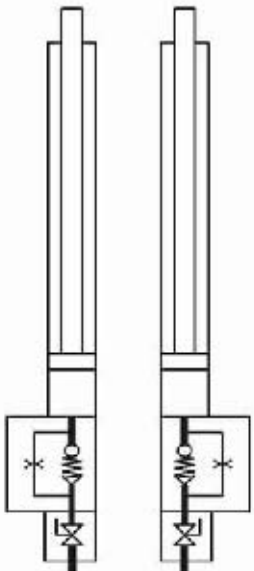
ELECTRIC SYSTEM

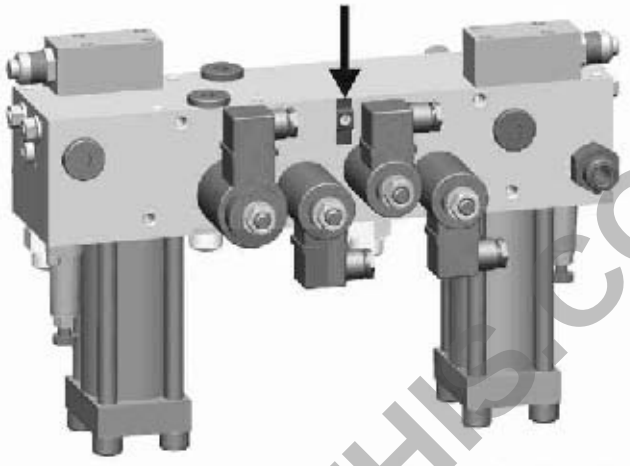
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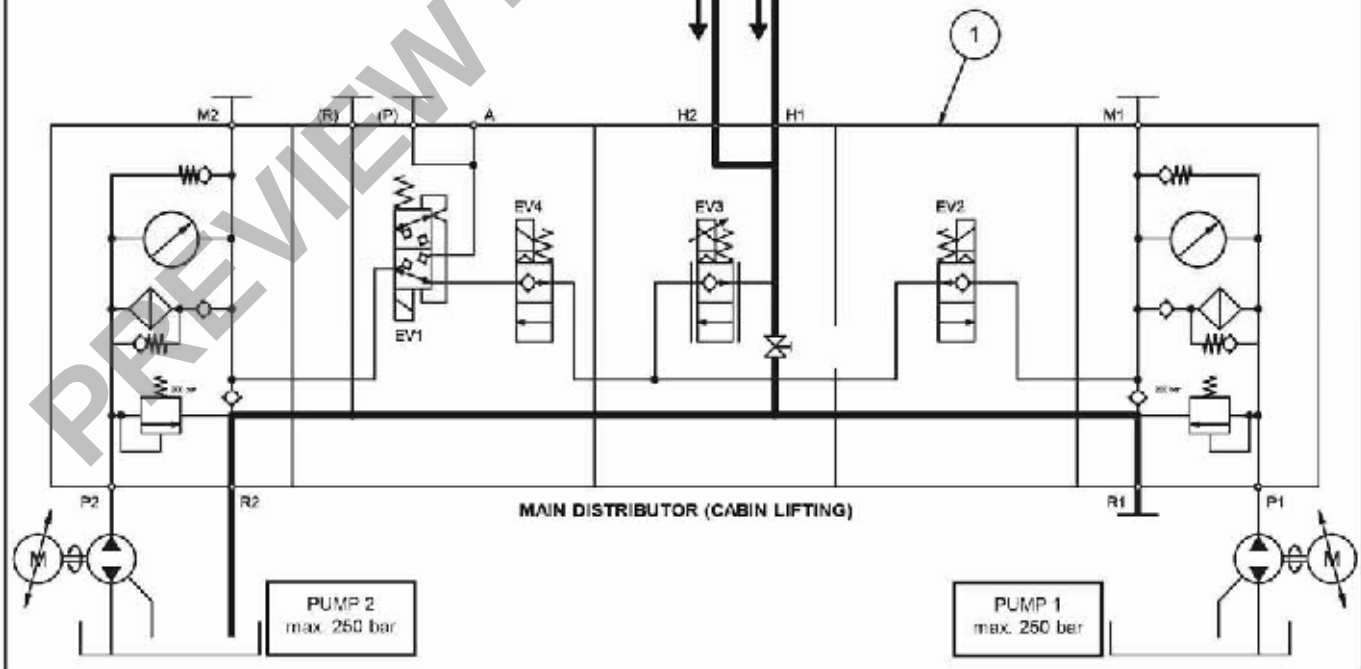
4.08 FUNCTIONAL DIAGRAM OF CABIN LOWERING IN CASE OF EMERGENCY BECAUSE OF NO VOLTAGE





The motor compartment valve unit is issued with a 5 mm Allen wrench.

Use the wrench carefully to unloose the valve indicated by the arrow and open so that the cabin lowers at reduced speed. When the cabin is lowered, close the valve.



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- When welding operations are carried out, it is necessary to use proper accident-prevention protections: protective glasses, helmet, overalls, safety shoes. The protective glasses must be worn also by the people who do not carry out the works if they stay near a welding area.
- Before using the batteries, make sure that the cables are connected to the terminals as described: (+) with (+) and (-) with (-).
- Do not short-circuit the terminals.
- The gas emanated during a recharge is higly flammable. During the recharge of the battery leave the battery compartment uncovered in order to use a more efficient ventilation and remove the plugs.
- Do not check the condition of the battery charge by means of "jumpers" obtained by placing metal objects on the terminals.
- Before any intervention check if there are no short-circuit elements.
- Disconnect the batteries before acting on the electric system.
- For the battery chargers and similar equipment, use only auxiliary electric power supply sources in order to avoid any electric shocks.
- A fluid passing through a very small hole can be almost invisible but strong enough to penetrate into the skin; in these cases check the fluid by means of a card or a piece of wood.
- To chek the pressure of the plant use the proper devices.

BANDS, ROPES AND HANGING ROPES: SUGGESTIONS FOR THE USE

- Register all used hanging ropes, whose features and data are shown on the identification plate.
- Do not use bands, ropes or hanging ropes, whose identification plate has been lost.
- Always use bands, ropes or hanging ropes of proper dimensions. As far as the hanging ropes are concerned, take into consideration the lifting angle and the unbalance of the load.
- The hooks of the hanging ropes must have a proper size according to the hook of the bridge crane and they must move freely.
- Position the load in the hook mouth.
- Do not place the load on the point of the hook.
- During lifting, do not carry out sudden operations that could tear the ropes and the bands.
- Do not carry out lifting operations with twisted ropes and bands.
- Knots are forbidden.
- Always protect the ropes and the bands when they are near sharp edges.
- During the movements without load in order to avoid unintentional collisions or hooking, fasten the hooks to the proper seats and lock them.

Use of hanging ropes with unbalanced load

If unbalanced loads must be lifted it is advisable to reduce the carrying capacity of the hanging ropes:

- Slings with 2 arms, consider them as the slings with 1 arm.
- Slings with 3 and 4 arms, consider them as the slings with 2 arms.

Suggestions for maintenance

Check the bands, the ropes and the hanging ropes according to the law in force in order to determine their working conditions.

Carry out the replacement in the following cases:

- When the components are deformed, cut or when there are cracks, hollows, notches or abrasions on them.
- When the wear of the components is higher than 10% of the initial dimensions.
- When the sling is overloaded.

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CORRECT METHOD TO APPLY THE FEMALE CONNECTORS

To ensure an optimum connection between the female connectors and the adapters mentioned in this manual, it is necessary to carry out the following procedure, which is different from the one for the assembly of the rigid pipes.

Female connectors without gasket (metal/metal connection)

Screw the nut manually and then tigthen 1/4 turn by means of a wrench

Female connectors with O-RING

Screw the nut manually and then tighten 1/4 turn by means of a wrench.

In any case make sure that the pipe is correctly aligned before tightening the nut to the adapter.

DRIVING TORQUES



ROTARY METRIC FEMALE CONNECTOR

Thread UNF	External diameter of the pipe	Driving torque Nm	
		Nominal torque	min. / max.
M 12x1,5	6	20	15 -25
M 14x1,5	8	38	30 - 45
M 16x1,5	8 10	45	38 - 52
M 18x1,5	10 12	51	43 - 65
M 20x1,5	12	58	50 - 65
M 22x1,5	14 15	74	60 - 88
M 24x1,5	16	74	60 - 88
M 26x1,5	18	105	85 - 125
M 30x2	20 22	135	115 - 155
M 36x2	25 28	166	140 - 192
M 42x2	30	240	210 - 270
M 45x2	35	290	255 - 325
M 52x2	38 42	330	280 - 380



ROTARY FEMALE CONNECTOR jic 37°

Thread UNF	Dimension	Driving torque Nm	
		Nominal torque	min. / max.
7/16-20	-4	15	9 - 21
1/2-20	-5	20	13 - 27
9/16-18	-6	30	18 - 42
3/4-16	-8	50	30 - 70
7/8-14	-10	69	44 - 94
1.1/16-12	-12	98	63 - 133
1.3/16-12	-14	118	73 - 163
1.5/16-12	-16	140	90 - 190
1.5/8-12	-20	210	135 - 285
1.7/8-12	-24	280	200 - 380
2.1/2-12	-32	450	300 - 600



ROTARY FEMALE CONNECTOR BSP

Thread UNF	Driving torque Nm	
	Nominal torque	max.
G1/4	20	15 - 25
G3/8	34	27 - 41
G1/2	60	42 - 76
G5/8	69	44 - 94
G3/4	115	95 - 135
G1	140	115 - 165
G1.1/4	210	140 - 280
G1.1/2	290	215 - 365
G2	400	300 - 500



ROTARY FEMALE CONNECTOR ORFS

Thread UNF	Dimension	Driving torque Nm	
		Nominal torque	max.
9/16-18	-4	14	16
11/16-16	-6	24	27
13/16-16	-8	43	47
1-14	-10	60	68
1.3/16-12	-12	90	95
1.3/16-12	-14	90	95
1.7/16-12	-16	125	135
1.11/16-12	-20	170	190
2-12	-24	200	225
2-1/2-20	-32	460	490

The values shown on the tables refer to the galvanized steel connectors. Different values correspond to connectors of different materials.

