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POWER FROM INNOVATION

Hoppecke Batterien
GmbH & Co.KG
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Operating & maintenance manual for the PU changer

IMPORTANT: Before operating the machine:

- Read the operators manual.
- Follow the safety instructions in the manual.
- Unless you have been authorised and trained, do not operate the host truck.
- No personnel to be within 1 metre distance of the machine whilst it is in operation.
- Consider a regular thorough examination service contract to keep the machine in optimum condition.
- The PU series may be used with any manufacturers powered pallet truck (PPT). Therefore the operator must also be authorised and trained to use the host powered pallet truck applicable to this PU changer.
- It is forbidden to use the machine for transporting people; they could sustain severe or fatal injuries; and to transport any material other than industrial truck batteries.



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1 General

1.1 Specific use and capacity of the PU changer

The PU changer is specifically designed to pull and push material handling batteries on and off charging racks and on and off industrial trucks that are fitted with rollers or transfer balls or equivalent. It is not designed to pull metal on metal.

It is suitable for this task in a way described in this manual. If the PU changer is used in a way other than established in the operating instructions, the written approval of the manufacturer and, if necessary of the responsible authorities must be obtained beforehand to prevent any potential dangers.

The maximum battery weight cannot exceed 2,500 Kg's.

2 Safety notices for the owner

The owner is any physical or legal person who uses the host truck and machine or who authorises its use by others.

2.1 Residual Risks

Despite working carefully and according to the standards and regulations, and with the observance of all safety notices, residual risks cannot be excluded when operating the PU.

A residual risk cannot be excluded even beyond the immediate danger area of the PU, therefore any persons standing within the area of the PU must pay particular attention to the task of battery changing in order to be able to react fast in case of an incident.

Caution: All persons standing near the machine must be advised of the hazards arising during operation of the machine. Please refer to any additional safety rules from your own company. When the machine is being operated, there should be no personnel other than the operator with in 1 metre distance of the machine.

To maintain a high standard of safety it is forbidden:

- To use the machine for transporting people; they could sustain severe or fatal injuries.
- Or transport any material other than industrial truck batteries.

2.2 Safety standard & safe operation of the PU

1. Only qualified personnel who have been trained to use the machine are allowed to operate it.
2. Any relevant accident prevention regulations and safety regulations are complied with.
3. The operating, maintenance & repair guidelines for the machine are observed.
4. The machine operator has read and understood the operator's manual.
5. When the machine is being operated there should be no personnel other than the operator within 1 metre distance of the machine.

2.3 Spare parts, accessories & Warranty invalidation

The machine, its parts and accessories are either specified by the manufacturer and it is for this reason we advise that only manufacturers provide any parts and accessories.

- The manufacturer will not be held responsible for personal or material damage which may arise from the use of third party spare parts and accessories.
- The use of non-original spare parts and accessories will invalidate the warranty.

2.4 Maintenance & Repair

2.4.1 Risk of electric shock

Warning: Before carrying out any maintenance or repair disconnect the battery from the host powered pallet truck.

- A short circuit will result in an electric arc which can cause serious burns.
- Any electronic parts may sustain damage.
- The Emergency stop/ battery disconnect see fig 3, isolates the positive pole of the 24 volt dc supply. The main fuse is located on the host truck as close to the positive battery terminal as possible. (Location will vary as the host truck can be any supplier's product).

2.4.2 Authorised personnel

Maintenance & repair work can only be carried out by personnel who have been:

- Properly trained.
- Authorised by the owner.

Only when the above conditions are satisfied can maintenance & repair work be carried out by the operator or service engineer.

DANGER. Do not replace, adjust or bypass safety mechanisms. This could result in serious or fatal injuries.

If a safety mechanism has been damaged, the machine must not be operated until the fault has been rectified and the host truck has been cleared for use by an authorised engineer.

After completing maintenance and repair work it is essential to check the operation of the safety mechanisms before operating the machine.

2.5 Battery handling safety.

DANGER. When handling batteries, avoid contact with smoke, fire and naked flames. This could result in accidents with serious or fatal injuries.

Batteries release Hydrogen which collects in the battery compartment of the host powered pallet truck. It can explode if it comes into contact with a naked flame. Read the manufacturers safety instructions for the battery and charger that came with the host powered pallet truck.

2.6 Operational safety note.






Safe and effective use of an electric powered pallet truck requires expertise and attentiveness on the part of the driver. In this regard:

- The battery changing unit should only be used on a flat surface between the battery changing room/ station and the industrial truck requiring a battery change.
- The driver should be fully trained and authorised to operate the machine.
- When the machine is being operated there should be no personnel other than the operator within 1 metre distance of the machine.

3 Installation

NOTE: This is to be carried out by a trained service engineer.

Clamp kit and fitting instructions.

