

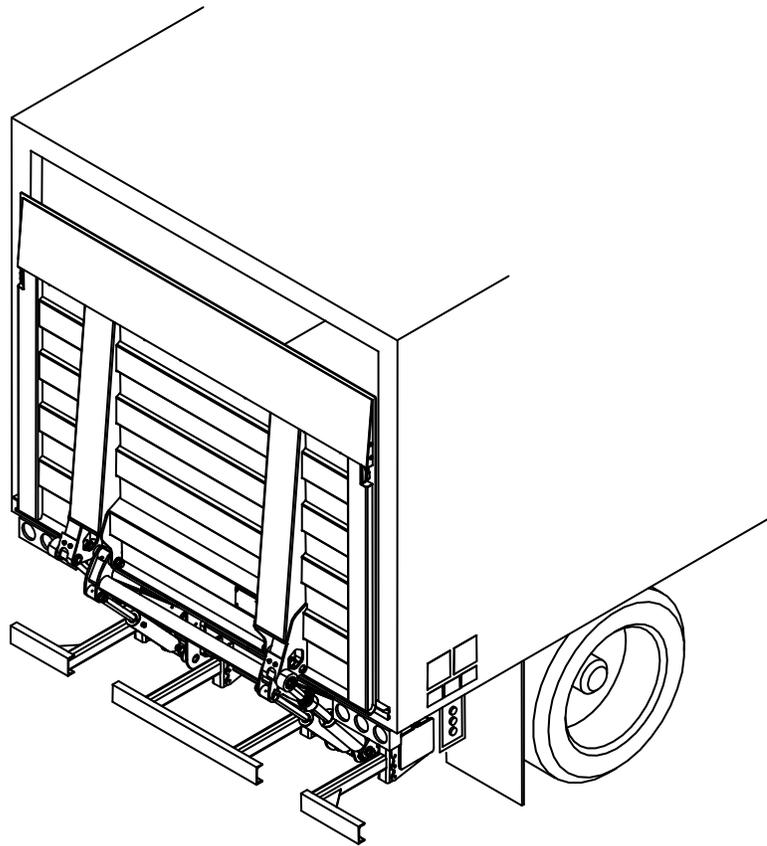
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# Tech Manual

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## BZ-33, BZ-44 GEN 5

3300 lb. & 4400 lb. Capacity Cantilever Liftgates



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### All Generation 5

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Improper operation and maintenance of this liftgate could result in severe personal injury or death.

Read and understand the contents of the owner's manual and all warning and operation decals before operating and/or performing maintenance on this liftgate.

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# Introduction

Each Waltco liftgate is manufactured to stringent quality standards for years of reliable service. To ensure maximum performance of your Waltco liftgate, always specify and use “OEM Parts” from Waltco.

This manual does not provide procedures for the servicing and repair of Waltco liftgates. Service and repair should only be performed by an authorized Waltco distributor. For information on the nearest authorized Waltco distributor contact:

**Waltco Lift Corp.**  
285 Northeast Avenue  
Tallmadge, OH 44278  
Phone: 800.411.5685  
Fax: 800.411.5684  
E-mail: [parts@waltco.com](mailto:parts@waltco.com)



**This is the safety alert symbol. This manual uses this symbol to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid personal injury or death.**



**The use of non-standard or makeshift parts can be extremely hazardous and result in serious injury or death.**



**Every vehicle that has a WALTCO Liftgate must have legible WARNING AND OPERATION DECALS clearly posted on the vehicle and an OWNER'S MANUAL in the vehicle at all times as a guide for proper operation and maintenance.**

## Introduction control card

In order to meet the requirements of the market, Zepro has chosen to relinquish the traditional relay technology. Our solution in order to meet the requirements is processor control.

There are many advantages with modern semiconductor technology:

- Completely enclosed components  
*(Much more dependable in severe climates and environments)*
- Programmable  
*(Common platform/spare parts for several models)*  
*(More flexible when new functions are requested)*
- Digital and analogue signal processing  
*(Allows safer manoeuvring)*  
*(Designed for future, more advanced functions, such as weighing and variable speeds)*  
*(Possible to monitor critical factors, such as the supply voltage)*
- Fusing and other excessive load protection  
*(Makes possible automatically resetting fuses for overloads)*



## The control process

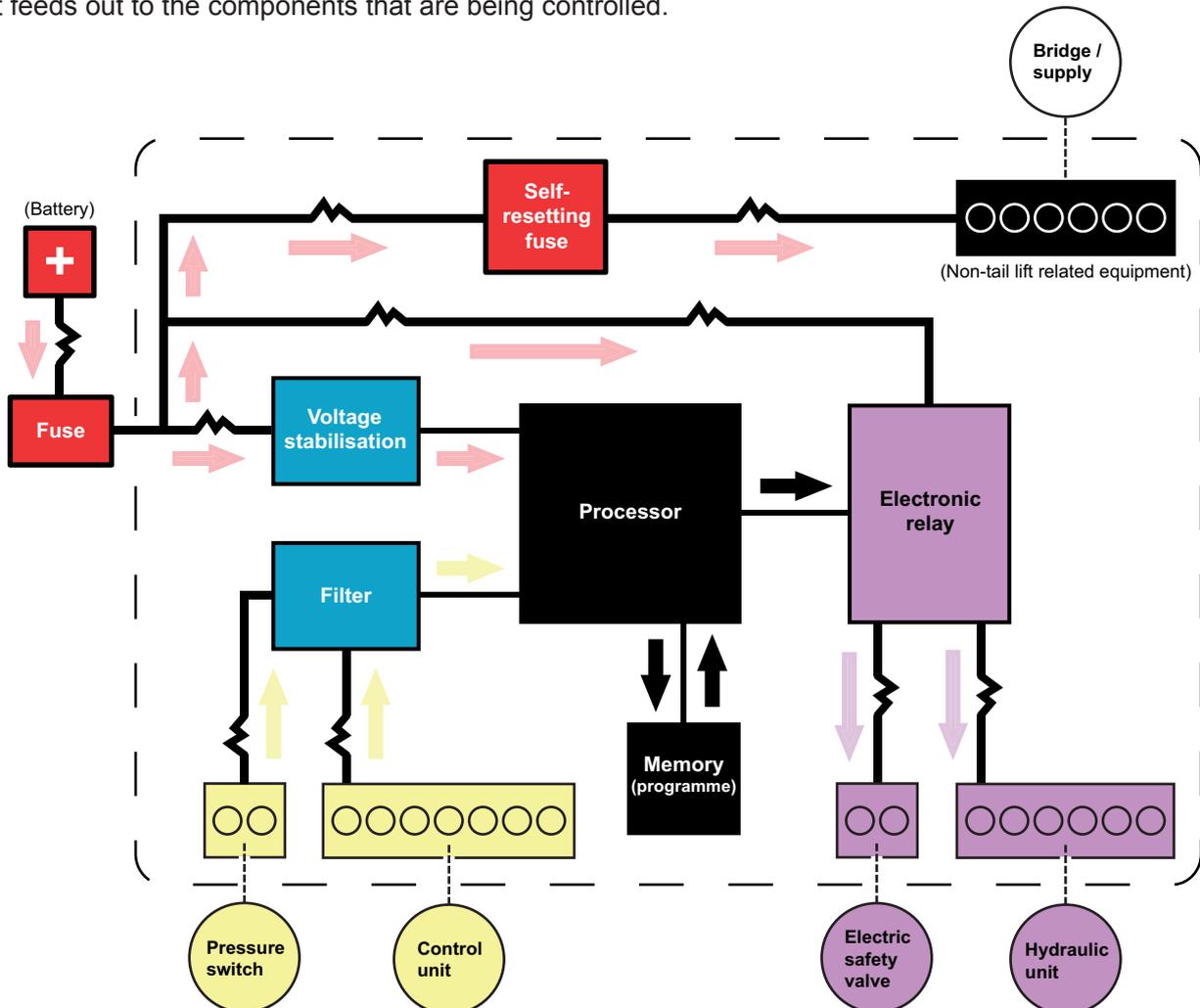
Most modern control systems have the same basic design. The brain of the system is some form of processor. The processor tracks what has to be done depending on the particular job and the signals it receives. Three zones are built up around these:

- Inputs
- Processor
- Outputs

The input is a channel to stabilise everything that is to go into the processor. Normally the card's internal voltage is reduced to 5V and it is stabilised to be as free of interference as possible. All incoming signals handled by the control system are filtered and stabilised. This is done to create a stable environment for the processor to work in.

The processor has to know what it is suppose to do with the signals. It has a memory to help it do this. This memory is often integrated in the processor circuits. The routines and rules the processor follows are stored in the memory in the form of a program.

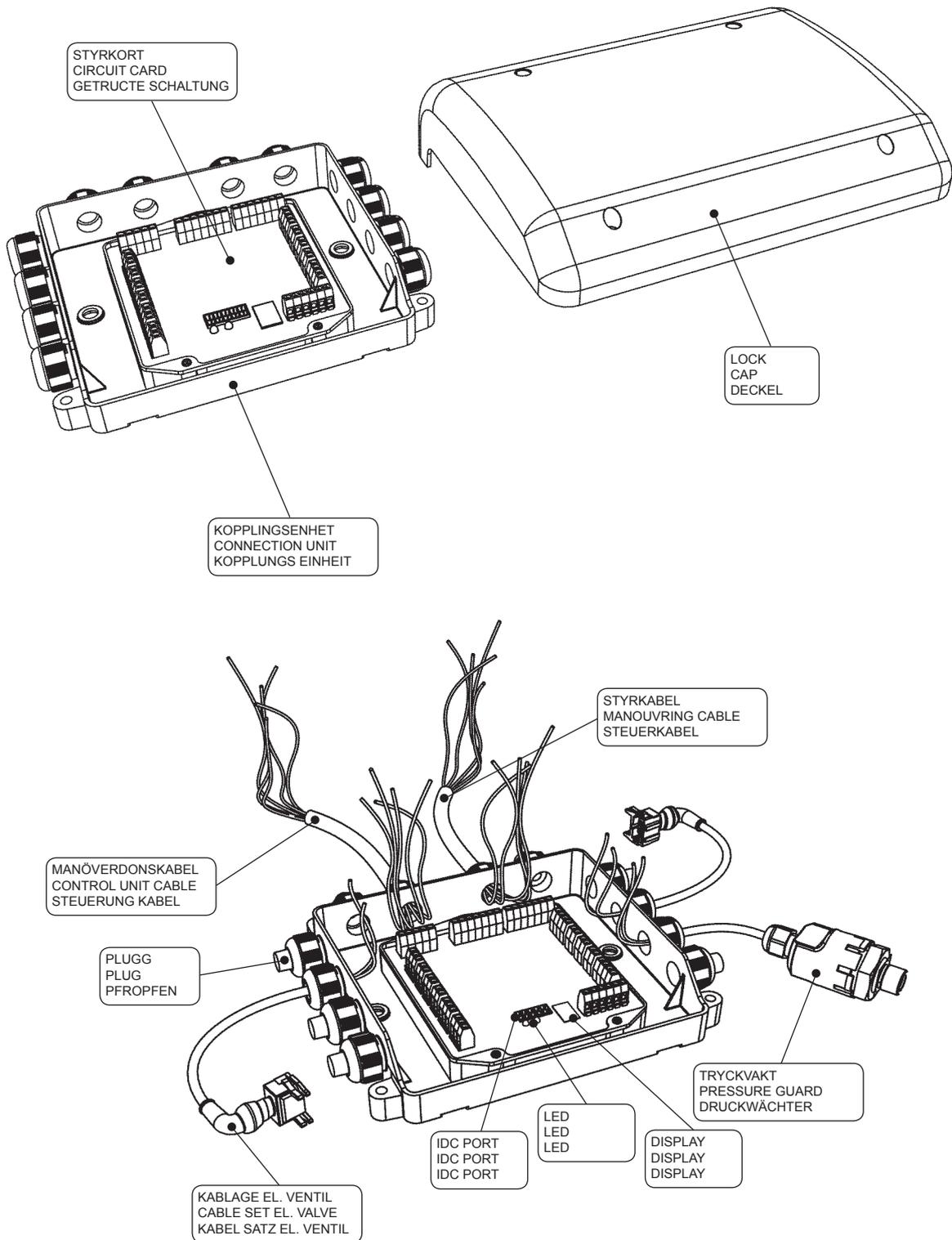
When the processor has processed all input signals based on the program that is using, in most cases it sends a control signal to an amplifier circuit. In other words, this is a modern electronic version of the classic relay. Compared to the processor, it has contact with the original unfiltered supply voltage which it feeds out to the components that are being controlled.