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4.00 SICOS FAULTS DIAGNOSTIC SYSTEM

4.01 SICOS ALARMS OVERVIEW

PROGRAMMER STRING	SICOS STRING	DESCRIPTION
EEPROM KO	CALL SERVICE	EEPROM content is not correct
EEPROM OFFLINE	CALL SERVICE	It is not possible read EEPROM
POWER FAILURE #1	CALL SERVICE	Short circuit on SICOS output G7,G8,G9
DRIVE INC. START	DRIVE INC. START	Traction speed request high at start-up
INCORRECT START	INCORRECT START	Traction direction request active at start-up or bad start sequence
FORW + BACK	CALL SERVICE	Forward and reverse request active together
HAND INC.START	HAND INC.START	The photocell / sensor does not detect the hand presence (only on "EUROPE" models)
CABIN INC. START	CABIN INC. START	Lift/lower cabin speed request high at start-up
FORKS INC. START	FORKS INC. START	Lift/lower fork speed request high at start-up
ROT INC. START	ROT INC. START	Fork rotation speed request high at start-up
TRANS INC. START	TRANS INC. START	Fork translation speed request high at start-up
CAN BUS KO EPS	CALL SERVICE	No can message from EPS AC controller
CAN BUS KO TR.	CALL SERVICE	No can message from traction controller
CHECK UP NEEDED	CALL SERVICE	Periodical maintenance required
FORK ENC. ERROR	CALL SERVICE	Error in fork height encoder
PASSWORD NEEDED	CALL SERVICE	It is necessary insert password
CAN BUS KO PU 1	CALL SERVICE	No can message from AC2 PUMP 1 controller
CAN BUS KO MHY 1	CALL SERVICE	No can message from MHYRIO 1 controller
CAN BUS KO JOY	CALL SERVICE	No can messages from joystick or cantiller
CAN BUS KO MHY 2	CALL SERVICE	No can message from MHYRIO 2 controller
CAN BUS KO MHY 3	CALL SERVICE	No can message from MHYRIO 3 controller
HGT ENC PROX FRK	CALL SERVICE	Input reset encoder forks always active
CAN BUS KO PU 2	CALL SERVICE	No can message from AC2 PUMP 2 controller
HEIGHT ENC.ERROR	CALL SERVICE	Error in cab height encoder
LIFT LIMIT	LIFT LIMIT	Cabin is in height block condition. Press bypass button to lift again
SLACK CHAIN	CALL SERVICE	Chain slack

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2.02 UNLOADING FROM THE CONTAINER

Necessary special tools



motorized power pallet truck



tow band or chain of proper length



800x200x200 mm (31.49x7.87x7.87in) wooden beam

Procedure



Before starting to work wear the proper accident prevention clothes.



Step 1

MOTORIZED POWER PALLET TRUCK

Remove the pallet where the attachment and the other components of the truck are positioned **(fig. 1-2)**. Remove the retainers from the load wheels and also the tie rods that fasten the truck to the container.

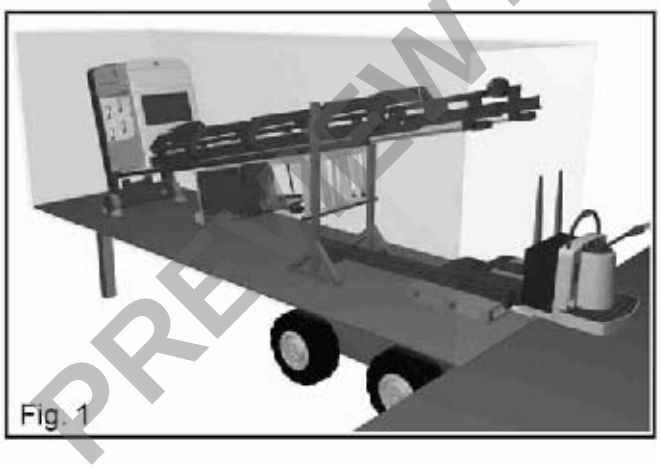


Fig. 1

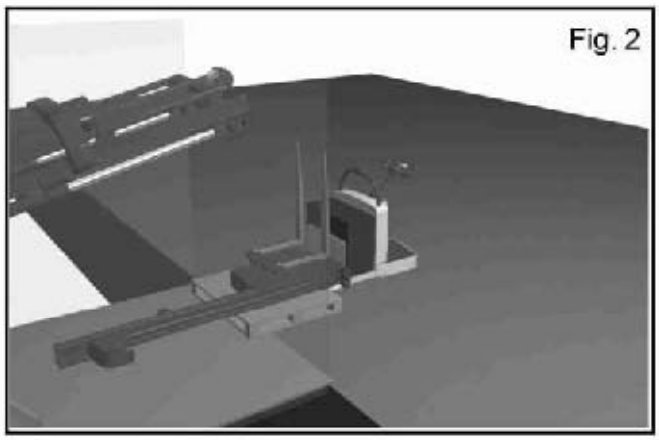


Fig. 2

Step 2

MOTORIZED POWER PALLET TRUCK - TOW BAND OR CHAIN - WOODEN BEAM

Position the wooden beam on the forks of the power pallet truck and insert the forks under the lower cross member of the supporting frame **(fig.3)**. Attach the tow band or the tow chain to the wooden beam **(ref. A fig.4)** and to the cross member located between the load wheels of the frame **(ref. B fig. 4)**. Be careful not to damage any devices or components that are located on the frame cross member (amplifier for electromagnetic brakes of the load wheels, wire guidance antenna).

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4.02 ANALYSIS AND TROUBLESHOOTING OF THE SICOS ALARMS

"Eeprom ko"

Cause:
The Checksum operation fails for an hardware or software defect of the non-volatile embedded memory supporting the controller parameters. This alarm does not inhibit the machine operations, but the truck will work with the default values.

Troubleshooting:
Carry out a CLEAR EEPROM operation. Switch the key off and on to check the result. If the alarm is always enabled, it is necessary to replace the controller. If the alarm disappears, the previously stored parameters are replaced by the default parameters.

"Eeprom offline"

Cause:
There is no communication between the microprocessor and the EEPROM because of an hardware or software defect of the non-volatile embedded memory supporting the controller parameters. This alarm does not inhibit the machine operations, but the truck will work with the default values.

Troubleshooting:
Carry out a CLEAR EEPROM operation. Switch the key off and on to check the result. If the alarm is always enabled permanently, it is necessary to replace the controller. If the alarm disappears, the previously stored parameters are replaced by the default parameters.

"Power failure#1"

Cause:
This alarm appears when there is a short circuit of one of the coils connected to outputs of the SICOS (Buzzer, G7 /Light WG Aut, G8 /Horn, G9). After the overload condition has been removed, the alarm disappears automatically by releasing and then enabling a travel demand.

Troubleshooting:
- If the fault arises at start up (no load driving is requested), the hardware overcurrent protection circuit may be damaged and the controller must be replaced.
- If the fault arises when the controller drives the load (immediately after a request), then the problem concerns the wiring and the coils.

"Drive inc. start"

Cause:
When the truck is started, the traction is required (the traction potentiometer value is different from zero).

Troubleshooting:
- For versions provided with forward control: check the voltage of Can Tiller 1 pin C4. If the voltage is different from zero when the traction potentiometer is at rest, the problem concerns this component and it must be replaced. Otherwise, the problem may concern the acquisition of potentiometer output voltage. In this case it is necessary to replace the Can Tiller 1.
- For versions provided with "side seat control": the problem may concern the joystick managing the traction function. Replace this device to solve the problem.

