WORKSHOP MANUAL

TSX	CTX	CTXi
Type 4522	Type 4523	Type 4535
		

60424518 GB

Ed: 01/2002
Rev: 05/2003

Diagram list for TSX in A3 format

452106010	Plug and socket parts list table
452249553	Tiller card diagram
452206507	COMBI system input/output diagram for the TSX
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452206529	Electrical diagram
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452206522	Preproduction sensor connection diagram
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452249707	Electric drive input/output diagram
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452249708-B	Electric drive sheath diagram
452206030-B	Parameter setting table

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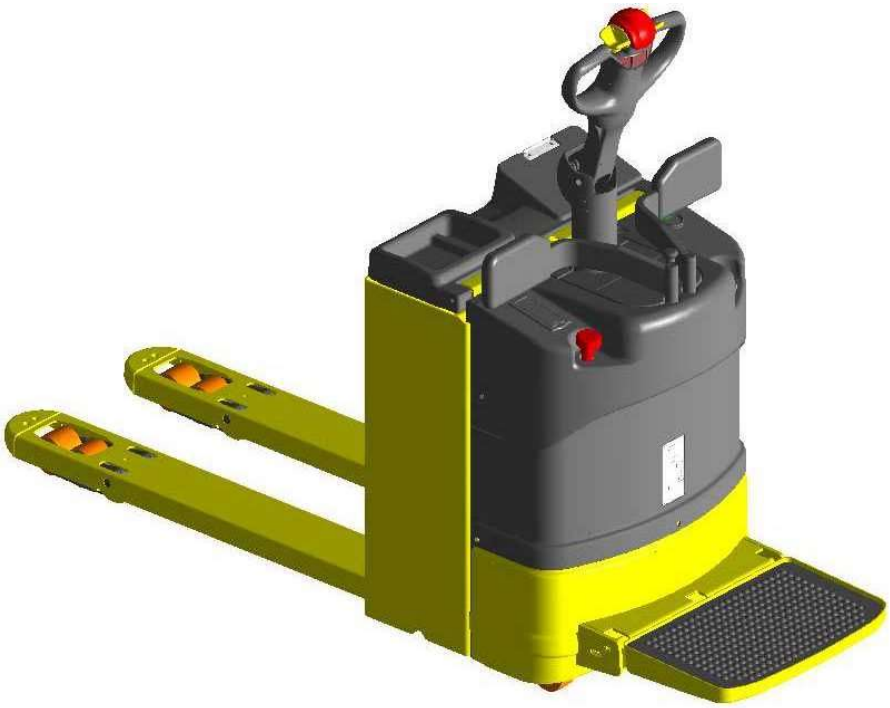
WORKSHOP MANUAL

PART I

TSX Type 4522



Ed. 09/2001
Rev. 03/2002

Inspection and maintenance table

MAINTENANCE OPERATIONS					
Description	**When necessary**	**Daily inspection**	**Operating hrs**		
			1000	**2000**	**3000**
Battery					
Check the level and density of electrolyte		●			
Load pick up					
Grease the tie rods and levers			●		
Replace the lever bushings	●				
Brake					
Check the emergency parking brake		●			
Replace the brake disc	●				
Adjust the emergency parking brake	●				
Electrical system					
Clean the electric motors			●		
Check the motor manifolds			●		
Replace the traction motor brushes	●				
Replace the lifting cylinder motor brushes (only 1.8kW)	●				
Replace the steering motor brushes	●				
Hydraulic system					
Check the condition of the piping			●		
Check the level of hydraulic system oil			●		
Top up the hydraulic system oil	●				
Replace the hydraulic system oil					●
Reducer					
Check the level of oil			●		
Replace the oil				●	
Wheels					
Check the condition of the wheels		●			
Replace the load wheel	●				
Replace the drive wheel	●				
Replace the castor wheels	●				
Top up the castor wheel hydraulic system oil	●				
Grease the castor wheels			●		
Replace the castor wheel hydraulic system oil					●
Steering					
Grease the gears			●		
Replace the tiller brake disc pad					●
Platform / Side panels					
Grease the platform pins	●				
Grease the side panel gears	●				

For the cold stores version, double the greasing and lubrication operations by halving the interval time.

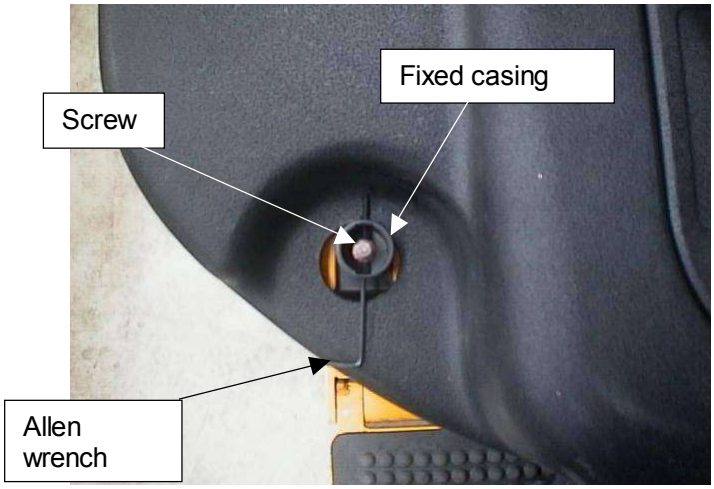
Note*: To perform this operation, refer to the overall drawing number 452208510.

Complete wired battery charger mod. CHARIS 24v 50A L.E.S. (452218501)

Arancio	Orange
Azzurro	Light blue
Batt.	Battery
Bianco	White
Blu	Blue
Carica batteria Charis 24V, 50A cod. pim. 95325428	Charis 24V, 50A battery charger number 95325428
Cavo nero 10 mmq	Black wire 10 mm^2
Cavo OLFLEX-FD 855-P 2x0.5 cod. pim. 95319691	OLFLEX-FD 855-P 2x0.5 wire, number 95319691
Cavo rosso 10 mmq	Red wire 10 mm^2
Cavo spiralato 3x1.5 mmq	Spiral wire
Codice	Code
Colore base	Basic color
Contatto maschio STEELSPRING 0.5-1 cod. pim. 95319124 AMP 1-962915-1	0.5-1 STEELSPRING male contact number 95319124 AMP 1-962915-1
Giallo	Yellow
Gommino passacavo 0.5-1 cod. pim. 95319126 AMP 828904-1	0.5-1 cable tray rubber cap number 95319126 AMP 828904-1
Grigio	Gray
Marrone	Brown
Nero	Black
NOTA PER IL MONTAGGIO: Il cablaggio dei contatti maschi STEEL SPRING cod. pim. 95319124 e dei gommini passacavo cod. pim. 95319126 va eseguito in opera adattando la lunghezza del cavo olflex.	ASSEMBLY NOTES: The length of the olflex wire should be cut to the appropriate length when wiring the STEEL SPRING male contacts, Pimespo part number 95319124, and the cable tray rubber caps, Pimespo part number 95319126.
Relè	Relay
Rosa	Pink
Rosso	Red
Spina Schuko con introduzione cavo diritta	Schuko plug with straight wire insertion
Terminale a occhiello 95319896 AMP 719538-4	Eye terminal number 95319896 AMP 719538-4
Verde	Green
Viola	Violet

Motor compartment hood removal

Pull up the red emergency button knob.
Turn the knob until the screw hole at the side is aligned with the hole at the side of the insulating casing of the emergency button knob unit.
Insert a 2 mm pin through both holes, which will keep the screw together with the fixed insulating casing.
Remove the knob by unscrewing it in an anti clockwise direction.

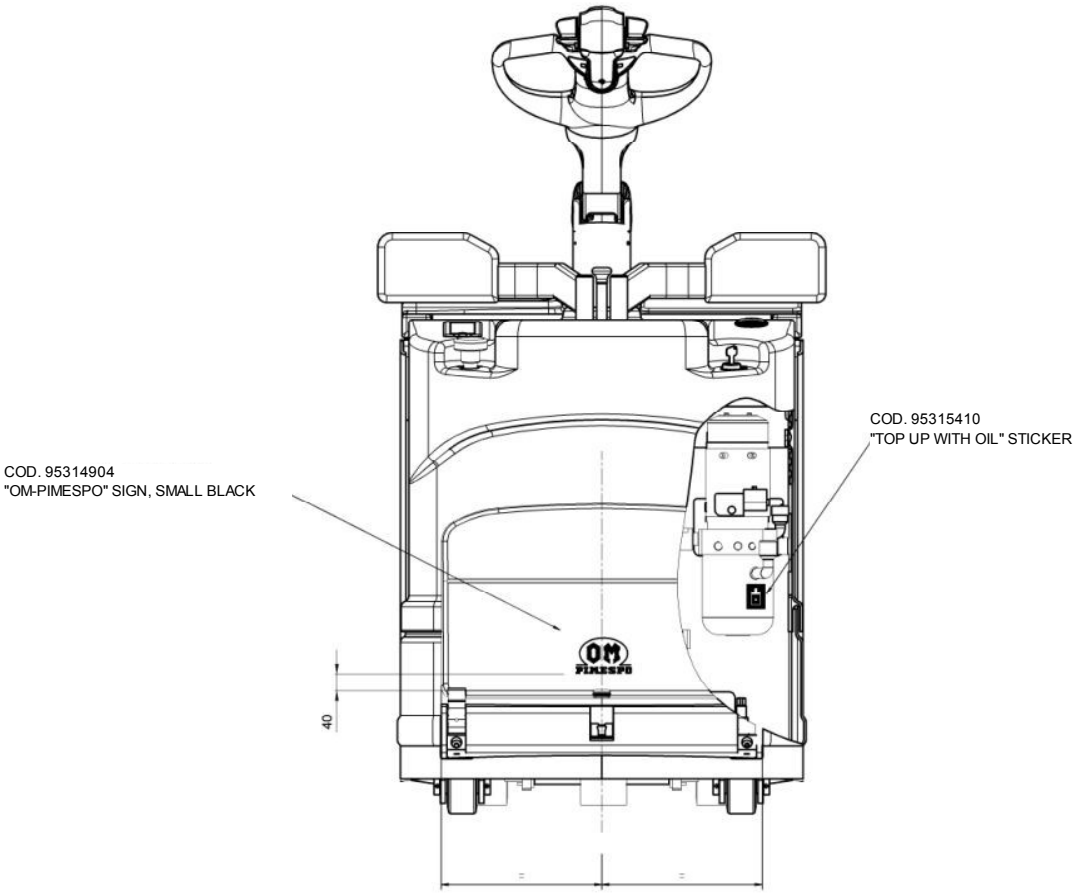


A 2 mm Allen wrench can be used for this operation.
Remove the wrench after unscrewing the knob.
DANGER!
When performing any operations in the motor compartment:

- Unplug the battery
- Remove the FU4 fuse

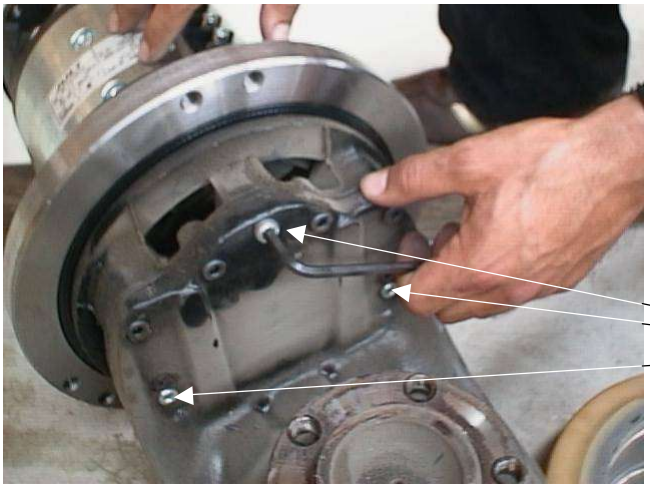
DANGER!
When performing any operation inside the motor compartment:
- Unplug the battery
- Remove the FU4 fuse

View from the operator side (+ inside right)



VIEW FROM A

Use appropriate containers to dispose of the oil in accordance with the regulations in force.



After draining the oil from the reducer, place the unit on the floor or on a workbench.
Remove the 3 fastening screws to separate the traction motor from the reducer.

Traction motor to reducer fastening screws

Remove the spring lock washer seated in the bearing.
Attention: the flange shown in the figure at side is visibly cracked.
This may happen if the motor to reducer fastening screws are longer than they should be.
It is therefore important to make sure that they are the correct length!

Correct length: M8x70

Using a pin driver, remove the oil seal from the flange.

Lubricate the O-ring mounted on the traction motor flange with the same reducer oil, and mount the traction motor onto the reducer unit.
Turn the motor body until the terminal board is aligned with the beginning of the crown wheel.
See page I – 4.5

Tighten the motor fastening screws to **10 Nm** of torque.

Attention: make sure that the screws are the correct length. If they are too long, they will break the flange!

Correct length: M8x70

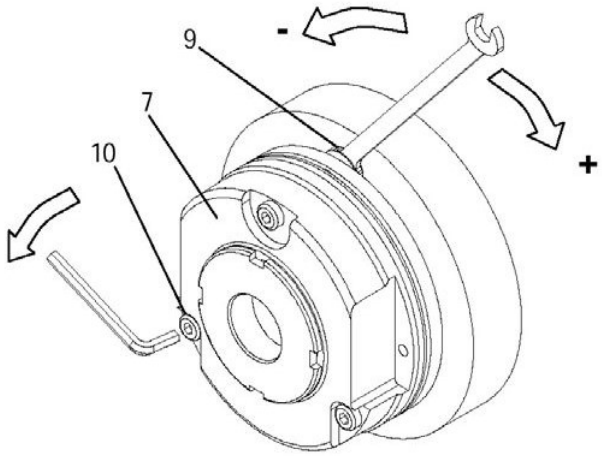
Mount the traction wheel after making sure that there are no signs of wear or tear (smooth, split, scored, or worn).
Tighten the fastening screws to 140 Nm of torque.

Move the motor slightly to align the holes.
Screw and tighten the traction motor fastening screws to **10 Nm** of torque.

Using a flat end screwdriver as a lever against the electric drive support, turn the electric drive pinion gear.
This will turn the reducer unit and bring the terminal board to the front.

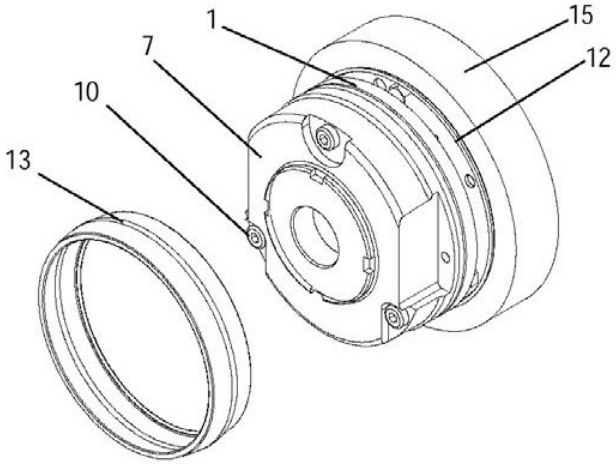
Screw the traction motor cables, the electromagnetic brake, and the castor wheel hydraulic unit in the original order.
Calibrate the electromagnetic brake if necessary **(see the Braking System chapter)** and bleed the hydraulic system **(see the Hydraulic Castor Wheel Unit chapter).**

After loosening the fastening screws (10), use the wrench to either tighten or loosen the adjustment nuts (9) to increase or decrease the size of the gap. Tighten the screws again with the dynamometric wrench and repeat the operation until the correct measurement is obtained.



Rubber protector assembly

The electromagnetic brake can be protected by fitting a rubber protector around it near the brake disk, if the truck is so equipped or it is considered necessary. This will protect the brake lining from abrasive particles, etc.



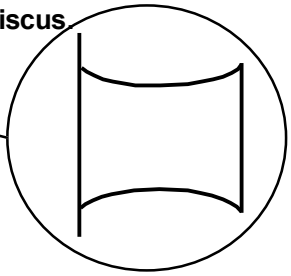
1. Electromagnetic brake disk
7. Electromagnetic brake body
10. Fastening screws
12. Friction disk
13. Rubber protector
15. Motor flange

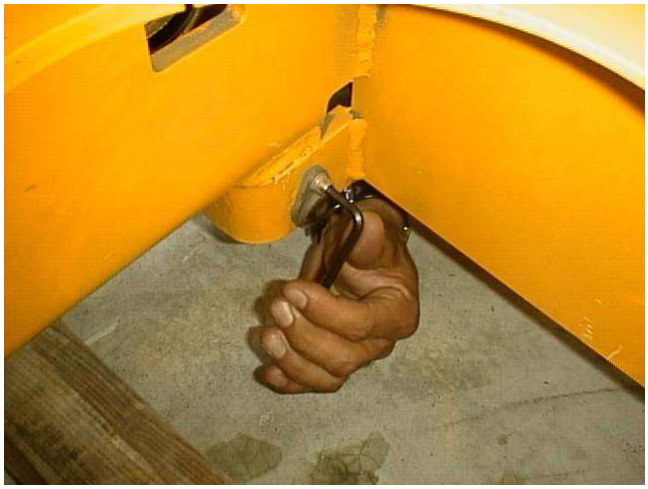
Tap the roller pins to remove them from the bearings.

If the pins are blocked, remove them with a hydraulic press.

Remove the rockers after removing the rollers.

Check the rocker pins for wear and replace them if worn, in which case the pins will have the appearance of a convex meniscus.



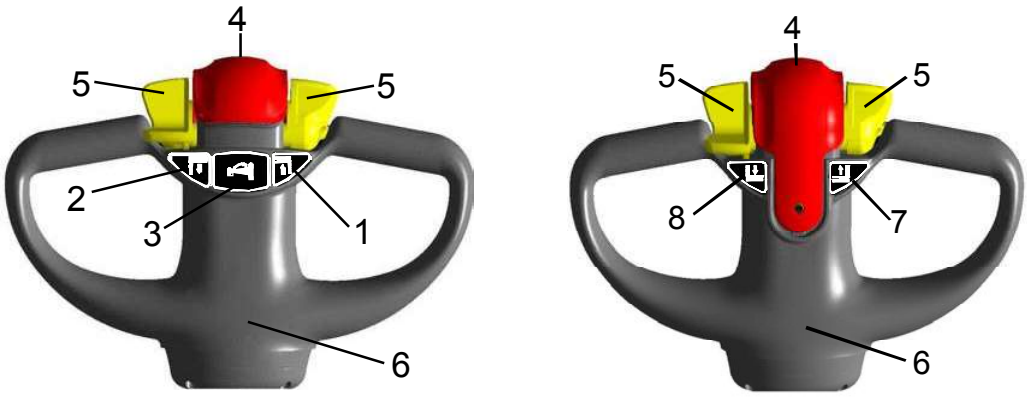


Unscrew the lock screw of the main pivot of the rear fork.
The screw is located under the motor compartment.

Attention: remove the battery before disassembling the rear forks.

Tiller unit

Tiller head controls



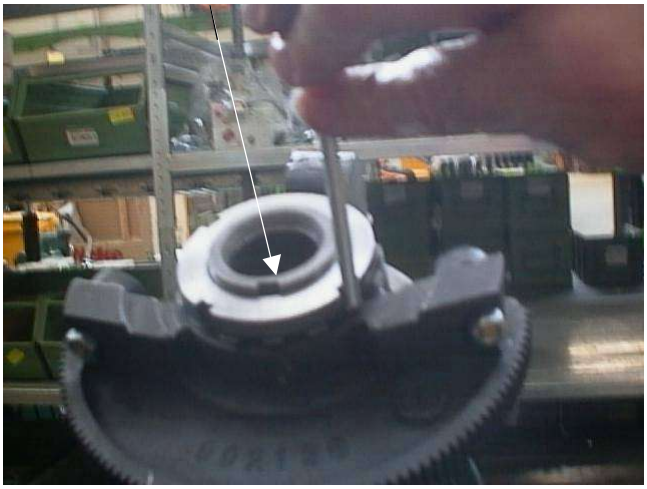
1 Fork lower button
2 Fork lift button
3 Acoustic alarm button
4 Tiller safety button
5 Traction control butterfly-shaped lever
6 Tiller body
7 Fork lift button
8 Fork lower button

Tiller body

The tiller body is a single unit made of injection molded plastic (PA6 polyamide), which is then hollowed by means of gas to create internal cavities that make the unit lighter.
The angle and size of the handles are comfortable for the operator without causing the hands to ache after long periods of use. The space within the handles is also large enough to accommodate work gloves if worn.
The mechanical stress and fracture tests confirm that the tiller body has excellent impact resistance.
Inside the tiller body there is an electronic card that receives the electrical signals from the buttons and the accelerator potentiometer. The logic processes the data received and sends it to the electronic control via serial digital transmission.