## Technical specification for the control card

Dimensions	130 x 150 x 35 mm.
Connection	Weco screw terminal block 970 HEN/"poltal" with brass screws without wire protector.
Assembly	The circuit card is installed in the casing.
Button inputs	9 - 30 volt in from common voltage. Shutdown level at about 10V with a 12V system, and about 20V with 24V. Two inputs for B Two inputs for E Two inputs for C One input for IN One input for OUT
VDHH connection	5 pole connection block for VDHH cabling. A start input, bridge if cabin switch not used. One output for lamp indicator. Max 140 mA
Sensor inputs	Pressure guard 1 – digital. Fused with PTC 0.5A Pressure guard 2 - digital. Fused with PTC 0.5A SE 1 – digital input for position indication. Fused with PTC 0.5A. SE 2 – digital input for angle indication. Fused with PTC 0.5A. SE 3 – digital input for angle indication. Fused with PTC 0.5A.
Outputs	8 semiconductor outputs. 3.7A per output continual, can handle inductive loads. Short-circuit protection 6A per circuit (two outputs in each). Maximum output current all outputs powered by 12A (not verified).
Analogue outputs	1 analogue output. The same output can be configured for digital control of external stop relay for shut off of voltage supply.
Indicators	2 LED for signal indication. 7 segment digit display for operation and malfunction indication. <i>Note. Separate output for audible alarms via 10 pole terminal/IDC.</i>
Function control	The card is configured with a hand terminal.
Supply voltage in	12 - 24 volt truck system, polarity protection. Normal function at 7 – 36V. Max 36V for 60 seconds.
Supply voltage out	Three different types of fused supply voltages out. A: Outputs from control circuits have internal short circuit protection that activates at about 6A. B: Output for extra equipment is fused with a PTC 3.75A. C: Outputs for sensors are fused with en common PTC 0.5A.
Casing	IP67, cast in a box made from composite.
Temperature range	-40 – +85 °C, 85% RH (during operation)

### Technical specification of the control card continued.



## **The system's different control programs**

### **Program 1 - Double-acting x2/ hydr. Auto-Tilt**

*Refers to standard lift ZHD 1500/2000/2500 MA, with hydraulic Auto-Tilt*

### **Program 2 - Double-acting x2/ el. Auto-Tilt**

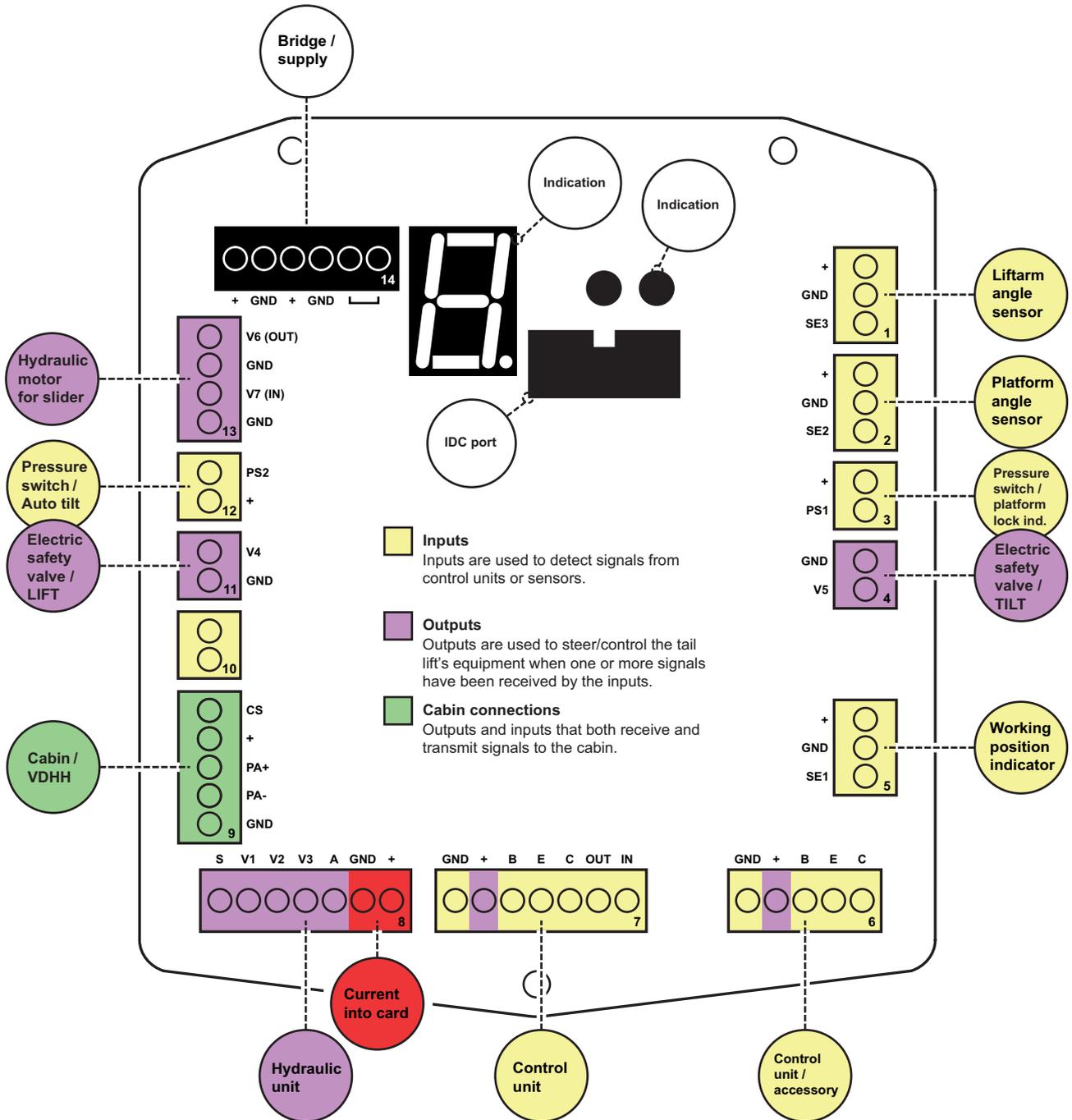
*Refers to standard lift ZHD 1500/2000/2500 MA, with electric Auto-Tilt*

### **Program 3 - Double-acting x4**

*Refers to standard lift ZHD 1500/2000/2500 DA*

(See page 1.9 - 1.11 for function list of control program)

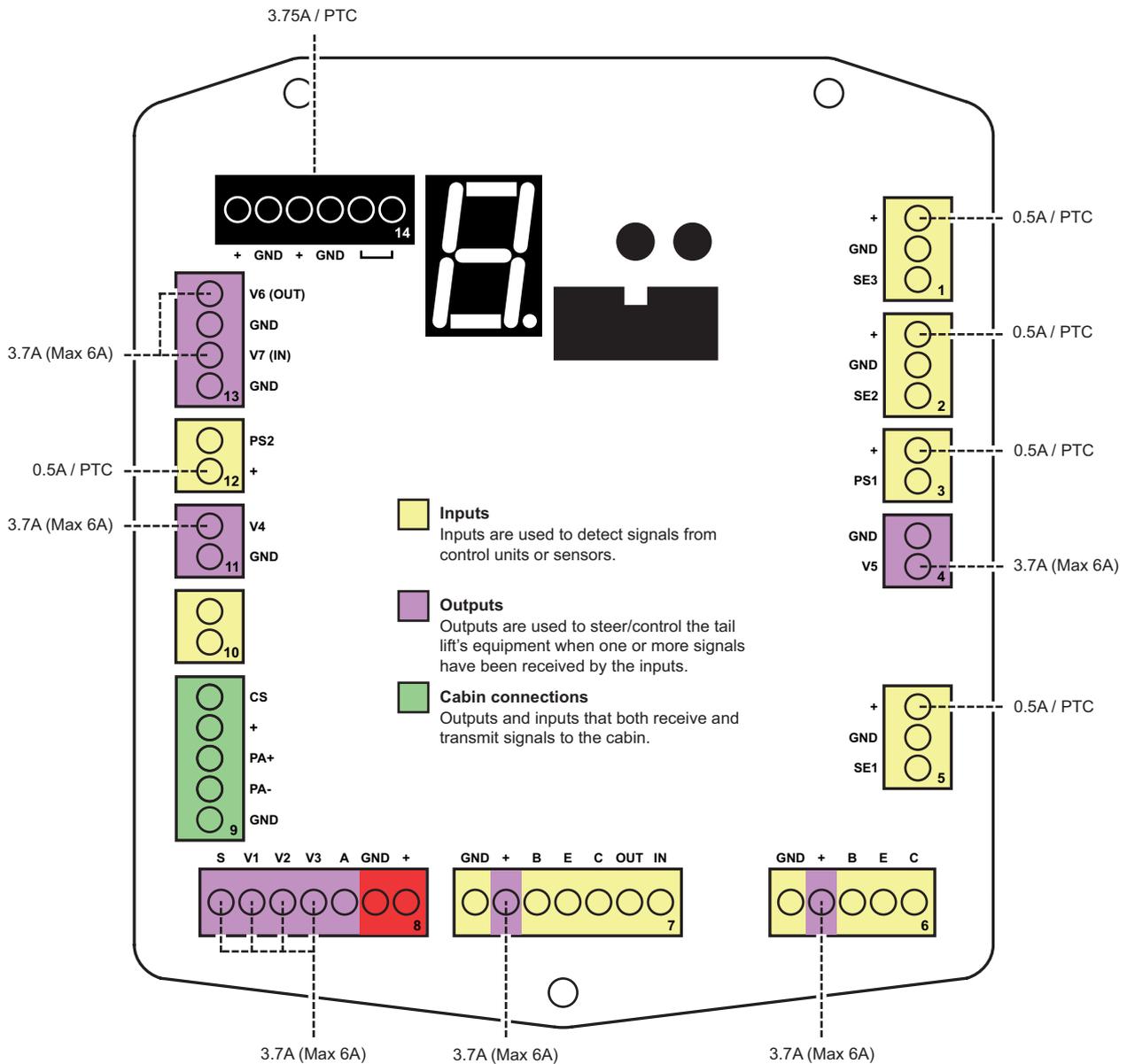
## Connections to the control card



### Inputs and outputs

The picture above shows the control card's terminals. Terminal blocks are either inputs, outputs or cabin connections, which are a mixed terminal block. Mixed means the block can both receive and send signals. Ports for incoming supplies to the control card are marked in red. A summary description of the control process can be found in page 1.2 to provide and understand the difference between output and input.

## The control card's fusing

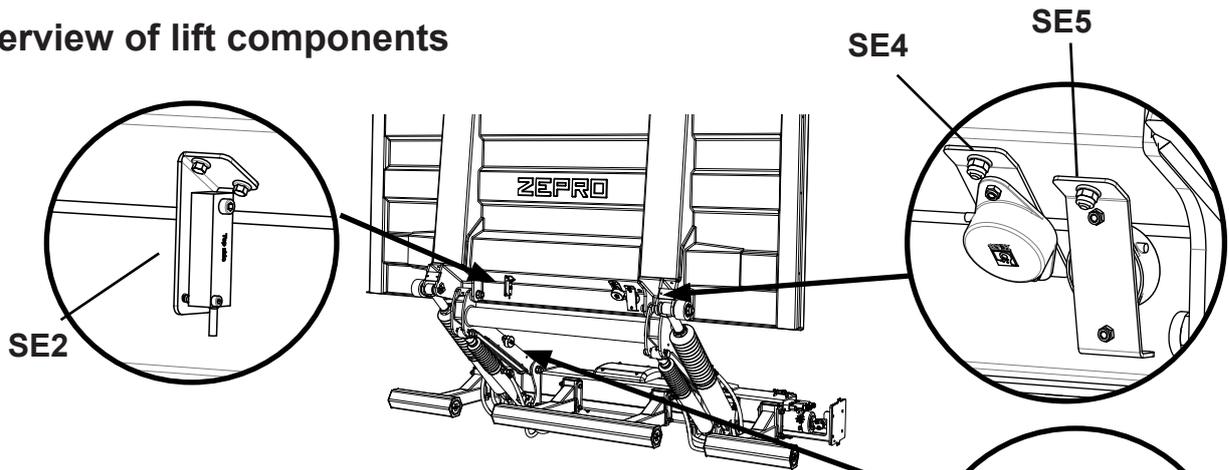


## Fusing

The control card's short-circuit protection and fusing vary depending if the block's function is input or output. All power supply to sensors is commonly fused with an automatically resetting 0.5A fuse. Outputs, on the other hand, are fused individually with 3.7A fuses.

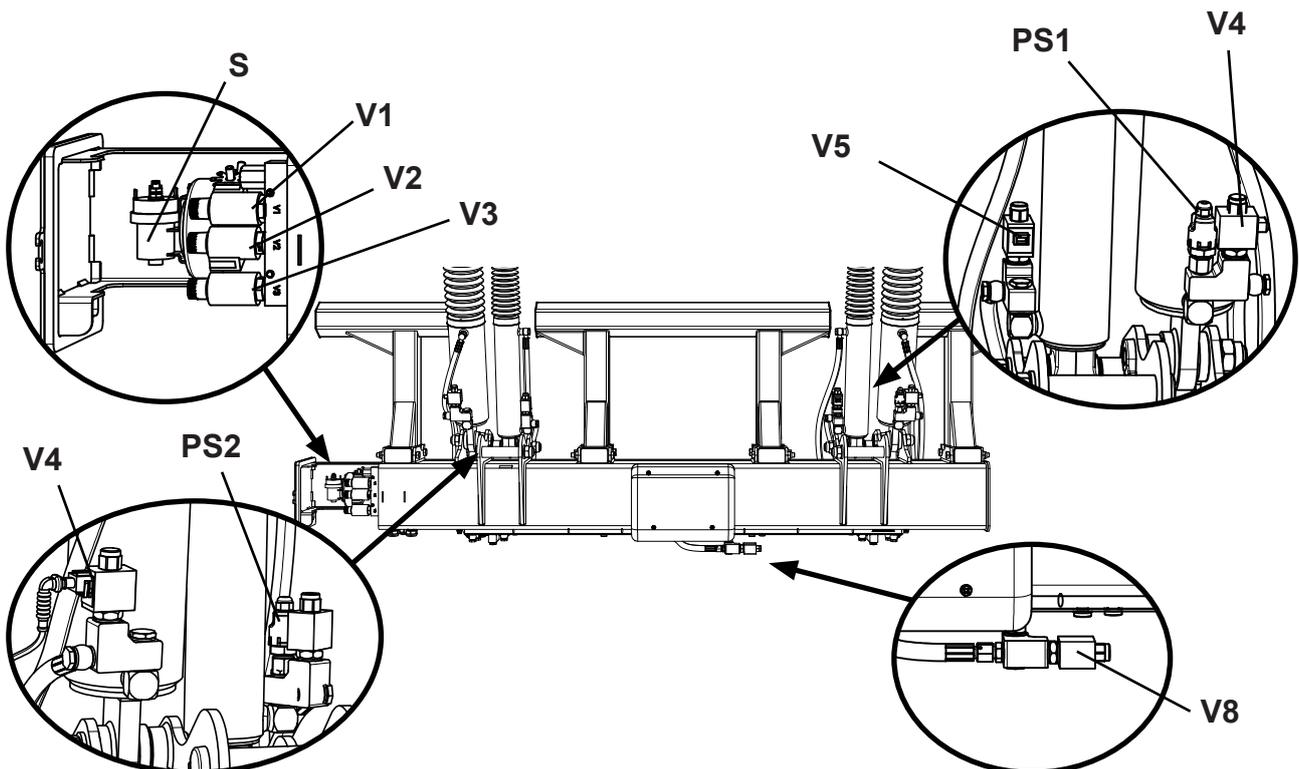
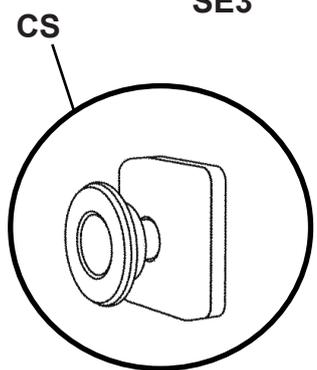
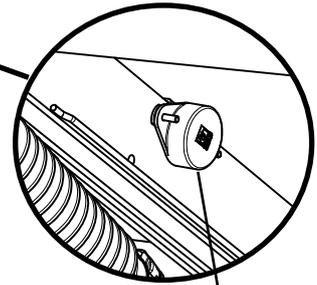
The accessories terminal block, which primarily supplies power to non lift-related equipment, also has a separate automatic resetting 3.75A fuse. If the fuse is triggered, it resets automatically once the short-circuit or overload is removed.