	<p>1. Clamp comprises of: 1 x top bar 1 x bottom bar 2 x M12 x 75mm bolts</p> <p>There are three clamps supplied with the PU. Space them out as evenly as possible over the full length of the PPT forks (this will vary according to the manufacturer). One at each end and one in or as near the centre as possible.</p>
	<p>2. Fix bottom plate under and between powered pallet truck forks.</p>
	<p>3. Rotate bottom bar 90 degrees.</p>
	<p>4. Line up top plate, and fix with the 2 x M12 x 75mm bolts. Approx torque is 98Nm.</p>
	<p>5. Assembled clamp fixed in position.</p>

4 Operation

TO SWITCH THE MACHINE 'ON', THERE IS EITHER A KEY-SWITCH OR A CODE SWITCH. SEE BELOW FOR FUNCTIONALITY.

4.1 Pre start procedure

NOTE: When not in use the carriage should be in the fully back (reverse) condition, i.e. The carriage is underneath the control panel of the machine. The battery mast should be locked in the fully raised position ready for use. On no account should the machine be moved with the carriage fully extended as it may cause damage or injury.

The pre-start procedure:

1. Emergency Stop

Ensure the emergency stop switch is pulled out. (See fig 2 or).

2. For machines with a Key Switch:

To switch the machine on turn the key right. **ON or EIN**
To switch the machine off turn the key left **OFF or AUS**

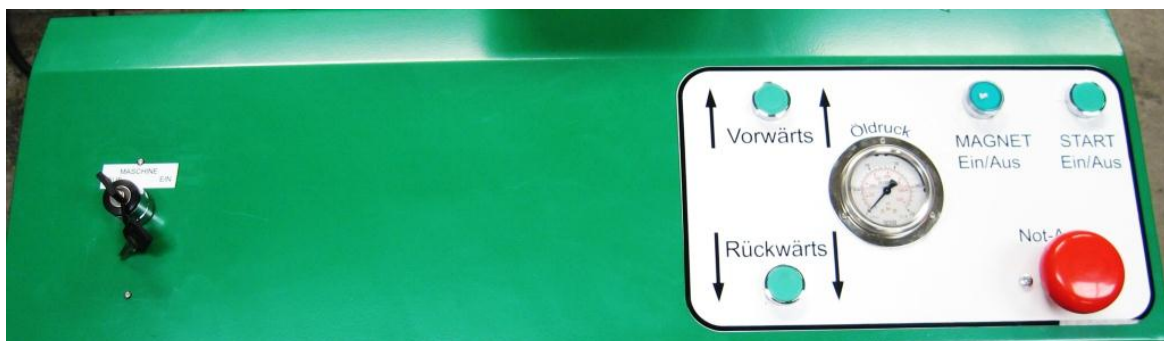
In the OFF/ AUS position the key can be removed to prevent unauthorised use of the machine.

(See fig 1)

Fig 1. Key-Switch.



Fig 2. Control Panel with Key-Switch.



3. Enable the electronic code switch:

The code switch is situated on the left hand side of the control panel (see Fig 5).

Refer to (fig 1) image on the right for setting up instructions.

The driver must log on using a 6 digit code. The code on delivery is (2 digit operator no and 4 digit pin no, i.e.) 01-1234.

- i. Press CE, this will clear any numbers that are in the switch memory.
- ii. Enter the 6 digit code 01 1234.
- iii. Press the Power/ Enter key.
- iv. Green led will flash and the unit will beep, machine is enabled ready for use.
IF Red led flashes and beeps, Entry is invalid, try again.

NOTE: Green led will flash while the machine is enabled, led will flash every 3 seconds.

- v. To disable the machine press Power/ Enter.

NOTE: The electronic code switch operating/ programming manual is provided as a separate document with this manual and left with supervisor/ manager. The code can be changed using this manual.

Fig 3. Electronic code switch.



4. Battery mast interlock handle/ battery keep-plate:

The machine cannot be started unless the battery catch is in the fully raised position.

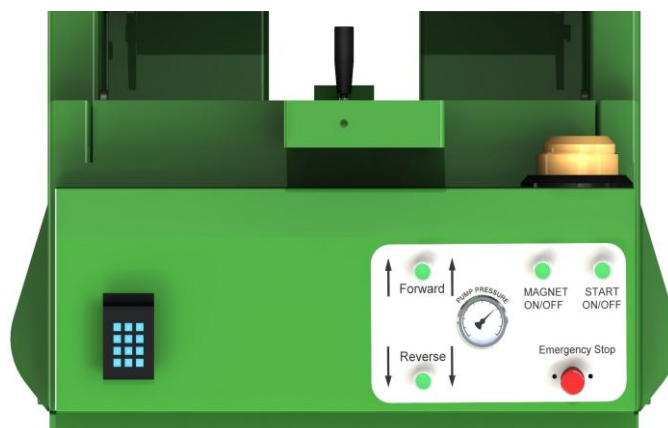
The catch is locked into position by turning the operating handle clockwise. To slacken the catch the handle is turned anti clockwise. There is a label on the mast confirming direction of the handle.