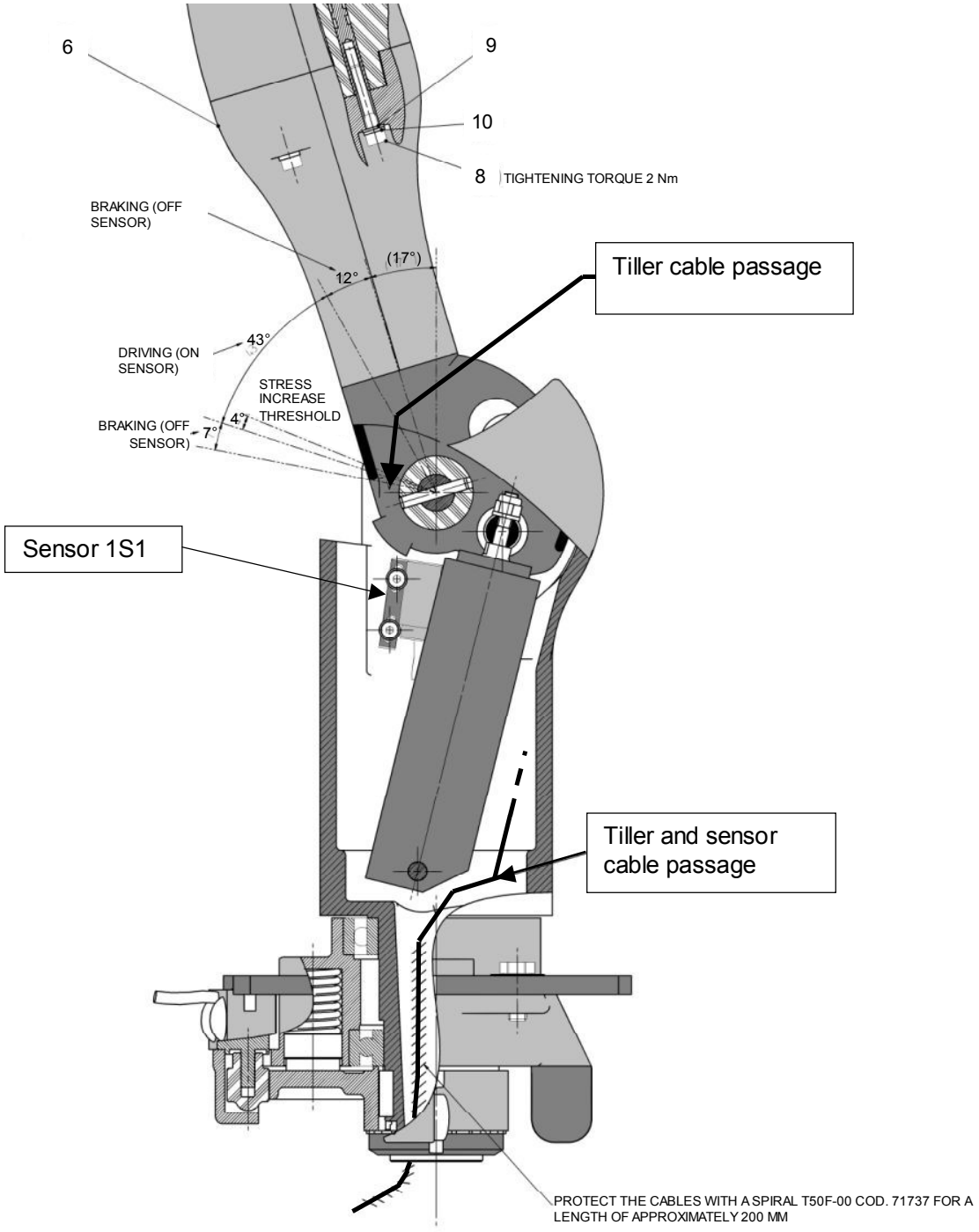
Remove the fastening nuts from the steering support hub. Support the tiller unit when removing the screws.
Remove the tiller unit from the motor compartment structure; remove the XO connector first and then the 1S1 sensor from the main opening in the tiller unit.

Main opening

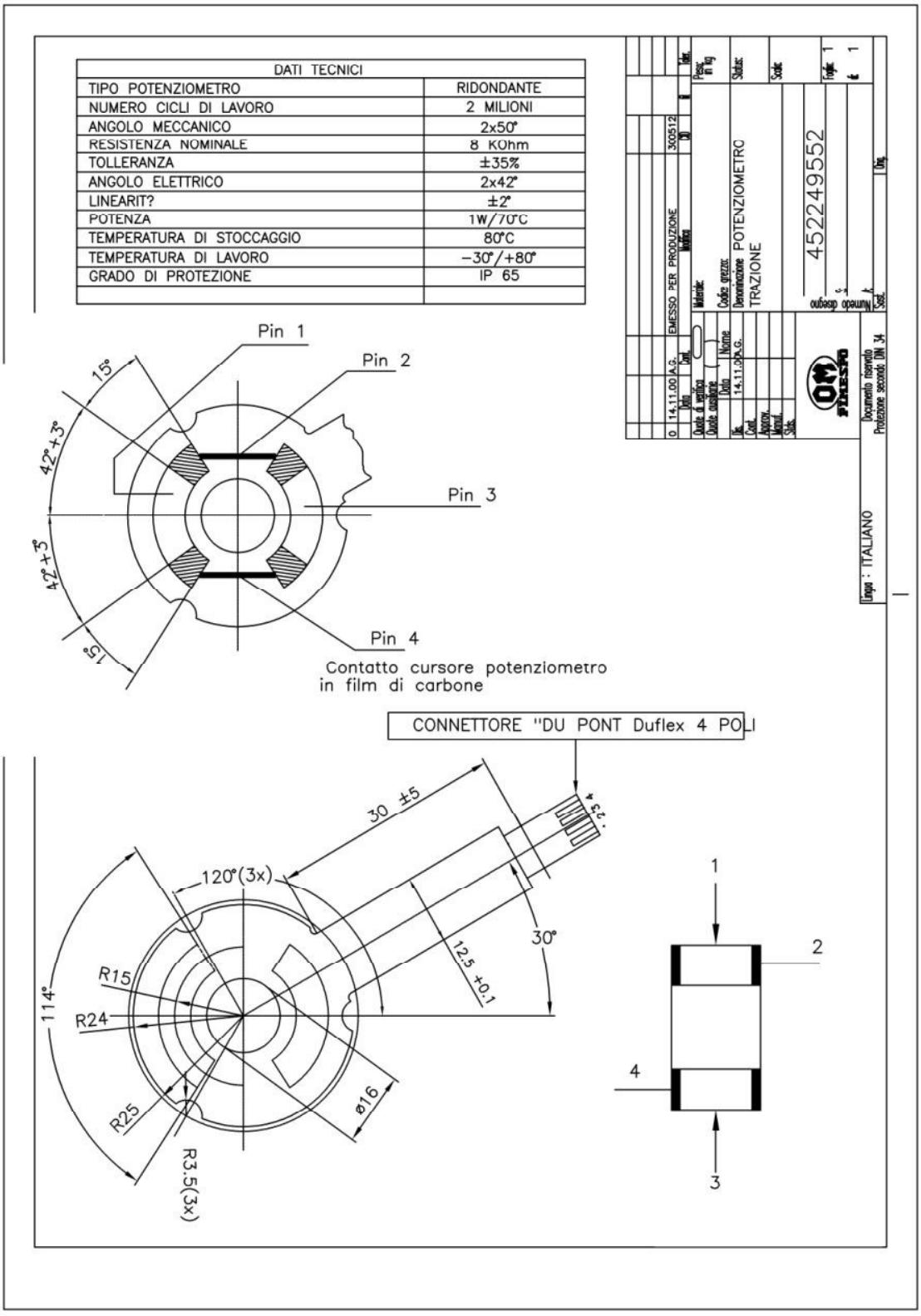


Clamp the tiller unit in a vise and using a punch, tap the lock washer tab to remove it from the lock nut cavity.

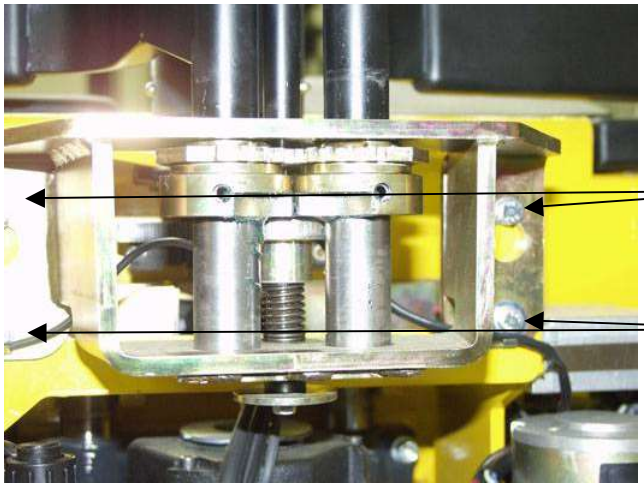
Tiller wiring diagram (side view)



Traction potentiometer



Side panel unit removal

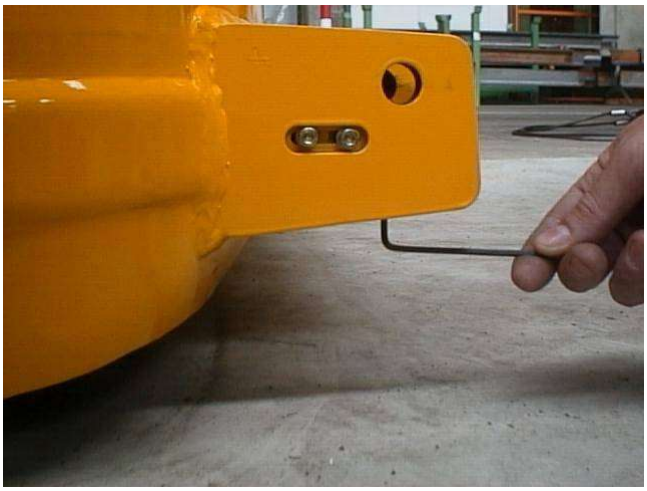


Unscrew the 4 side panel unit fastening screws but remove only the lower screws. Remove the side panel 7S1 sensor.

The side panel unit will remain suspended by the upper screws. Raise the side panel unit and pull the upper screw heads out of the holes.

Place the side panel unit on the floor or on a workbench.
Grasp the side panel sensor lock washer with a pair of adjustable pliers and unscrew the fastening screw with a wrench.

Sprag removal



Using an L-shaped Allen wrench, unscrew the sprag grub screw.

The sprag will be quickly released from its housing due to the pressure from the Belleville washers. Retrieve the Belleville washers, some of which will still remain in the hole.
There are 32 Belleville washers for each sprag.

Hydraulic castor wheel unit

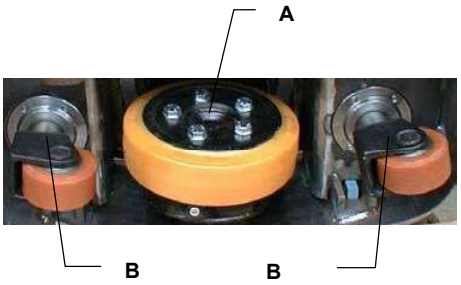
Smart hydraulic castor wheels (OM Pimespo patent)

The electrohydraulically operated castor wheel is designed to increase the stability of the truck as it is curving and yet still provide good shock absorption capability on very uneven floors.
The drive wheel is always loaded, thus providing a good grip on the floor and offering the following advantages:

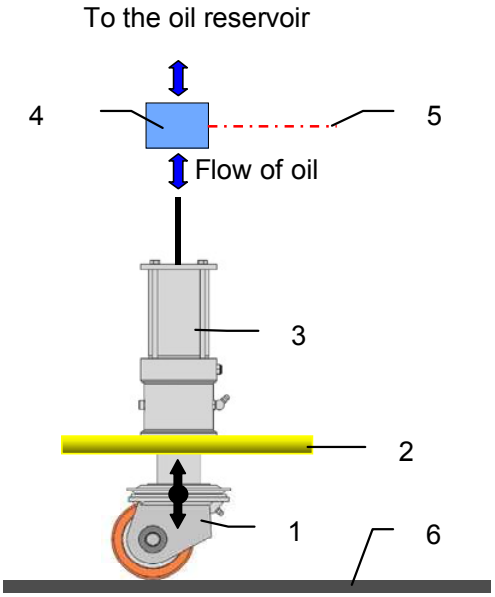
- Shorter braking distances
- Greater traction, allowing the truck to climb slopes easily and travel over steps.

The wheel unit consists of the following:

A. Fixed middle drive wheel (without springs)
B. Smart hydraulic side castor wheels, which are able to adapt to the working conditions of the truck.

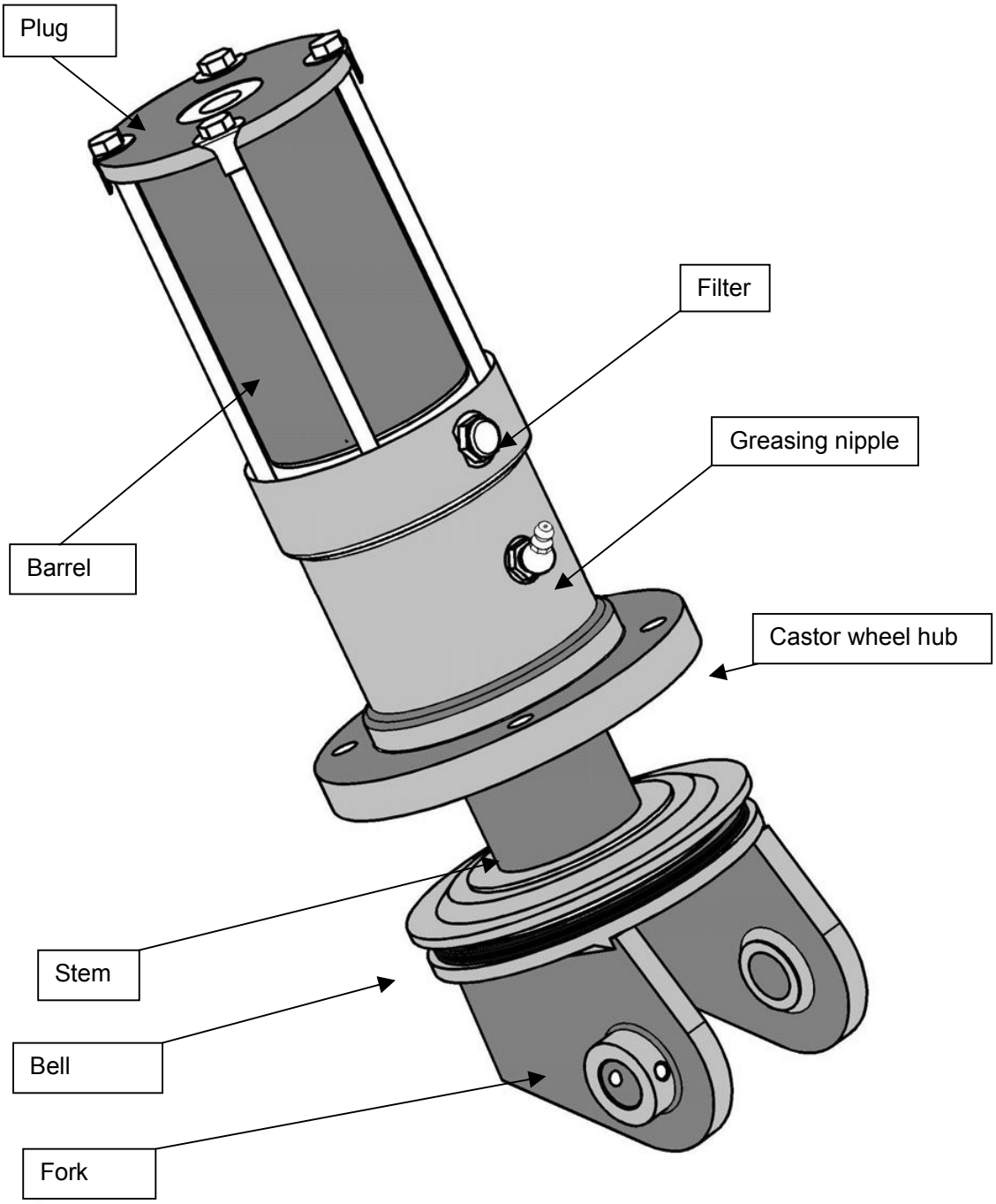


Operating principle



1 Castor wheel + stem (the part that moves with respect to the truck body)
2 Truck body
3 Castor wheel (the part that is fixed to the truck body)
4 Electrovalve that opens and closes to allow the oil to flow through
5 Electric control signal
6 Floor

Castor wheel unit

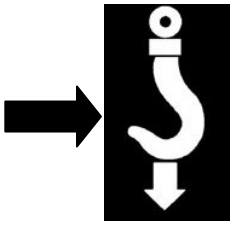


Second method of bleeding the castor wheel hydraulic system

DANGER!
When performing any operation inside the motor compartment:
- Unplug the battery
- Remove the FU4 fuse

The second method of bleeding the hydraulic system should be performed with a bridge crane to lift the truck.

Pay attention to this symbol

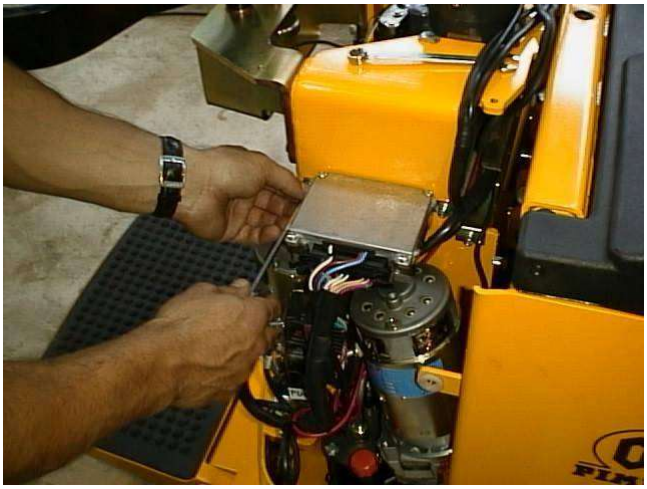


The system is completely empty and fully assembled.

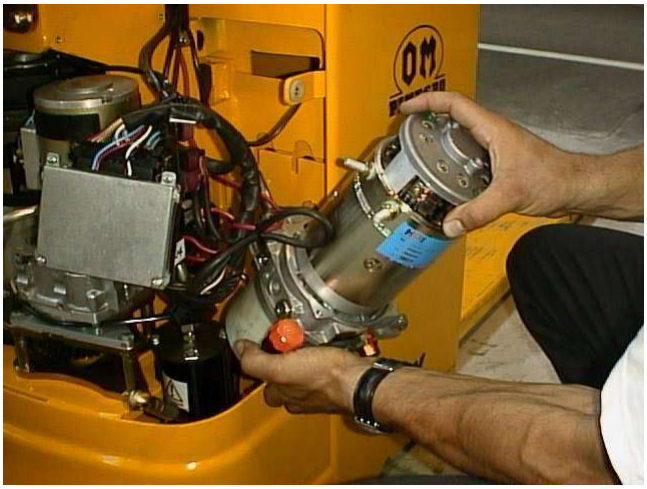
Fill the reservoir with hydraulic oil to the upper edge.

Using a bridge crane, remove the battery from its compartment following the instructions described in the Batteries chapter.
Access the fastening screws through the battery compartment and loosen them with a ratchet wrench. The electropump unit will remain suspended on the support.