## Overview of lift components



## Connection, description of components

- V1**..... is the port where the shift valve is attached.
- V2**..... is the port where the lift valve is connected.
- V3**..... is the port where the tilt valve is connected.
- V4**..... is the port where the lift cylinder's electrical valve is connect.
- V5**..... is the port where the tilt cylinder's electric valve is connected.
- V8**..... quick opening valve, connected to connection box for 4 button control.
- PS1**.....is the port where the pressure guard for the lock indicator is connected.
- PS2**.....is the port where the pressure guard for auto tilt is connected.
- SE2**.....is the port where the angle sensor for horizontal platform is connected (el. autotilt).
- SE3**.....is the port where the angle sensor on liftarm is connected (autotilt).
- SE4**.....is angle sensor for remote control, connected to connection box for 4 button control.
- SE5**.....is angle sensor for **V8**, connected to connection box for 4 button control.
- S**..... is the port where the solenoid is connected.
- CS**..... is the port where the cabin power switch is connected. Bridged to + if not used.



## Function list for control program

### Program 1 - ZHD 1500/ 2000/ 2500 MA, with hydraulic Auto-Tilt (program 1, art. no. 54175)

<u>Function</u>	<u>Signal in</u>	<u>Signal out</u>	<u>Notes</u>
Lift	B	S+V2	
Lower	E	V1+V2+V4+V5	
Tilt up	B+C	S+V3	
Tilt down	C+E	S+V1+V3+V5	
Open platform alarm	Ps1	Pa- (-).	Pressure guard for falling pressure connected to the tilt cylinders + side, sends (when in neutral mode) connected signal (+) back to Ps1, which in turn sends a signal out (-) on Pa-.
Overload protection	Ps2	Blocks/cancels lift and tilt up functions.	Pressure guard for rising pressure connected to tilt cylinders + side sends (when activated) +signal back to Ps2 which blocks/cancels lift and tilt up functions.
Activation	Cs	Connection units' functions are activate	No in-signal on Cs results in blocked control unit connectors. Signal to Cs usually comes from the cabin switch, or in cases where such a switch is not used the +signal comes in on Cs bridged from+ on the nearby connector.

## Function list for control program continued.

### Program 2 - ZHD 1500/ 2000/ 2500 MA, med electric Auto-Tilt (program 2, art. no. 32664)

<u>Function</u>	<u>Signal in</u>	<u>Signal out</u>	<u>Notes</u>
<b>Lift<sup>1</sup></b>	B	S+V2	
<b>Lift<sup>2</sup></b>	B+Ps2	S+V2	
<b>Lower</b>	E	V1+V2+V4	
<b>Tilt up</b>	B+C	S+V3	
<b>Tilt up from ground</b>	B+Se2	S+V3	Whilst there is signal in on B/lift the program performs tilt up until platform is horizontal or Se2 becomes inactive, at this point the lift function takes over.
<b>Tilt down</b>	C+E	S+V1+V3+V5	
<b>Tilt down to ground</b>	E+(Ps2)+Se3	V1+V3+V4+V5	Completed lowering function/lift arm at ground (no pressure in lift cylinder/signal on Ps2) will automatically be taken over by tilt down, signal on Se3 is also considered in order to doublecheck that lift arm is at ground.
<b>Open platform alarm</b>	Ps1	Pa- (-).	Pressure guard for falling pressure connected to the tilt cylinders + side, sends (when in neutral mode) connected signal (+) back to Ps1, which in turn sends a signal out (-) on Pa-.
<b>Activation</b>	Cs	Connection units' functions are activated.	No signal in on Cs results in blocked control unit connectors. Signal to Cs usually comes from the cabin switch, or in cases where such a switch is not used the +signal comes in on Cs bridged from+ on the nearby connector.
<b>No press. in lift cyl.</b>	Ps2	-	Used in conditions for tilt down to ground.
<b>Angle indicator for platform.</b>	Se2	-	Indicates horizontal platform, used in conditions for tilt up2.
<b>Angle indicator for lift arm.</b>	Se3	-	Indicates lift arm at ground, used in conditions for tilt down2.

## Function list for control program continued.

### Program 3 - ZHD 1500/ 2000/ 2500 DA (program 3, art. no. 32665)

<u>Function</u>	<u>Signal in</u>	<u>Signal out</u>	<u>Notes</u>
Lift	B	S+V2	
Lower	E	S+V1+V2+V4	
Tilt up	B+C	S+V3	
Tilt down	C+E	S+V1+V3+V5	
Open platform alarm	Ps1	Pa- (-).	Pressure guard for falling pressure connected to the tilt cylinders + side, sends (when in neutral mode) connected signal (+) back to Ps1, which in turn sends a signal out (-) on Pa-.
Overload protection	Ps2	Blocks/cancels lift and tilt up functions.	Pressure guard for rising pressure connected to tilt cylinders + side sends (when activated) +signal back to Ps2 which blocks/cancels lift and tilt up functions.
Activation	Cs	Connection units' functions are activated.	No in-signal on Cs results in blocked control unit connectors. Signal to Cs usually comes from the cabin switch, or in cases where such a switch is not used the +signal comes in on Cs bridged from+ on the nearby connector.

## Technical specification of the hydraulic unit 7050

**Unit 7050 is used with the following lift models:**

ZHD 1500/2000

### Technical data

Oil volume: 4.8 l

Overflow pressure: 200±5 bar

Nominal pressure: 190 bar

Dimensions: L=670, W=222, H=214

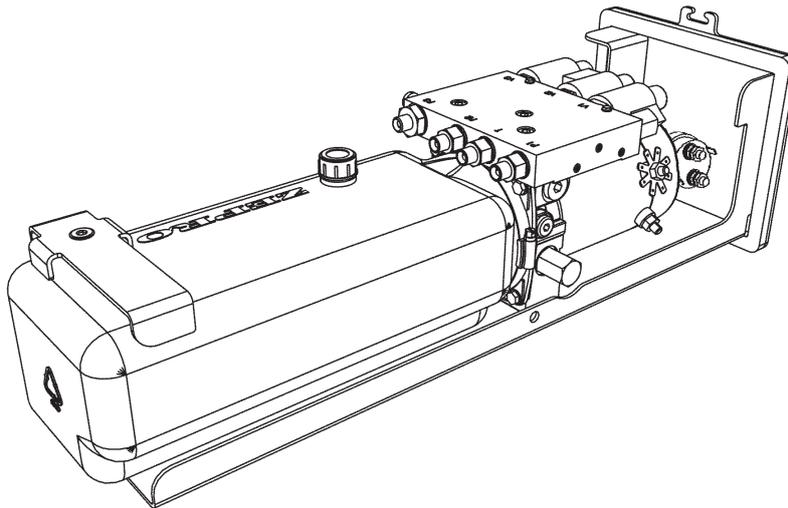
Total weight: 30kg incl. oil

Motor type: 1,5kW, ref. No: 32206 (12 Volt) and 32207 (24 Volt)

Pump type: 2,5cc, ref. No: 32204

Valve system: Cartridge valves, ref. No. 33420 (24 Volt)

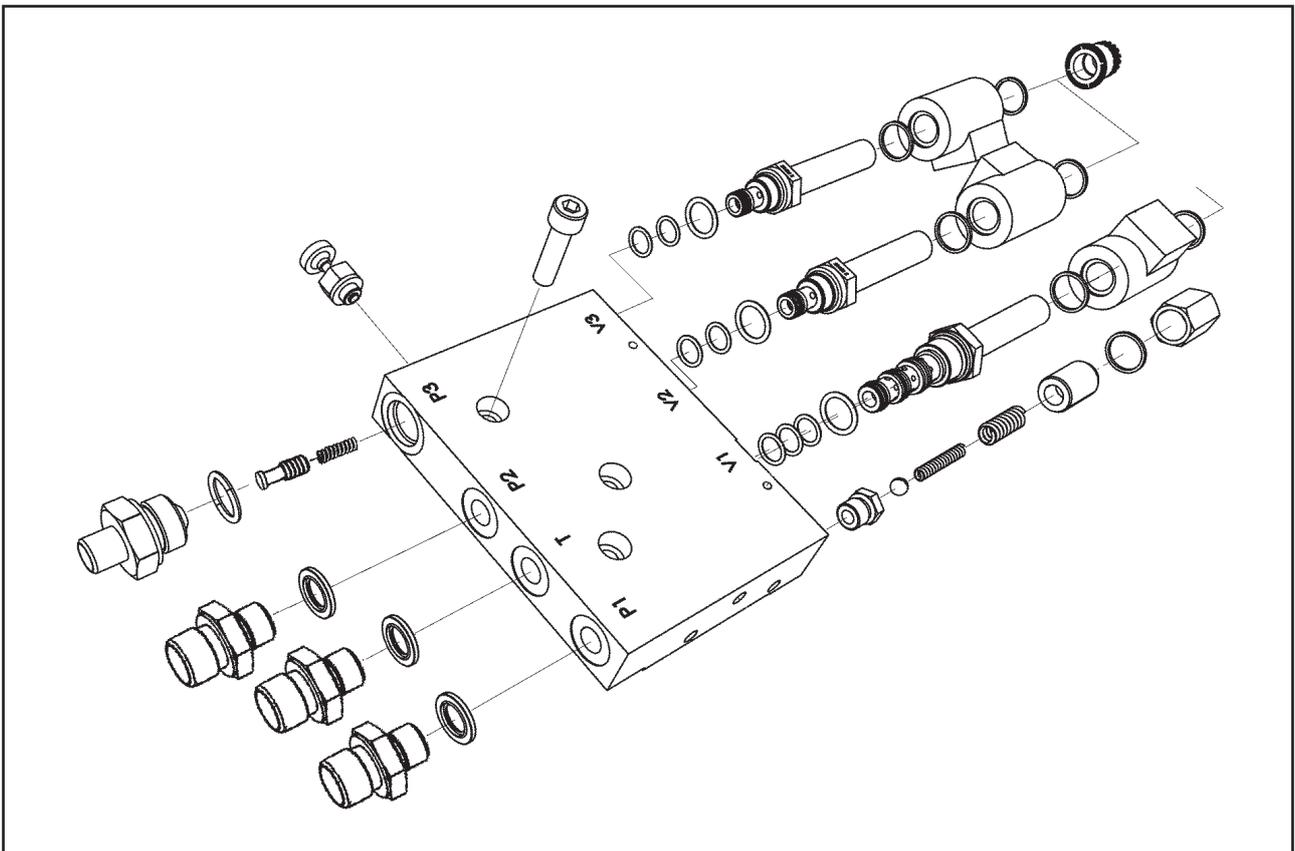
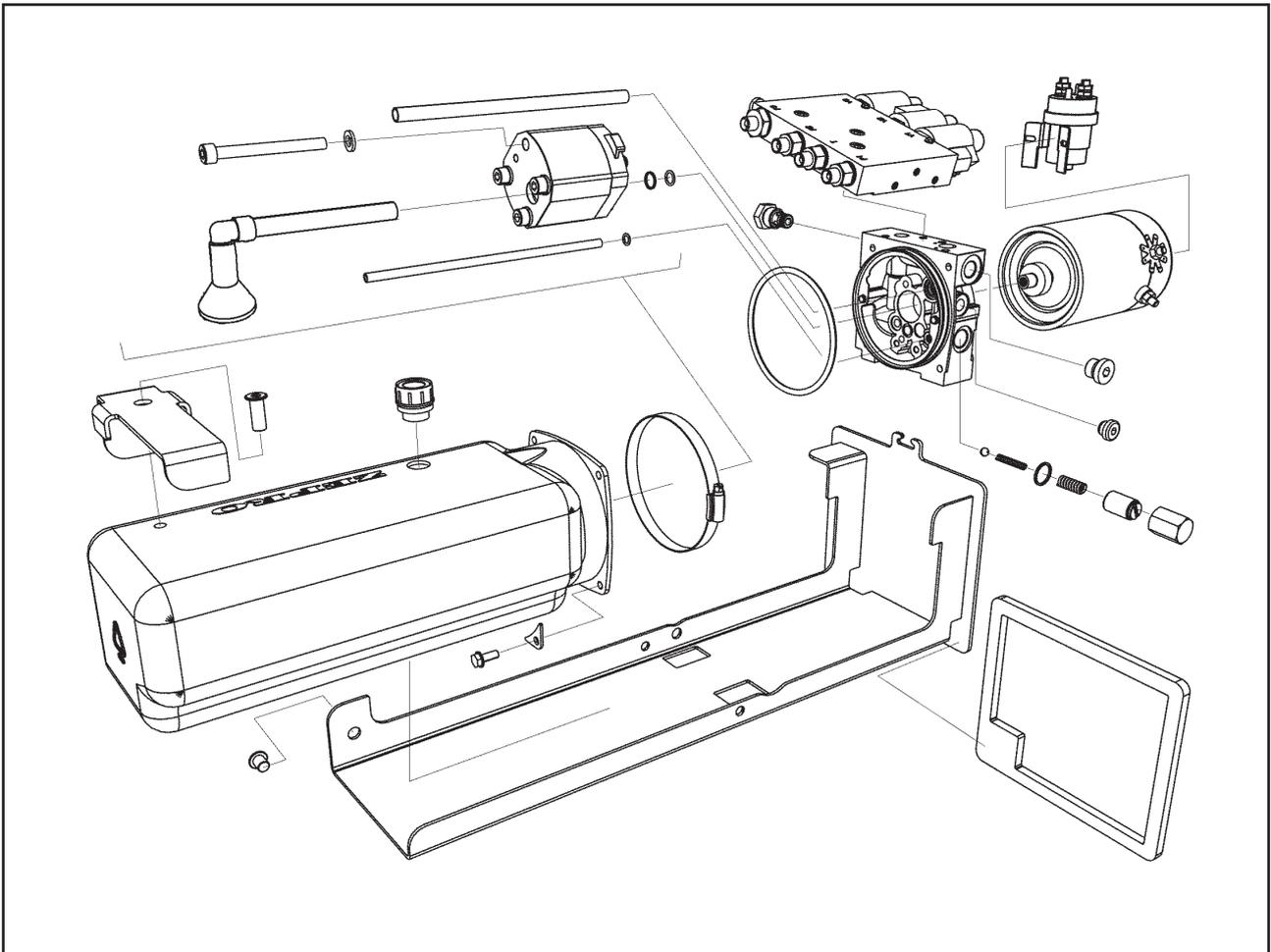
Solenoid: Ref No. 32798 (24 Volt)