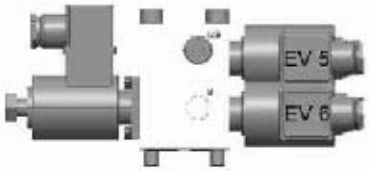
"Incorrect start"

Cause:
- When the truck is started, the traction (forward or reverse) is required or the operator presence is detected.
- An incorrect start sequence has been carried out because of:
  - a traction request without the operator presence

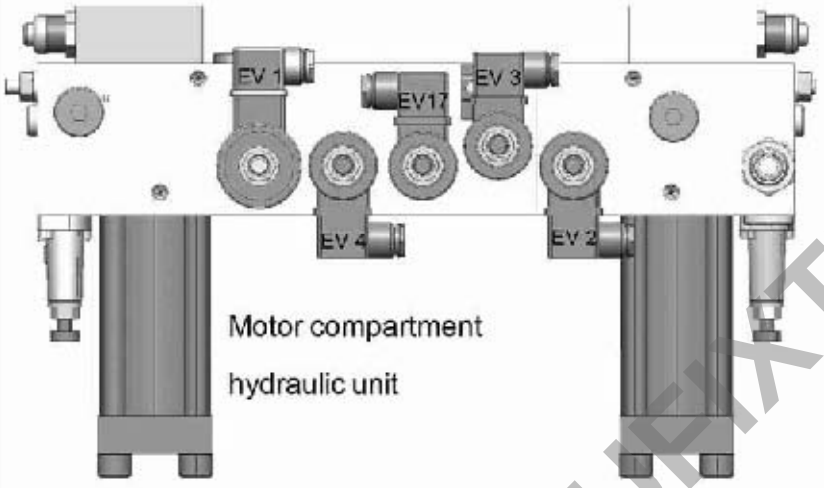
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9.00 ELECTRICAL COMPONENTS MEASURES

ELECTROVALVES COILS

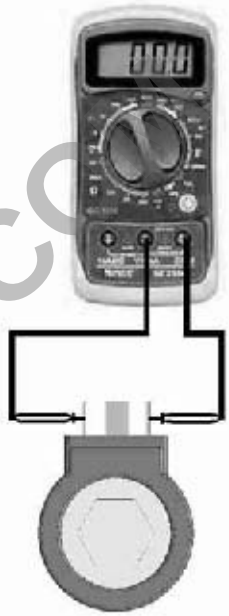


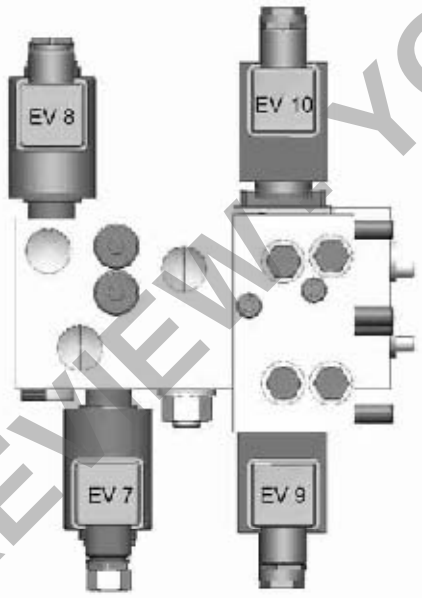
Stabilizers hydraulic unit

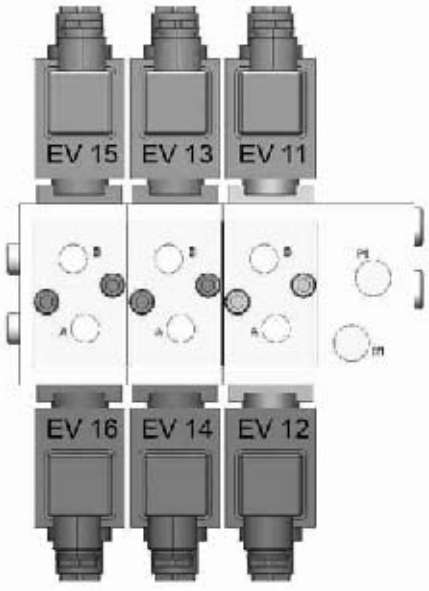


Motor compartment

hydraulic unit







Hydraulic unit over the cab

SOLENOID VALVE	MEASURED VALUE (ohm)
EV 1	17,8
EV 2	27,1
EV 3	18,6
EV 4	27,4
EV 5	27
EV 6	27
EV 7	18,5
EV 8	18,2
EV 9	19,5

SOLENOID VALVE	MEASURED VALUE (ohm)
EV 10	19,7
EV 11	19,6
EV 12	19,9
EV 13	19,5
EV 14	19,7
EV 15	19,7
EV 16	19,8
EV 17	19,6

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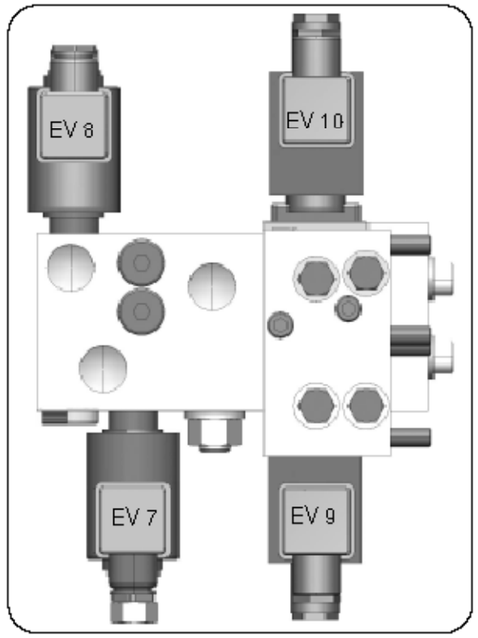
1.00 REFERENCE TABLE FOR THE ELECTRIC COMPONENTS OF THE MOTOR COMPARTMENT

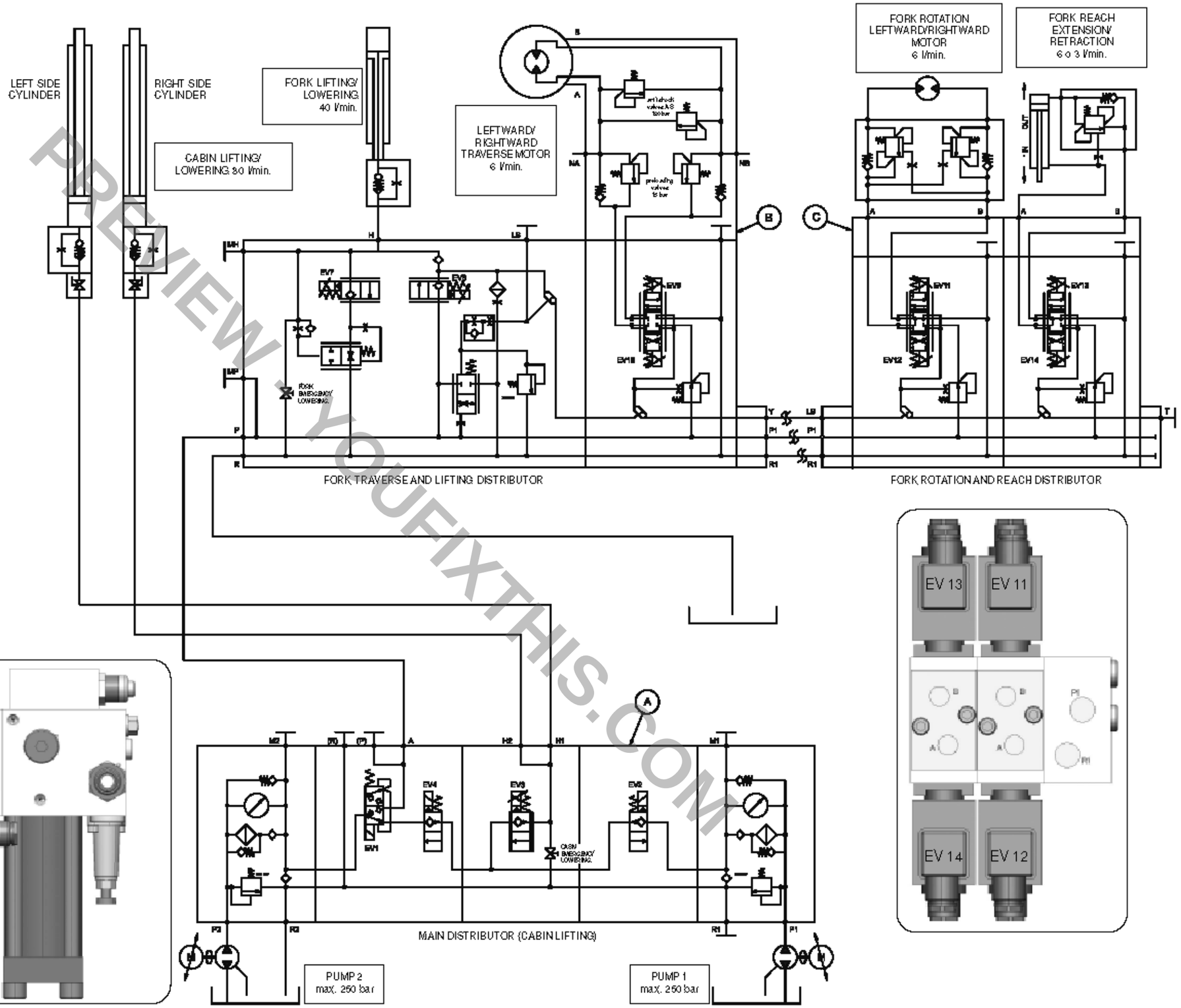
Ref.	Description	Diagram symbol reference	Diagram page
1	6.5 Kw 28/44 volt AC drive motor	Traction motor	1/20
2	14 Kw 287/44 volt AC pump 2 motor	Pump 2 motor	1/20
3	14 Kw 287/44 volt AC pump 1 motor	Pump 1 motor	1/20
4	0.5 Kw AC steering motor	Steer motor	1/20
5	Motor compartment valve unit		
6	AC2 Module for pump 1 motor	AC2 pump 1	4/20
7	AC2 Module for drive motor	AC2 traction	3/20
8	AC2 Module for pump 2 motor	AC2 pump 2	4/20
9	EPS AC Module for steering motor	Eps AC	3/20
10	Solenoid valve module	Mhyrio 1	5/20
11	Remote control switch	Main coil K3	2/20
12	Main remote control switch	Main coil K2	2/20
13	Main remote control switch	Main coil K1	2/20
14	Right fan of the motor compartment	Fan 3	4/20
15	Left fan of the motor compartment	Fan 6	4/20
16	Module cooling fan	Fan 1 Fan 2	5/20
17	Sensor for motor compartment hood closing	SW 45	4/20
18	10 A fuse after remote control switch of the logic board supply	Fuse 9	2/20
19	15 A fuse before the contact of the K3 remote control switch	Fuse 7	2/20
20	2 A fuse before the K3 remote control switch	Fuse 6	2/20
21	Emergency push button for the lowering and lifting of the cab	SW 54	5/20
22	Push button for the right/left fork traverse	SW 14	5/20
23	Wheel position sensor	SW 4	3/20
24	Flash beacon	Flash beacon	4/20
25	Elettromagnetic brake	EMB coil K5	3/20
26	Aisle presence photocells	SW 8 - SW 9	5/20