When the handle is fully down and locked into position it functions as a keep plate to hold the battery in position whilst it is being transported.

Fig 4. Battery mast.



Fig 5. Control panel.



4.2 To pull a battery off a charging rack or industrial truck

1. Ensure the pre start procedure (3.1) is complete and before starting the operation, ensure the battery is free of electrical/ mechanical plugs, interlocks or connections before trying to remove it. Also ensure the rollers on the rack/ industrial truck and the battery changing machine move freely and are free from debris or any other obstructions.

2. Move the machine using the host tiller control and align it with the rack/ industrial truck. Then, by using the raise/ lower function on the host tiller control, align the machine rollers and charging rollers to equal height.

3. Press the magnet button to energise the two pulling magnets. (this button latches and has a built in led which lights to show the magnets are energised. Pressing the button again will de-energise the magnets).

DANGER: Never leave the magnets on for longer than 6-10 minutes when not in use, there is a risk the magnets will overheat and may cause damage or injury. In extreme situations the magnet plug/ sockets can melt.

4. Press the start button, this acts as a dead man and must always be depressed whilst operating the machine. Pressing this button enables the power pack.

5. With the start button depressed, control the carriage movement by pressing the forward/ reverse buttons as necessary. Press the forward button to move the carriage to the end of travel and engage the magnet onto the battery case.

When the magnets are touching the battery case, it can be pulled off the rack/ industrial truck. On some host machines the height may have to be readjusted before withdrawal as the battery weight can cause the host system to 'yield' and drop by up to 20mm under load. It is important that these minor adjustments are made to enable a safe and smooth withdrawal.

DANGER: Failure to make these minor adjustments may cause the magnets to pull away from the battery, and may cause the edge of the battery to dig into the rollers which may damage the rollers.

6. Press the reverse button to pull the battery off the rack/ industrial truck onto the machine. This should be done in one smooth operation. Stop the carriage at the end of travel by releasing the reverse button and finally release the power button to complete the procedure.

7. Now lower the battery mast (**see fig 2**), ensuring the keep plate is over the lip of the battery case. This completes the removal operation. If the machine is being used immediately to exchange a battery (or within 5 minutes) it is advisable to keep the magnets switched on. This assists the battery keep plate in limiting battery movement whilst moving the machine.

General note regarding forward/ reverse push buttons: If the forward/ reverse buttons are not released at the end of travel there are forward & reverse proximity switches that will stop the carriage. This is to protect against damage or injury.

4.3 To push a battery off the machine onto a charging rack or industrial truck

1. Move the machine using the host tiller controls and align it with the rack/ industrial truck. Then, by using the raise/ lower function on the host truck align the machine rollers and charging rollers to equal height. Be prepared to make fine adjustments as necessary to enable a safe and smooth push off.

Park the machine with the tiller control vertical and observe the following push off procedure:

1. Ensure the pre start procedure (3.1) is complete before starting the push off operation.
2. Ensure the magnets are switched on. This provides additional security whilst pushing the battery.
2. Unlock and fully raise the battery catch/ keep plate and lock in position (**see fig 4**).
3. With the start button depressed, control the carriage movement by pressing the forward button to push the battery off the machine. The host machine may rise as a few millimetres as the battery weight is taken off which may give rise to the leading edge of the battery digging into the rack/ industrial truck rollers and may need a small adjustment to enable a safe and smooth push off. (**see 3.2 DANGER note above**).
4. When the battery is safely and fully positioned onto the charging rack/ industrial truck, press the reverse button to pull the carriage all the way back to its parked position. At the end of travel release the reverse button and finally release the power button to complete the procedure.
5. Ensure the magnets are switched off, leaving them on may cause overheating, damage or injury.

NOTE: To ensure the magnets are off, disable the machine by either pressing the Power/ Enter key on the electronic code switch or the emergency stop (battery disconnect) switch.

General note regarding forward/ reverse push buttons: If the forward/ reverse buttons are not released at the end of travel there are forward & reverse proximity switches that will stop the carriage. This is to protect against damage or injury.

5 Maintenance

The PU changer is not designed for continual use. It is designed for a 35% duty cycle, based on duty cycle information received over time across a number of applications. In view of this a certain level of maintenance is required to maintain functionality, operating safety and maximum life expectancy:

- Carry out the daily inspection before starting work (See table below).
- Keep the machine clean. This makes it easier to check for wear and damage.
- When cleaning the machine follow these recommendations:
 - a). Do not use high pressure cleaners and/ or solvents.
 - b). Do not use metal brushes
 - c). Do not wet-clean the electrics
 - d). Do not use flammable cleaning solutions.
 - e). Take care of the environment (see last page).

DANGER Risk of accidents.