### Power consumption max

7050 (200 bar)	12 volt	24 volt
Pump - Motor unit	245 A	135 A
Magnet (hydraulic unit)	4,2 A	2,1 A
Magnet (electric safety valve)	1,5 A	0,75 A
Solenoid	1,5 A	0,85 A
Cable area:		
Control cable	1,5 mm <sup>2</sup>	1,5 mm <sup>2</sup>
Main cable 0-8m	35 mm <sup>2</sup>	35 mm <sup>2</sup>
Main cable 8-15m	50 mm <sup>2</sup>	35 mm <sup>2</sup>
Main cable <15m	-	50 mm <sup>2</sup>
Power source:		
Min. capacity	180 Ah	170 Ah
Min. voltage	9 Volt	18 Volt

### Technical specification of the hydraulic unit 7050 continued



## Technical specification of the hydraulic unit 7100

**Unit 7100 is used with the following lift models:**

ZHD 2500

### Technical data

Oil volume: 4.8 l

Overflow pressure: 200±5 bar

Nominal pressure: 190 bar

Dimensions: L=670, W=222, H=214

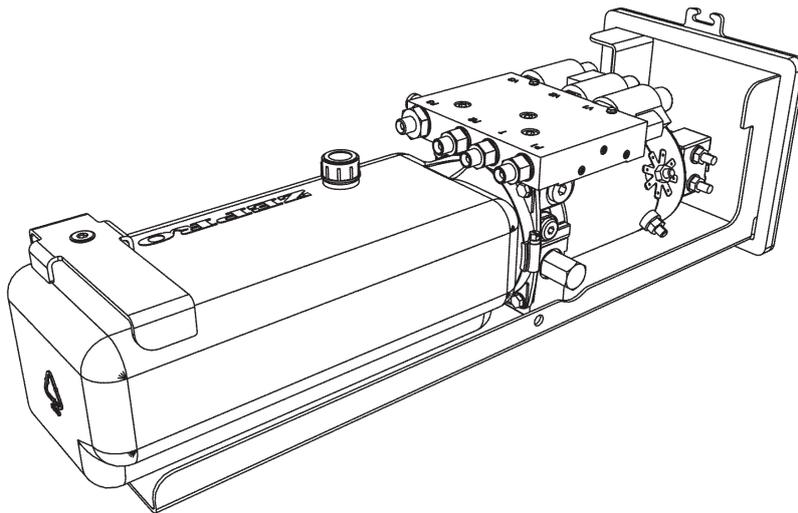
Total weight: 30kg incl. oil

Motor type: 2,8kW, ref. no: 33480 (24 Volt)

Pump type: 3,2cc, ref. no: 32205

Valve system: Cartridge valves, ref. No. 33420 (24 Volt)

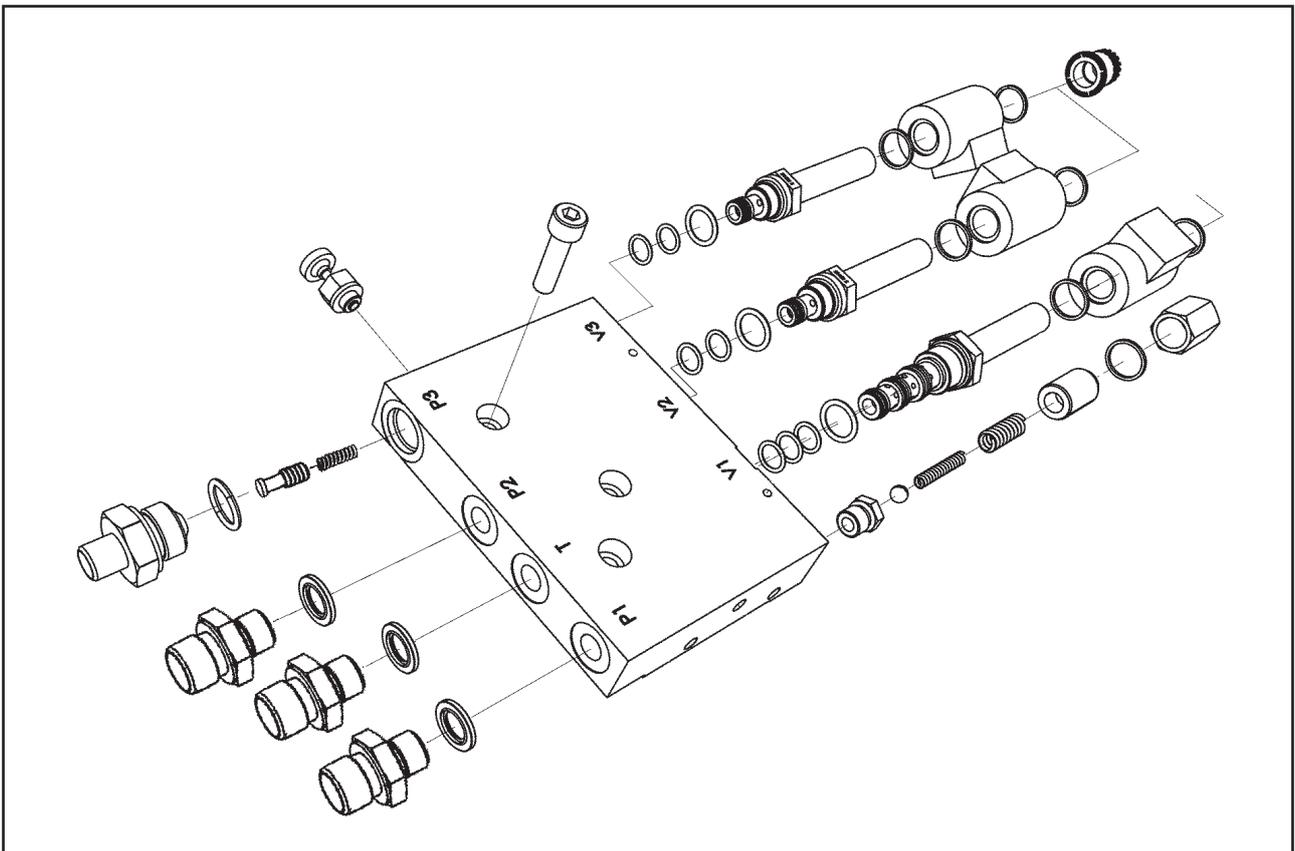
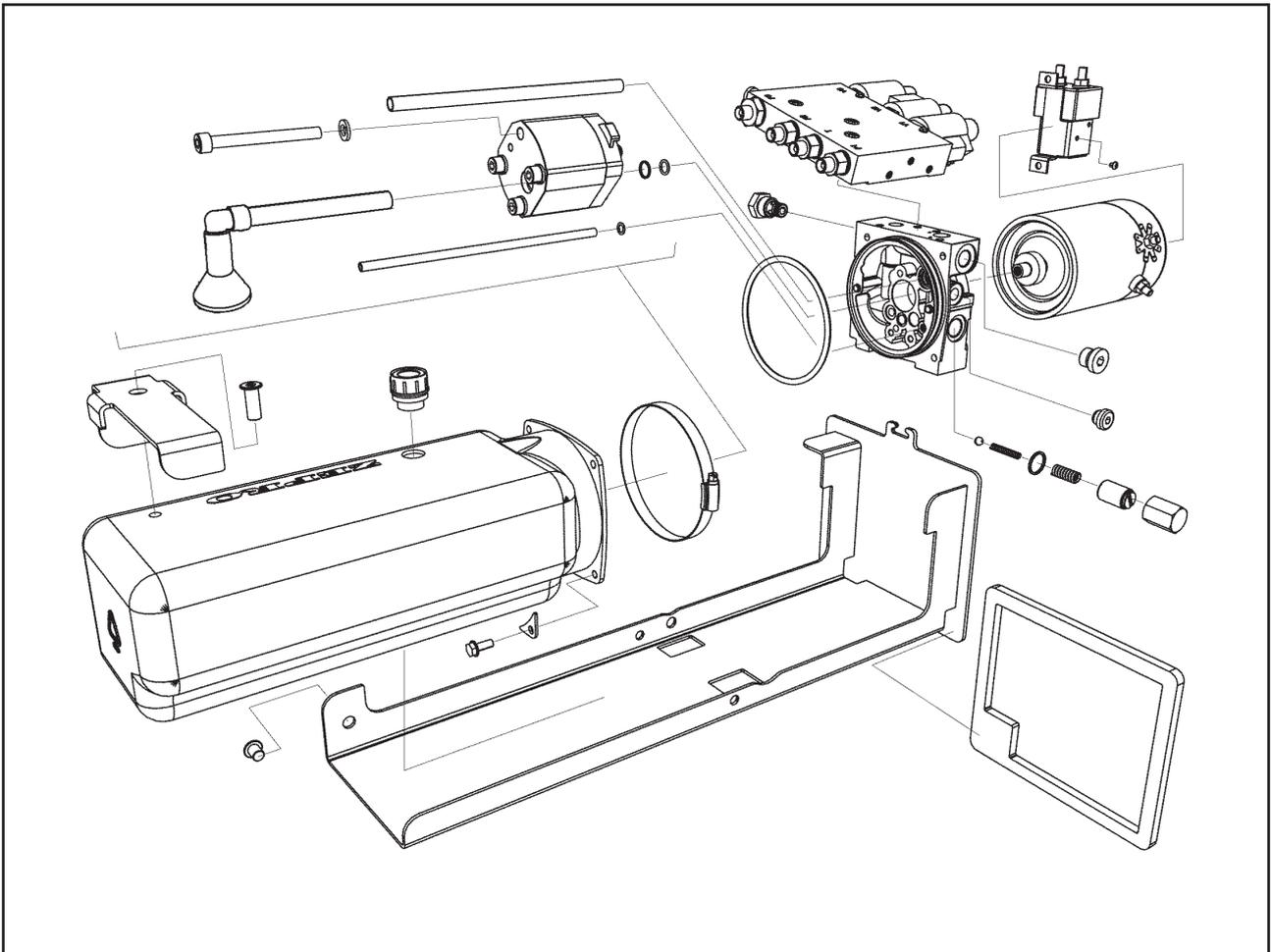
Solenoid: ref no.: 32536 (24 Volt)



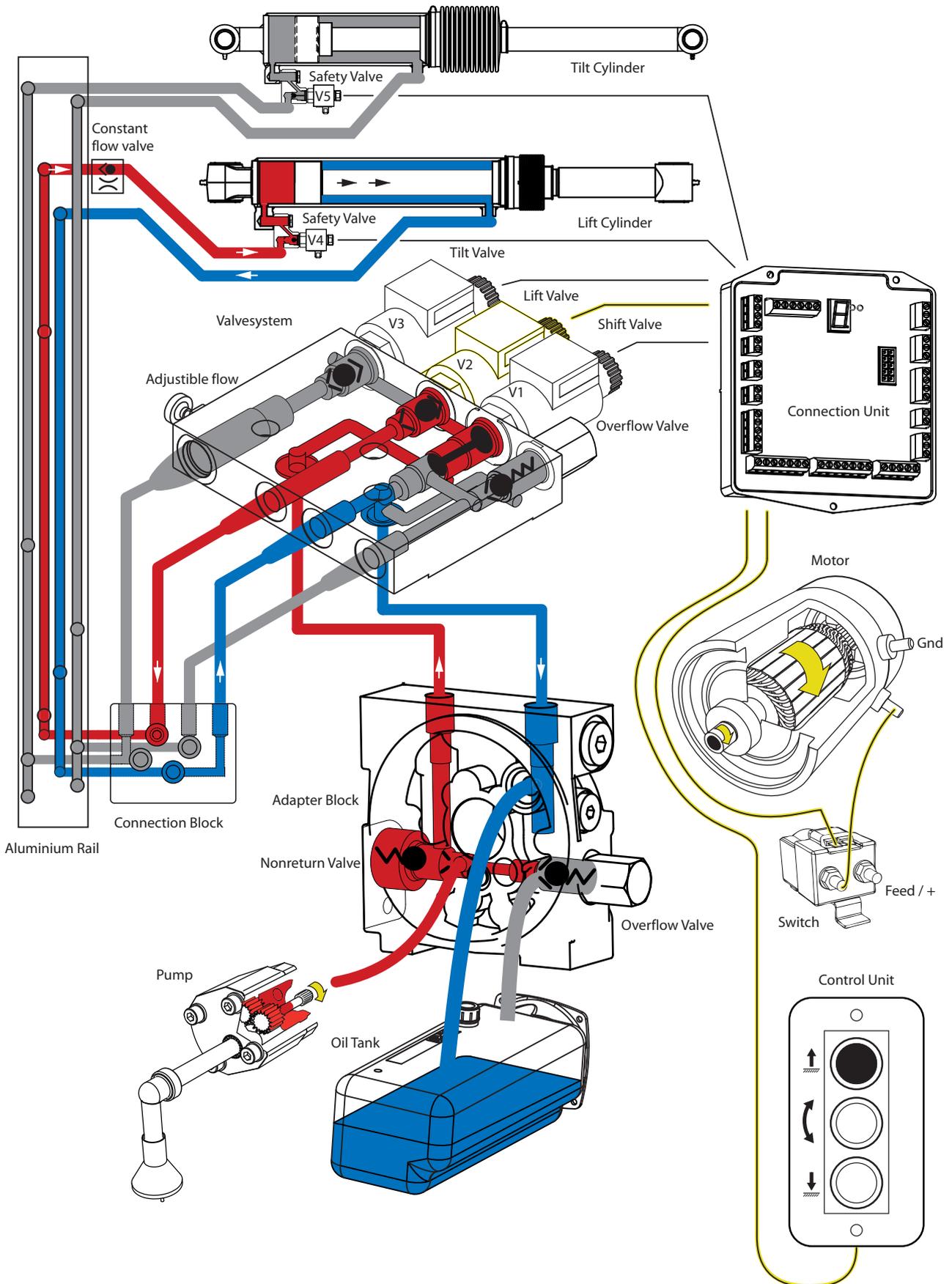
### Power consumption max

7100		24 volt
Pump - Motor Unit		200 A
Magnet (hydraulic unit)		2,1 A
Magnet (electric safety valve)		0,75 A
Solenoid		0,85 A
Cable area:		
Control cable		1,5 mm <sup>2</sup>
Main cable <8 m		35 mm <sup>2</sup>
Main cable 8-15 m		35 mm <sup>2</sup>
Main cable >15 m		50 mm <sup>2</sup>
Power source:		
Min. capacity		170 Ah
Min. voltage		18 Volt