Access holes for the screws

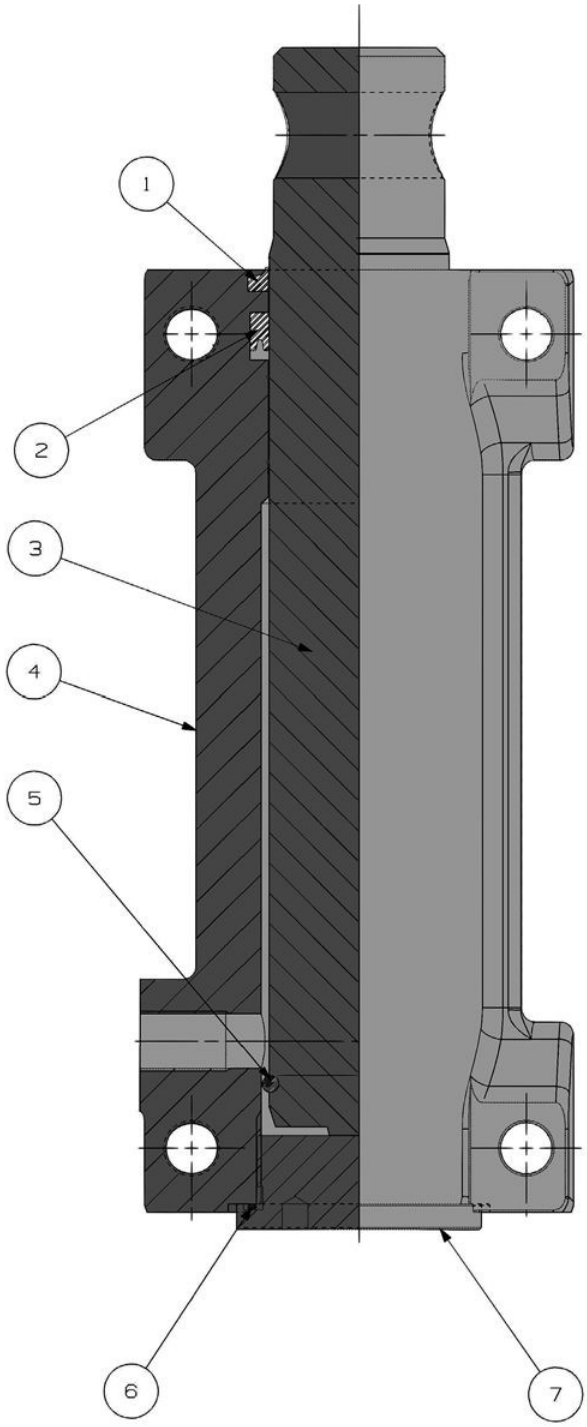


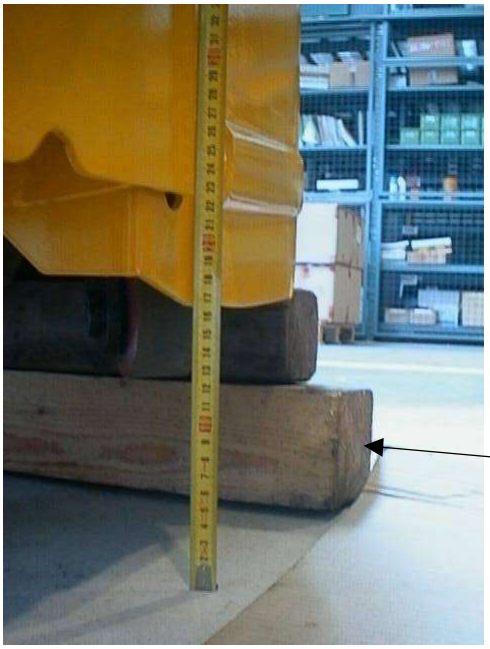
Unscrew and remove the support screws from the electric drive system. Place the L.E.S. system near the electric drive gear motor.



Grasp the hydraulic unit firmly and lift it to release the screws from the support. Lower the unit towards the castor wheel, turn the upper part towards the outside, and remove it from the motor compartment. All the necessary operations can be performed once the unit has been removed.

Lift cylinder assembly





Lift the truck until the edge of the fixed frame is 17-18 cm off the floor.
Place one or two wooden beams under the edge of fixed frame.

Wooden beams

For safety reasons, it is a good idea to leave the hydraulic jack pushed in a little way under the platform support.

COMBI System

COMBI Specifications

The traction and lift motors are controlled by the COMBI (Combined) system which is capable of working at a maximum current of 300 A. The logic and power units are mounted inside a housing complete with gaskets to provide maximum protection against splashing (water, acid, etc.), and against dust, small shavings, or particles.

- Rated power supply voltage 24V DC.
- Maximum current for the traction motor 300A DC.
- Maximum current for the pump motor 300A DC.
- High frequency MOS technology (Static).
- Real time control of the internal and external parts that may affect the behavior of the truck with self-diagnosis of the control circuits.
- Various operating configurations that can be selected from the console to meet the different needs of the operator.
- Speed control: the speed of the motor is determined by the accelerator, with automatic regenerative braking if the motor speed exceeds the preset speed, thus allowing the truck to perform optimally on slopes.
- Good traction and lift motor efficiency due to the high frequency switching of the MOSFET power transistors.
- Communication of the serial signals from the tiller, requiring less wiring.
- Monitoring microcontroller that controls the functions of the main microcontroller (redundant safety features).
- Automatic energy recovery system during traction (energy sent to the battery) in the following operating conditions:
  - Truck on a downslope with the accelerator released
  - Braking upon release of the accelerator
  - Braking when reversing
  -

The control is mounted onto an aluminum dissipator approximately 30 mm thick for improved heat exchange. The same chopper is used on different truck types but it recognizes the truck on which it has been installed and automatically selects the input/output control program, including the relevant configurations and parameters.
The coding is done by the wiring and is different for each truck, and consists of either negatively polarizing or not one or both X1:34, X1:35 inputs, SEL.1 and SEL.2 respectively.

Name	Ident. Pin.	Polarization	Type
SEL.1 SEL.2	X1:34 X1:35	Not connected Not connected	**TSX**
SEL.1 SEL.2	X1:34 X1:35	Connected to **-B** Connected to **-B**	**CTX**

Parameter Change

When the **PARAMETER CHANGE** menu is opened, it displays a list of items that can be modified to optimize the performance of the truck.
(The "curve braking" parameter has been removed).

Name	Meaning	Ref.
ACCELER. DELAY	Traction motor acceleration delay	Min = 0 Max = 9
DECELER. DELAY	Traction motor deceleration delay upon partial release of accelerator	Min = 0 Max = 9
RELEASE BRAKING	Braking upon release of travel (complete release of accelerator)	Min = 0 Max = 9
INVERS. BRAKING	Braking when traveling in reverse	Min = 0 Max = 9
CUTBACK SPEED 1	Speed reduction 1 (connected to the state of the SR1 input)	Min = 0 Max = 9
CUTBACK SPEED 2	Speed reduction 2: the maximum speed of the truck when it automatically slows down to curve	Min = 0 Max = 9
CUTBACK SPEED 3	Speed reduction 3: the maximum speed during ride-on or pedestrian operation, with the side panels positioned on the side opposite the operator (Input I2)	Min = 0 Max = 9
CREEP SPEED TR.	Power suppy voltage applied to the traction motor upon slight rotation of the accelerator	Min = 0 Max = 9
SOFT WORKING	Slow speed during "tiller always ON" operation (input 2TS)	Min = 0 Max = 9
MAX SPEED FORW	Maximum traction speed when traveling in the direction of the operator during ride-on operation and with the side panels positioned on the operator side	Min = 0 Max = 9
MAX SPEED BACK	Maximum traction speed when traveling in the direction of the forks during ride-on operation and with the side panels positioned on the operator side	Min = 0 Max = 9
MAX. I TRACTION	Maximum armature current on the traction motor	Min = 0 Max = 9
ARMA NOM CURR.	Minimum nominal armature current below which the field will be weakened	Min = 0 Max = 9
WEAK DROPOUT	Value of the armature current to exit the weakened field	Min = 0 Max = 9
FIELD CURR. MAX	Maximum current of the traction motor field	Min = 0 Max = 9
FIELD NOM CURR.	Nominal current of the traction motor field	Min = 0 Max = 9
PU. ACCELER. DEL	Pump motor acceleration delay	Min = 0 Max = 9
PU. DECELER. DEL	Pump motor deceleration delay upon partial release of the tiller second automatic return lever	Min = 0 Max = 9
LEVER LIFT SPEED	Lift speed with the tiller second automatic return lever or with the distributor	Min = 0 Max = 9
LIFT SPEED	Lift speed with the tiller button	Min = 0 Max = 9

ALARMS	PROBABLE CAUSES	CORRECTIVE ACTION
I TR.=0 (EVER) **(B)** There is no traction current when the truck is driving or braking.	• The motor is disconnected. • The current sensor is broken.	• Check the connections. • Replace the system.
HIGH I TR. ST. BY **(B)** The rotor (driving or braking) is high when the truck is started or when it is at rest.	• The current sensors give a false reading. • Abnormal current flow to the traction motor	• Replace the system.
HIGH FIELD CURRENT **(B)** The field current is high when the truck is started or is at rest.	• The current sensors give a false reading. • Abnormal current flow to the traction motor	• Replace the system.
NO FIELD CUR. **(B)** There is no field current when the traction function is invoked, or when the traction rest phase is being monitored.	• The emergency button coil is not connected. • The motor field is not connected.	• Check that the emergency button coil is connected. • Check that the field power cables are connected correctly.
CAPACITOR CHARGE **(B)** The COMBI power unit capacitors cannot be charged.	• There may be a shortcircuit on the outlets. • The traction motor armature is not connected.	• Check that there are no shortcircuits on the outlets. • Check that the traction motor wires are connected correctly.
TH. PROTECTION Thermal protection on the chopper.	• The temperature of the chopper is ≥77 °C (if there is a loss of performance) or higher than 90 °C (if the truck has stopped).	• Switch off the truck and allow it to rest until the temperature falls below the limit.
BATTERY LOW The lift function is locked out due to low battery.	• The battery is discharged.	• Recharge the battery.
CHARGING BATTERY **(B)** The battery is being charged with the on-board rectifier.	• It is functioning correctly. • The connection wire between pins X4:9 and X4:10 is disconnected.	• No corrective action. • Connect it again (the battery charger is not on board).
CONTACTOR DRIVER **(B)** The emergency button power contactors do not close during synchronization.	• The emergency button control circuit is broken.	• Check that the emergency button is functioning correctly.
TR. ACC NOT OK **(B)** The accelerator voltage is not correct.	• The traction accelerator voltage is greater than the minimum stand-by value.	• Replace the potentiometer. • Replace the system. • Perform the VACC program.

Electrical system

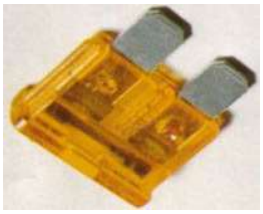
Sheaths and connectors

This truck is equipped with automotive-type wiring:

- All the wires are protected by sheaths, and the shunts are ultrasonically welded and protected by heat-shrink tubing.
- All the connectors and fuse holders are fastened to the body of the truck with metal brackets, thus avoiding problems caused by vibrations.
- With the exception of the electric drive connector, all the remaining connectors are protected to IP67 standard. Each wire is individually fastened and sealed with a silicon seal.

Fuse protection

All the electrical power signals are protected by fuses:



Blade-type fuse protection:

- 5A fuse protects the COMBI logic and tiller card
- 10A fuse protects the auxiliary systems
- 30A fuse protects the electric drive
- These are automotive-type fuses that are easy to find

Power supply fuse protection:

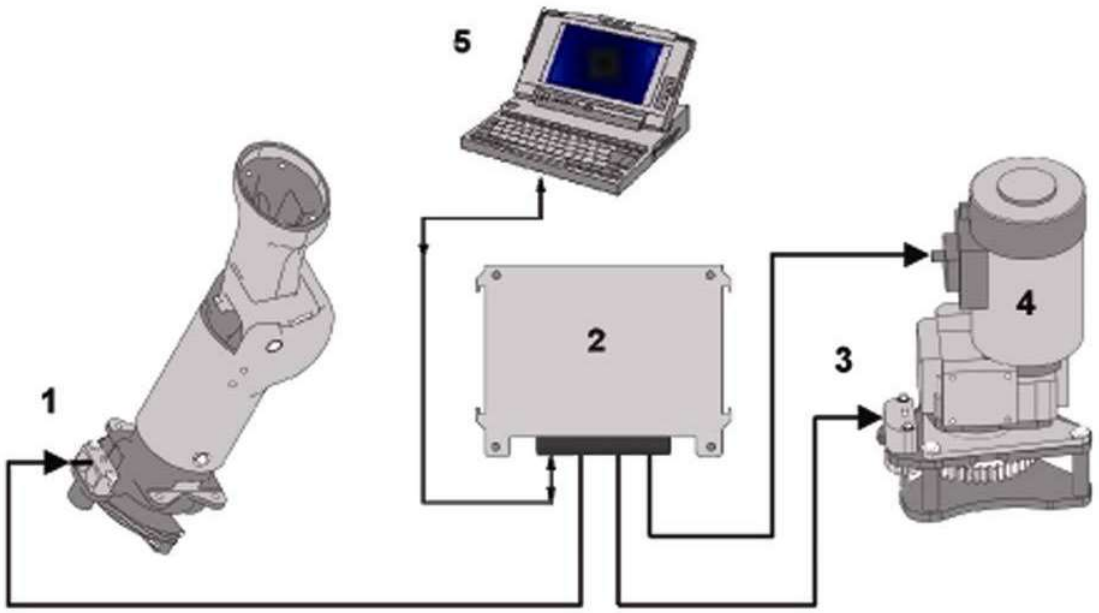
- 300A fuse protects the traction and lift motors

Potenziometro ruota motrice	Drive wheel potentiometer
Potenziometro sterzo guida elettrica	Electric drive steering potentiometer
Potenziometro trazione-timone	Tiller-traction potentiometer
Protezione secondo DIN34	Protected to DIN34
Puls. avvisatore acustico	Acoustic alarm button
Puls. disc. dx/sx superiore	Upper right /left lower button
Puls. soll. dx/sx superiore	Upper right/left lift button
Pulsante arresto di emergenza	Emergency stop button
Pulsante sicurezza timone	Tiller safety button
Quote ausiliarie	Auxiliary dimensions
Quote di verifica	Test dimensions
Raddrizzatore	Rectifier
Rele di potenza guida elettrica	Electric drive power relay
Rosa	Pink
Rosso	Red
Scala	Scale
Scheda timone	Tiller card
Schema di collegamento elettrico	Electrical connection diagram
Sensore fine corsa sollevamento	Lift limit stop sensor
Sensore lato centralina idraulica	Sensor on hydraulic unit side
Sensore lato opposto centralina idraulica	Sensor on opposite side of hydraulic unit
Sensore livello olio ruote	Wheel oil level sensor
Sensore optional	Optional sensor
Sensore pedana giù/su	Platform down/up sensor
Sensore spondine	Side panel sensor
Sensore timone	Tiller sensor
Sost.	Replaces
Spina Schuko	Schuko plug
Tutti i simboli, i relativi contrassegni e le abbreviazioni dei colori dei cavi introdotti nel presente schema fanno riferimento alle seguenti norme: EN 60617-xx, CEI 44-6, VDE0293, IEC757	All the symbols, markings and abbreviations for the wire colors referenced in this diagram are in accordance with the following standards: EN 60617-xx, CEI 44-6, VDE0293, IEC757
Valvola pivotante ruota dx/sx	Right/left castor wheel valve
Verde	Green
Viola	Violet

L.E.S. Electric Drive

Steering System

The L.E.S. (Linde Electrical Steering) electric drive system is used. This system is already used by the Linde Group, thus it is tested and safe.
It is made up of the following components:

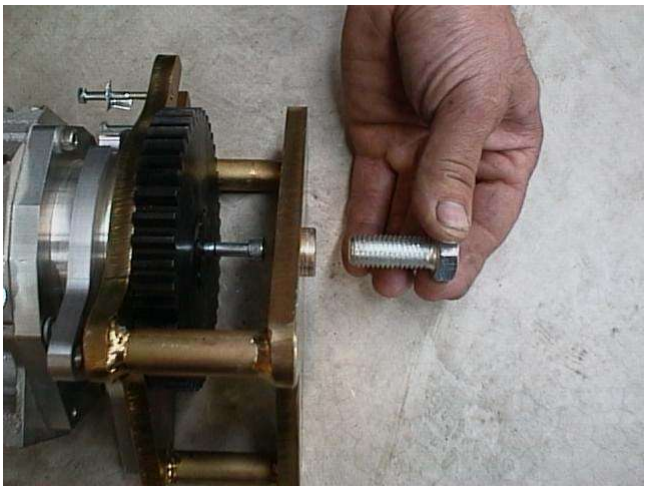


1 Potentiometer detecting the position of the tiller arm
2 L.E.S. electronic control unit
3 Potentiometer detecting the position of the driving wheel
4 Steering electric motor
5 PC with Service software

The steering hardening (tiller arm) is achieved through a disk braking system.
The braking is adjusted so as to enable the operator to steer without a considerable effort when the truck is not running and to run at full speed without perceiving a "light steering" sensation.
The tiller/wheel gear ratio is 1:1.2, bearing in mind that the peak rotation of the tiller arm is equal to ±75°, whereas the peak rotation of the driving wheel is equal to ±90°.

Alarm Table

Code	Probable Causes	Corrective Action
20-23	Truck identification problems through the Pin-codes	
24	Wrong encoding of the truck: for the electric drive the identification occurs through the wiring (input combination 21, 18 and 4)	• Check the encoding read in the window (AuxAB and Code). • Check the corresponding wiring
27	The emergency K1 relay contact does not open when starting up the truck: When switching the truck on, the K1 relay should be open.	• If this code appears, the contact may be stuck or short-circuited. Check the lack of short-circuit between the pins 2 and 14 on module and wiring sides (switch the truck off).
28	Emergency relay open during the operation: the safety relay is closed by LES during standard operation and is open in the event of a failure.	Open the LES module and check: • If the internal K1 relay has a mechanical or electric defect, the module should be replaced. Before the replacement, check: • The RC circuit that prevents the oxidation when the relay is mechanically intact; • The proper wiring of the truck, when the relay contacts are not burnt-out.
29	The external 3K1power relay contact is not at rest before the tripping of the control. **Note:** when the key-contact is closed, the LES circuit checks the protection devices before energizing the power relay.	Check the 3K1 relay. If the contacts are stuck, the probable cause is a motor short-circuit, thus check: • The power line that may be damaged; • The FU4 fuse; • The mos-fet (LES card).
30	Failure in the control of the external 3K1 power relay.	Failure within the LES module:
31	The external 3K1power relay contact could not close.	Probable causes: • The relay is not energized; • The contact is mechanically broken; • The contact is oxidised.



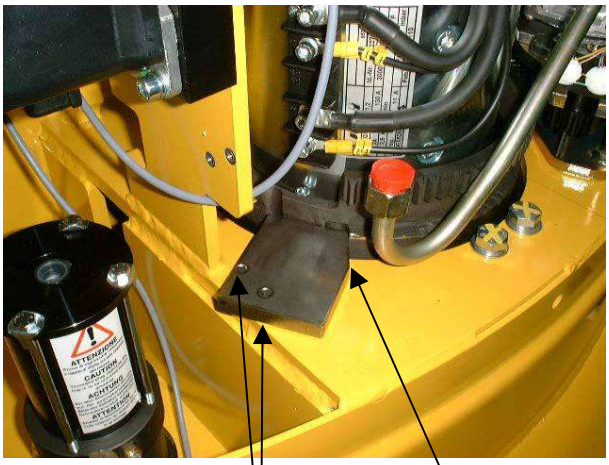
Screw a **TE M14X35** screw in the bush.

By means of a wrench, screw it against the Allen screw head.

By screwing further, the pinion will be pulled out of the shaft.

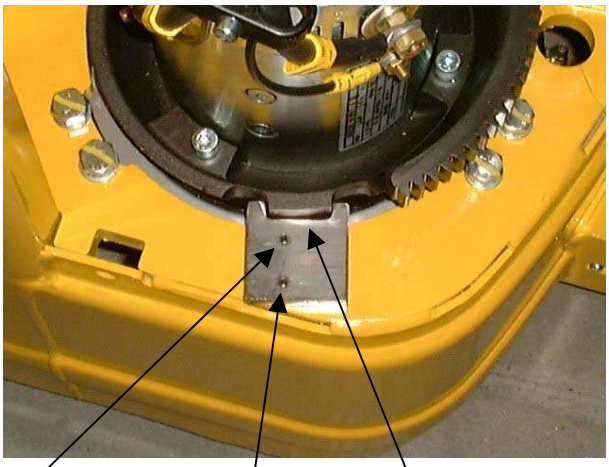
Electric Drive Calibration

ATTENTION: This operation should be performed with switched on truck, only in the cases specified. Work very carefully, especially in the gear area.
Before beginning the calibration of the electric drive system, it is necessary to make some centering reference marks on the reducer unit and on the tiller unit.