If you carry out the test run in your normal working environment, you risk endangering yourself and your colleagues, as you will have to concentrate on the host truck and machine. Carry out the test drive in an open area free of obstacles.

5.1 Operators Inspection table 1

Daily (or every 8 hours) according to site duty.

Machine part or component	Activity
Main power leads.	Check they are not worn or frayed. Check for signs of burning
The main fuse is located on the host truck close to the positive battery terminal. (Location will vary as the host truck can be any supplier's product).	Check for signs of overheating/ burning
Magnets and switch. See fig 5.	Set machine up for operation. Depress the magnet switch, the pushbutton should illuminate, then hold a piece of steel against the magnets, they will attract the steel until the switch is turned off.
Hydraulics: Oil type Shell tellus 32 or equivalent (ISO 6743/4 viscosity ISO 3448)	Check for leaks: i.e. light oil on the floor of the machine. If leaks are found inform supervisor/ manager and quarantine the host truck until an engineer can assess the incident. Change oil every year or 2000hrs dependant on duty.
Rollers.	Check all rollers are free to move and are clear of debris. Check rollers for impact damage and report any damage to the supervisor/ manager.

<p>Drive chains: Typical life is 15,000hrs Every 100hrs wipe chain with proprietary chain lubricant very sparingly.</p>	<p>Visually check chains are clear of any debris and that there is approximately 6-12 mm of slack in the bottom chain. If it is more than this inform the supervisor/ manager. Chain adjustment is for service engineer and described in 4.2.</p>
<p>Carriage guides</p>	<p>The guides are self lubricating nylon. Visually Inspect for dirt/ debris. Wipe with a dry cloth.</p>
<p>Labels/ decals</p>	<p>Check they are complete and legible. Report defects to supervisor/ manger.</p>
<p>Electronic code switch: See Fig 5 for position and Fig 3 for detail.</p>	<p>Enter code and check the warning beacon flashes (this indicates the control power supply and power to the magnets is healthy).</p>
<p>Emergency stop/ battery disconnect. See Fig 5.</p>	<p>With the beacon flashing (as above) press the emergency stop, this will remove all power to the machine. The Emergency stop/ battery disconnect, isolates the positive pole of the 24 volt dc supply.</p>
<p>Battery mast/ interlock see fig 4.</p>	<p>With system enabled (as electronic code switch check above), Raise the mast handle to full height and lock into position. Press 'START' button on the console, hydraulic power pack will energise. Release 'START' button. Now unlock battery mast and move to full lower position. Press 'START' button, hydraulic power pack will not energise. Safety Interlock is working OK.</p>
<p>Magnets.</p>	<p>Depress magnet switch on control panel (fig 5). LED lights on the switch button. Put a metallic object next to each magnet in turn and it should attach to the magnets. On releasing the switch the metal object will come away from the magnets.</p>

5.2 Chain adjustment

NOTE: This is to be carried out by a trained service engineer.

The left and right drive bottom chains need some slack to work correctly. This should be approximately 12-18mm. If this needs adjusting it can be achieved by using the chain adjuster and locking screws positioned on the left and right side of the carriage ends.

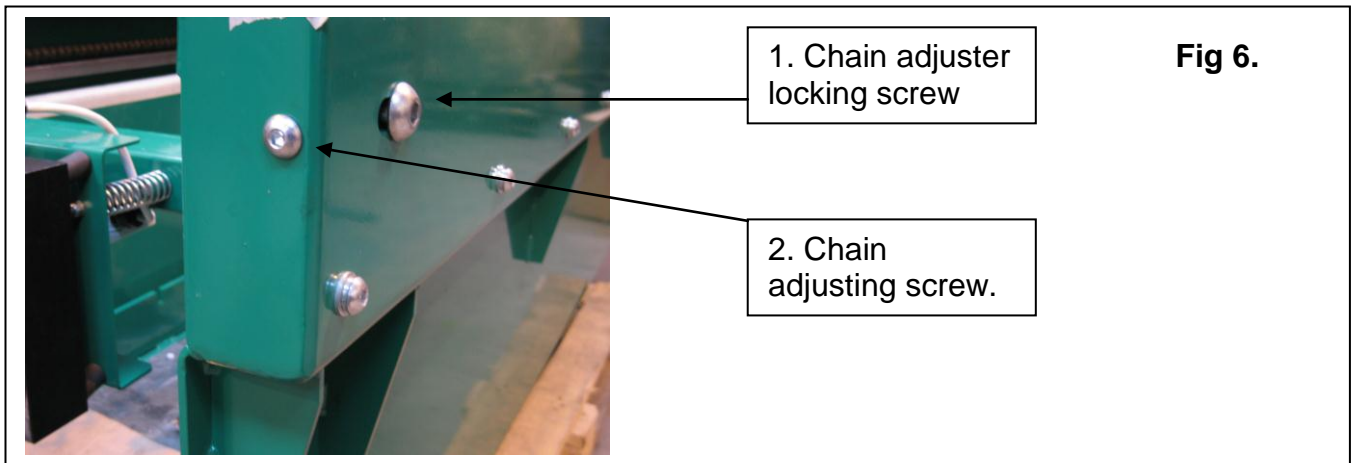
Fig 6 below shows the right hand adjusting points; it is the same for the left hand chain adjustment.