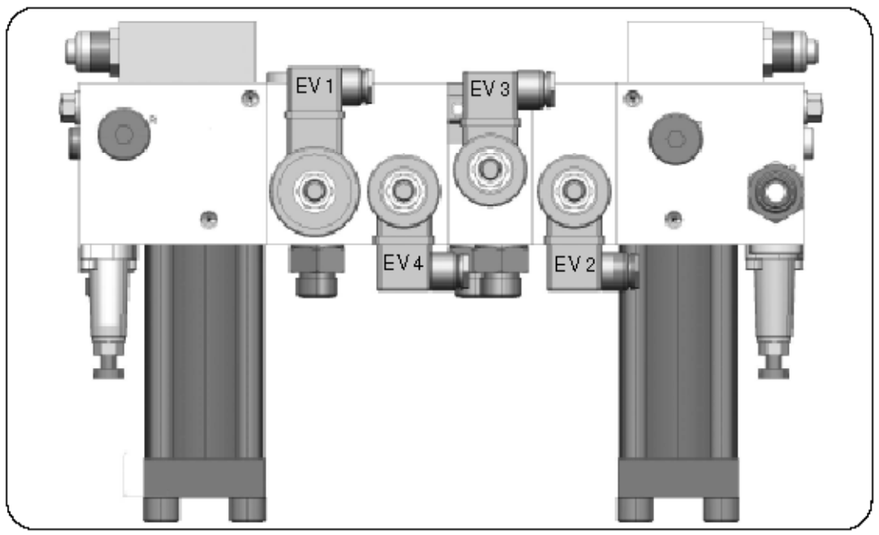
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HYDRAULIC DIAGRAM: STANDARD MODEL







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DRIVING TORQUE OF SCREWS, NUTS AND CONNECTORS

Before the disassembly of the various parts and of the bolts and screws, read carefully the instructions below.

To tighten the screws use the product *LOCTITE 270* in order to ensure the safety of the threaded couplings.

If it is not possible to loosen the screws because this product is used, do not add extensions to the tools, but heat the area (maximum 50°) in oder to eliminate the effect of *LOCTITE 270*.

In the above mentioned cases use a small quantity of *LOCTITE 270* in the assembly phase (30% of the connection surface).

The driving torque with which the threaded couplings are tightened is very important to ensure the safety of the truck connection.

The bolts and nuts and the corresponding driving torques are shown in this table on this page.

Nominal diameter	DRIVING TORQUE Nm	
	Class 8	Class 10
M 3	4	5.2
M 4	7	9.15
M 5	12.14	14.8
M 6	17.2	20,9
M 8	31.8	38.1
M 10	50.5	60.3
M 12	74.2	88.5
M 14	101.2	120.8
M 16	138.2	164.9
M 18	176.6	203.5
M 20	225.4	259.7
M 22	278.8	321.2
M 24	324.8	374.2
M 27	422.3	486.5
M 30	516.1	594.7

				Preloading N	DRIVING TORQUE Nm					
					Class 5.8		Class 8.8		Class 10.9	
						💧		💧		💧
M 4	0.7	7	3	2400	1.92	1.44	3.07	2.3	4.17	3.13
M 5	0.8	8	4	3880	3.88	2.91	6.2	4.65	8.43	6.33
M 6	1	10	5	5490	6.58	4.94	10.5	7.9	14.3	10.8
M 8	1.25	13	6	9990	16	12	25.6	19.2	34.8	26.1
M 8	1	13	6	10700	17.1	12.8	27.4	20.5	37.3	27.9
M 10	1.5	16	8	15825	31.7	23.8	51	38	69	52
M 10	1.25	16	8	16700	33.4	25.1	53	40.1	73	55
M 12	1.75	18	10	23025	55	41.4	88	66	120	90
M 12	1.25	18	10	25150	60	45.3	96	72	130	96
M 14	2	21	12	31400	88	66	140	105	190	145
M 14	1.5	21	12	34125	96	72	155	115	210	155
M 16	2	24	14	42850	135	105	220	165	300	225
M 16	1.5	24	14	45600	145	110	235	175	320	240
M 20	2.5	30	17	66875	270	200	430	320	580	435
M 20	1.5	30	17	74250	295	225	475	355	650	485

💧 = with lubricant

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PROGRAMMER STRING	SICOS STRING	DESCRIPTION
GROUND INC.START	CALL SERVICE	Request for forks speed traverse or lift/lower cab through the motor compartment buttons active at start up
HGT ENC PROX CAB	CALL SERVICE	Input reset encoder cabin always active
SIDE GATES	SIDE GATES	Side gates open
HYD.INC.START	HYD.INC.START	Hydraulic command sequence not correct
HOOD OPEN	HOOD OPEN	Hood is open
AUX BRAKE KO	CALL SERVICE	Auxiliary brake broken
WRONG ROTATION	WRONG ROTATION	2 rotation command together (only in forward control)
AISLE INC. START	AISLE INC. START	In aisle configuration, wrong sequence in aisle request and block/cutback sensor
WRONG PANTO POS	CALL SERVICE	Over 1500mm with pantograph out
WRONG STAB_POS	CALL SERVICE	Wrong stabilizer position
CAN BUS KO PLC	CALL SERVICE	No can messages from PLC (If PLC option is ON)
MIS PROX PANTO	CALL SERVICE	Mismatch between pantograph linear transducer and sensor closed pantograph.
POT PANTO OUT R.	CALL SERVICE	Pantograph potentiometer out of range
POT ROT OUT R.	CALL SERVICE	Fork rotation potentiometer out of range
POT TRASL OUT R.	CALL SERVICE	Translator fork potentiometer out of range
LOAD CAPACITY	LOAD CAPACITY	Overload: load exceeded 1600 Kg (3527 lb)
CAB.RES.ENC.FAIL	CAB.RES.ENC.FAIL	Reset height encoder cabin didn't detected
WG AUTO PLUS MAN	CALL SERVICE	Input manual guidance and automatic guidange active at same time
END AISLE KO	CALL SERVICE	SICOS detects problem in aisle slow down, stop and reset sensors
SERVICE	CALL SERVICE	Maintenance service is required
WRONG HOUR METER	WRONG HOUR METER	Mismatch in hours stored in sicos and in traction controller
FRK.RES.ENC.FAIL	FRK.RES.ENC.FAIL	Reset height encoder fork didn't detected
AISLE MISMATCH	CALL SERVICE	Mismatch in input aisle read from AC2 TRACTION and from MHYRIO 1.
MIS. INPUT ENC CAB	CALL SERVICE	The cab lifts without a cab lifting request
ROTATION STALLED	CALL SERVICE	The forks do not rotate even if the rotation request has been activated.
TRAVERSE STALLED	CALL SERVICE	The forks do not traverse even if the traverse request has been activated.
PANTOGRAPH OPEN	PANTOGRAPH OPEN	the reach extends itself by more than one half of its maximum extension.