Use the dedicated tool for centering the **TSX** reducer unit.
Lift the truck by a few centimeters from the ground. Apply the tool and tighten it by means of screws in the holes located in the lower part of the frame. Turn the reducer unit until it bottoms against the tool.

Refer to section 18 of the recommendations for the technician for manufacturing the tool.



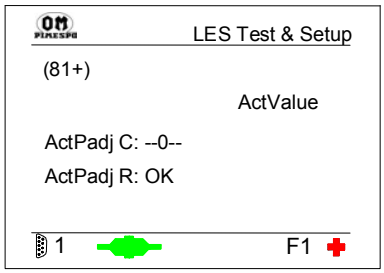
Use the dedicated tool for centering the **CTX**, reducer unit.
Lift the truck by a few centimeters from the ground. Turn the reducer unit as long as the motor flange cam is aligned with the securing holes of the sensor /S3.
Apply the tool and turn the reducer unit as long as the holes are lined up with the lower frame part holes.
Tighten with screws.

Refer to section 18 of the recommendations for the technician for manufacturing the tool.

Driving Wheel Potentiometer Calibration Test

- Type **“81”.**

The following procedure should be performed when the truck is switched on.
When the tiller is in its working position, centre it and then release it in a vertical position.
Press "ENTER". If - >0< - is displayed after ActPadj C, the calibration is correct.

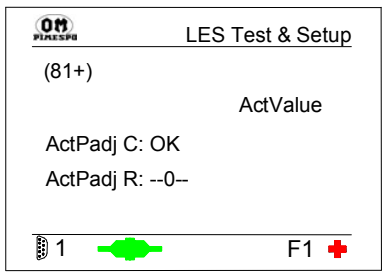


Should the >0< symbol not appear, press “ARROW UP” or “ARROW DOWN” to get it.
The value shown by the ActPadj C variable may be adjusted of some mV on the right or on the left of the zero point (error voltage). Check the reference values on the reduction unit for alignment to each other when the truck is stopped. As alternative, check the performance of the running truck (the tiller and steering wheel arms should be parallel to the fork arms). The truck should run on a straight line.

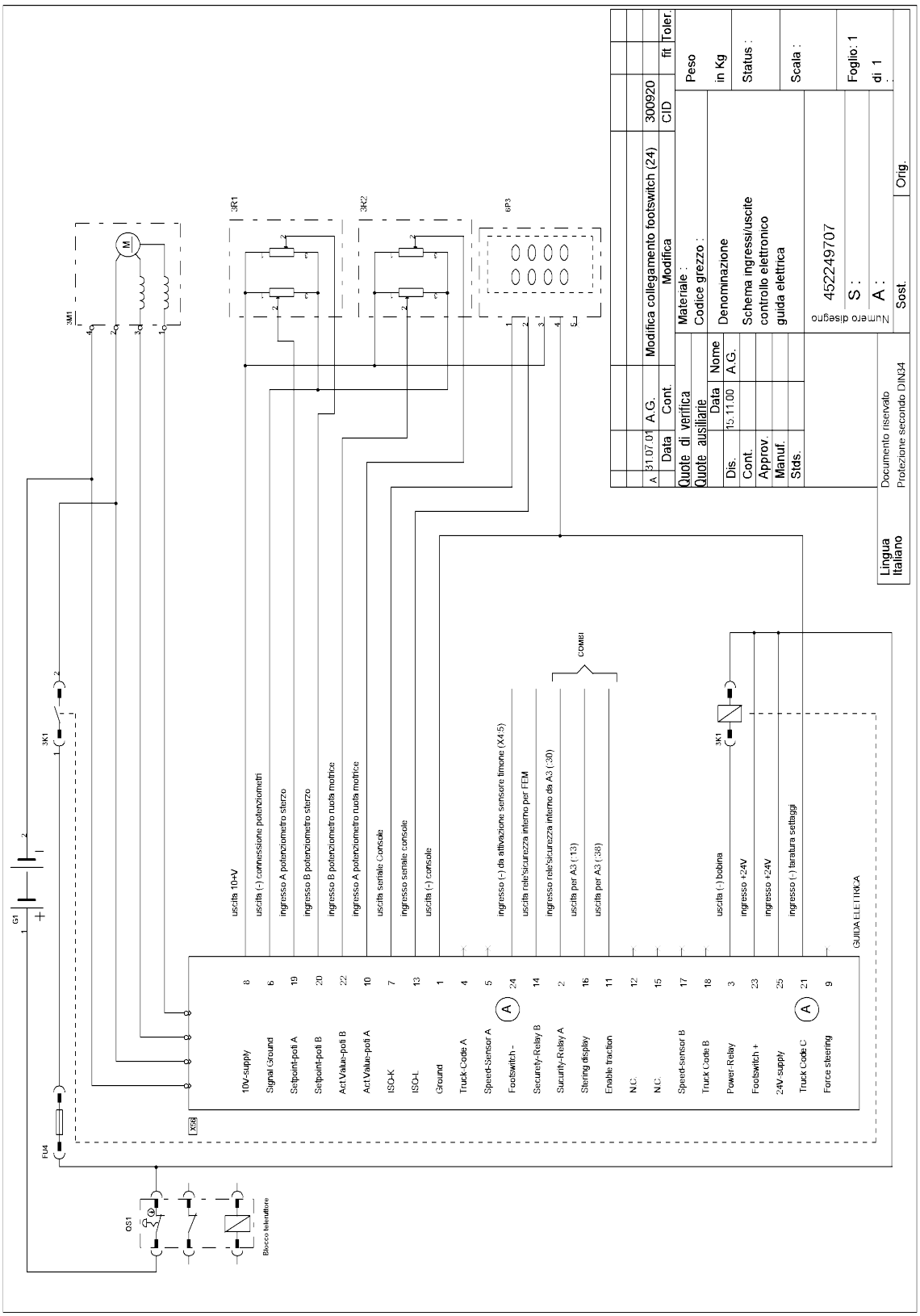
- Press **“BACK SPACE”** to confirm; **an acoustic signal will be heard.**
- Check the “OK” message on the ActPadj C line.

For entering automatically the second point of the calibration step, proceed as follows:

- Turn the tiller **clockwise** as long as its stroke limit position is reached (space bar depressed).
  Should the >0< symbol not appear, press “ARROW UP” or “ARROW DOWN” to get it.
- Press **“BACK SPACE”** to confirm; **an acoustic signal will be heard.**
- Check the “OK” message on the ActPadj RC line.

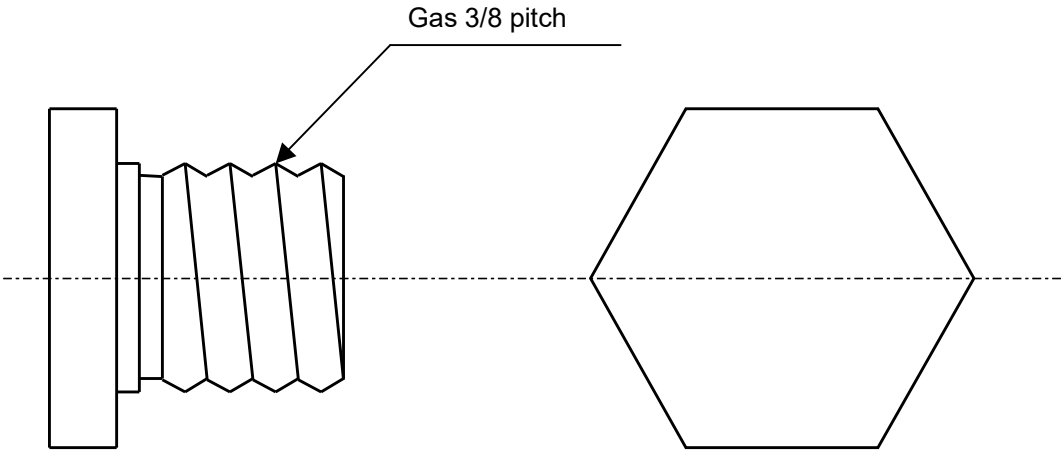


Electric Drive Input/Output Diagram (See drawings in A3 format)

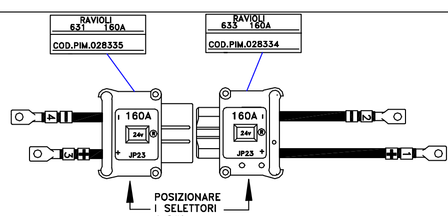


Isolare la saldatura	Insulate Welding
OG – Arancio	OG – Orange
A – Azzurro	A – Light Blue
WH – Bianco	WH – White
BU – Blu	BU – Blue
YE – Yellow	YE – Giallo
GY – Grigio	GY – Grey
BN – Marrone	BN – Brown
BK – Nero	BK – Black
PK – Rosa	PK – Pink
RD – Rosso	RD – Red
GN – Verde	GN – Green
VT – Viola	VT - Violet
Tolleranza lunghezza conduttori Nm	Conductor length tolerance in mm
Fino a 300	Up to 300
Da 300 a 600	300 to 600
Da 600 in poi	600 On
Se si sommano delle singole misure la tolleranza da considerare è quella della quota totale	If you add each measure, consider the total value as tolerance.
Tutti i simboli, i relativi contrassegni e le abbreviazioni dei colori dei cavi, introdotti nel presente schema, fanno riferimento alle seguenti norme: EN 6061/-xx;CEI 44-6; VDE 0293 IEC 75/	All symbols, the corresponding marks and acronyms of colours for cables as in this diagram make reference to the following standards: EN 6061/-xx;CEI 44-6; VDE 0293 IEC 75/
Morsettiera -B Impianto Combi +24V dopo pulsante emergenza Al microinterruttore di 3K1 Morsettiera 3M1 Alla bobina relè 3K1	Welding -B combined system +24V after the emergency button has been pressed in 3K1 microswitch 3MI Terminal Board in 3K1 Relay Coil
Emesso per produzione	Production
Data - Cont.	Date - cont.
Modifica	Change
Tolleranze	Tolerance
Quote di verifica	Check values
Materiale	Material
Quote ausiliarie	Auxiliary values
Codice grezzo	Raw material code
Peso in kg – Status - Scale	Weight in kg – Status - Scale
Denominazione	Denomination
Data – Nome	Date Name
Dis. – Cont. – Approved – Manuf. – Stds.	Drw. - Cont. - Approved – Manuf. – Stds.
Guaina guida elettrica	Electric drive sheath
Lingua: Inglese	Language: English
Documento riservato - Protezione secondo DIN34	Confidential Document Protection according to DIN34
Foglio 1/1	Paper 1/1
Numero disegno	DRW No.
Sostituito	Replaced
Originale	Original

Plug for the castor wheel hydraulic unit



CODICE	COLORE	N. CAVO	SEZIONE (mmq)	CONTATTI	LUNGHEZZA (mm)	CAPOCORDA (D.)	CL	TL	TSX	CTX	TN	CN	LOGO			
452106011	CODICE PRESA COMPLETA CABLATA						●									
452106012	BK	1	25		170	10	●									
452106013	BK	2	25		700	10	●									
452106014	CODICE SPINA COMPLETA CABLATA						●									
452106015	BK	3	25		740	8	●									
452106016	BK	4	25		970	8	●									
452006007	CODICE PRESA COMPLETA CABLATA							●								
452006008	BK	1	25		420	10		●								
452006009	BK	2	25		420	10		●								
452006010	CODICE SPINA COMPLETA CABLATA							●								
452006011	BK	3	25		920	8		●								
452006012	BK	4	25		1025	8		●								
452206508	CODICE PRESA COMPLETA CABLATA								●		●					
	BK	1	25		450	10			●		●					
	BK	2	25		450	10			●		●					
452206511	CODICE SPINA COMPLETA CABLATA								●							
	BK	3	25		1220	8			●							
	BK	4	25		1220	8			●							
452306007	CODICE PRESA COMPLETA CABLATA									●		●				
	BK	1	25		400	10				●		●				
	BK	2	25		860	10				●		●				
452306010	CODICE SPINA COMPLETA CABLATA									●						
	BK	3	25		1550	8				●						
	BK	4	25		1300	8				●						
452606011	CODICE SPINA COMPLETA CABLATA										●					
	BK	3	25		920	8					●					
	BK	4	25		1160	8					●					
452506008	CODICE SPINA COMPLETA CABLATA											●				
	BK	3	25		440	8						●				
	BK	4	25		1025	8						●				
(*) 87506060	CODICE PRESA COMPLETA CABLATA												●			
87506061	BK	1	25		850	10							●			
87506010	BK	2	25		850	10							●			
87506205	CODICE SPINA COMPLETA CABLATA												●			
	BK	3	25		2720	8							●			
	BK	4	25		2660	8							●			
	CODICE PRESA COMPLETA CABLATA															
	BK	1				10										
	BK	2				10										
	CODICE SPINA COMPLETA CABLATA															
	BK	3				8										
	BK	4				8										
	CODICE PRESA COMPLETA CABLATA															
	BK	1				10										
	BK	2				10										
	CODICE SPINA COMPLETA CABLATA															
	BK	3				8										
	BK	4				8										
	CODICE PRESA COMPLETA CABLATA															
	BK	1				10										
	BK	2				10										
	CODICE SPINA COMPLETA CABLATA															
	BK	3				8										
	BK	4				8										
	CODICE PRESA COMPLETA CABLATA															
	BK	1				10										
	BK	2				10										
	CODICE SPINA COMPLETA CABLATA															
	BK	3				8										
	BK	4				8										



La lunghezza indicata in tabella si riferisce al cavo non lavorato.
Il cablaggio deve essere eseguito ad opera d'arte.

DATI TECNICI CAVO	
TENSIONE NOM.	450/750 V
TEMP. MAX. DI ESERCIZIO	70°C sul conduttore
RAGGIO MINIMO DI CURVATURA	6 volte il diametro esterno max
CARATTERISTICHE PARTICOLARI	non propagante la fiamma

(*) presa batteria come indicato in figura a lato con l'aggiunta della maniglia presa batteria cod. Pim. 95301156

TOLLERANZA LUNGHEZZE CONDUTTORI IN mm		
fino a 300	da 300 a 600	da 600 in poi
+10	+20	+30
-10	-10	-20

La tolleranza della somma di piú lunghezze è quella del valore totale

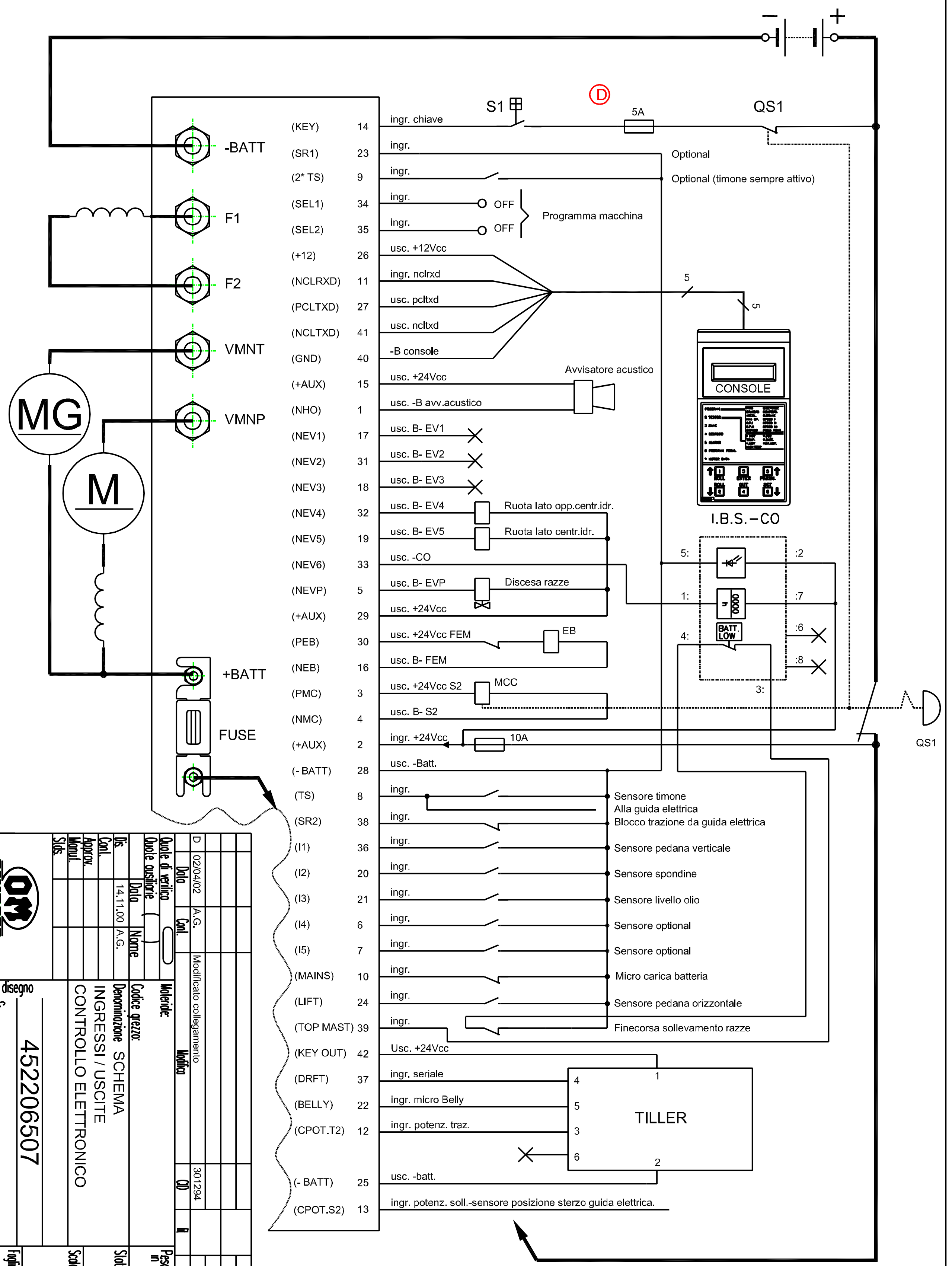
DATI TECNICI PRESA - SPINA	
PORTATA NOM.	160A
TENSIONE MAX DI ESERCIZIO	150V c.c.
COSTRUZIONE SECONDO NORME	DIN43589-1, -2;FEM4.007a, b E CEE86/663 Add.C
GRADO DI PROTEZIONE	IP23
LIMITI DI TEMPERATURA	-20deg.C / +90deg.C
VITA MECCANICA	10^6 OPERAZIONI

NOTE AI COMPONENTI
Conduttore a corda flessibile di rame ricotto rosso,isolamento in PVC
Term. ad occhiello non isolati: prestazioni basate su UL486A, BS4579-1, IEC77

	DATA	MODIFICA	CONT	CID
0	set-99	emesso per produzione	R.G.	300003
D	18/07/01	modificata lunghezza cavi	D.S.	300919

LOGICA PER CONTROLLO ELETTRONICO 300A + 300A

TSX



D	02/04/02	A.G.	Modificato collegamento
Quale di verifica	Data	Cont.	Modifica

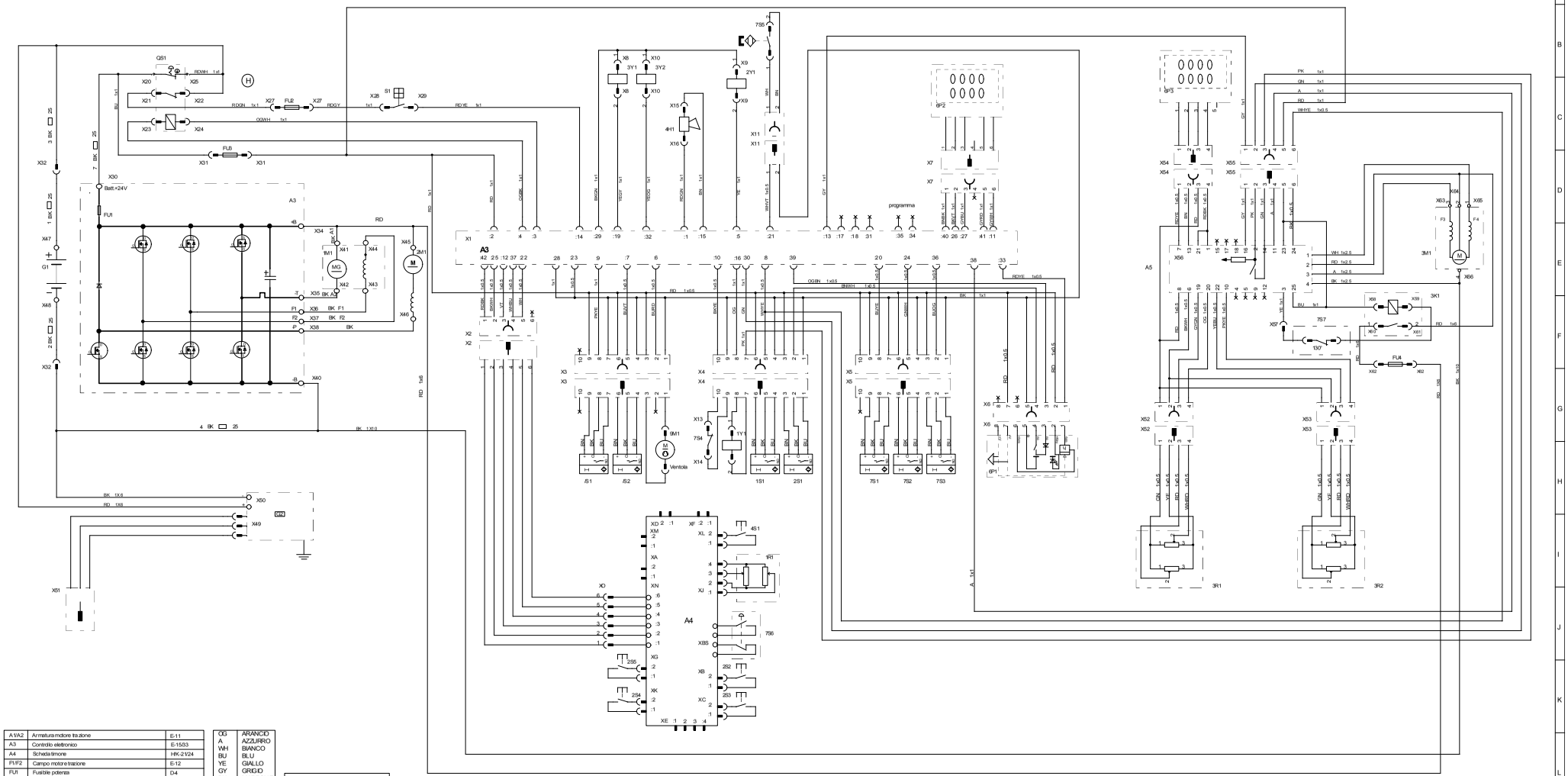
Quote ausiliarie

	Data	Nome
Dis.	14.11.00	A.G.
Cont.		
Approv.		
Manuf.		
Stds.		