Slack off the chain adjuster locking screw 1. Then adjust the chain tension by turning the chain adjusting screw 2 to the desired setting. Finish by locking the chain adjuster locking screw 1.

CAUTION:

Always have -6-12 mm slack on the chain.

Do not over tighten the chain, it may reduce its life and cause damage to the machine.



5.3 Checking-adjusting unloading valve

The pressure relief valve, (1.) is part of the hydraulic power pack unit and is situated under the control panel. The pressure relief valve is located on top of the 3-way solenoid valve (see photo fig 7).

Remove the plastic cover and turn the valve clockwise to increase the unloading pressure and anticlockwise to decrease the unloading pressure. The valve is set at 70 bar, which covers the full range of batteries weights. There is a pressure gauge on the control panel to monitor the hydraulic pressure.

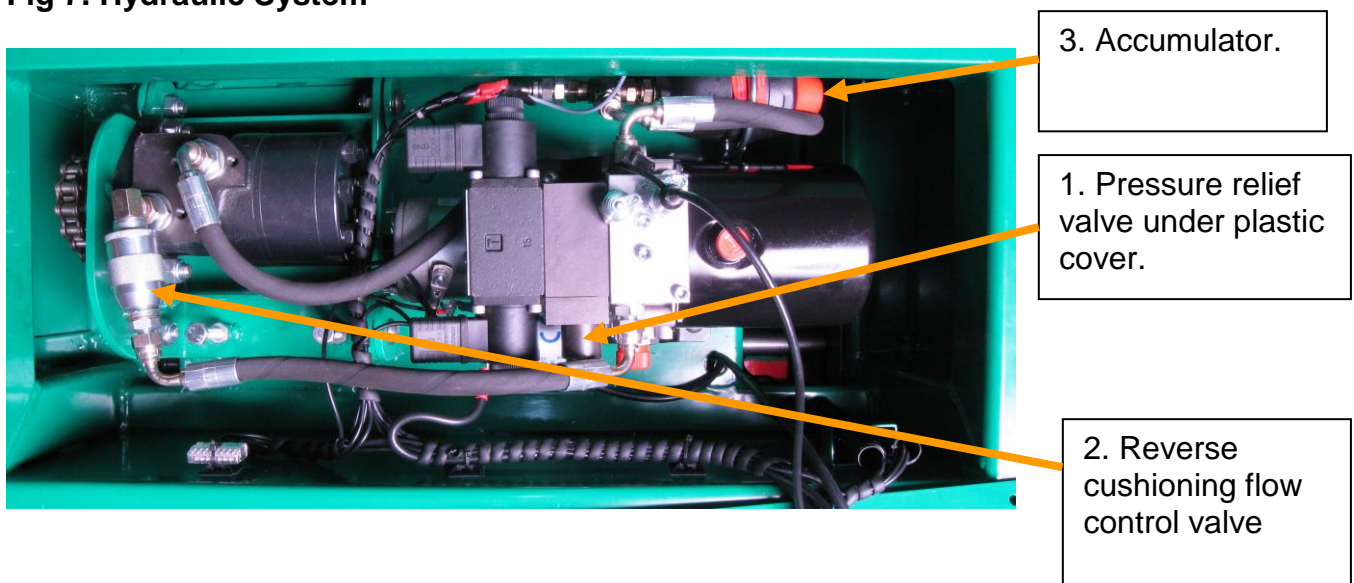
NOTE: There may be times when this needs adjusting according to the weight of batteries being used. For example the valve may be adjusted downwards if the machine is used to pull lighter weight batteries.

There is another relief valve below on the pump block. This has a red cover. This valve is factory preset and cannot be adjusted.

5.4 Hydraulic cushioning to reduce snatching magnets

When pulling the battery off the rack/ industrial truck, i.e. reverse direction, it is useful to cushion the torque. This prevents shock loading and reduces the risk of the magnets pulling off the battery. It is achieved by using a flow control valve (2) and an accumulator charged with nitrogen to 30 bar pressure. The flow control valve (2) is adjusted to give the desired level of cushioning. This will vary according to the battery weight, and is set in mid position. Turning the valve clockwise increases the cushion effect and turning the valve anti-clockwise decreases the cushioning effect.

Fig 7. Hydraulic System



6 Spare Part List

This list is proposed under following consideration:

- Delivery time of spare parts.
- Estimation which parts could fail.
- Most economic way to reduce time on site. In most cases it is e.g. more rational to take a new power supply than trying to disassemble it into its parts and change the components.