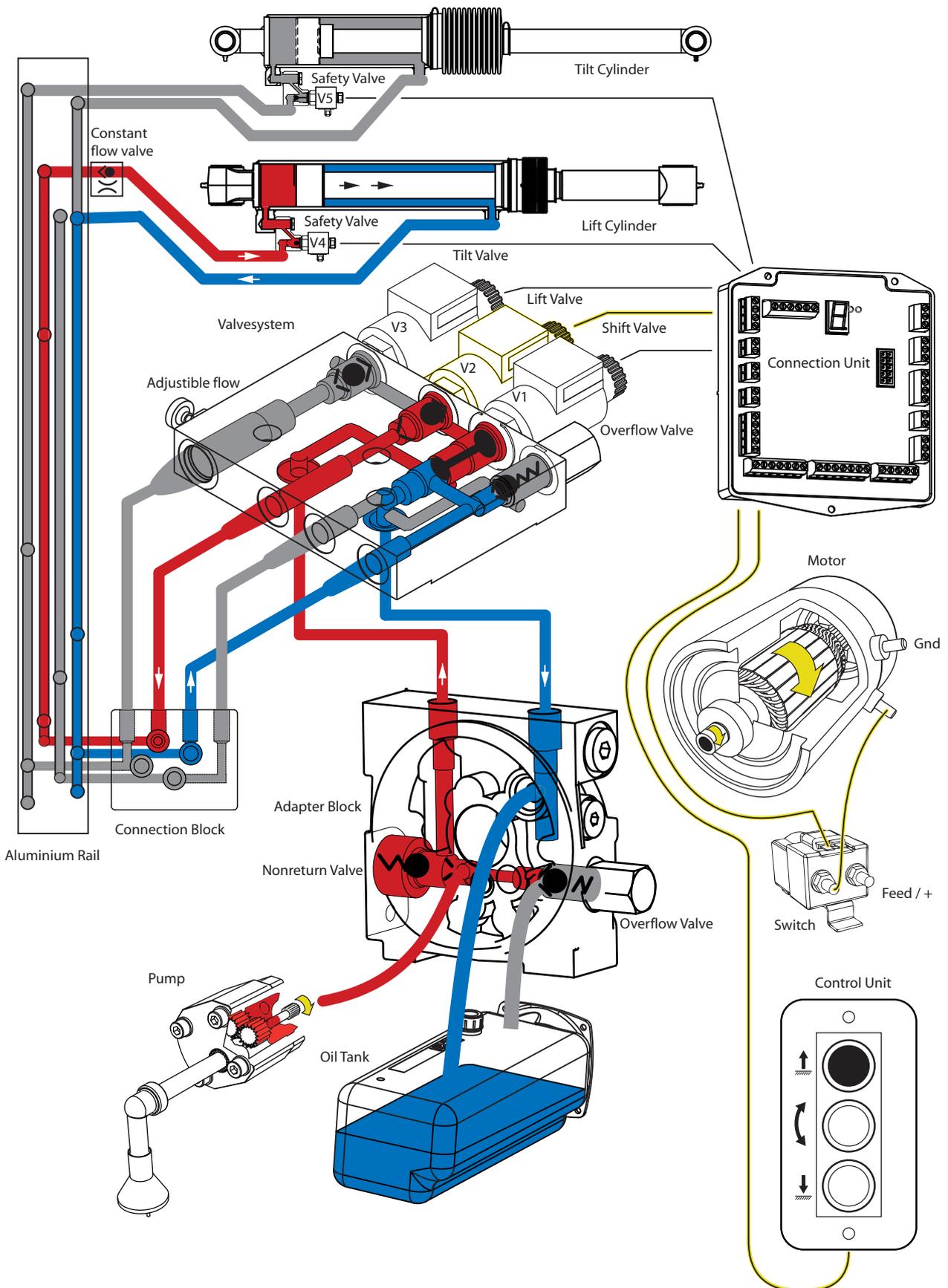
### Technical specification of the hydraulic unit 7100 continued



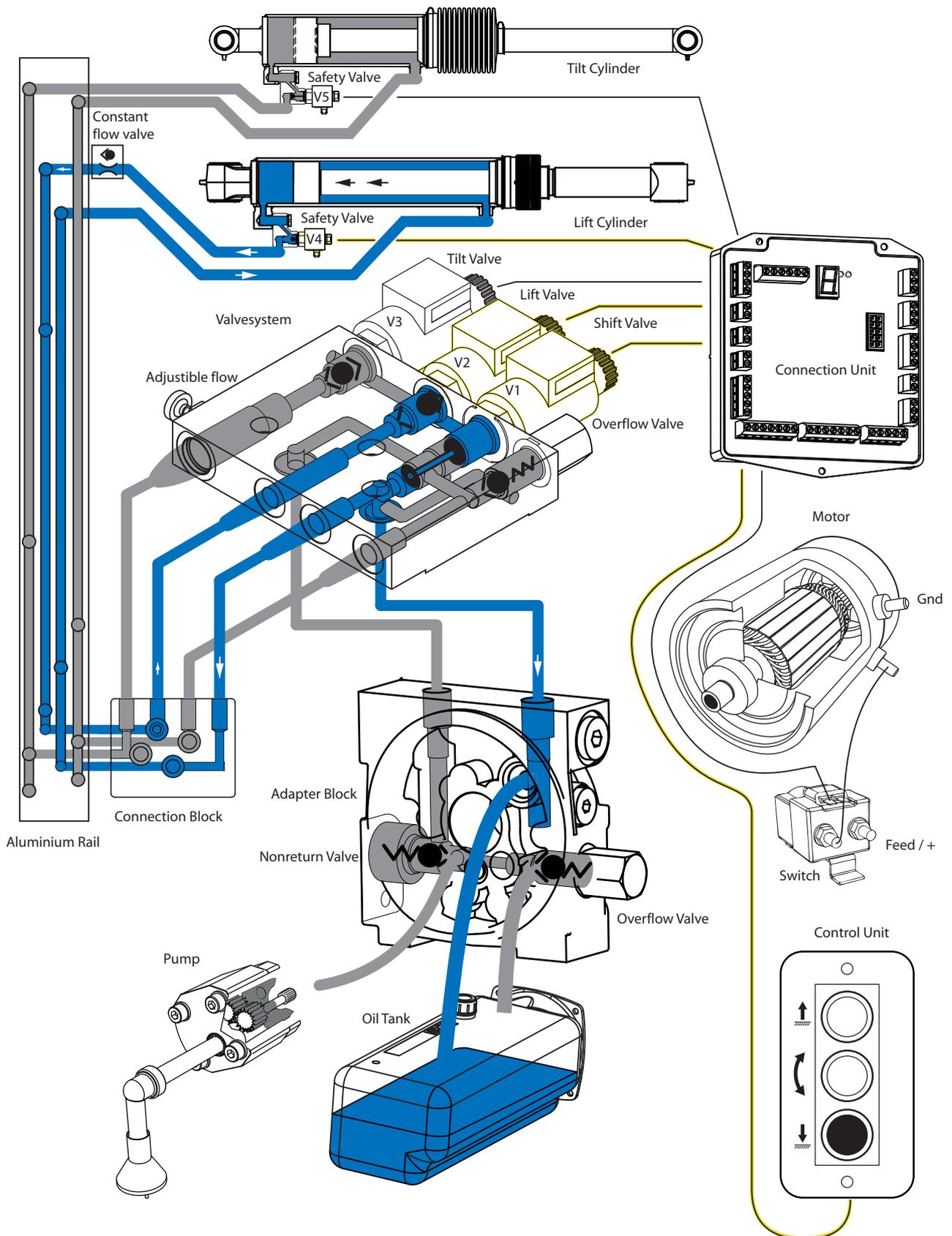
### Flow chart ZHD 1500/2000/2500 MA, lift



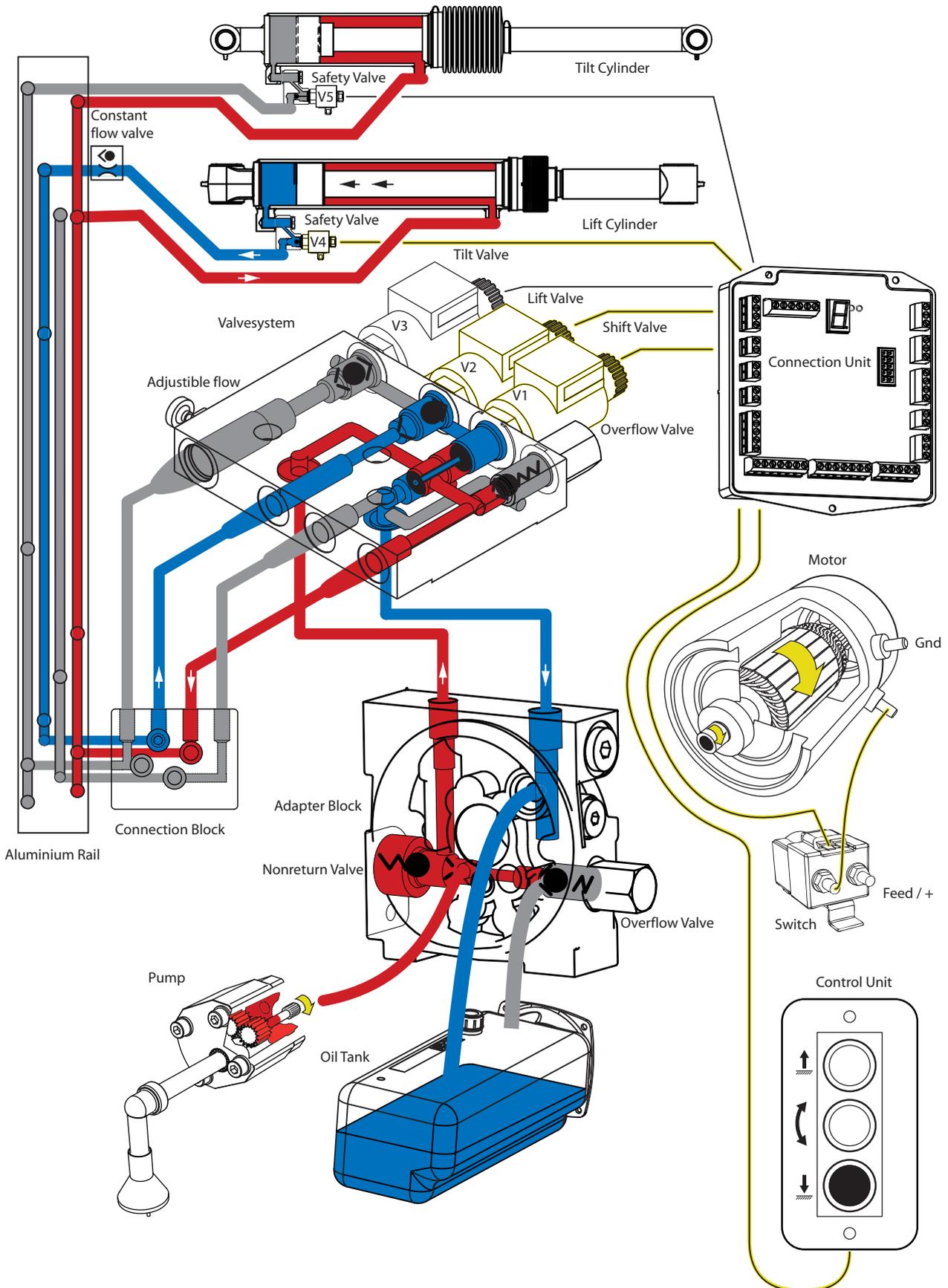
### Flow chart, ZHD 1500/2000/2500 DA, lift



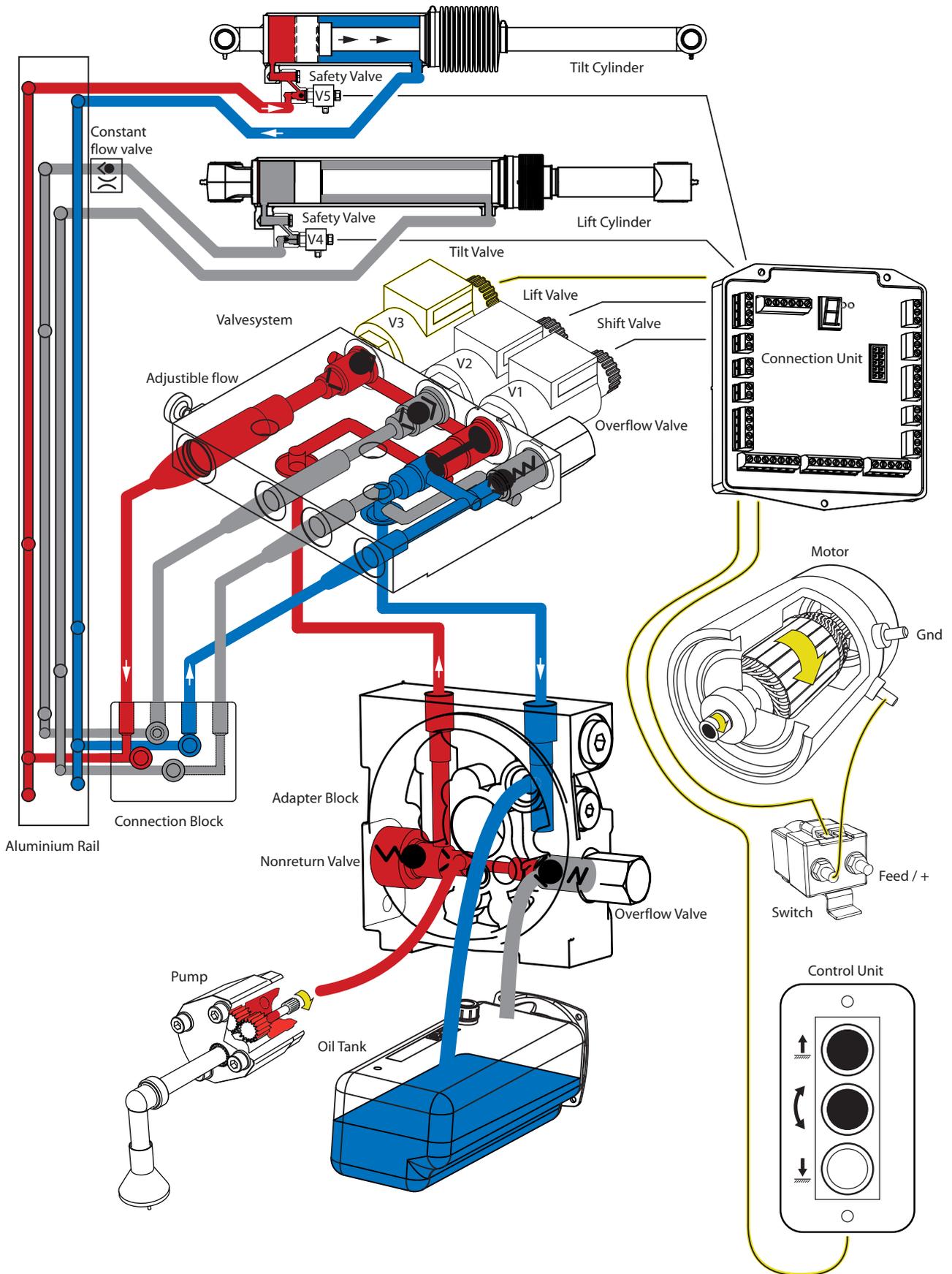
### Flow chart, ZHD 1500/2000/2500 MA, lowering



