8

T3
G1/4

MOTOR
3000W - 24VDC

M

130b

3.6 cc   6 cc

7,5L

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Ech./Scale SANS	Dessiné par/Drawn by COGNET	Vérifié par/Checked by DI FLORIO	Code projet Project code	Date 30-06-2014	Folio 1/1
GROUPE/GROUP HYDRAULIQUE STAR 8-10			Haulotte		
DESIGNATION SCHEMA HYDRAULIQUE HYDRAULIC DIAGRAM			A2 Format	4000278470 Numéro/Number	A Indice Version