The owner decides about the stock quantity of spare parts.

6.1 Mechanical

Ref M2. P.25 Rear Bearing end caps (per pair)
Ref M5. 10B1 N.26 split link. Drive chain motor to drive shaft. X1
Ref M6. 10B2 N.26 split link. Carriage chain. X2
M9. Bearing 16004 zz. Front sprocket bearing. X2
M13. Front Rubber bumpers (per pair)
Ref M10-M27-M37 Complete roller.

6.2 Hydraulic

MCV4-V1B-RO-PE-MAZ-TO2-F1. Power pack unit
CAU Solenoid coil.

6.3 Electrical

EH1. Magnet. EM-20106
EH4. ED 125 Emergency stop.
EH5. LED low profile beacon 180 degrees
EH 10. 1.5 metre extended 14A black curly cable
FU7. Maxi-blade fuse. 60Amp. (Main Fuse).
FU2. Blade fuse 15Amp. Control fuse.
EH 12. ZB4-BA3. Pushbutton (green momentary). Same for Fwd, Rev & Start
EH 13. ZB4-BZ102.T terminal contact body (1n.c.). Forward switch block.
EH 14. ZB4-BZ105. terminal contact body (1n.o. & 1 n.c.). Start & Reverse.
EH15. ZB4-BW0B31. pushbutton body illuminated (1n.o. and 24Volt LED). Magnet switch with LED
EH16. ZB4-BH033 Magnet on/ off latching pushbutton
EH25. Proximity switch.