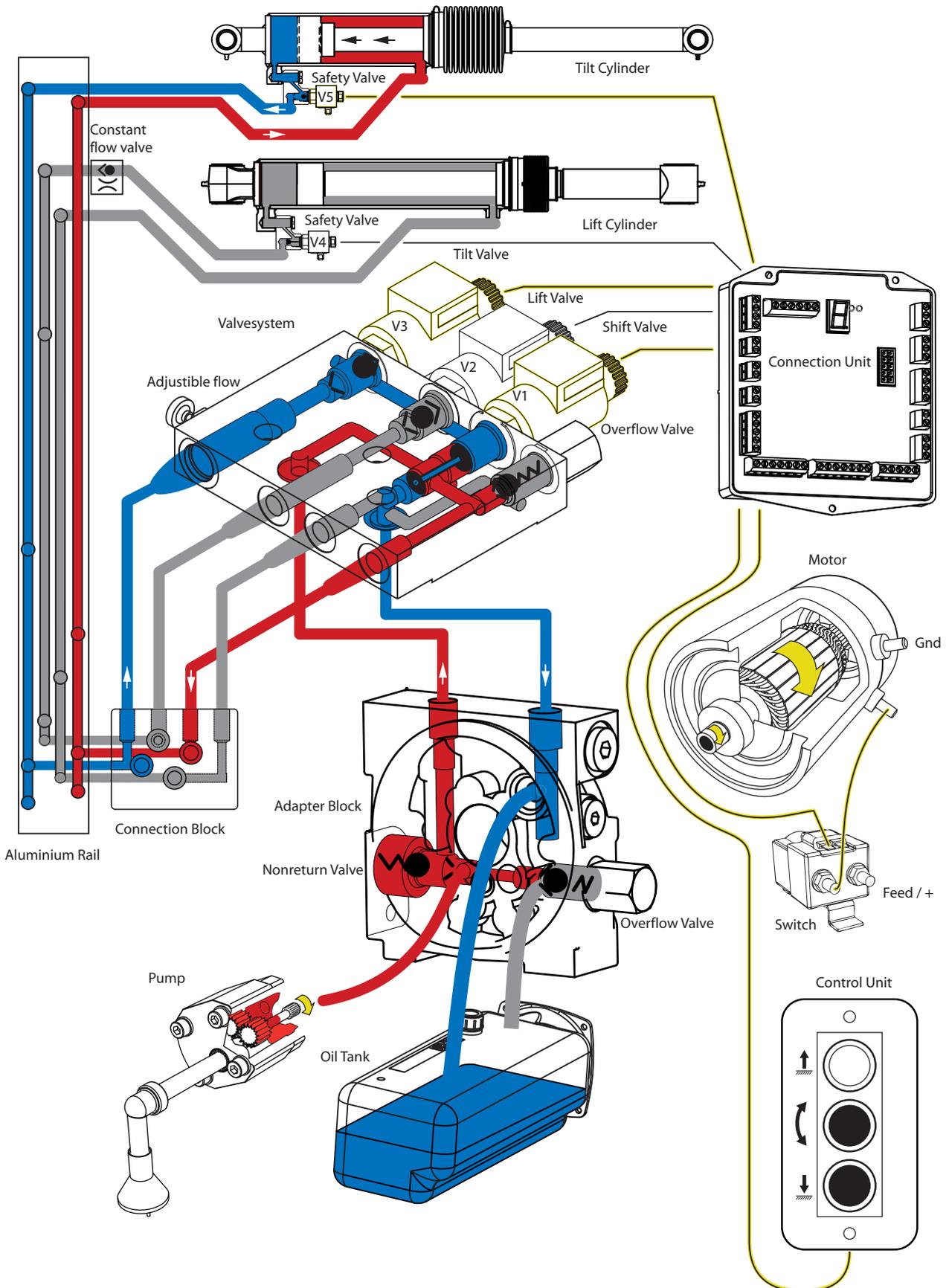
### Flow chart, ZHD 1500/2000/2500 DA, lowering



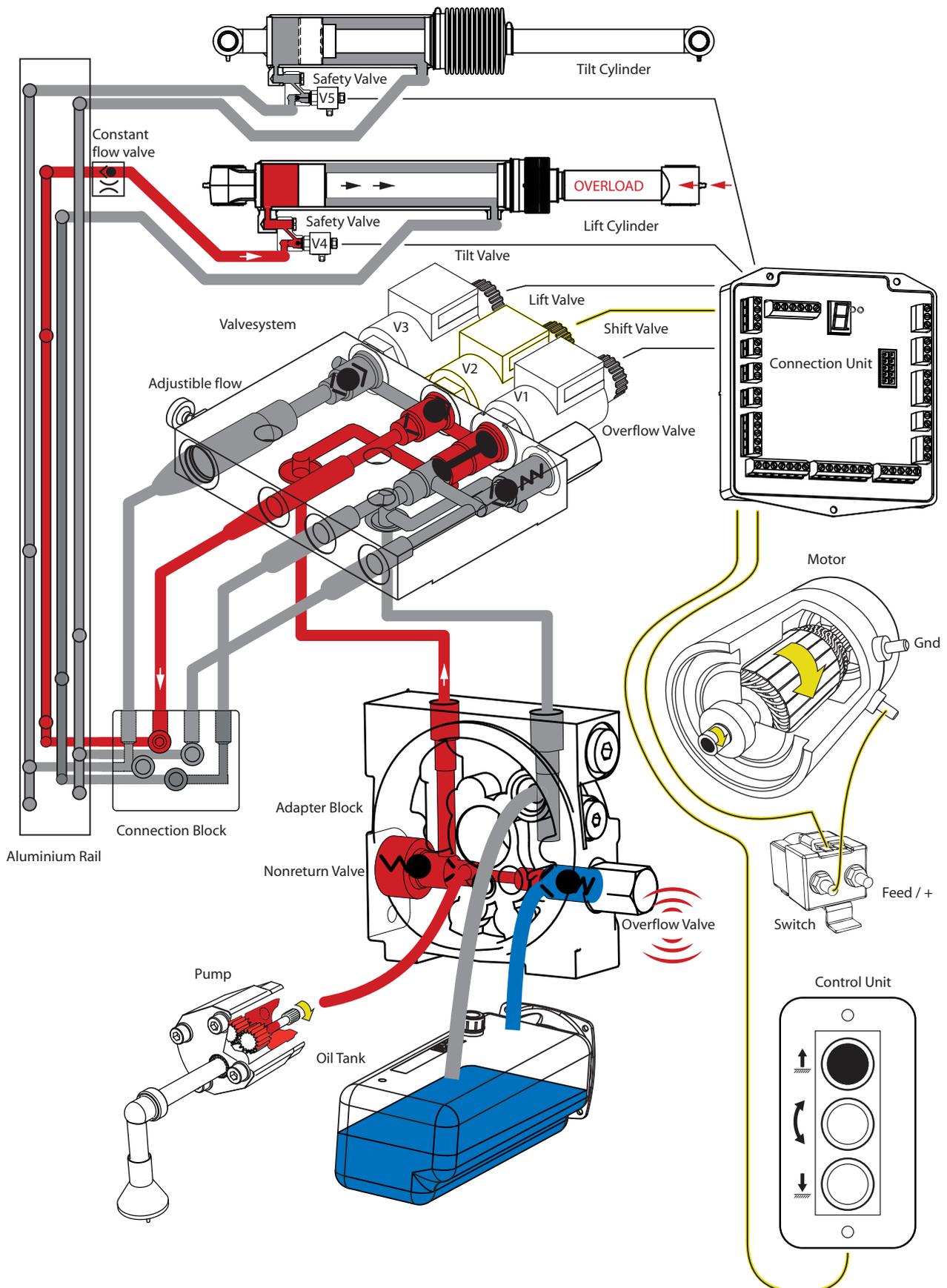
### Flow chart, ZHD 1500/2000/2500 MA/DA, tilt up



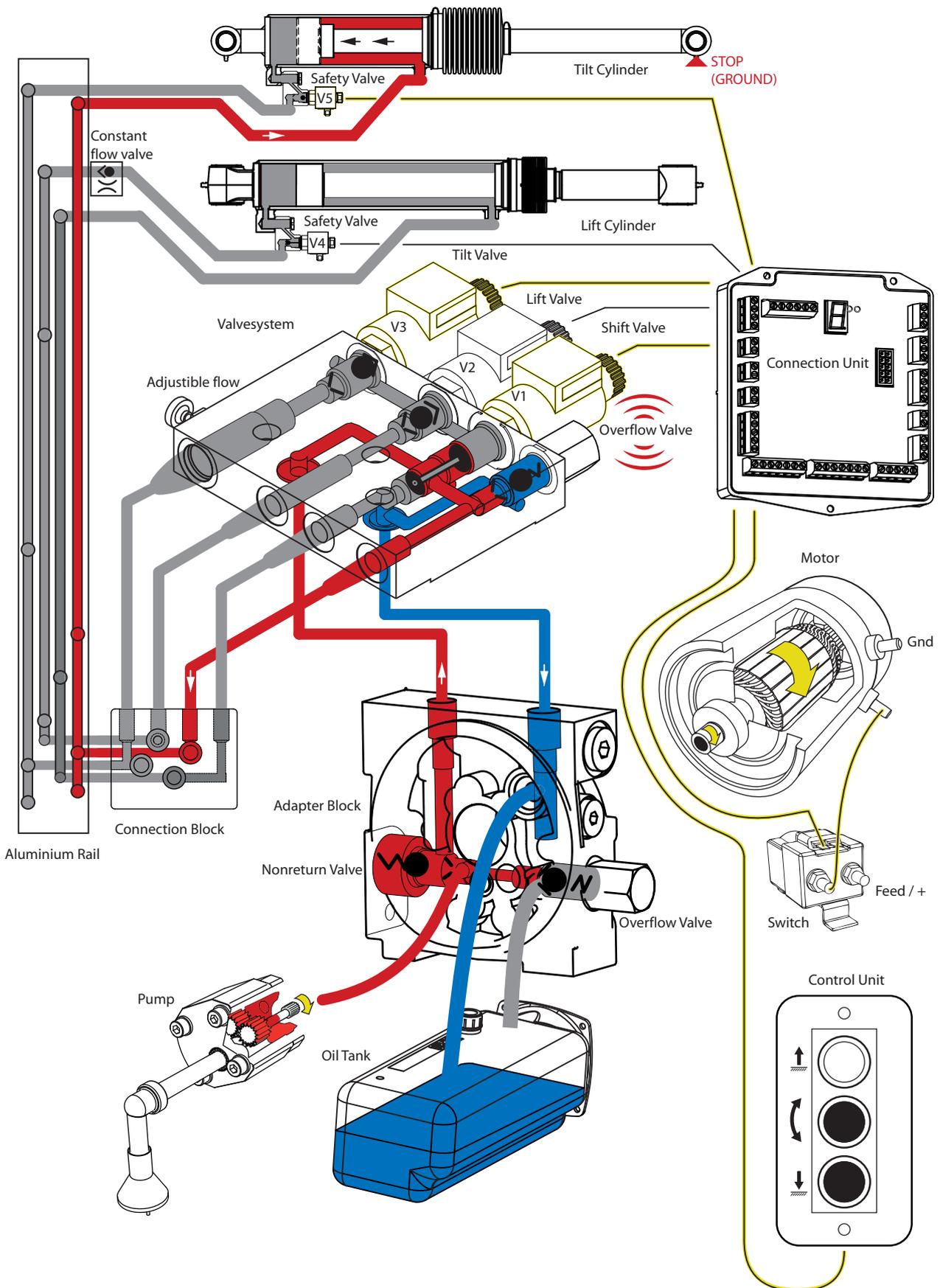
### Flow chart, ZHD 1500/2000/2500 MA/DA, tilt down



### Flow chart, ZHD 1500/2000/2500 MA/DA, lift (when overloaded)



### Flow chart, ZHD 1500/2000/2500 MA/DA, tilt down (when overloaded)



# WALTCO TECH TIPS

Model: BZ Gen 5

EO No. N/A

## Explanation of BZ Generation 5 Controls and Controller

Waltco started shipping a new version of the BZ model liftgate in September of 2010 with is now called the BZ Generation 4 (G4). This gate has new switches and new controller from the previous Generation 3 BZ's.

The new controller has several new features built-in to protect the hydraulic unit from damage due to shorted wires, damaged switches, low voltage, etc. One of the things the unit will do is shut down the liftgate if it identifies a problem.

The most common shut down situation that can occur is the controller will shut down the liftgate if a button is pressed continuously for an extended period of time (several minutes). When this occurs, the situation is easily identified by the diagnostic code that is displayed on the controller and the condition can be quickly remedied by releasing the stuck switch or replacing/repairing the damaged switch or wire.

The controller has two inputs on it. These are intended so that the permanent mounted controls and the Corded Remote are connected to each input. The permanent control(s) is to be connected input #1 and Remote(s) to Input #2. The installation instructions provided with all Gen 4 BZ's show this as the method of connecting the switches.

The important thing to remember is that the controller has a diagnostic LED that will identify the cause of any shut down of the liftgate and that it should be the first thing to look at when the liftgate is not functioning. Following are diagrams of the controller and a chart with an explanation of all of the codes that the controller may indicate when a shut down occurs.

The controller has 2 red LED's as well as a single digit display with a blinking decimal point. These have the following functions:

**Display:** Indicates function and errors as well as the program configuration. For two digit codes, it will flash the first digit then the second digit a moment later. When all is functioning properly, the unit will flash "P" "1" when the Cab Switch is turned on. This indicates the default program #1 has initialized with no problems.