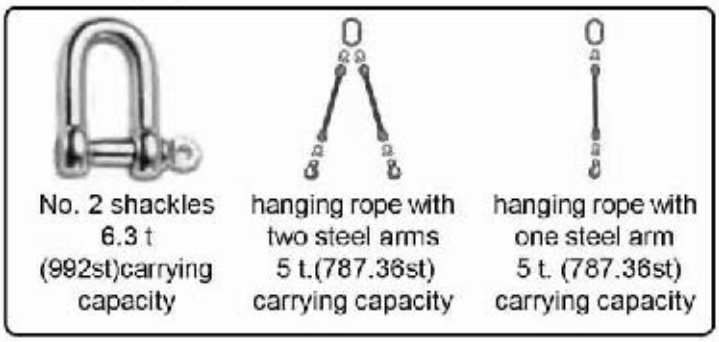
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2.03 LOADING ON AND UNLOADING FROM THE TRUCK

INSTRUCTIONS FOR SLINGING

Necessary special tools



No. 2 shackles 6.3 t (992st)carrying capacity	hanging rope with two steel arms 5 t.(787.36st) carrying capacity	hanging rope with one steel arm 5 t. (787.36st) carrying capacity

Park the truck in a safe area, far from the transit of other motor vehicles and from the passage of pedestrians. Before starting to work wear the proper accident prevention clothes.

HANGING ROPE SIZES FOR THE LIFTING OF THE TRUCK

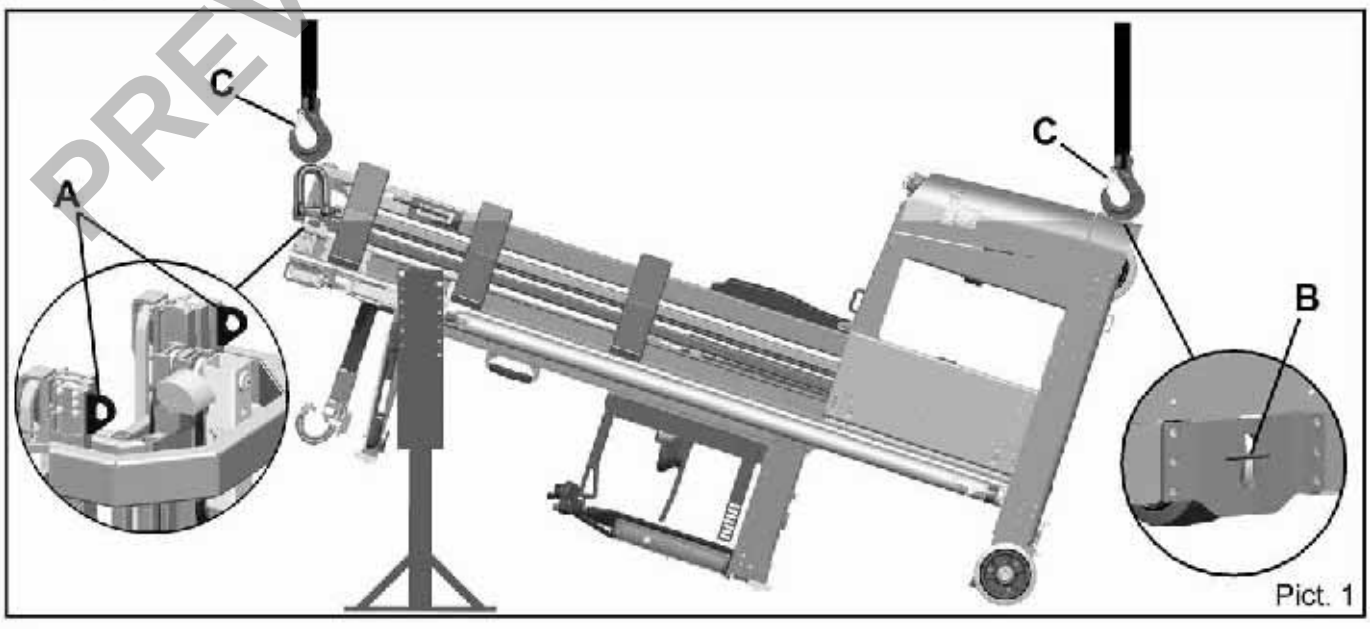
Length of the hanging rope with 2 arms	Length of the hanging rope with 1 arm
3000 mm (118.10in)	2000 mm (78.73in)

SLING

1) Insert the two shackles in the proper holes on the upper part of the mast **(ref.A fig.1)**.
2) Attach the two hooks of the hanging rope with two arms to the two shackles.
3) Attach the hook of the hanging rope with one arm to the pin located on the drive wheel protection plate **(ref.B fig.1)**.

Now the truck can be lifted with the two crane trucks and positioned vertically.

Always use hooks with safety clips (ref.C fig.1)



Pict. 1

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- the traction potentiometer output is different from zero before the traction request is disabled (only for version "with forward controls").

Troubleshooting:

- Check the operation of the sensors detecting the operator presence. If one of the two sensors does not work correctly, replace it. Otherwise, check the sensor acquisition in Mhyrio2 tester menu. If both sensors do not operate correctly replace the controller.
- In versions provided with "forward control": check the voltage of Can Tiller 1 pin C1 (FWD) and pin C5 (REV), if one of the two voltages is different from zero and the microswitch is opened, the problem concerns this component. It is then necessary to replace the microswitch. Otherwise, if these voltages are equal to zero and the FWD or REV inputs in Can Tiller 1 tester menu are on, the problem concerns the input acquisition. In this case it is necessary to replace the Can Tiller 1.
- In versions provided "with forward control": check the voltage of Can Tiller 1 pin C4. If the value is different from zero and the traction potentiometer is at rest, the problem concerns this component. Otherwise, if the output is zero and the analogue input in Can Tiller 1 tester menu is high, the problem concerns the acquisition of potentiometer output voltage. In this case it is necessary to replace the Can Tiller 1.
- In versions provided with "side seat control": the problem may concern the joystick managing the traction function. Replace this device to solve the problem.

"Forw+back"

Cause:
The forward and reverse traction requests are activated at the same time.

Troubleshooting:

- In versions provided with "forward control": check the voltage of Can Tiller 1 pin C1-FWD (pin C5-REV). If one of these voltages is different from zero and the microswitch is opened, the problem concerns this component. It is then necessary to replace this microswitch. Otherwise, if the voltage is zero and the FWD or REV inputs are on in Can Tiller 1 tester menu, the problem concerns the input acquisition. In this case it is necessary to replace the Can Tiller 1.
- In versions provided with "side seat control": the problem may concern the joystick managing the traction function. Replace this device to solve the problem.

"Hand inc. start"

Cause:
This alarm is enabled when the sensor does not detect the hand presence.

Troubleshooting:

- In versions with "forward control": check the voltage of Can Tiller 0 (left hand presence) and Can Tiller 1 (right hand presence) pin A2. If one of these voltages is lower than the value when the hand is present, the problem concerns the photocell. It is then necessary to replace the component. Otherwise, if this input is high (24V) and the digital input is off in Can Tiller tester menu, the problem concerns the input voltage acquisition. In this case it is necessary to replace the Can Tiller 1.
- In versions with "side seat control": the problem may concern one of the two Joysticks managing the truck functions. Replace this device to solve the problem.

"Cabin inc. start"

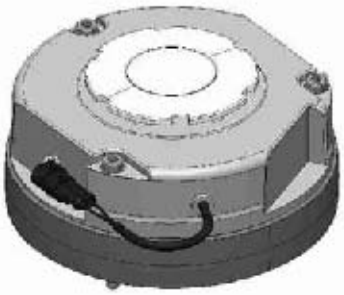
Cause:
When the truck is started, cabin lifting lowering is required.

Troubleshooting:

- In versions with "forward control": check the voltage of Can Tiller 0 pin C1 (LOW) and pin C5 (LIFT), if one of these voltages is different from zero and the microswitch is opened, the problem concerns this component. It is then necessary to replace the microswitch. Otherwise, if these outputs are zero and the LOW or LIFT inputs are on in Can Tiller 0 tester menu, the problem concerns the input voltage acquisition. In this case it is necessary to replace the Can Tiller 0.