7 Electronic Schematic

Fig 8. Schematic with Key-Switch

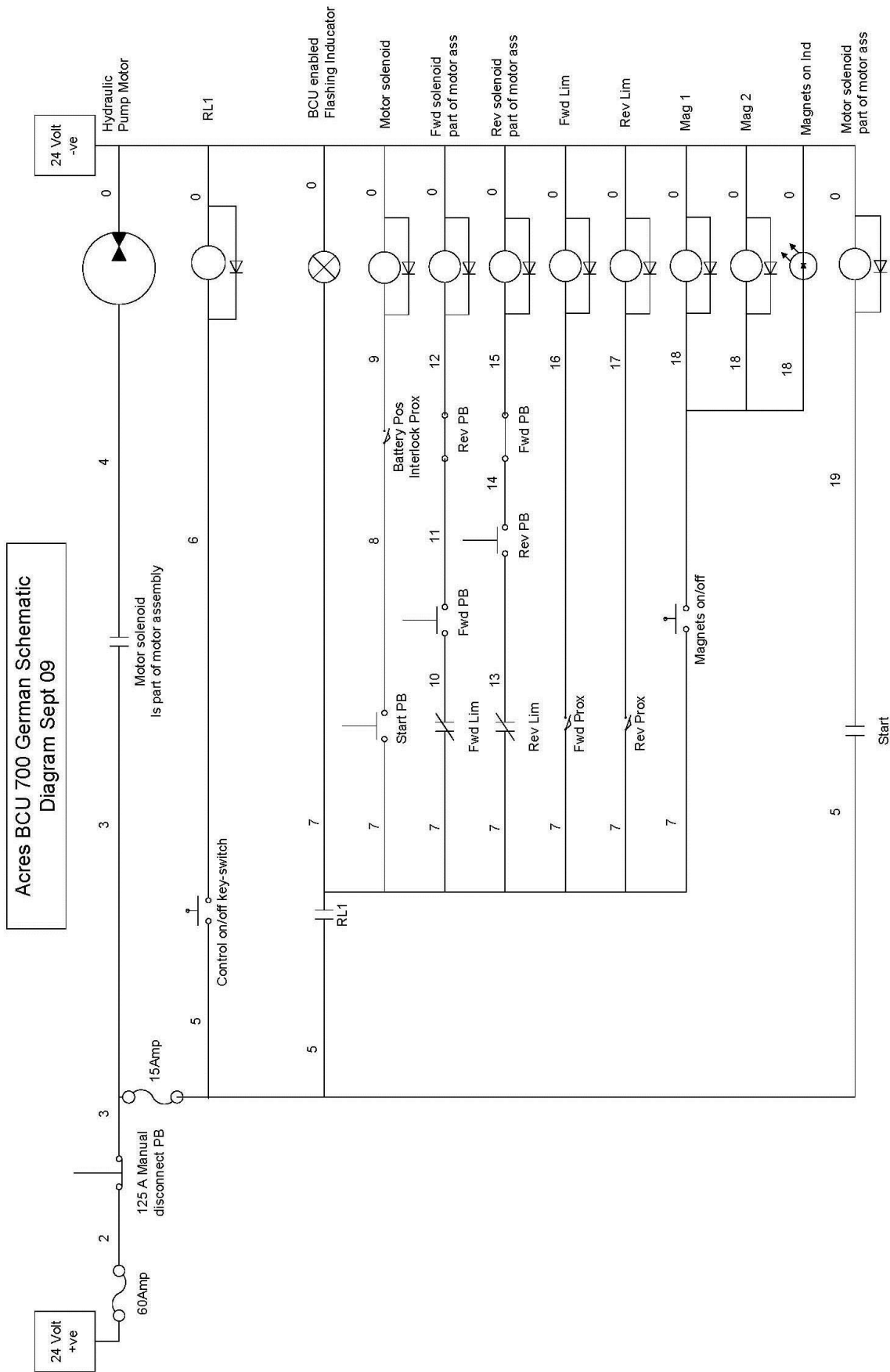
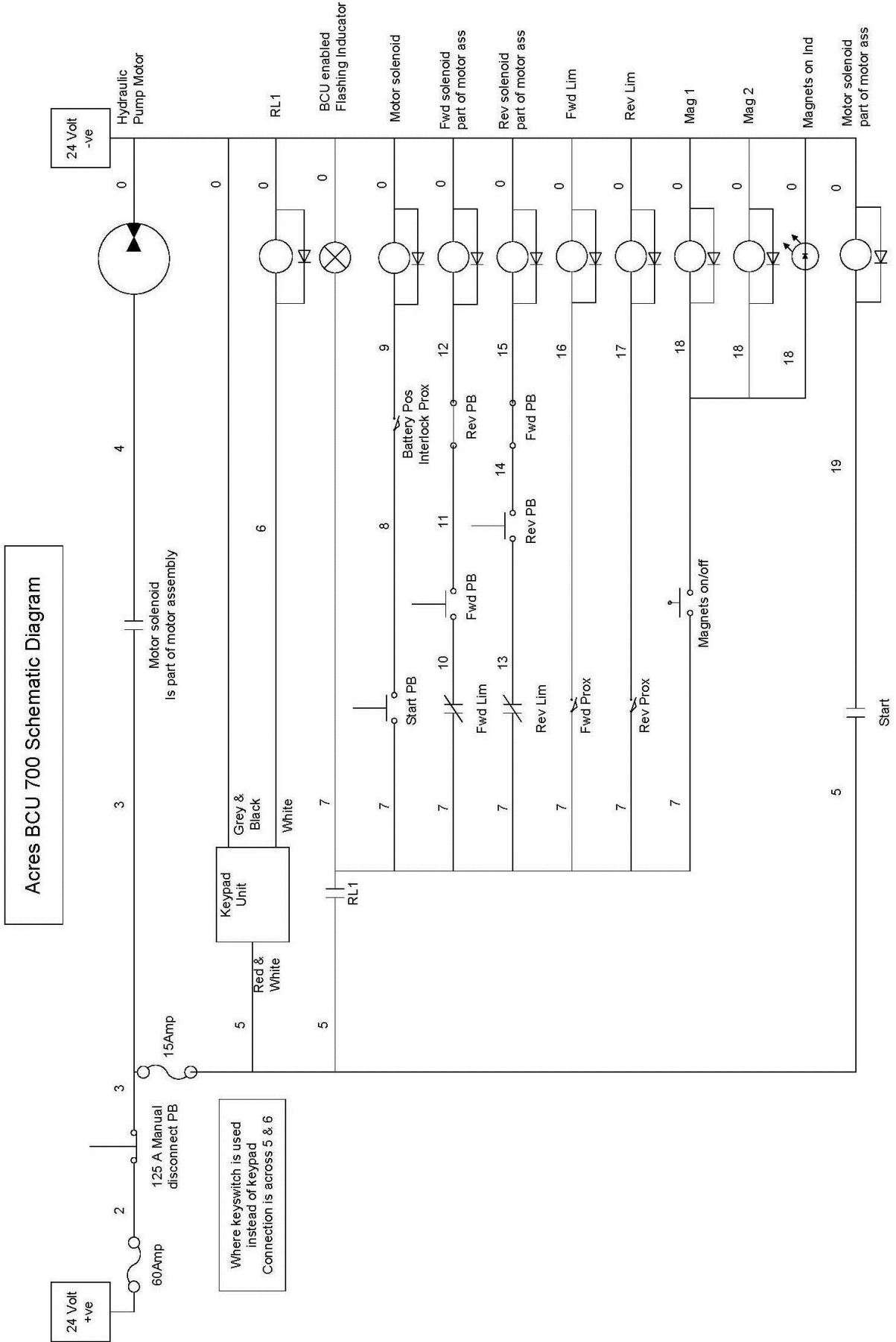