**Blinking decimal:**

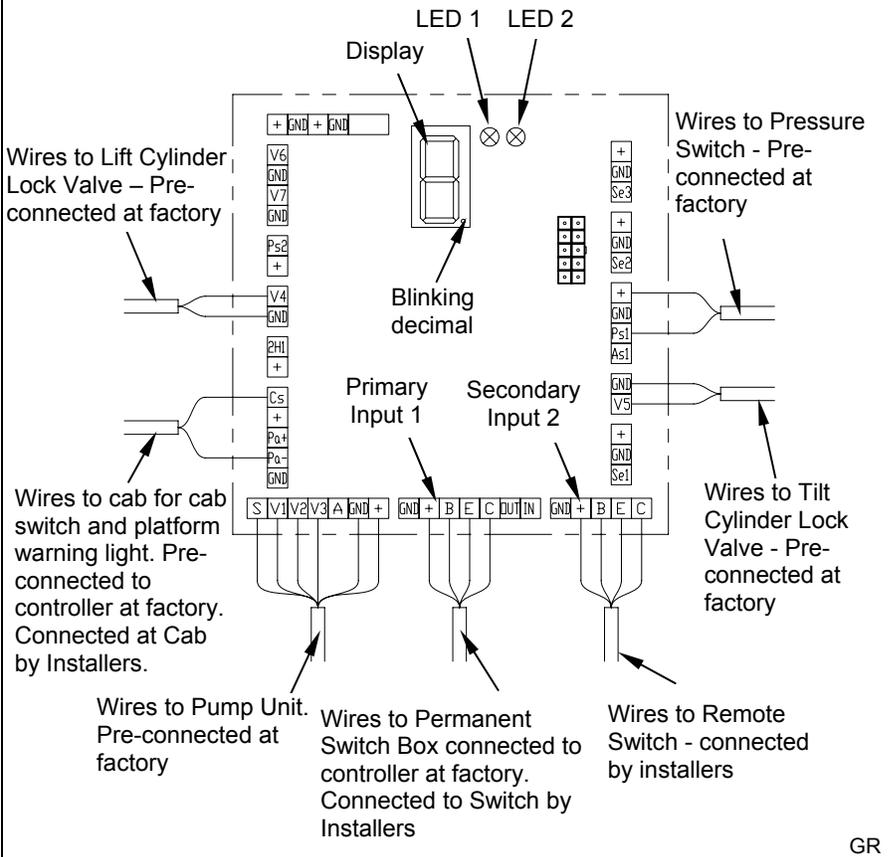
**Off:** The controller has no power and/or ground (independent of Cab Switch).

**On:** Controller has power but no controls are connected.

**Blinking:** Controls are connected and functioning. Waiting on a switch to be used.

**Led 1:** Indicates active input from control connected to primary bank.

**Led 2:** Indicates active input from control connected to auxiliary bank.



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# Explanation of BZ Generation 5 Controls and Controller

Digit Display Codes:

Code	Function Display
1	Control unit 1 in use (Permanent Controls)
2	Control unit 2 in use (Remote Control)

Code	Error Display	Code	Error Display	Code	Error Display
E 1	Control Unit 1 locked out	F 0	Short circuit to motor solenoid	F 5	Short circuit to Valve (V5)
E 2	Control Unit 2 locked out	F 1	Short circuit to Valve (V1)	F 6	Short circuit to Valve (V6)
E 4	Voltage drop <sup>A</sup>	F 2	Short circuit to Valve (V2)	F 7	Short circuit to Valve (V7)
H	Battery voltage too high <sup>B</sup>	F 3	Short circuit to Valve (V3)	F 8	Short circuit feed to Control Unit 1
L	Battery voltage too low <sup>B</sup>	F 4	Short circuit to Valve (V4)	F 9	Short circuit feed to Control Unit 2

<sup>A</sup> Faulty ground connection, poor cable connections, abnormal amperage draw e.g. faulty motor.

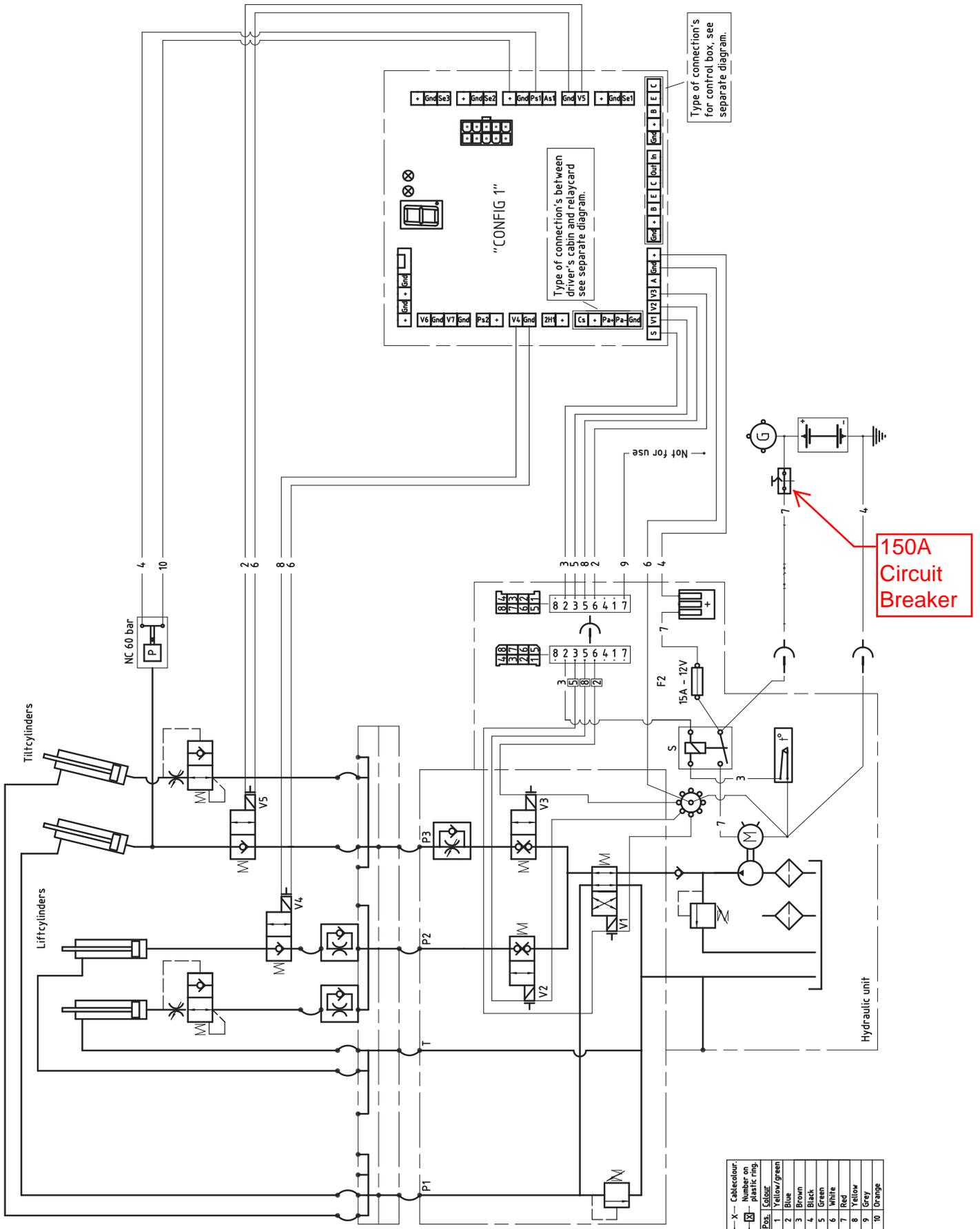
<sup>B</sup> Correct voltage range is between 9.0V and 15.0V. The controller will not function at all if voltage falls below 7.0V, but will start working again when voltage returns to above 7.0V

Notes:

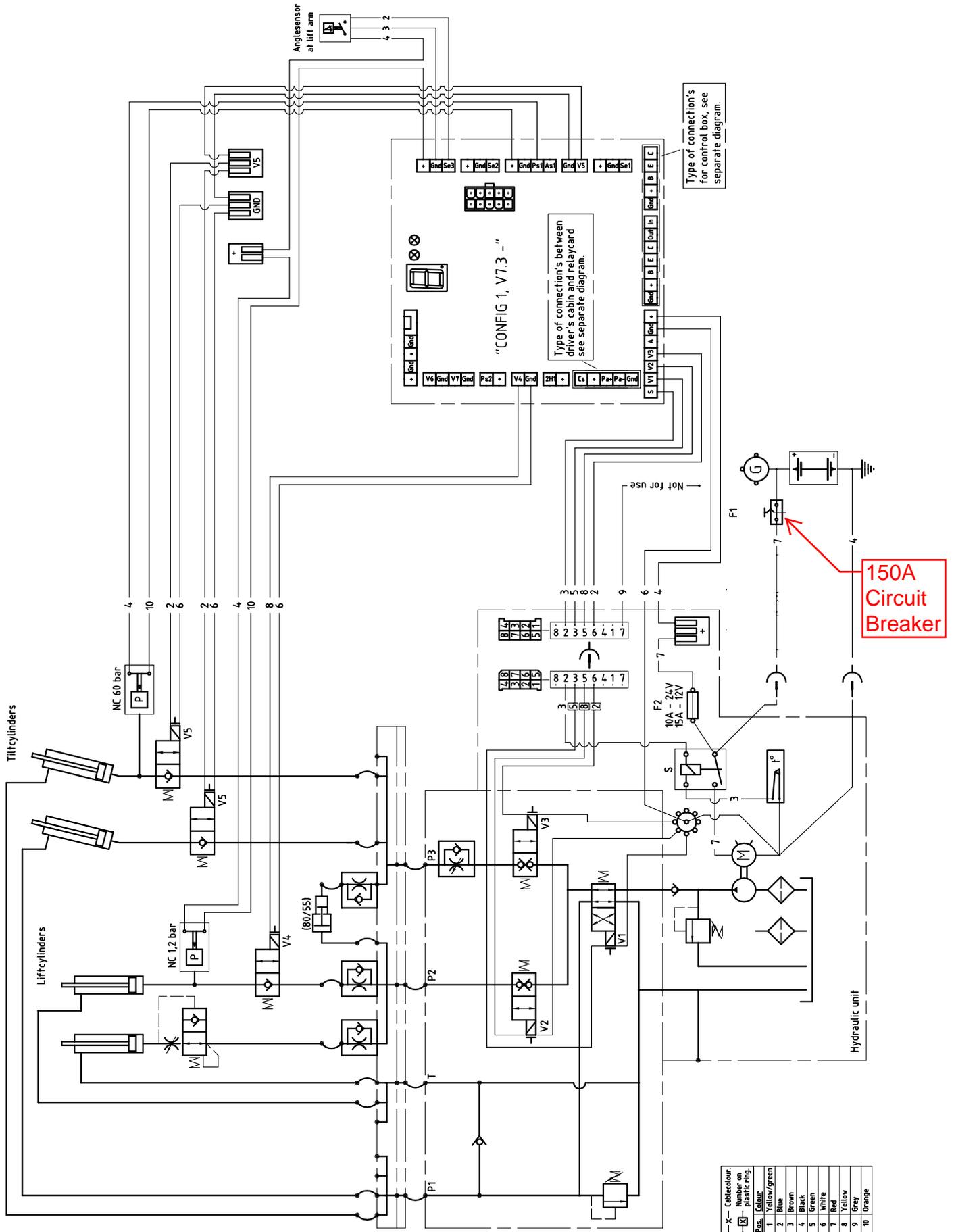
- 1 Error displays E4 and F0 – F9 will only show on the display when that actual function / output is active.
- 2 When Cab Switch is turned off, "E" or "F" is displayed followed by the 5 most recent error codes.

# Electric and hydraulic diagram

## ZHD/ZHDL-1500/2000 MA

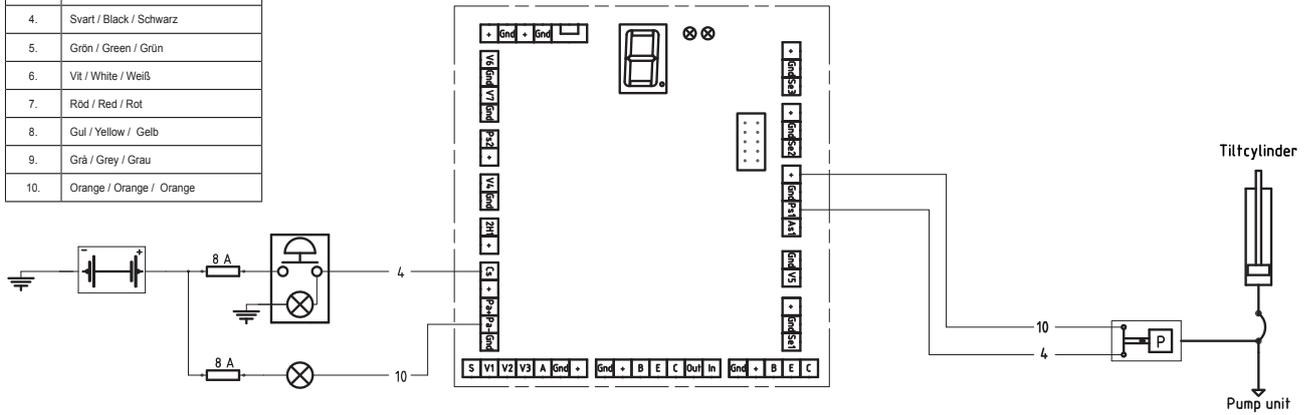


# BZ GEN 5 SCHEMATIC WITH AUTO-TILT

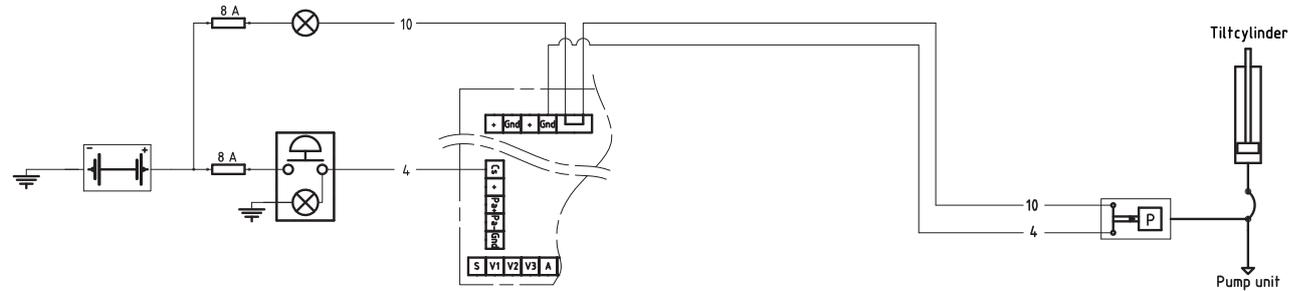


Nr./No.	Färg / Color/Farbe
1.	Gul / Grön, Yellow / Green, Gelb / Grün
2.	Blå / Blue / Blau
3.	Brun / Brown / Braun
4.	Svart / Black / Schwarz
5.	Grön / Green / Grün
6.	Vit / White / Weiß
7.	Röd / Red / Rot
8.	Gul / Yellow / Gelb
9.	Grå / Grey / Grau
10.	Orange / Orange / Orange