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ELECTROMAGNETIC BRAKES COILS



Electromagnetic brake traction wheel



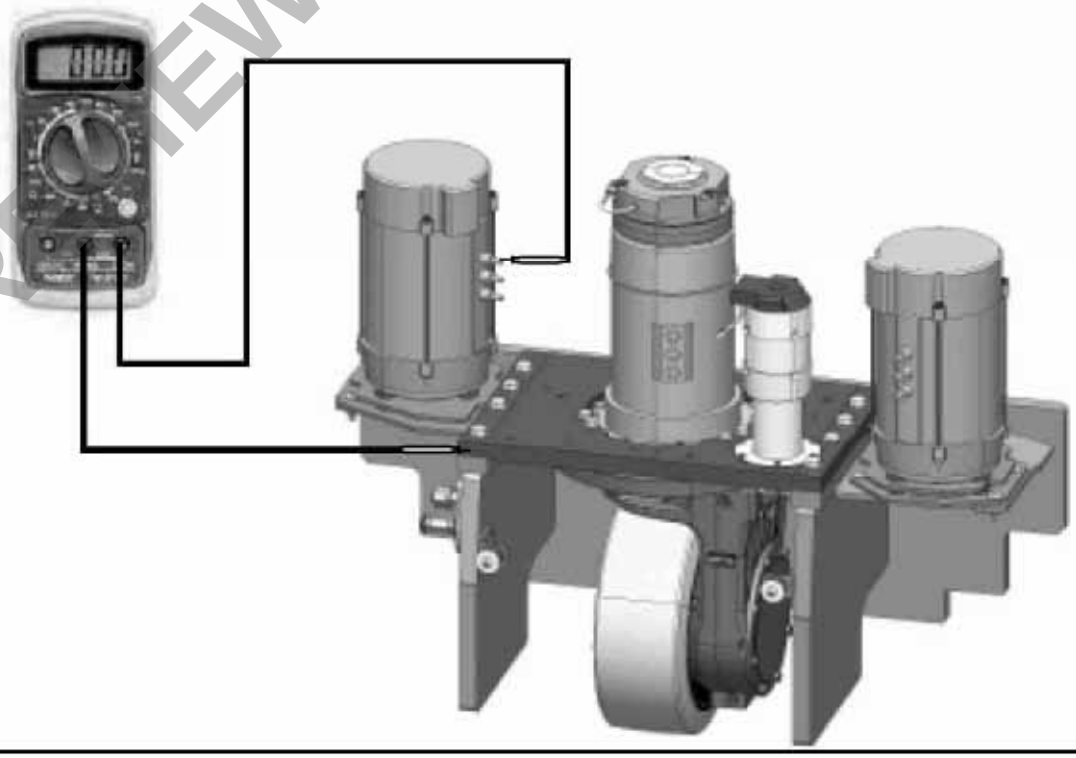


Electromagnetic brake load wheel

BRAKE COIL	MEASURED VALUE (ohm)
TRACTION WHEEL	10,8
LOAD WHEEL	4,8

MOTORS

To measure the motor isolation, disconnect the cables of the phases **(U,V, W)**. Connect one point of the tester to U phase and the other one on the frame. The resistance value **(Ω)** indicated by the tester must be infinite **(~)**. If not, the motor is not isolated and the relative module diagnoses the alarm **"capacitor charge"**. Repeat the operation for the other two phases (V,W).



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2.04 VERTICAL POSITIONING

Necessary special tools


No. 2 crane truck 10 t.(1574.73st) carrying capacity


stepladder


safety belt


sling kit (see page 10)

Necessary tools


30 mm open end wrench

Procedure

Before starting to work wear the proper accident prevention clothes.



Step 1

No. 2 CRANE TRUCKS - 30 mm OPEN END WRENCH

Lift the truck slowly in order to release the plate of the supporting frame **(ref.D fig. 2,3)**.

Using the open end wrench loosen and remove the four screws **(ref.E fig. 3)** which fasten the left and right plate of the supporting frame. Withdraw the two plates.

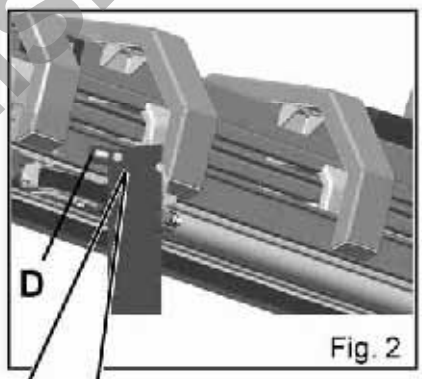


Fig. 2

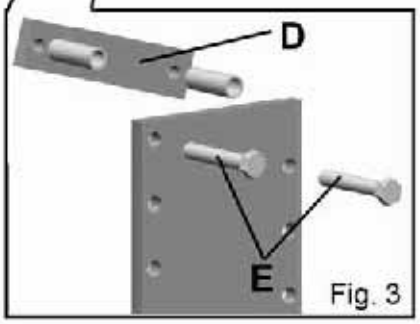


Fig. 3

Step 2

No. 2 CRANE TRUCKS

Lift the truck from the ground with both crane trucks and remove the supporting frame **(ref.F fig.4)**.

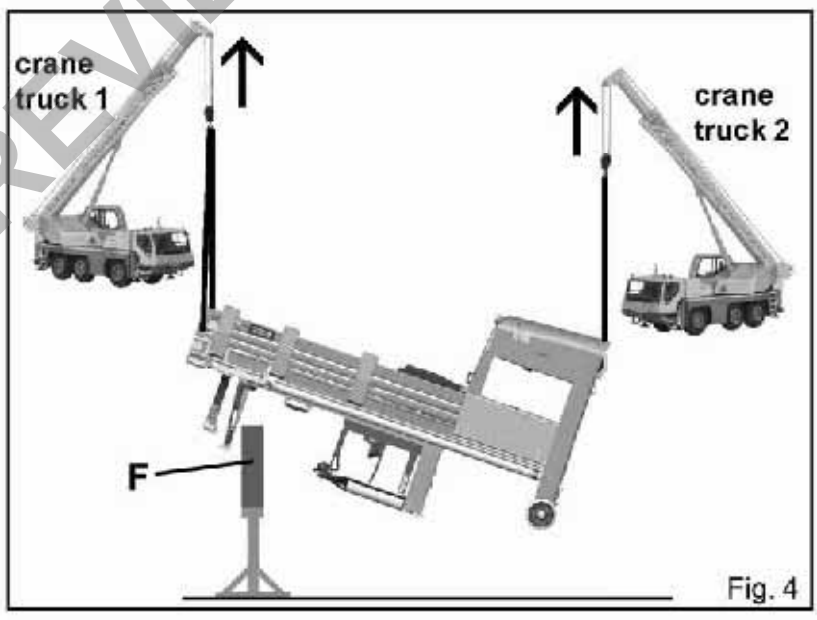


Fig. 4

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- In versions provided with "side seat control": the problem may concern the Joystick managing the cab lifting/lowering request. Replace this device to solve the problem.

"Forks inc. start"

Cause:
When the truck is started, the fork lifting/lowering request is required.

Troubleshooting:
- In version provided with "forward control": check the voltage of Can Tiller 0 pin C1 (LOW) and pin C5 (LIFT) , if the voltage of even one of these pins is not zero and the microswitch is open, the problem concerns this component. It is then necessary to replace the microswitch. Otherwise, if the voltage is zero and the LOW or LIFT input are on in Can Tiller 0 tester menu, the problem concerns the input acquisition. In this case it is necessary to replace the Can Tiller 0.
- In version provided with "side seat control": the problem may concern the Joystick managing the cab lifting/lowering request. Replace this device to solve the problem.

"Rot inc. start"

Cause:
When the truck is started, the fork rotation is required.

Troubleshooting:
- In versions provided with "forward control": check the voltage of Can Tiller 0 and Can Tiller 1 pin A4 (fork rotation potentiometer output). If the voltage of even one of these pins is not zero when the potentiometer is at rest, the problem concerns this component. It is then necessary to replace the potentiometer. Otherwise, if the voltage is zero and the analogue input is high in Can Tiller tester menu, the problem concerns the input acquisition. In this case it is necessary to replace the Can Tiller where the wrong acquisition is found.
- In versions provided with "side seat control": the problem may concern the Joystick managing the fork rotation request. Replace this device to solve the problem.

"Trans inc. start"

Cause:
When the truck is started, a fork traverse is required.

Troubleshooting:
- In versions provided with "forward control": check the voltage of Can Tiller 1 CNA#6 (fork traverse potentiometer output). If the voltage is not zero when the potentiometer is at rest, the problem concerns this component. It is necessary to replace the potentiometer. Otherwise if this input is zero and the analogue input is high in Can Tiller 1 tester menu, the problem concerns the input acquisition. In this case it is necessary to replace the Can Tiller 1.
- In versions provided with "side seat control": the problem may concern the Joystick managing the fork traverse request. Replace this device to solve the problem.

"Can bus ko eps"

Cause:
There is no communication between Sicos and EPS via Can Bus.

Troubleshooting:
Check the can bus controller and its resistances, carry out a re-start procedure (Key-on). If the alarm is still present, replace the EPS controller.

"Can bus ko tr."

Cause:
There is no communication between Sicos and the traction controller via Can Bus.

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GENERAL SAFETY STANDARDS

PERSONAL SAFETY

- Always use the personal protective equipment when they are required.
- Pay attention to the squashing risks due to moving parts, oscillations, not correctly fastened materials when lifting operations are carried out or when the loads are moved.
- Do not wear rings, watches, jewels, unbuttoned or hanging clothes such as scarves, unbuttoned jackets or smocks with open zips that can get entangled in the moving parts.
- Do not carry out cleaning, lubrication or maintenance operations when the battery is connected.
- If you use compressed air to clean the parts, wear glasses with lateral guards. The maximum pressure of the air must not exceed 1 bar (15 psi).