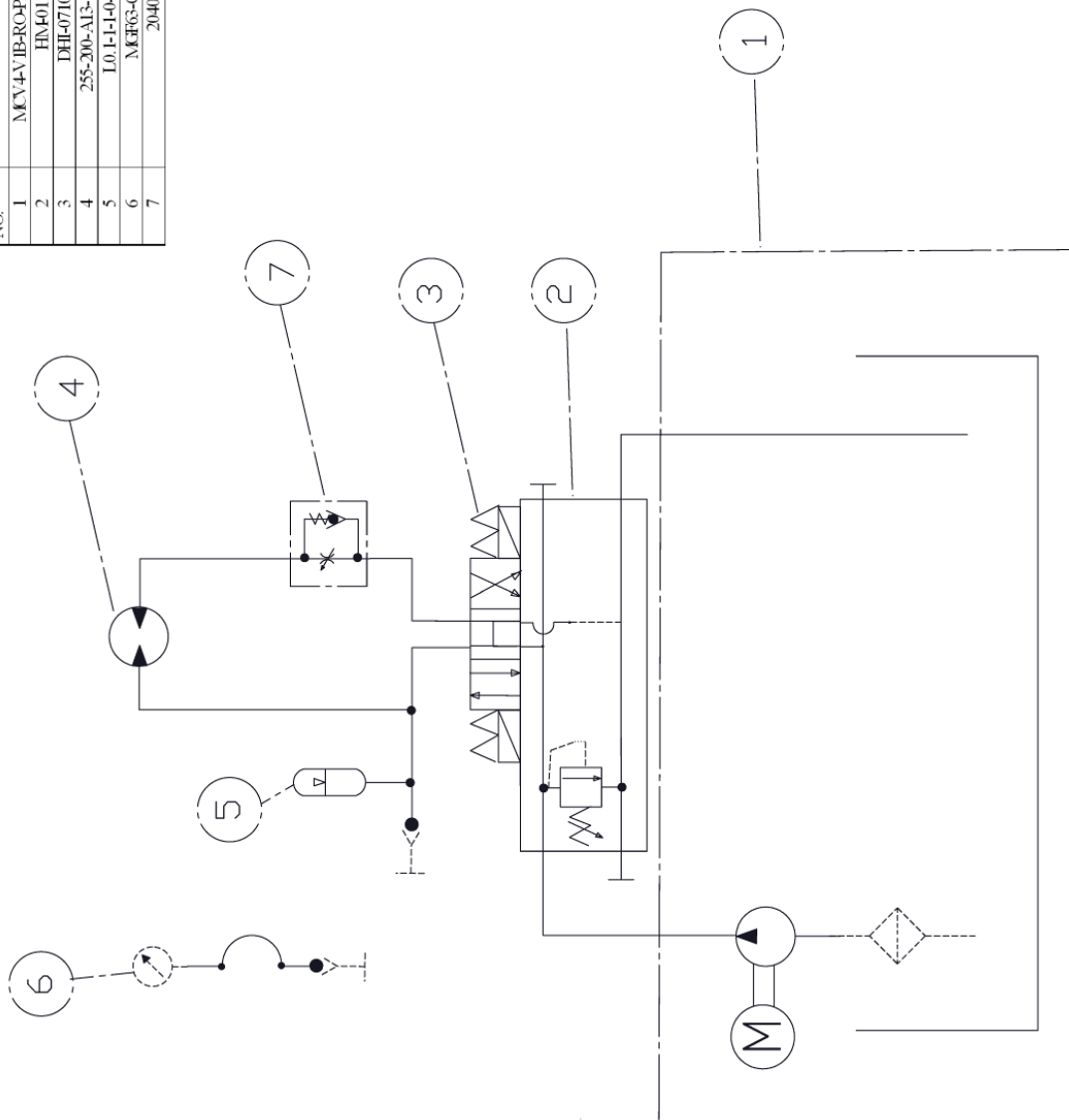
Fig 9. Schematic with electronic code switch



8 Hydraulic Schematic

Fig 10. Hydraulic Schematic

ITEM NO.	PART NUMBER	DESCRIPTION
1	MCV4V1B-RO-PE-MAZ-T01-F1	24 volt power pack with NG 6 interface, 1 litre reservoir and starter solenoid
2	HN4011/210	Relief valve
3	DHL0710-24DC	Three position, 3 way solenoid control valve
4	255-200-A13-12-BAAAA	Hydraulic motor
5	L0.1-L1-04GH/2*-A	0.1 litre accumulator pre-charged to .30 bar.
6	MK663-GH-250	63mm, 0 to 250 bar, glycerine filled pressure gauge
7	204010	Needle valve with free reverse flow



9 Environmental safety & disposal

Environmentally harmful substances are used in servicing and cleaning all types of technical equipment. Please do not simply release them into the environment but act responsibly:

- Clean and lubricate the machine only in specially designated areas which are equipped to contain harmful chemicals and oils.
- Oil & grease require special disposal. Dispose of them in the correct manner or even better, set aside for recycling.
- Should the machine be scrapped, dispose of it via a specialist company in order that valuable raw materials will be separated and recycled.