Materiale:
Codice grezzo:
Denominazione SCHEMA INGRESSI / USCITE CONTROLLO ELETTRONICO
Numero disegno 452206507
Sost. A:
S:
Orig.
301294 CAD
Peso: in kg
Toler.
Status:
Scala:
Foglio: 1 di 1

Documento riservato
Protezione secondo DIN 34

Lingua : ITALIANO



A-YA2	Armatura motore trazione	E-11
A3	Controllo elettronico	E-15/33
A4	Scheda timone	HK-21/24
F1/F2	Campo motore trazione	E-12
FU1	Fusibile potenza	D-4
FU2	Fusibile elettronica	C-10
FU3	Fusibile ausiliari	D-8
G1	Batteria	E-2
G2	Raddrizzatore	HR-8/11
4H1	Avvisatore acustico	C-22/23
1M1	Motore trazione	E-11
2M1	Motore pompa sollevamento	E-14
6P1	indicatore batteria scarica + contatore	GH-35/55
6P2	Consolle	B/C-30/33
QS1	Pulsante arresto di emergenza	B/C-6/7
S1	Chiave	C-13
1S1	Sensore optional	H- 19/20
1S1	Sensore timone	H-25
2S1	Sensore fine corsa sollevamento	H-26
2S2	Puls. soll. dx superiore	K-24
2S3	Puls. disc. sx superiore	K-24
2S4	Puls. sdl. dx inferiore	K-20
2S5	Puls. disc. sx inferiore	K-20
5J2	Sensore optional	H-21
5M1	Ventola (optional)	H-22
4S1	Puls. avvisatore acustico	I-24
7S1	Sensore sponsline	H-29
7S2	Sensore pedana Giù	H-30
7S3	Sensore pedana su	H-31
7S4	Micro carica batteria	GH-23
7S5	Sensore livello dio ruote	B-25/26
7S6	Pulsante sicurezza timone	J-24/25
XA	Connettore 2 poli	I-22
XB	Connettore 2 poli	K-23
XBS	Terminali saldati su A4	J-23
XC	Connettore 2 poli	K-23
XD	Connettore 2 poli	I-22
XE	Connettore Dupont Dubox 4 poli	K-22/23
XF	Connettore 2 poli	I-23
XG	Connettore 2 poli	J-21
XH	Connettore Dupont Dubox 4 poli	I-23
XJ	Connettore Dupont Dubox 4 poli	I-23
XK	Connettore 2 poli	K-21
XL	Connettore 2 poli	I-23
XM	Connettore 2 poli	I-21
XN	Cavi saldati senza connettore	J-21
XO	Connettore Molex 6pdi	J-20
XP	-	-
1R1	Potenziometro trazione timone	IU-24/25
7S7	Sensore termico	F-43
-	-	-

OG	ARANCIO
A	AZZURRO
WH	BIANCO
BU	BLU
YE	GIALLO
GY	GRIGIO
BN	MARRONE
BK	NERO
PK	ROSA
RD	ROSSO
GN	VERDE
VT	VIOLA

Tutti i simboli, i relativi contrassegni e le abbreviazione dei colori dei cavi, introdotti nel presente schema, fanno riferimento alle seguenti norme: EN 60617- xx ; CEI 44-6; VDE 0293 IEC 757

X1	connettore SAAB 42 poli -nero-	E-15/33	X22	Contatto QS1: microinterruttore	C-7	X45	Morsetto 2M1: +24V (nella versione 1.8KW)	E-14	3K1	Rele' di potenza guida elettrica	E/F-44/46				
X2	connettore SAAB 6 poli -nero-	F-16/18	X23	Contatto QS1: -BOB	C-5	X46	Morsetto 2M1: -B (nella versione 1.8KW)	F-14	3R1	Potenziometro di sterzo guida elettrica	I-37/39				
X3	connettore SAAB 10 poli -nero-	F/G-19/22	X24	Contatto QS1: +BOB	C-7	X47	Morsetto batteria +	E-2	3R2	Potenziometro rusta motrice	I-42/44				
X4	connettore SAAB 10 poli -grigio-	F/G-23/27	X25	Morsetto QS1	B-7	X48	Morsetto batteria -	F-2	X52	Connettore SAAB 4 poli -grigio-	G-38/39				
X5	connettore SAAB 10 poli -blu-	F/G-28/31	X27	Contatto FU2	C-9/10	X49	Connettore femmina 3 vie (raddrizzatore)	I-8	X53	Connettore SAAB 4 poli -nero-	G-43/44				
X6	connettore molex 6poli	G-32/35	X28	Contatto S1: B+ diretto	C-13	X50	Cavi senza connettore (raddrizzatore)	H-8	X54	Connettore SAAB 4 poli -nero-	C/D-38/39				
X7	connettore SAAB 6 poli -nero-	C/D-31/33	X29	Contatto S2: ritorno	C-14	X51	Spina Schuko	J-3	X55	Connettore SAAB 6 poli -nero-	C/D-40/42				
X8	connttopre JPT 2 poli	B/C-21	X30	morsetto Batt. +24V	D-4	--	---	--	X56	Connettore AMP 25 poli	E-38/43				
X9	connettore DIN 43650 PG9	B/C-24	X31	Contatto FU3	D-7/9	--	---	--	X57	Giunto a 1 via	F-42				
X10	connettore JPT 2 poli	B/C-20	X32	Spina - presa	D/F-2	--	---	--	X58	Contatto 3K1: +bobina	F-45				
X11	Connettore MOLEX 2 poli	C/D-25/26	X34	morsetto +B	E-10	1Y1	Freno elettromagnetico	G/H-24	X59	Contatto 3K1: -bobina	F-46				
--	---	--	X35	morsetto -T	F-10	2Y1	Elettrovalvola discesa rapze	B/C-24	X60	Contatto 3K1: microinterruttore	F-45				
X13	Contatto 7S4: MANS	G-23	X36	morsetto F1	F- 10	3Y1	Valvola proporzionale ruota dx	B/C-20	X61	Contatto 3K1: microinterruttore	F-46				
X14	Contatto 7S4: -B	H-23	X37	morsetto F2	F- 10	3Y2	Valvola proporzionale ruota sx	B/C-21	X62	Contatto FU4	F-45/46				
X15	Contatto 4H1: (+)	C-22	X38	morsetto -P	F-10	--	---	--	X63	Morsetto 3M1:	D-47				
X16	Contatto 4H1: (-)	C-22	X40	morsetto -B	G-10	--	---	--	X64	Morsetto 3M1: +24V	D-47				
X17	Predisposizione contatto 9M1: (+)	G-13	X41	Morsetto 1M1: +24V	E-11	A5	Controllo elettronico guida elettrica	E-38/43	X65	Morsetto 3M1:	D-48				
X18	Predisposizione contatto 9M1: (-)	G-15	X42	Morsetto 1M1: -B	E-11	FU4	Fusibile potenza guida elettrica	F-45/46	X66	Morsetto 3M1: connessione B-	E-47				
X20	Morsetto QS1	B-5	X43	Morsetto F1 motore trazione	E- 12	3M1	Motore guida elettrica	D/E-47/48	--	---	---				
X21	Contatto QS1: microinterruttore	C-5	X44	Morsetto F2 motore trazione	E-12	6P3	Consolle	B/C-38/40	--	---	---				

H	02.04.02	A.G.	Modificato collegamento 301294
	Data	Cont.	Modifica CID fit Toler.

Quote di verifica

Quote ausiliarie

	Data	Nome
Dis.	14.11.00	A.G.
Cont.		
Approv.		
Manuf.		
Stds.		

Materiale :
Codice grezzo :

Denominazione

Schema di collegamento elettrico

Peso in Kg

Status :

Scala :

Numero disegno 452206529

S :

A :

Foglio: 1 di 1

Sost. Orig.

PIMESPO

Lingua Italiano

Documento riservato
Protezione secondo DIN 34

Tappo in gomma per ….. e …..	Rubber cap for ….. and …..
Terminale a occhiello Ø 8 isolato cod. Pim 029058 AMP 34163	Insulated eye terminal diameter Ø 8 cod. Pim 029058 AMP 34163
Tolleranza lunghezza conduttori in mm	Wire length tolerances in mm
Verde	Green
Viola	Violet

Preproduction Sensor Connection Diagram (452206522)

Aggiornamento disegno	Updated drawing
Al tappeto sensibile pedana operatore	To the operator-sensing platform mat
Arancio	Orange
Azzurro	Azure
Bianco	White
Blu	Blue
Codice grezzo	Material part number
Colore	Color
Colore base	Basic color
Conn. SAAB ….. poli nero/grigio/blu	Black/gray/blue …..-pin SAAB connector
Connettore completo cablato	Fully wired connector
Cont.	Checked
Contatto maschio STEELSPRING 0.5-1 COD.PIM.95319124 AMP1962915-1	Male contact STEELSPRING 0.5-1 COD.PIM.95319124 AMP1962915-1
Contrassegnare le guaine con i codici indicati nel disegno, il numoreo di modifica, il codice del fornitore e la data di costruzione: sett./anno sui connettori segnalare in modo indelebile il codice, es.: “X1”. Tutti i connettori devono essere forniti cablati.	Mark the sheaths with the drawing number and update, the supplier code number, the date of manufacture week/year. The part number is to be indelibly marked on the connectors, for example "X:1". All the connectors are to be supplied already wired.
Da 300 a 600	Between 300 and 600
Da 600 in poi	From 600 and up
Data	Date
Denominazione	Description
Documento riservato	Confidential document
Emesso per produzione	Issued for production
Finecorsa sollevamento	Lift limit stop
Fino a 300	Up to 300
Foglio (..) di (..)	Sheet (..) of (..)
Giallo	Yellow
Gommino passacavo	Cable tray rubber cap
Grigio	Gray
Guarnizione per …… poli	Gasket for …..-pin
Lingua	Language
Marrone	Brown
Materiale	Material
Modifica	Modification
Nero	Black
Nome	Name
Nota: I sensori 7S1, 7S2 e 7S3 devono essere forniti con le proprie ghiere.	Note: Sensors 7S1, 7S2 end 7S3 must be equipped with the appropriate lock nuts
Numero disegno	Drawing number
Pedana fissa	Fixed platform
Protezione secondo DIN34	Protected to DIN34
Quote ausiliarie	Auxiliary dimensions
Quote di verifica	Test dimensions

Electric Drive Input/Output Diagram (452249707)

Uscita 10+V	10+V output
Uscita (-) connessione potenziometri	Potentiometer connection output (-)
Ingresso A potenziometro sterzo	Drive potentiometer A input
Ingresso B potenziometro sterzo	Drive potentiometer B input
Ingresso B potenziometro ruota motrice	Driving wheel potentiometer B input
Ingresso A potenziometro ruota motrice	Driving wheel potentiometer B input
Uscita seriale console	Console serial output
Ingresso seriale console	Console serial input
Uscita (-) console	Console output (-)
Ingresso (-) da attivazione sensore timone (X4:5)	Input (-) from drawbar sensor enabling (X4:5)
Uscita relè sicurezza interno per FEM	Inside safety relay output for FEM
Ingresso relè sicurezza interno da A3 (:30)	Inside safety relay input from A3 (:30)
Uscita per A3 (:13)	Output for A3 (:13)
Uscita per A3 (:38)	Output for A3 (:38
Uscita (-) bobina	Wheel output (-)
Ingresso +24V	Input +24V
Ingresso +24V	Input +24V
Ingresso (-) taratura settaggi	Input (-) setting calibration
Modifica collegamento footswotch (24)	Change in the footswitch connection (24)
Modifica	Change
Materiale	Material
Codice grezzo	Raw material code
Denominazione	Denomination
Schema ingressi/uscite - Controllo elettronico Guida elettrica	Electric drive – Electronic control Input/output diagram
Data	Date
Quote di verifica	Check values
Quote ausiliarie	Auxiliary Values
Nome	Name
Lingua : Inglese	Language: English
Documento riservato – Protezione secodno DIN34	Confidential Document Protection accordino to DIN34
Peso in Kg – Status – Scala – Foglio 1/1 Orig. - Sost.	Weight in kg – Status – Scale – Paper 1/1 Original – Replace
Numero disegno	DRW No.

Tabella parametri

	PARAMETER CHANGE	MODELLI TSX 4522	TSX 4522*	CTX 4523	TN 4526
	ACCELER DELAY	5	5	4	2
	DECELER DELAY	5	5	4	7
	RELEASE BRAKING	0	0	0	0
	INVER.BRAKING	9	9	9	9
!	CUTBACK SPEED 1	1	1	9-(5)	9
!	CUTBACK SPEED 2	5	5	9	9
!	CUTBACK SPEED 3	3	3	5	9
	CREEP SPEED TR	1	1	0	0
	SOFT WORKING	5	5	5	5
!	MAX SPEED FORW	0	0	0	5
!	MAX SPEED BACK	9	0	9	4
!	MAX I TRACTION	9	9	9	9
!	ARMA NOM CURR.	9	9	2	9
!	WEAK DROPOUT	5	5	4	9
!	FIELD CURR MAX	6	8	9	9
!	FIELD NOM CURR	9/8	9	9	8
	PU ACCELER DEL	3	3	3	0
	PU DECELR DEL	5	5	5	0
	LEVER LIFT SPEED	~~9~~	~~9~~	9	~~9~~
	LIFT SPEED	9	9	9	9
	DOWN SPEED	~~5~~	~~5~~	5	~~5~~
	SLOW LIFT SPEED	~~5~~	~~5~~	5	~~5~~
	CREEP SPEED PUMP	~~0~~	~~0~~	1	~~0~~
	EV.ACCELER DEL	~~5~~	~~5~~	2	~~5~~
	EV.DECELER DEL	~~5~~	~~5~~	0	~~5~~
	MIN DESC EVP	~~5~~	~~5~~	1	~~5~~
	MAX DESC EVP	~~5~~	~~5~~	4	~~5~~
	MIN DESC EVP FINE	~~5~~	~~5~~	5	~~5~~
	MAX DESC EVP FINE	~~5~~	~~5~~	5	~~5~~
	AUXILIARY TIME	5	5	5	~~5~~

4522* TSX con rullo singolo

Valore di **FIELD NOM CURR** con parametro a **0** e con parametro **FIELD CURR MAX** a **0**	6,5 A	6,5 A	6,5 A
Valore di **FIELD NOM CURR** con parametro a **9** e con parametro **FIELD CURR MAX a 9**	**18A**	**18A**	**18 A**

I valori FIELD NOM CURR e FIELD CURR MAX sopra riportati sono stati rilevati con tensione batteria = **26 V .**

ADJUSTMENTS	MODELLI TSX 4522	CTX 4523	TN 4526
ADJUST.BATTERY			
Permette di settare il valore della tensione di batteria.	●	●	●
MIN.ACC.LIFT (0V)			
Permette di settare il valore della tensione minima del potenziometro sollevamento		●	
MAX.ACC.LIFT (5V)			
Permette di settare il valore della tensione massima del potenziometro sollevamento		●	
MIN.ACC.DESC. (0V)			
Permette di settare il valore della tensione minima del potenziometro discesa		●	
MAX.ACC.DESC. (5V)			
Permette di settare il valore della tensione massima del potenziometro discesa		●	
SET STEER MIN (0V)			
Permette di settare il valore della tensione minima legata alla posiz.della ruota motrice	●		
SET STEER MAX (5V)			
Permette di settare il valore dela tensione massima legata alla posiz.della ruota motrice	●		
SET STEER 0-POS(2,5V)			
Permette di settare il valore della tensione legata alla posiz.della ruota motrice quando questa è parallela ai bracci delle forche	●		

	SET OPTIONS	MODELLI TSX 4522	CTX 4523	TN 4526
	HOUR COUNTER			
	RUNNING	●	●	●
	KEY ON			
	LIFT BLOCK			
	PRESENT	●		●
	ABSENT		●	
!	QUICK INVERSION			
	BELLY	●	●	●
	TIMED			
	PROPORTION LIFT			
	PRESENT		●	
	ABSENT	●		●
!	BRAKE IN QCK INV			
	ON		●	
	OFF	●		●
!	BRAKE IN RELEASE			
	ON			
	OFF	●	●	●
	EV. TYPE			
	NONE			
	OPTION #1		●	
	OPTION #2	●		●

	HARDWARE SETTING	MODELLI TSX 4522	CTX 4523	TN 4526
	SET CURRENT			
	300A	●	●	●
	200A			
	SET FIELD CURRENT			
	A	**28**	**28**	**28**

Verificare sempre le versioni di eprom

Prima del collaudo finale eseguire sempre il **Program Vacc**

(*) parametro con optional inserito

parametro ininfluente

parametro da regolare in fase di collaudo (Pimespo)

! Attenzione: la variazione di questo parametro puo' compromettere l'uso in sicurezza della macchina.
I parametri contrassegnati con il "!" debbono essere visibili solo dalla console a livello 1.

VERSIONE EPROM ZAPI : PICOX 040

REV.	DATA	NOME	MODIFICA	CID
B	06/03/02	A.G.	Nuova eprom	301251
A	14/02/02	A.G.	Introdotto TSX con rullo singolo	301209
0	23/03/01	A.G.	EMESSO PER PRODUZIONE	300665

	DATA	NOME
DIS.	15/03/01	A.G.