SAFETY IN THE WORKPLACE

- Make sure that all working tools are perfectly efficient and ready to use. Keep the working surfaces clean and free from the deposits that settle on the truck parts and cause damages.
- Keep sparks, free flames and cigarettes at a distance from fuels or flammable materials such as the gas of the batteries.
- Make sure that the working area is well ventilated, illuminated, dry and clean. Remove any water puddles or oil spots.
- Make sure that the lifting equipment, devices or machines can bear the load.
- Do not use petrol or other flammable liquids as detergents: use commercial non-toxic and non-flammable solvents.
- In case the service are carried out out of the workshop, lay the truck flat and block it. If it is necessary to carry out the work on slopes, block the truck and bring it in a flat area as soon as possible within a certain safety limit.
- Disconnect the batteries and label all controls in order to indicate that an intervention is in progress. Block the truck and any equipment to be lifted.
- Do not carry out any intervention on the truck when the operators are controlling it, except that they are qualified operators and help to carry out the intervention.
- During towing operations use only the prescribed attachment points and make sure that the pins and/or bolts are tightly secured. Lift and move all heavy components by means of a lifting device of proper carrying capacity. Use the proper towing eyes. Make sure that nobody stays near the load to be lifted.
- Do not twist chains or metal ropes.
- Do not use damaged or bent chains or ropes: do not use them during lifting or towing operations. While handling them always wear safety gloves.
- Do not accumulate cloths soaked with grease or oil: they represent a risk of fire. Always put them in a closed metal container.
- The oil must be collected and not be let off in the drain pipes; the industrial oils must be disposed of by specialized companies under the protection of the law in force in every Country.

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PROGRAMMER STRING	SICOS STRING	DESCRIPTION	EFFECT	TRUCK STATUS WHEN THE TEST IS DONE	RESTART PROCEDURE
COIL SHORTED	CALL SERVICE	The output (F8) of the flash beacon circuit is not able to drive the load	K2 main contactor open, power bridge opened, electromagnetic brake applied.	- START UP - STANDBY - MOTOR RUNNING	System re-synchronization: - release all the requests (traction and hydraulics) - release the operator presence button - push the operator presence button - do an operation request (traction or hydraulics or both)
ENCODER ERROR	CALL SERVICE	The flash beacon circuit (F8) or the output NSAFETY (F9) are in short (the current is higher than 10A).	K2 main contactor open, power bridge opened, electromagnetic brake applied.	MOTOR RUNNING	Key re-cycle.
WRONG SET BAT.	CALL SERVICE	Battery voltage is wrong: - Vbatt < 60%Vbattnom - Vbatt > 120%Vbattnom	K2 main contactor open, power bridge opened, electromagnetic brake applied.	START UP	Connect a correct battery
CAN BUS KO	CALL SERVICE	Can bus messages not received	K2 main contactor open, power bridge opened, electromagnetic brake applied.	- START UP - STANDBY - MOTOR RUNNING	System re-synchronization: - release all the requests (traction and hydraulics) - release the operator presence button - push the operator presence button - do an operation request (traction or hydraulics or both)
LOW TORQUE BRK	CAB. EMER. STOP	During hydraulic lowering function, the regen torque is detected to be too low to decelerate the cabin in the required time. The cabin is blocked.	K2 main contactor open, power bridge opened, electromagnetic brake applied.	- START UP - STANDBY - MOTOR RUNNING	System re-synchronization: - release all the requests (traction and hydraulics) - release the operator presence button - push the operator presence button - do an operation request (traction or hydraulics or both)
EMERGENCY	E STOP BUTTON	The positive on K2 line contactor is removed, due to emergency button opening.	K2 main contactor open, power bridge opened, electromagnetic brake applied.	- START UP - STANDBY - MOTOR RUNNING	System re-synchronization: - release all the requests (traction and hydraulics) - release the operator presence button - push the operator presence button - do an operation request (traction or hydraulics or both)
VBATT LEVEL 1	CHARGE BATTERY	Voltage of the battery is less than: 57V for 60V battery, 36V for 48V battery	K2 main contactor open, power bridge opened, electromagnetic brake applied.	- START UP - STANDBY - MOTOR RUNNING	System re-synchronization: - release all the requests (traction and hydraulics) - release the operator presence button - push the operator presence button - do an operation request (traction or hydraulics or both)
AUX OUTPUT KO	CALL SERVICE	The feedback of output driver NSAFETY (F9) is not consistent with the signal coming from the microprocessor.	K2 main contactor open, power bridge opened, electromagnetic brake applied.	- START UP - STANDBY - MOTOR RUNNING	System re-synchronization: - release all the requests (traction and hydraulics) - release the operator presence button - push the operator presence button - do an operation request (traction or hydraulics or both)

5.06 ANALYSIS AND TROUBLESHOOTING OF THE PUMPS ALARMS

"Watch dog"

Cause:

The system is provided with a watchdog circuit.The microchip tests the watchdog circuit in order to verify it is working properly. The output of this circuit changes status if it is not correctly stimulated by the microchip. If it changes status, it disables the output NSAFETY (F9 - AC2 PUMP1) and Power Bridge drivers.
The electromagnetic brake is activated during braking.
The error fault is given when:

- the output of the circuit in not consistent with the input during the start-up test of watchdog circuit (START-UP diagnostic).
- the output of the circuit changes during STANDBY or during the hydraulic functions (STANDBY and MOTOR RUNNING diagnostic)

Troubleshooting:

This is a internal fault of the controller, it is necessary to replace it.

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INPUTS

CAN TILLER 0	CAN TILLER 1	DISPLAY	AC2 PUMP 2	MHYRIO 2	MHYRIO 3
1A [1]	1A	10F	12F	8F	2C
2A [1]	2A	9F	6F	6F	4C
11A [1]	11A	17A [2]	5D	5B	5C
13A	17A	8A [2]	3D	2B	1B
4A	6A	1F	2D	6B	22A
5A	14A	2F	1D	4A	2B
	13A	2D	5F	2A	5B
	4A	3D	11F	3A	6B
	5A	16A [3]	1E	1B	1F
	12A	18A [3]	7E	22A	8F
	8A	2A [3]	1B	1C	6C
		19A [3]	2B	3C	1C
			1F	6C	3C
			1C		16A
			3C		19A
					1A

[1] in the aisle only
[2] model "EUROPE" only
[3] model "Forward Control" only

For the voltage values on each input, see the wiring diagram.

OUTPUTS

AC2 PUMP 2	MHYRIO 2	MHYRIO 3
W	4F	4G
V	9F	13G
U	6G	3G
2C	11G	9G
4C	4B	4B
	10A	10A

SETTINGS AND PROGRAMMING BY MEANS OF THE DISPLAY

There are no settings and programming by means of the display.

MECHANICAL ADJUSTMENTS AND SETTINGS

No mechanical adjustments and settings are required.

MECHANICAL ADJUSTMENTS AND SETTINGS

By means of the programming device it is possible to set the rotation stop with stop in the center if the forks stop when they are rotated forward beyond the central position.

Setting of the rotation stop with stop in the center from the right to the left

SICOS /config menu adjustments/ **aux speed 1**

Setting of the rotation stop with stop in the center from the left to the right

SICOS /config menu adjustments / **aux speed 2**

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Step 4

3mm ALLEN WRENCH - 8mm OPEN END WRENCH - HAMMER

With the Allen wrench and the open end wrench loosen and remove the four screws fastening the motor to the bracket **(ref. I-L fig. 4)**, remove the motor from the support **(ref. M fig. 4)**. With the hammer remove the steering wheel pin from the support **(ref. N fig. 4-5)**.

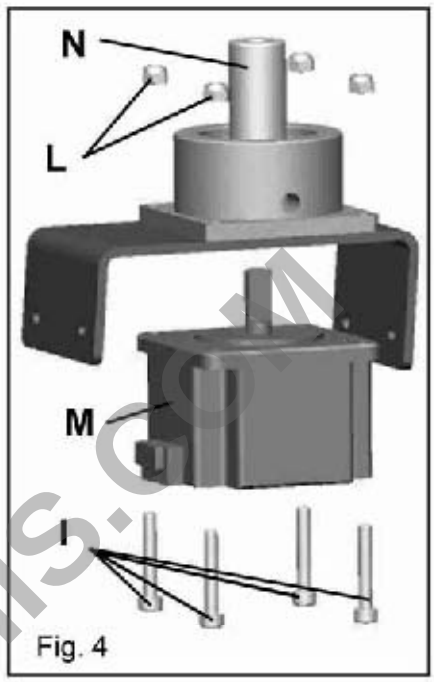


Fig. 4

Step 5

SNAP RING PLIERS - DEAD BLOW HAMMER - PIN EXTRACTOR

With the seeger pliers remove the snap ring that fastens the bearing **(ref. O fig. 6)**. Overturn the support and with the hammer an the pin extractor remove the bearing from the support (ref. P fig 6) and replace.

Reassemble the bearing and the kit by following the disassembly procedure in the reverse order.

After assembling, no adjustment is necessary.