PIMESPO

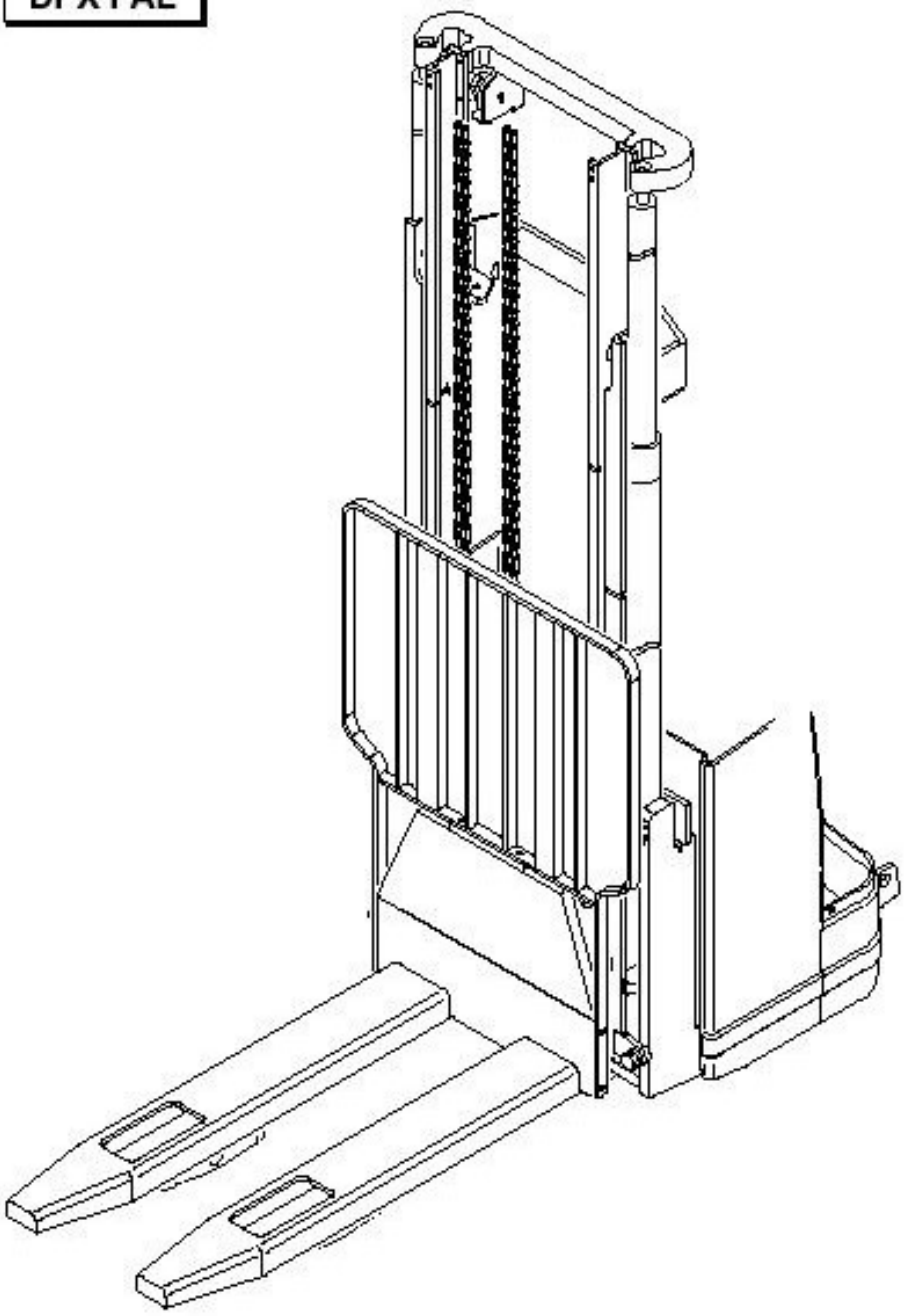
DENOMINAZIONE:

TABELLA SETTAGGIO PARAMETRI

CODICE:

452206030

DPX PAL



ATTENTION: It is absolutely **PROHIBITED** to operate standard or cold store trucks in areas where there is a risk of explosion unless they have been specifically designed or modified for this type of use. The same restrictions apply to trucks that operate in dusty environments or where there is a high level of air-borne particulates.
The only trucks permitted to work in areas where there are gases, fumes, and inflammable and explosive particulates present are those that have been specially equipped to do so without causing the risk of explosion or fire.

Documentation provided with the truck

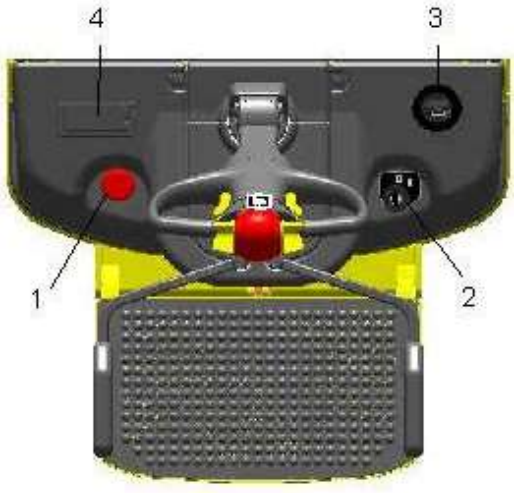
The following standard set of documentation is provided with the truck:
- 1 Use and Maintenance Manual
- 1 Operator Manual
- 1 “Safety Instructions for Industrial Forklift Trucks” Manual
- 1 EC Certificate of Conformity
- 1 Manufacturer's Certificate

Extra set of documentation

The following extra set (1) of documentation is provided with the truck:
- 1 Use and Maintenance Manual
- 1 Operator Manual
- 1 “Safety Instructions for Industrial Forklift Trucks” Manual (VDMA)

Truck body

Dashboard – controls – instruments



1 Emergency stop button.
2 Ignition key switch.
3 I.B.S. + hour meter instrument
Battery-state-of-charge indicator, use time indicator, truck "ON" or "OFF" indicator.
4 Built-in rectifier power cable compartment (optional).

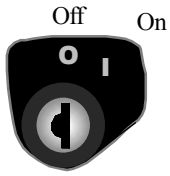
Emergency stop button

The red emergency stop button is clearly visible and within easy reach of the operator. When the button is pressed, it cuts off the current to the main and auxiliary power systems, which immediately activates the electromagnetic brake. The button is a "combination" type button in that the current can be cut off in two ways:

- 1) Mechanically, by pressing the button, or
- 2) Electrically, by signal from the COMBI system

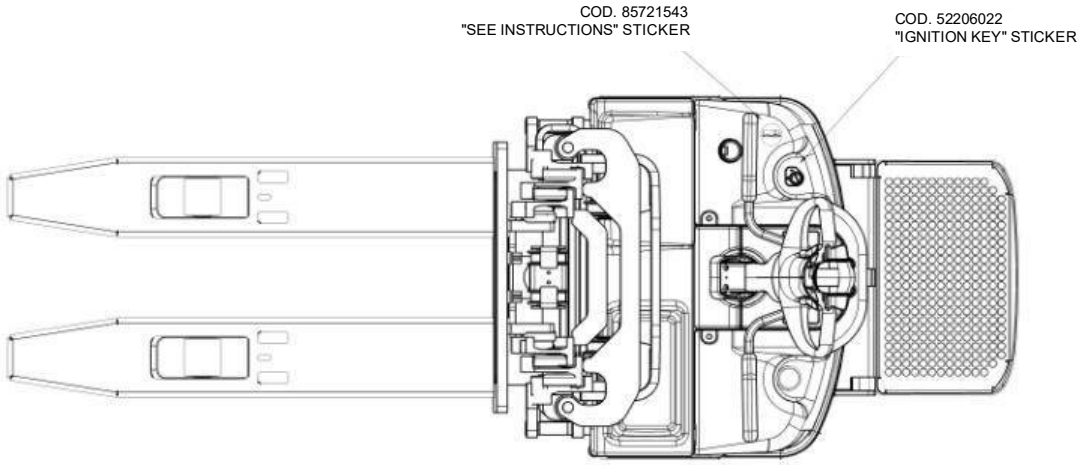
This feature requires only one component instead of the usual combination of button plus remote control switch, thus saving space and wiring.

Ignition switch

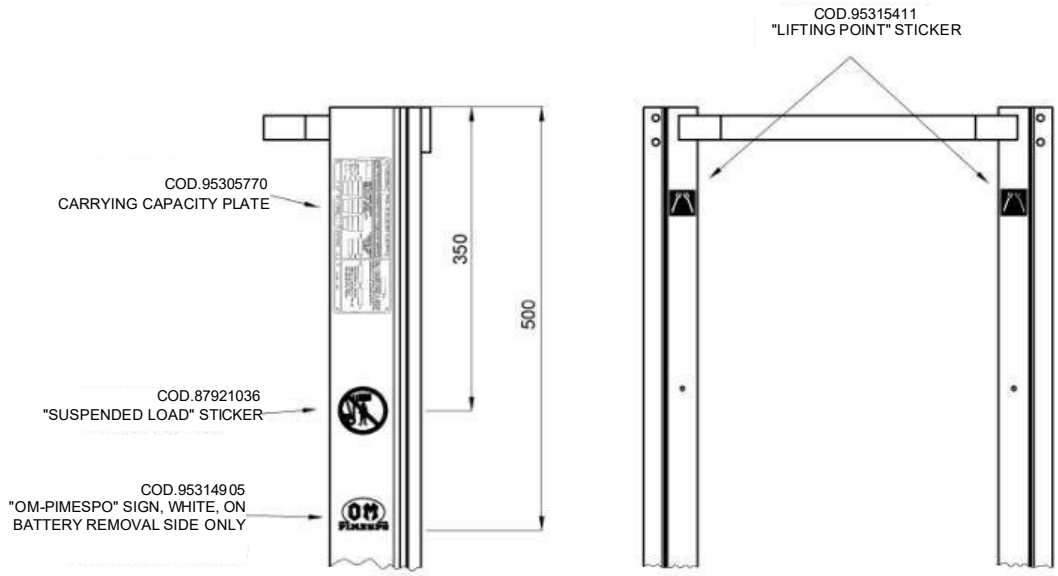


When the ignition switch is in the "I" position, it powers the control circuits and starts the diagnostic safety checks of the electronic panel. When it is in the "O" position, none of the circuits are powered.

View from above

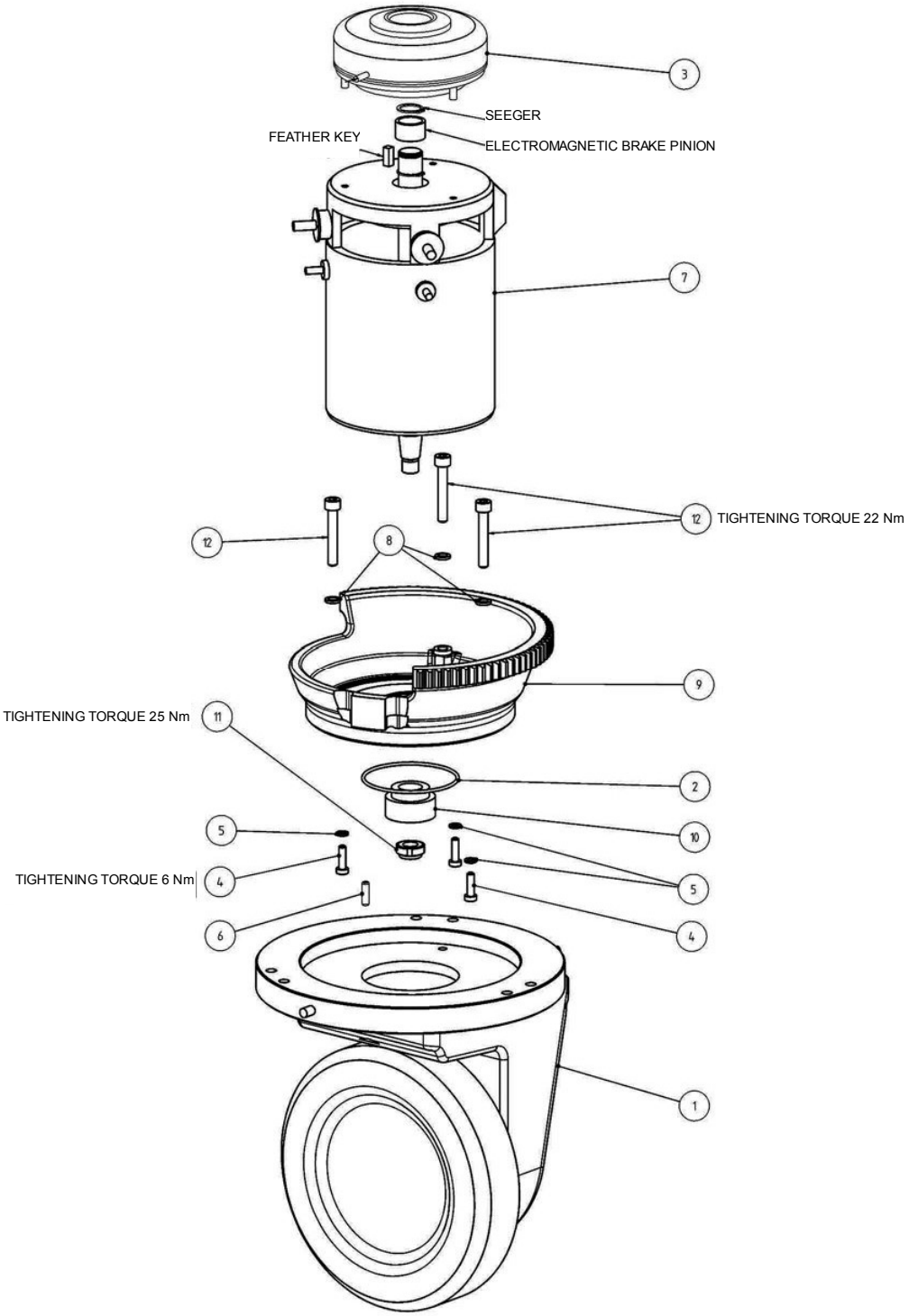


View from operator side and 1st mast section side



SIMPLEX MAST

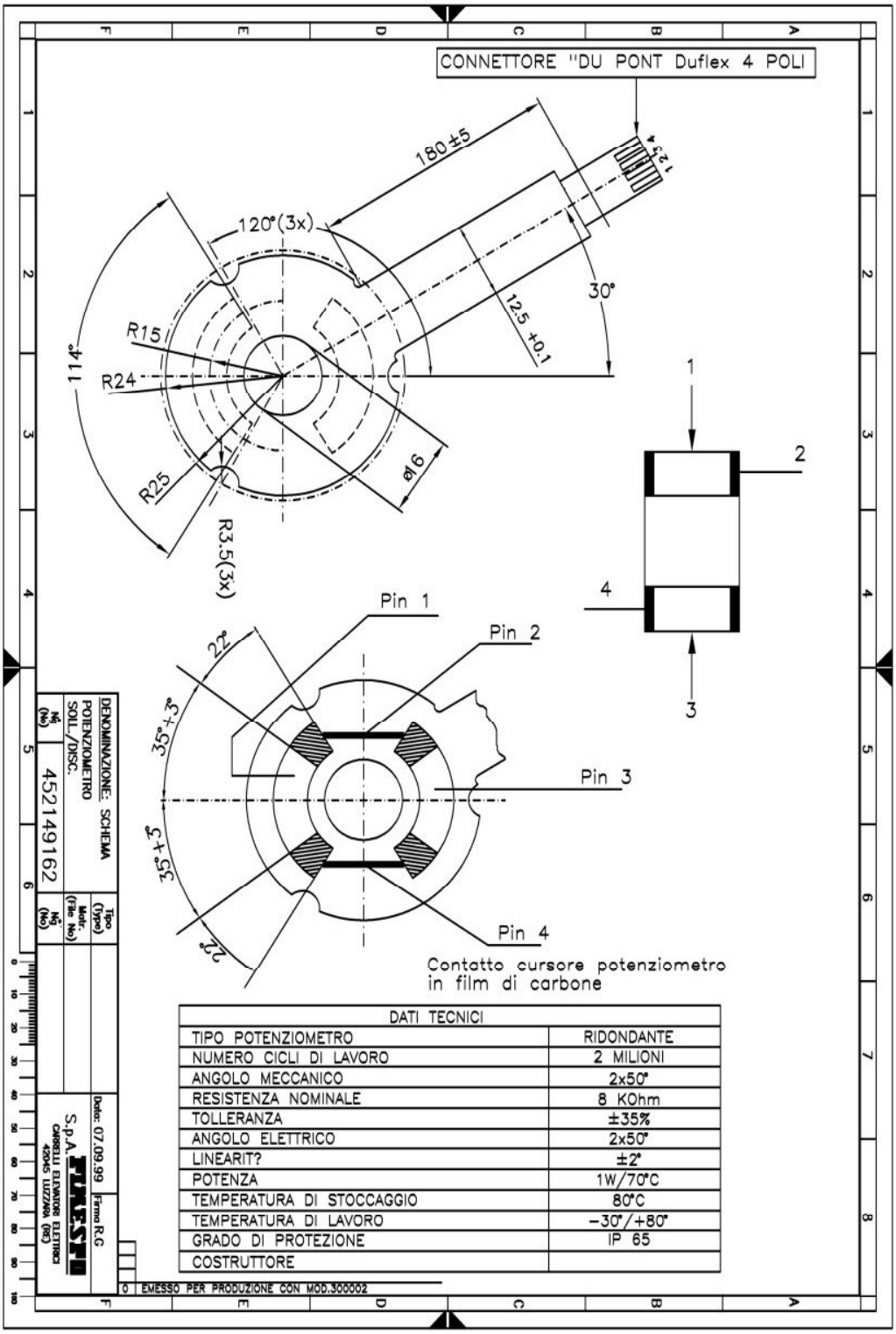
Traction unit assembly diagram



Using a soft metal rod, tap the pin to remove it from the roller.

After removing the roller, the bearings or nylon rings (wire coverings) can be replaced.
Replace the roller if it is worn or split.
If one roller needs to be replaced, replace also the other one if it is excessively worn.

Lift / lower function potentiometer

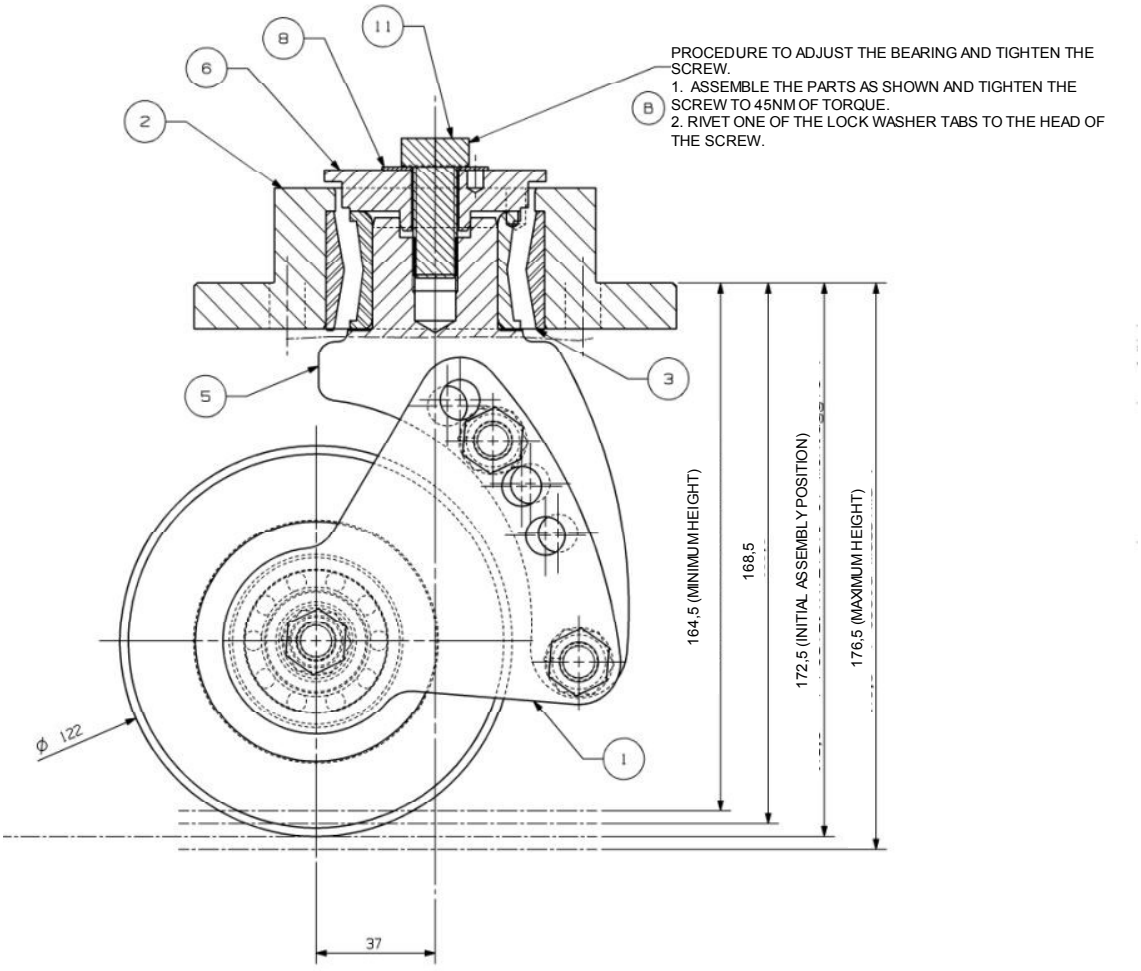


DATI TECNICI	
TIPO POTENZIOMETRO	RIDONDANTE
NUMERO CICLI DI LAVORO	2 MILIONI
ANGOLO MECCANICO	2x50°
RESISTENZA NOMINALE	8 KOhm
TOLLERANZA	±35%
ANGOLO ELETTRICO	2x50°
LINEARIT?	±2°
POTENZA	1W/70°C
TEMPERATURA DI STOCCAGGIO	80°C
TEMPERATURA DI LAVORO	-30°/+80°
GRADO DI PROTEZIONE	IP 65
COSTRUTTORE	

Castor wheel unit

The polyurethane castor wheel is mounted onto a support the height of which is adjustable to reset the inclination of the machine if the drive wheel becomes excessively worn. This adjustment should be performed by a qualified technician.

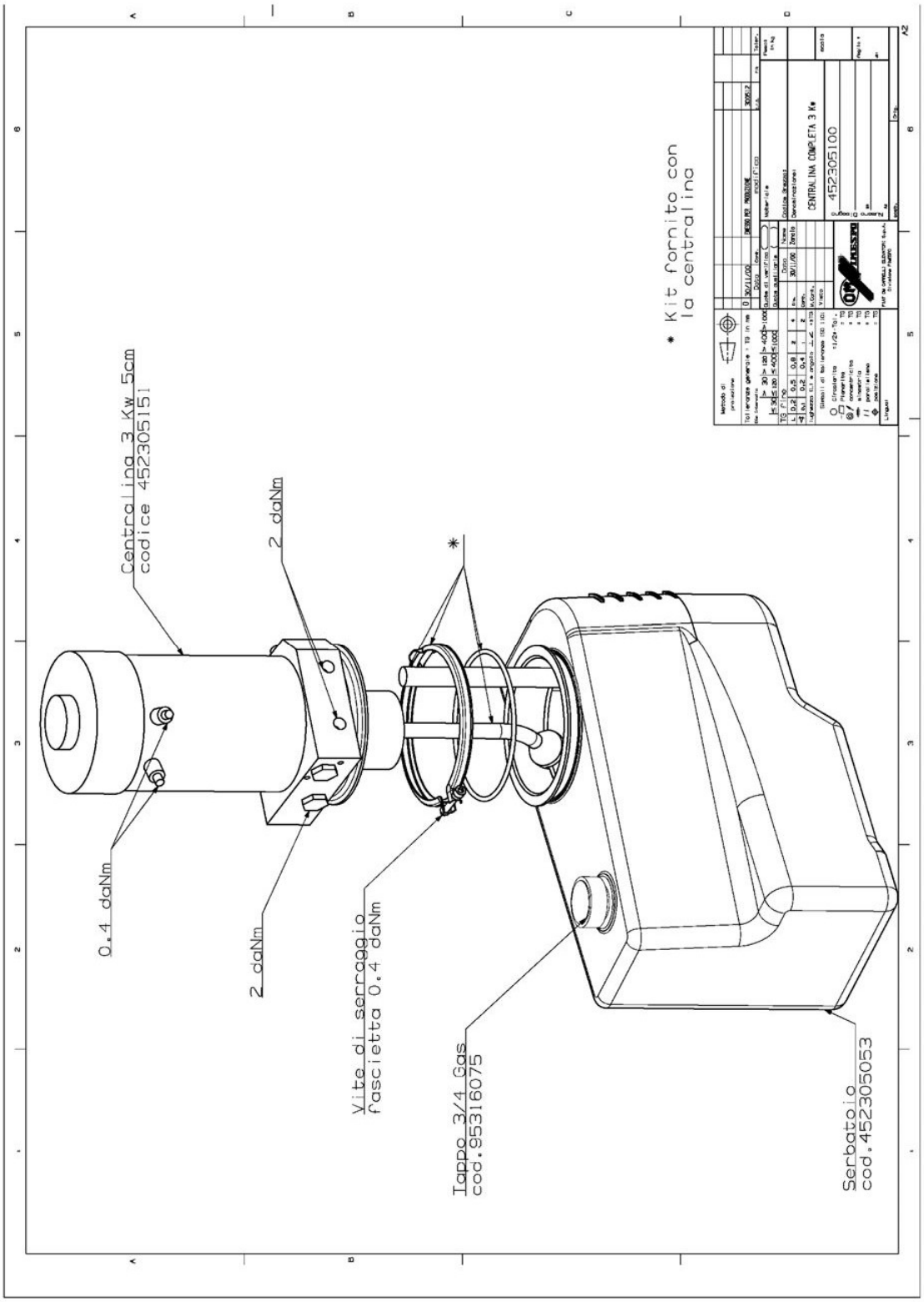
Castor wheel unit assembly (side view)



CTX Simplex hydraulic system diagram (452305020)

Codice grezzo	Material part number
Cont.	Checked
Data	Date
Denominazione	Description
Discesa forche	Fork lower function
Documento riservato	Confidential document
Foglio (..) di (..)	Sheet (..) of (..)
Funzione	Function
Lingua	Language
Materiale	Material
Modifica	Alteration
Motore +24V, 2.2 KW	Motor +24V, 2.2 KW
Nome	Name
Numero disegno	Drawing number
Peso	Weight
Protezione secondo DIN34	Protected to DIN34
Quote ausiliarie	Auxiliary dimensions
Quote di verifica	Test dimensions
Scala	Scale
Schema idraulico CTX Simplex con valvola proporzionale	CTX Simplex hydraulic system with proportional valve diagram
Sequenza di attivazione	Sequence of operation
Sollevamento forche	Fork lift function
Sost.	Replaces
Tabella di verita	Truth table

3 KW hydraulic unit assembly



Traction wheel

Drive wheel

The drive wheel is made of TRACTOTHAN, which is a special blend of polyurethane and rubber that provides better grip than the previous Vulkolan tire. Steering is much easier even from a standstill due to the power steering.

Slick rubber drive wheel (Optional)

A slick rubber tire is available on the 1400 kg version truck only for situations where better grip is needed.

See Chapter 17 section II Optionals for further information.

Traction wheel replacement

Attention: before replacing the traction wheel, place a wooden beam under the fork tips. Lower the forks, bringing them to rest on the wooden beams.
Switch on the truck and position the tiller parallel to the forks.
Switch off the truck
Unplug the battery.

Electrical system

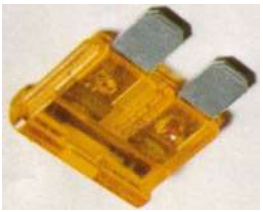
Sheaths and connectors

This truck is equipped with automotive-type wiring:

- All the wires are protected by sheaths, and the shunts are ultrasonically welded and protected by heat-shrink material.
- All the connectors and fuse holders are fastened to the body of the truck with metal brackets, thus avoiding problems caused by vibrations.
- With the exception of the electric drive connector, all the remaining connectors are protected to IP67. Each wire is individually fastened and sealed with a silicon seal.

Protection fuses

All the electrical power signals are protected by fuses:



Blade type protection fuses:

- 5A fuse protects the COMBI logic and tiller card
- 10A fuse protects the auxiliary systems
- 30A fuse protects the electric drive
- These are automotive-type fuses that are easy to find

Protection power fuse:

- 300A fuse protects the traction and lift motors

Micro soll. distributore (optional)	Distributor lift microswitch (optional)
Modifica	Alteration
Morsetto …..	Terminal …..
Morsetto ….. connessione	Terminal ….. connection
Morsetto ….. motore trazione	Terminal ….. traction motor
Morsetto …..batteria	Terminal ….. battery
Motore guida elettrica	Electric drive motor
Motore pompa sollevamento	Lift pump motor
Motore trazione	Traction motor
Nero	Black
Nome	Name
Numero disegno	Drawing number
Orig.	Original
Peso in kg	Weight in kg
Potenziometro ruota motrice	Drive wheel potentiometer
Potenziometro soll/disc timone	Tiller lift/lower potentiometer
Potenziometro sterzo guida elettrica	Electric drive steering potentiometer
Potenziometro trazione-timone	Tiller-traction potentiometer
Protezione secondo DIN34	Protected to DIN34
Puls. avvisatore acustico	Acoustic alarm button
Puls. disc. dx/sx superiore	Upper right /left lower button
Puls. soll. sx inferiore	Lower left lift button
Pulsante arresto di emergenza	Emergency stop button
Pulsante timone sempre attivo - optional	Tiller always ON button - optional
Quote ausiliarie	Auxiliary dimensions
Quote di verifica	Test dimensions
Rele di potenza guida elettrica	Electric drive power relay
Rosa	Pink
Rosso	Red
Scala	Scale
Scheda timone	Tiller card
Schema di collegamento elettrico	Electrical connection diagram
Sensore fine corsa sollevamento col - optional	Mast lift limit stop sensor - optional
Sensore optional	Optional sensor
Sensore pedana orizzontale/verticale	Horizontal/vertical platform sensor
Sensore spondine	Side panel sensor
Sensore timone	Tiller sensor
Sost.	replaces
Spina Schuko	Schuko plug
Status	Status
Std	Standards
Terminale saldati su A4	Terminals welded onto A4
Toler.	Tolerance
Tutti i simboli, i relativi contrassegni e le abbreviazioni dei colori dei cavi introdotti nel presente schema fanno riferimento alle seguenti norme: EN 60617-xx, CEI 44-6, VDE0293, IEC757	All the symbols, markings and abbreviations for the wire colors referenced in this diagram are in accordance with the following standards: EN 60617-xx, CEI 44-6, VDE0293,IEC757
Verde	Green
Viola	Violet

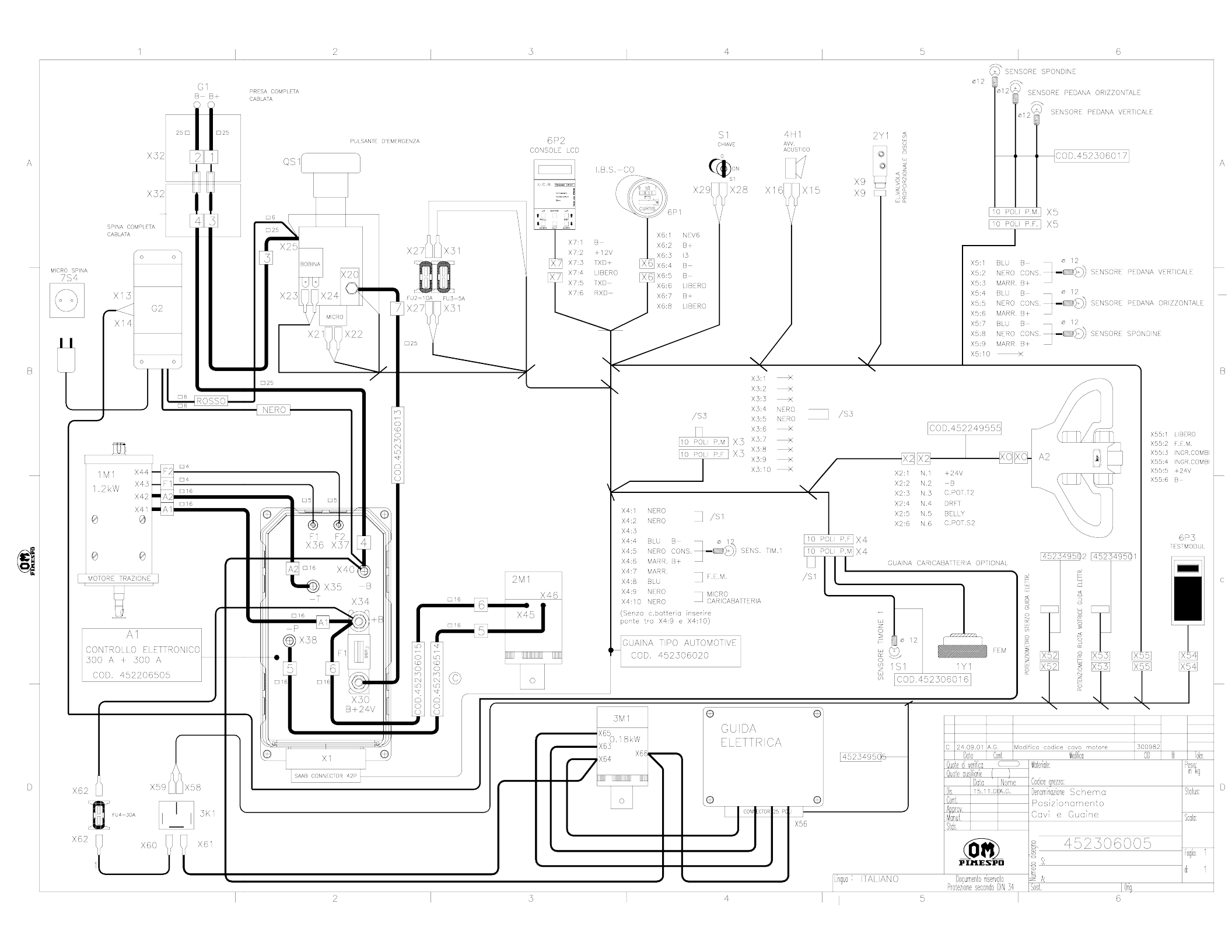
Electric Drive System Input/Output Diagram (452349504)

Blocco teleruttore	Contactor cut-out
Uscita 10+V	10+V output
Uscita 10+V	10+V output
Uscita (-) connessione potenziometri	Potentiometers connection output (-)
Ingresso A potenziometro sterzo	Steering potentiometer A input
Ingresso B potenziometro sterzo	Steering potentiometer B input
Ingresso A potenziometro ruota motrice	Drive wheel potentiometer A input
Ingresso B potenziometro ruota motrice	Drive wheel potentiometer B input
Uscita seriale Console	Console serial output
Ingresso serial Console	Console serial input
Uscita (-) console	Console output (-)
Ingresso (-) da attivazione sensore timone (X4:5)	Input (-) from tiller sensor activation (X4:5)
Uscita relé sicurezza interno per FEM	Safety internal relay output for electromagnetic brake
Ingresso relé sicurezza interno da A3 (:30)	Safety internal relay from A3 (:30)
Uscita opzionale	Optional output
Uscita per A3 (:38)	A3 (:38)output
Ingresso (-) taratura settaggi	Setting input (-)
Uscita (-) bobina	Coil output (-)
Ingresso +24V	+24V input
Ingresso +24V	+24V input
Guida elettrica	Electric drive
Data	Date
Cont.	Checked
Quote ausiliarie	Auxiliary dimensions
Quote di verifica	Test dimensions
Data	Date
Nome	Name
Dis.	Drawing
Cont.	Checked
Approv.	Approved
Modificato collegamento footswitch (24)	Modified footswitch connection (24)
Modifica	Modification
Codice grezzo	Material part number
Denominazione	Description
Schema ingressi/uscite controllo elettronico guida elettrica	Input/output diagram for electric drive electronic control
Numero disegno	Drawing number
Sost.	Replaces
Orig.	Original
Peso in kg	Weight (kg)
Scala	Scale
Foglio (..) di (..)	Sheet (..) of (..)
Lingua	Language
Documento riservato	Confidential document
Protezione secondo DIN34	Protected to DIN34

Notes for the technician

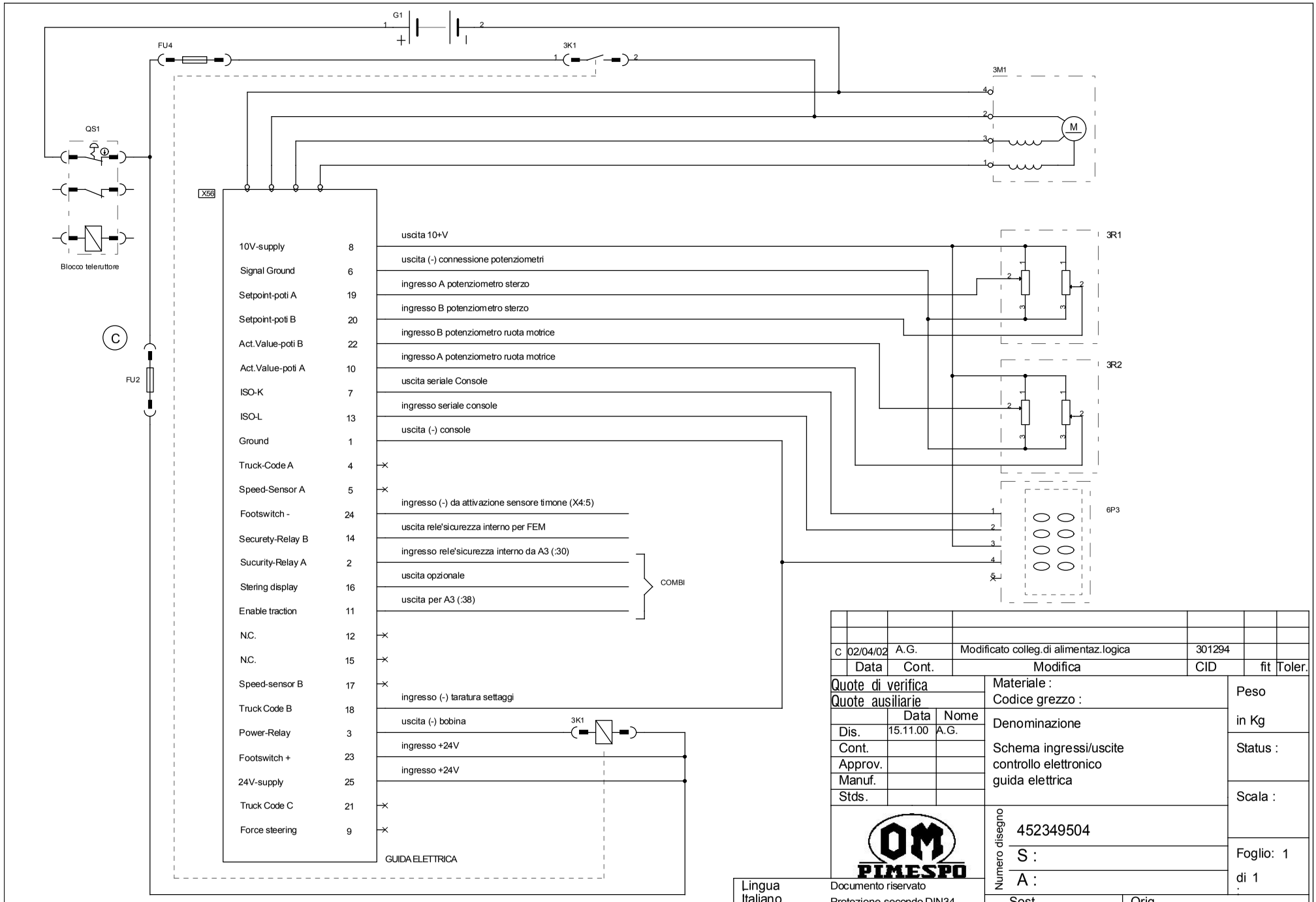
See - Chapter 18 section I - for information about constructing the tools.