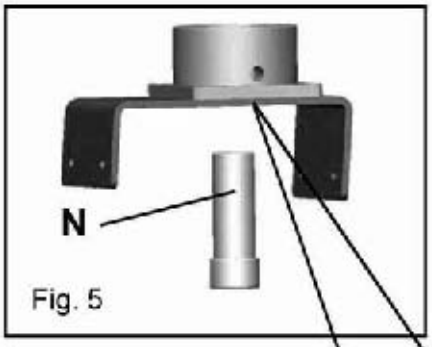


Fig. 5

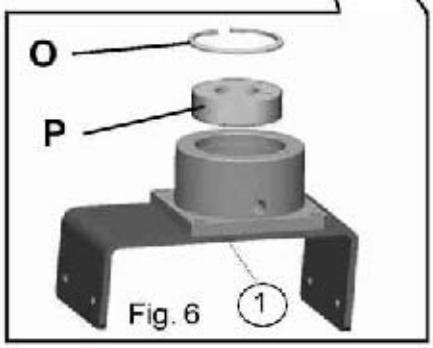


Fig. 6

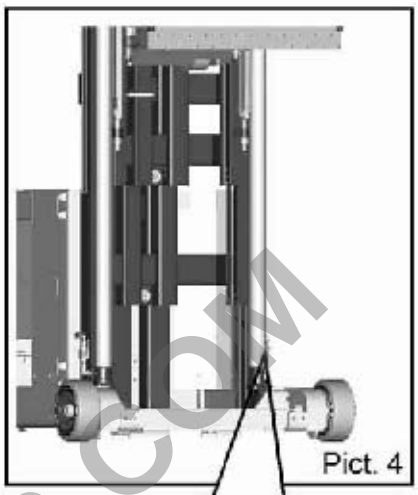
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Step 3

0.39 in OPEN-ENDED WRENCH

By means of the wrench loosen the locking bolt of the keep plate of the hinge pin of the stem with the pulley support **(ref.D pict.6)**, remove the plate and extract the pin releasing the stem.


Pict. 4

Step 4

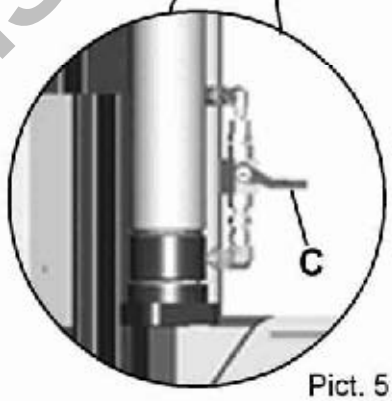
NORMAL PLIERS

By means of the pliers remove the split pin of the hinge pin of the chain with the chain tightener, extract the pin **(ref.E pict.8)**, release the chain **(ref.F pict.7)** and move it so as to reach the sleeve of the cylinder with the pin wrench.

Step 5

Enable the cabin lowering push button **(ref.B pict.1)**, make the cylinder stem lower completely **(pict.9)**.

Set the key switch on OFF and disconnect the battery.



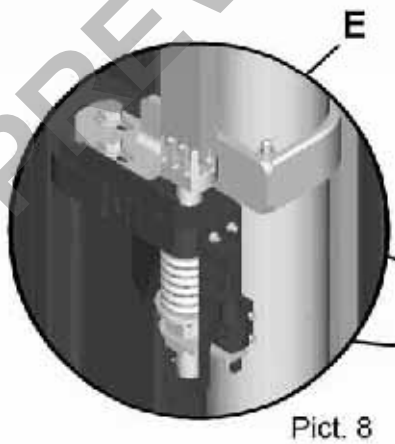
Pict. 5

Step 6

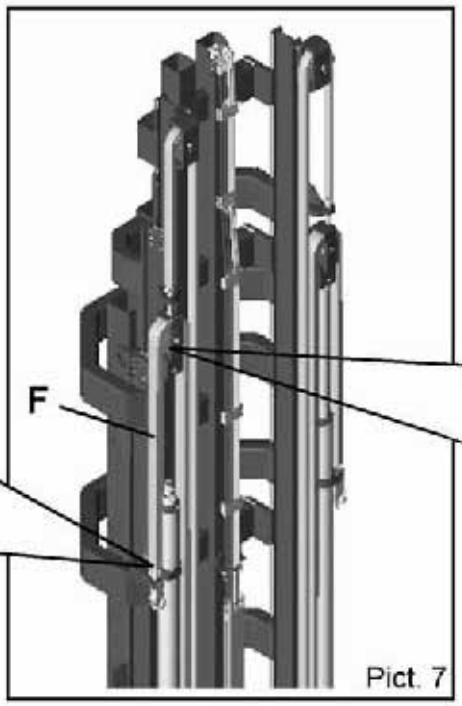
LADDER - SAFETY BELT - PIN WRENCH - CHAIN PIPE WRENCH

Place the ladder near the cylinder, secure oneself with the belt to the machine so as to work safely.

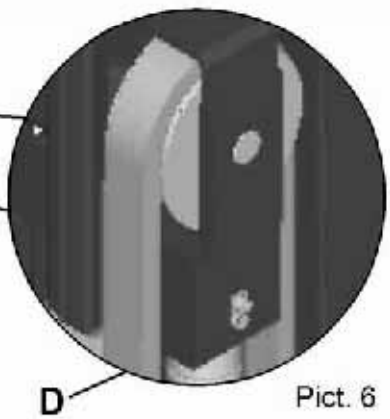
Put the pin wrench in the sleeve notches **(ref.H pict.11)** and the chain pipe wrench on the liner near the cylinder bracket **(ref.G pict.10)**. Loosen the sleeve from the cylinder, extract it from the stem and place it on a clean work bench.



Pict. 8



Pict. 7



Pict. 6

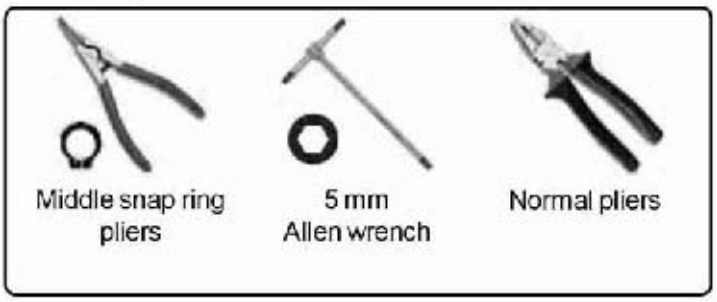
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4.06 UPPER SIDE GATE REMOVAL
MODEL: ALL MODELS

To remove the upper side gate kit it is necessary to remove the side gate unit and position it on a workbench.

Necessary tools



Procedure

Before starting to work wear suitable safety clothes.
Park the truck in a safe area, away from the transit of other motor vehicles and from the passage of pedestrians. Lower the forks to the ground, turn the key switch OFF and disconnect the battery.

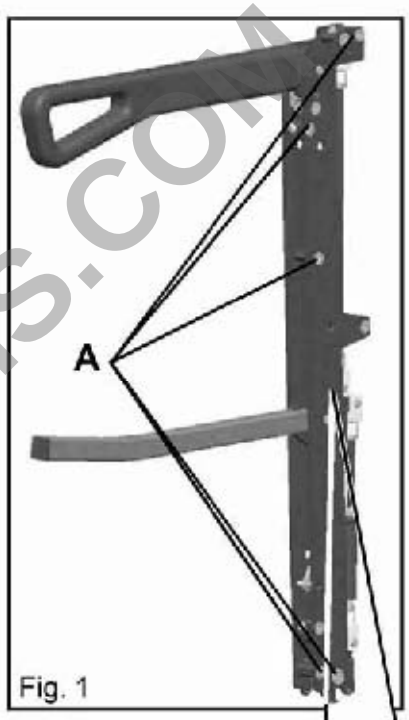


Fig. 1

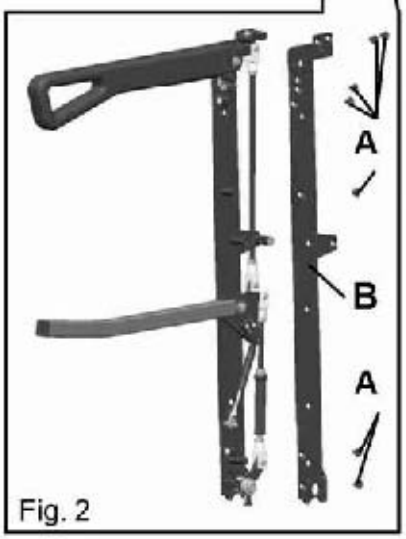


Fig. 2

Step 1
Remove the side gate kit from the truck (see "REMOVAL OF THE COMPLETE SIDE GATES" on page 3 of this section). Position it on a workbench.

Step 2
Remove the lower side gate (see"REMOVAL OF THE LOWER SIDE GATE" on page 6 of this section).

Step 3
Remove the lower side gate support (see "REMOVAL OF THE LOWER SIDE GATE SUPPORT" on page 7 of this section).

Step 4
Remove the external cover from the side gate kit (see "REMOVAL OF THE EXTERNAL COVER" on page 8 of this section).

Step 5
5 mm ALLEN WRENCH
Loosen and remove the fastening screws of the cover of the side gate unit **(ref. A fig.1,2)**. Remove the cover from the structure **(fig.2)**.

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