- **N.B. : These tools do not have part numbers, so they are not available for ordering new or as spare parts.**
- **The tools should be constructed by following the instructions in the drawings.**
- **Refer to the photographs and descriptions in the various chapters of this manual for the uses of these tools.**


G1
B- B+
PRESA COMPLETA CABLATA
SPINA COMPLETA CABLATA
MICRO SPINA 7S4
G2
PULSANTE D'EMERGENZA
QS1
BOBINA
MICRO
6P2
CONSOLE LCD
I.B.S.-CO
6P1
S1
CHIAVE
4H1
AVV. ACUSTICO
2Y1
ELMAVOIA PROPORZIONALE DISCESA
SENSORE SPONDINE
SENSORE PEDANA ORIZZONTALE
SENSORE PEDANA VERTICALE
COD.452306017
10 POLI P.M. X5
10 POLI P.F. X5
X5:1 BLU B-
X5:2 NERO CONS.
X5:3 MARR. B+
X5:4 BLU B-
X5:5 NERO CONS.
X5:6 MARR. B+
X5:7 BLU B-
X5:8 NERO CONS.
X5:9 MARR. B+
X5:10
ROSSO
NERO
COD.452306013
1M1
1.2kW
MOTORE TRAZIONE
A1
CONTROLLO ELETTRONICO
300 A + 300 A
COD. 452206505
2M1
3M1
0.18kW
X1
SAAB CONNECTOR 42P
/S3
10 POLI P.M X3
10 POLI P.F X3
X3:1
X3:2
X3:3
X3:4 NERO
X3:5 NERO
X3:6
X3:7
X3:8
X3:9
X3:10
COD.452249555
X2:1 N.1 +24V
X2:2 N.2 -B
X2:3 N.3 C.POT.T2
X2:4 N.4 DRFT
X2:5 N.5 BELLY
X2:6 N.6 C.POT.S2
A2
X55:1 LIBERO
X55:2 F.E.M.
X55:3 INGR.COMBI
X55:4 INGR.COMBI
X55:5 +24V
X55:6 B-
/S1
X4:1 NERO
X4:2 NERO
X4:3
X4:4 BLU B-
X4:5 NERO CONS.
X4:6 MARR. B+
X4:7 MARR.
X4:8 BLU
X4:9 NERO
X4:10 NERO
SENS. TIM.1
F.E.M.
MICRO CARICABATTERIA
(Senza c.batteria inserire ponte tra X4:9 e X4:10)
GUAINA TIPO AUTOMOTIVE
COD. 452306020
10 POLI P.F X4
10 POLI P.M X4
GUAINA CARICABATTERIA OPTIONAL
SENSORE TIMONE 1
1S1
COD.452306016
1Y1
FEM
POTENZIOMETRO STERZO GUIDA ELETTR.
POTENZIOMETRO RUOTA MOTRICE GUIDA ELETTR.
452349502
452349501
6P3
TESTMODUL
X52
X53
X55
X54
GUIDA ELETTRICA
CONNECTOR 25 POL
X56
452349505
3K1
FU4=30A
X62
X59 X58
X60 X61
FU2=10A FU3=5A
C 24.09.01 A.G. Modifica codice cavo motore 300982
Data Cont. Modifica CID ff Ider.
Quote di verifica
Quote ausiliarie
Data Name
Dis. 15.11.00 A.G.
Cont.
Approv.
Manuf.
Stos.
Materiale:
Codice grezzo:
Denominazione Schema Posizionamento Cavi e Guaine
Peso: in kg
Status:
Scala:
Numero disegno 452306005
Foglio 1
di 1
Sost.
Orig.
Lingua : ITALIANO
Documento riservato Protezione secondo DIN 34

Electrical diagram (452306023)

Approv.	Approval
Arancio	Orange
Armatura motore trazione	Traction motor armature
Avvisatore acustico	Acoustic alarm
Azzurro	Azure
Batteria	Battery
Bianco	White
Blocco teleruttore	Remote switch block
Blu	Blue
Campo motore trazione	Traction motor field
Carica batteria	Battery charger
Cavi saldati senza connettore	Welded connectorless wires
Cavi senza connettore (carica batteria)	Connectorless wires (battery charger)
Chiave	Ignition key
Codice grezzo	Material part number
Connettore ….poli	….-pin connector
Connettore terminale 3 vie (carica batteria)	3-way terminal connector (battery charger)
Console	Console
Cont.	Checked
Contatto ….. bobina	Contact ….. coil …..
Contatto ….. diretto	Contact …. direct
Contatto ….. microinterruttore	Contact …..microswitch
Contatto ….. ritorno	Contact …..return
Contatto ……	Contact …..
Controllo elettronico	Electronic control
Controllo elettronico guida elettrica	Electric drive electronic control
Data	Date
Denominazione	Description
Documento riservato	Confidential document
Elettrovalvola discesa colonna	Mast lower electrovalve
Fit	Fit
Foglio (..) di (..)	Sheet (..) of (..)
Freno elettromagnetico	Electromagnetic brake
Fusibile ausiliari	Auxiliary systems fuse
Fusibile elettronica	Electronic system fuse
Fusibile potenza	Power supply fuse
Fusibile potenza guida elettrica	Electric drive power supply fuse
Giallo	Yellow
Grigio	Gray
Indicatore batteria scarica + contaore	Discharged battery indicator + hour meter
Inserito collegamento per guida elettrica	Electric drive connection diagram
Lingua	Language
Manuf.	Manufacture
Marrone	Brown
Materiale	Material
Micro Belly	Belly microswitch
Micro carica batteria	Battery charger microswitch
Micro soll. distributore (optional)	Distributor lift microswitch (optional)



C	02/04/02	A.G.	Modificato colleg.di alimentaz.logica	301294		
	Data	Cont.	Modifica	CID	fit	Toler.

Quote di verifica	Materiale :	Peso
Quote ausiliarie	Codice grezzo :	in Kg
	Denominazione	Status :
Schema ingressi/uscite controllo elettronico guida elettrica		Scala :
	452349504	Foglio: 1
	S :	di 1
	A :	

Dis.	Cont.	Approv.	Manuf.	Stds.
Data	15.11.00			
Nome	A.G.			

OM PIMESPO

Numero disegno

Lingua	Documento riservato	Sost.	Orig.
Italiano	Protezione secondo DIN34		

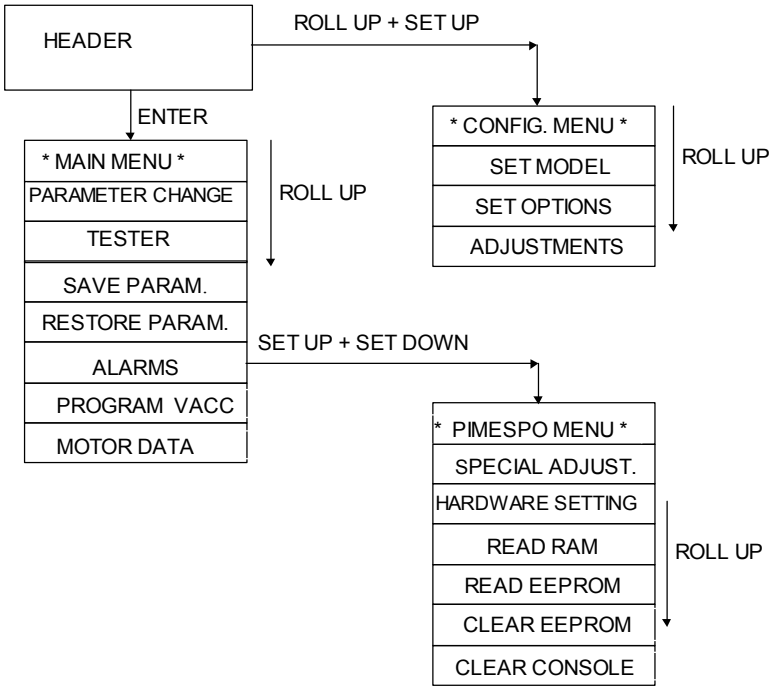
Electric Drive Sheath Diagram (452349505)

+ dopo teler.	+ after contactor
+24V dopo puls. emerg.	+24V after emergency button
Al conn. X55 di …	To the X55 connector of …
Al microinterruttore	To the microswitch
Al microinterruttore di …	To the microswitch of …
Alla bobina relé	To the relay coil
Alla console	To the console
Approv.	Approved
Arancio	Orange
Azzurro	Azure
-B imp. combi	-B combi system
Bianco	White
Blu	Blue
Cod. PIM.	PIMESPO code
Codice grezzo	Material part number
Colore	Color
Conn. AMP 25 poli nero p.f. ……	Black 25-pin AMP connector (socket)
Conn. SAAB 4 poli grigio p.f. ……	Gray 4-pin SAAB connector (socket)
Conn. SAAB 4 poli nero p.f. ……	Black 4-pin SAAB connector (socket)
Conn. SAAB 6 poli nero p.m. ……	Black 6-pin SAAB connector (plug)
Cont.	Checked
Cont. Femm. …	Female contact …
Cont. Maschio Steelspring …	Steelspring male contact …
Contrassegnare il gruppo guaine con il numero del disegno, della modifica, del fornitore e la data di costruzione (sett./ann.). Sui connettori deve essere segnato in modo indelebile il codice, es. X1. Tutti i connettori devono essere forniti cablati. Posizionare l'etichetta di contrassegno dove indicato	Mark the sheaths with the drawing number and update, the supplier code number, the date of manufacture week/year. The part number is to be indelibly marked on the connectors, for example "X:1". All the connectors are to be supplied already wired. Place the identification label where indicated.
Ad ultrasuoni	Ultrasound
Da 300 a 600	Between 300 and 600
Da 600 in poi	From 600 and up
Data	Date
Denominazione	Description
Dis.	Drawing
Documento riservato	Confidential document
Emesso per produzione	Issued for production
F.E.M.	Electromagnetic brake
Fino a 300	Up to 300
Foglio (..) di (..)	Sheet (..) of (..)
Fusibile 30A cod. PIM……	30A fuse PIMESPO code …
Giallo	Yellow
Gommino passacavo	Cable tray rubber cap
Grigio	Gray
Guaina guida elettrica	Electric drive sheath diagram

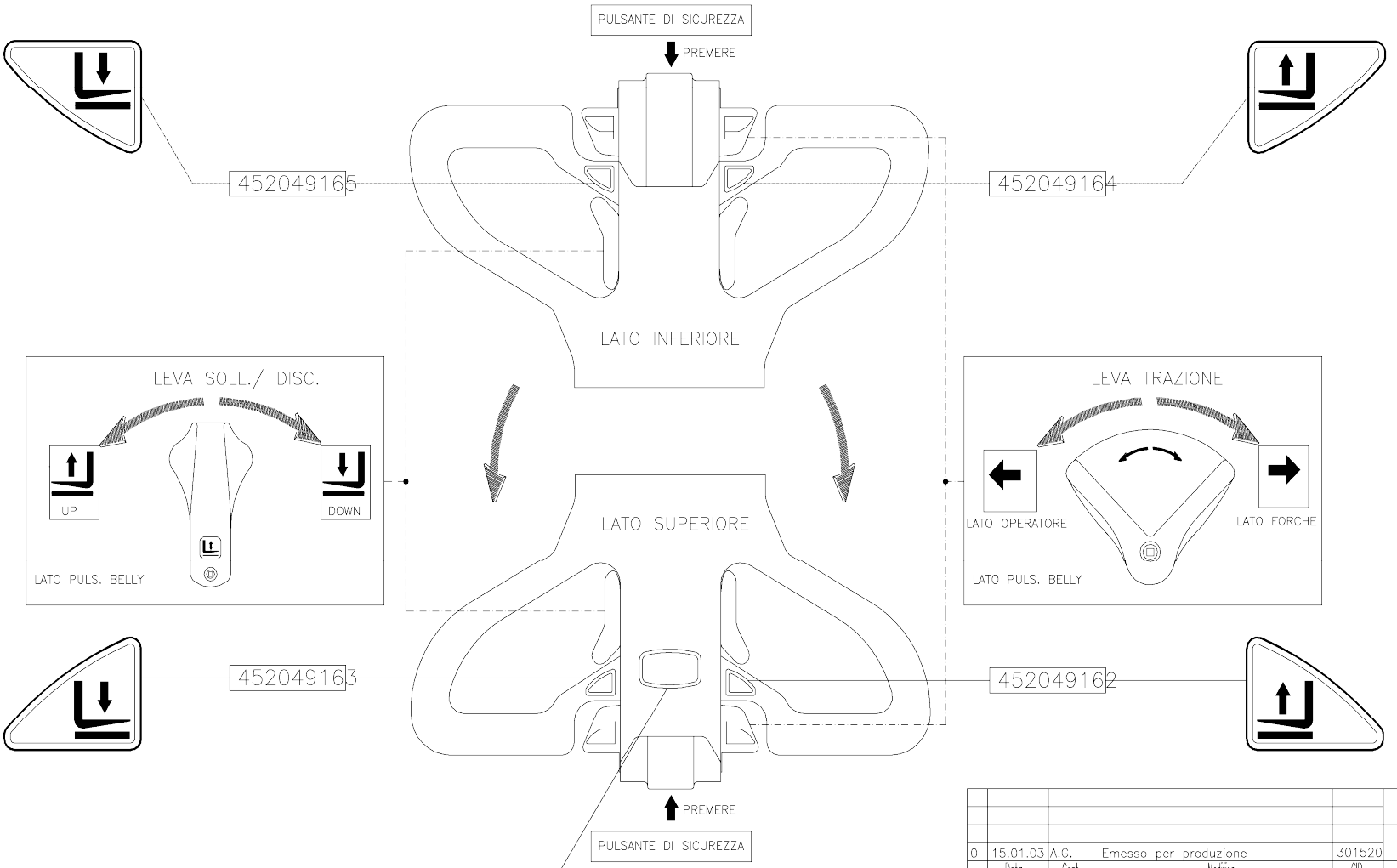
Press the ENTER key to access the following submenus:
- **PARAMETER CHANGE**
- **TESTER**
- **PROGRAM VACC**
- **MOTOR DATA (Not available)**
- **ALARMS**
- **SAVE PARAMETER (Do not use)**
- **RESTORE PARAMETER (Do not use)**

The following menus are also available to configure additional functions or special adjustments:
- **SET OPTIONS**
- **HARDWARE SETTINGS**

The menus are structured as follows:



The console is equipped with 6 keys:
- ENTER: confirms the selection made
- ROLL UP: selects the next item
- ROLL DOWN: selects the previous item
- OUT: exits the function selected
- SET UP: increments the parameter
- SET DOWN: decrements the parameter



PULS. CLAXON

COD. 452049160

0	15.01.03	A.G.	Emesso per produzione	301520		
	Data	Cont.	Modifica	CID	fil	Toler.

Quote di verifica		
Quote ausiliarie		
	Data	Nome
Dis.	16.12.02	A.C.
Cont.	18.12.02	R.V.
Approv.		
Manuf.		
Stds.		

Materiale:

Codice grezzo:

Denominazione Disegno di Montaggio equipaggiamento Elettrico

Numero disegno 45358081200

S:

A:

Pesa: in kg

Status:

Scala:

Foglio: 1 di: 1

Sost. | Orig.

Lingua : ITALIANO

In alphabetical order (Italian):

Italian	English
Aggiornamento dopo pre-serie	Update after pre-production
Avvisatore acustico	Acoustic alarm
Batteria	Battery
Carica batteria	Battery charge
Cavi saldati senza connettori	Cables welded without connectors
Cod.	Part number
Codice grezzo	Raw material part number
Connettore batteria	Battery connector
Connettore SAAB …. Poli	…. Pin SAAB connector
Console LINDE impianto LES	LES system LINDE console
Console ZAPI impianto COMBI	COMBI system ZAPI console
Cont.	Checked
Contatore CURTIS + blocco sollevamento batteria scarica	CURTIS hour meter + low battery lift lock out
Controllo elettronico guida elettrica	Electric drive electronic control
Controllo elettronico ZAPI trazione + sollevamento	Traction + lift ZAPI electronic control
Data	Date
Denominazione	Description
Descrizione	Description
Disegno a norma WN 10 754	Drawing to standard WN 10 754
Documento riservato	Confidential document
Elettrovalvola discesa razze	Fork arm lower function electrovalve
Elettrovalvola proporzionale discesa forche	Fork lower function proportional electrovalve
Elettrovalvola sollevamento razze	Fork arm lift function electrovalve
Elettrovalvola sollevamento/discesa forche	Fork lift/lower function electrovalve
Emesso per produzione	Issued for production
Foglio (..) di (..)	Sheet (..) of (..)
Freno elettromagnetico	Electromagnetic brake
Fusibile sicurezza ausiliari	Auxiliary equipment safety fuse
Fusibile sicurezza marcia-sollevamento	Travel-lift safety fuse
Fusibile sicurezza potenza guida elettrica	Electric drive power safety fuse
Fusibile sicurezza scheda timone, console, controllo elettronico	Tiller card, console, electronic control safety fuse
Fusibilie sicurezza logica guida elettrica	Electric drive logic safety fuse
Interruttore a chiave	Ignition key switch
Lingua	Language
Materiale	Material
Microinterruttore	Microswitch
Microinterruttore finecorsa sollevamento razze	Fork arms lift limit stop microswitch

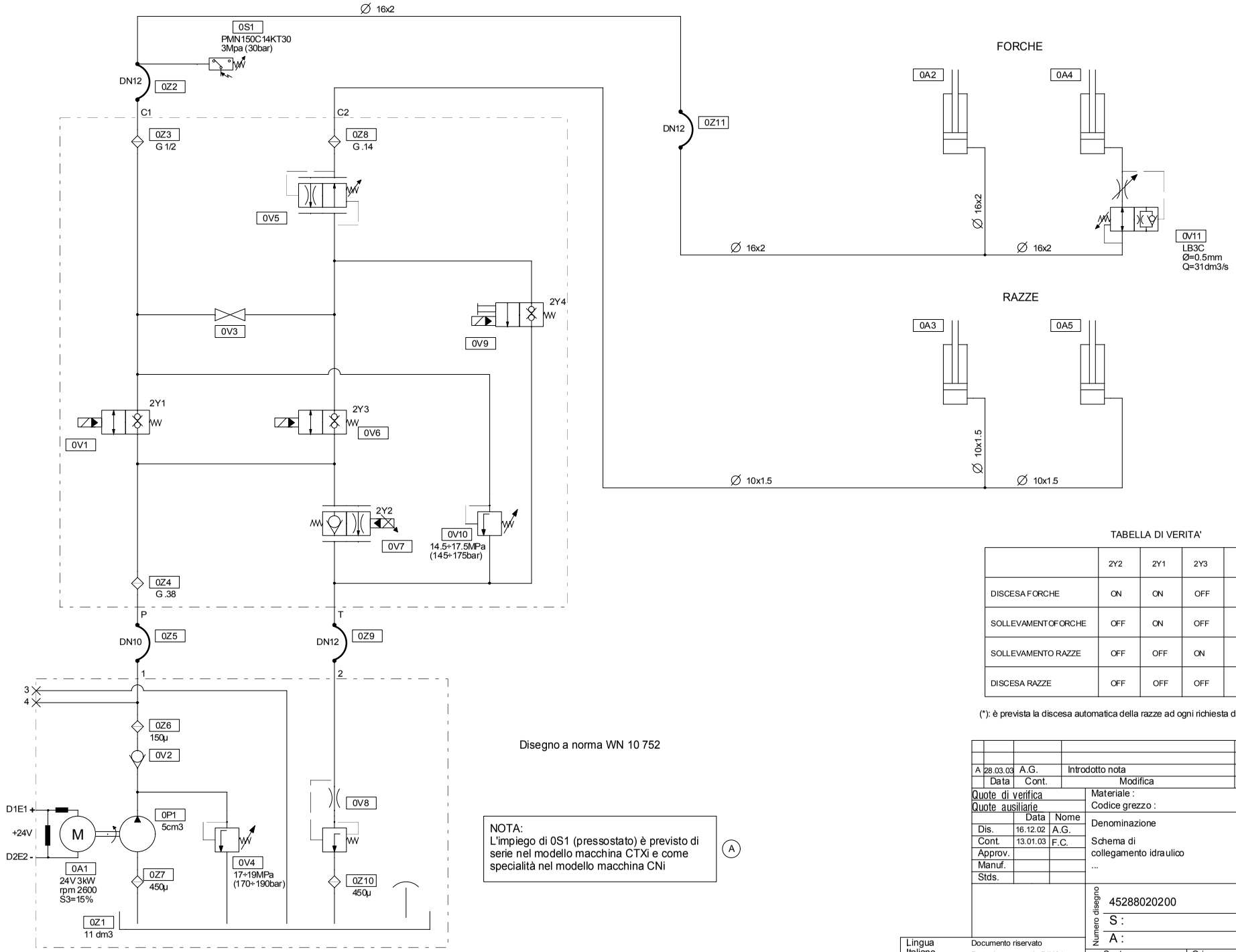


TABELLA DI VERITA'

	2Y2	2Y1	2Y3	2Y4	M.POMPA
DISCESA FORCHE	ON	ON	OFF	OFF	OFF
SOLLEVAMENTO FORCHE	OFF	ON	OFF	ON*	ON
SOLLEVAMENTO RAZZE	OFF	OFF	ON	OFF	ON
DISCESA RAZZE	OFF	OFF	OFF	ON	OFF

(*): è prevista la discesa automatica della razze ad ogni richiesta di sollevamento forche;

Disegno a norma WN 10 752

NOTA:
L'impiego di 0S1 (pressostato) è previsto di serie nel modello macchina CTXi e come specialità nel modello macchina CNi

A

A	28.03.03	A.G.	Introdotto nota	301673	
	Data	Cont.	Modifica	CID	fit Toler.

Quote di verifica
Quote ausiliarie

	Data	Nome
Dis.	16.12.02	A.G.
Cont.	13.01.03	F.C.
Approv.		
Manuf.		
Stds.		

Materiale :
Codice grezzo :

Denominazione

Schema di
collegamento idraulico
...

Peso
in Kg

Status :

Scala :

Numero disegno
45288020200
S :
A :

Foglio: 1
di 2

Sost. | Orig.

Lingua
Italiano

Documento riservato
Protezione secondo DIN34