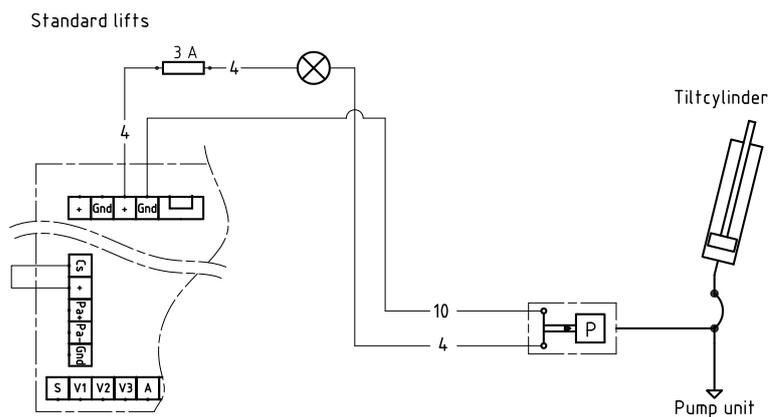
### Cabin switch, Alarm for open platform



### Cabin switch, Alarm for open platform when control unit has main switch



### Alarm for open platform (trailer)



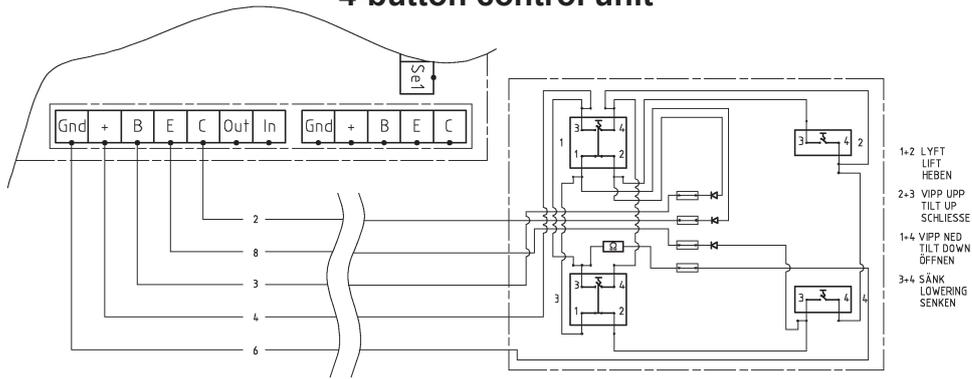
ZEPRO recommends that a strobe lamp/light placed on the trailer body exterior represents the alarm indication, clearly visible so that the driver can see it in the mirror

The light must be of amber color.

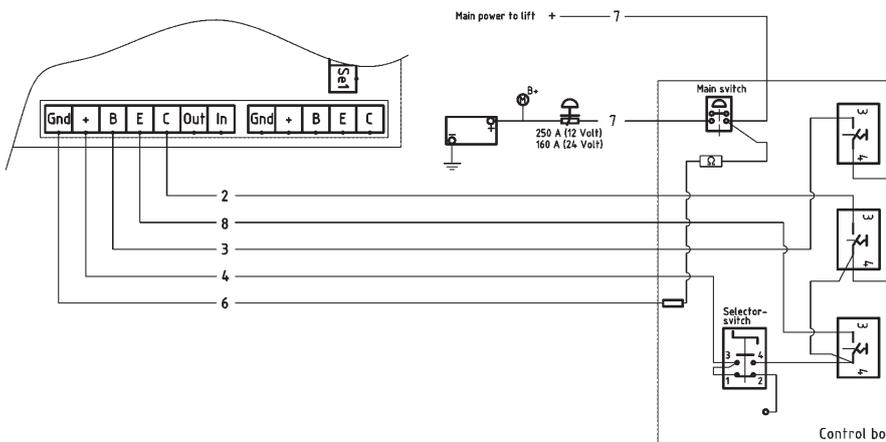
Connect the lamp/indicator according to the electric diagram.

3A fuse connected between the circuit card and the pressure switch.

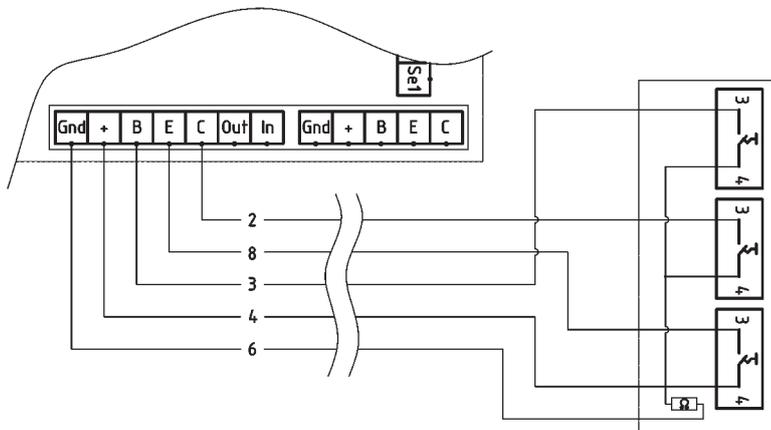
### 4-button control unit



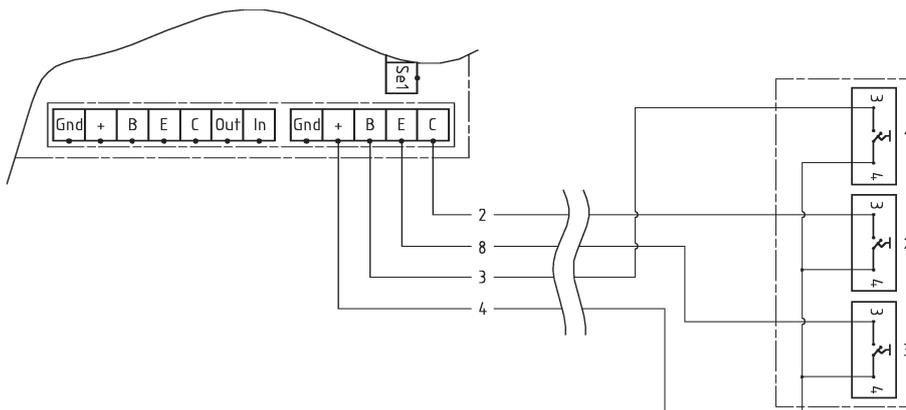
### 3-button control unit with main switch and selector switch



### 3-button control unit



### 3-button remote control unit with spiral cable



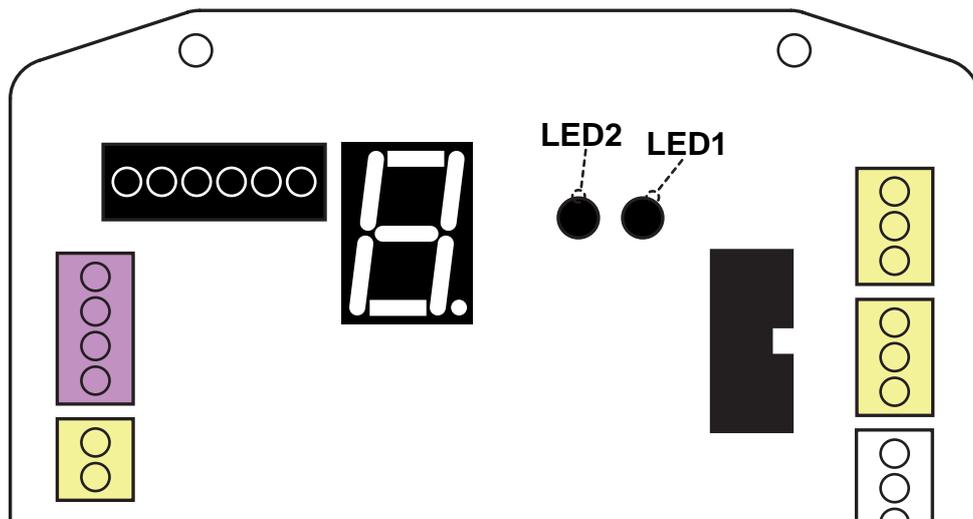
## Troubleshooting

### Indicators and readings

The control card has two red LEDs and a green 7-segment display. Both the LEDs and display can help to localise problems with the tail lift's equipment.

**The two red LEDs have the following functions:**

- Led 1 indicates active input
- Led 2 indicates active output



**The green dot on the display provides the following information:**

- No dot indicates the unit does not have supply voltage.
- A dot indicates the supply voltage is on and the CS input is off.
- A blinking dot indicates both the supply voltage and the CS input are on.

**The digit display provides the following information, input CS is on:**

The control card's configuration is shown first (during 2 sec.).

Följande konfigurationer finns:

- P1 - Config 1: DVx2 hydraulic auto-tilt
- P2 - P10 - Config 2-10: Other programs

## Troubleshooting continued.

Once the configuration has been shown, the display shifts to showing operational information.

### Operational indicators:

- Off - No control unit active
- 1 - Control unit 1 active <sup>3</sup>
- 2 - Control unit 2 active <sup>3</sup>

### Error indicator during operation:

- E1 - Control unit 1 locked <sup>2</sup>
- E - Control unit 2 locked <sup>2</sup>
- L - Low voltage <sup>1</sup>
- H - High voltage <sup>1</sup>
- E4 - Voltage drop
- F0-F9 - Short circuit (see error code list).

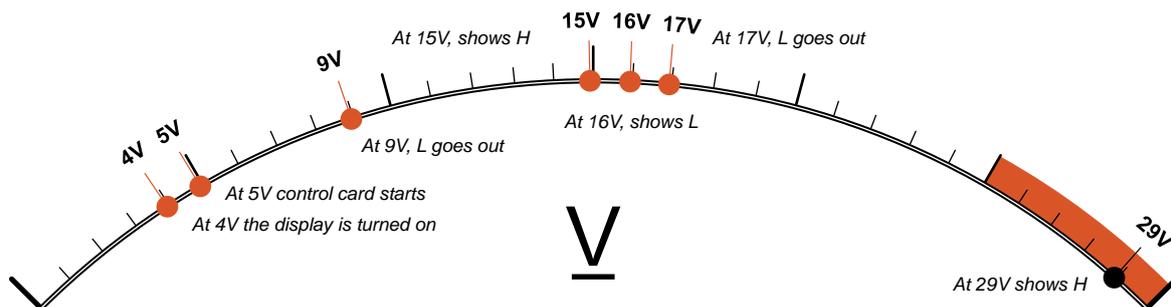
<sup>1</sup> Note that if only low or high voltage occur, the display combines this information with operational information about the active control unit.

<sup>2</sup> If a control unit is active more than 2 min, the control card will lock away that control units input. The input will be locked up again if no signal is recieved from the control unit for 6min, or if power is cut to the control card.

<sup>3</sup> The control unit is active for 4 sec after finished use, during that time no other control unit can be used.

### Priority order for operational indicators

1. Locked control unit (E1, E).
2. Active control unit (1, 2). Voltage drop (E4). Short circuit (F0-F9).
3. Low/high voltage (L, H).



### The display gives the following information, input CS is turned off:

The control card stores the five most recent errors in a list. The last 3 errors is shown on the display when CS is turned off. The list of errors is updated automatically by the control card. When the solenoid (S) has been activated 100 times without any fault, then the oldest error will be deleted from the list. This will be repeated until the error list is empty.

Following error codes is available:

Code	Error display	Code	Error display	Code	Error display
E1	Control unit 1 locked	F0	Short circuit to solenoid (S)	F5	Short circuit to valve (V5)
E2	Control unit 2 locked	F1	Short circuit to valve (V1)	F6	Short circuit to valve (V6)
E4	Voltage drop*	F2	Short circuit to valve (V2)	F7	Short circuit to valve (V7)
H	Battery voltage too high	F3	Short circuit to valve (V3)	F8	Short circuit feed to control unit 1
L	Battery voltage too low	F4	Short circuit to valve (V4)	F9	Short circuit feed to control unit 2

\* Faulty earth connection, poor cable connections, abnormal current consumption e.g. faulty motor.

Note! Error displays E-4 and F0 - F9 is only showing on the display when actual function / output is active on the circuit card.

Note: Everytime the power to the control card is turned off (f.ex. main switch), an error E4 is stored in error list

## 7. Troubleshooting continued.

What is wrong?

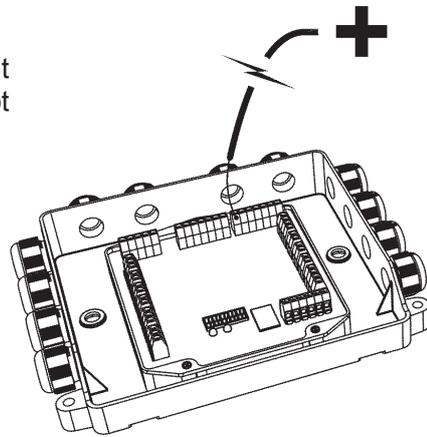
Check if the following faults are causing the problem

### Symptom

1. The control unit doesn't work.

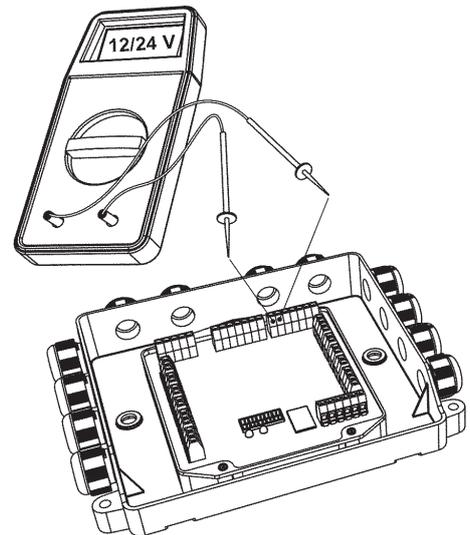
### Possible cause

1.1 The electronic card has no current if the decimal point is not lit or is not blinking.



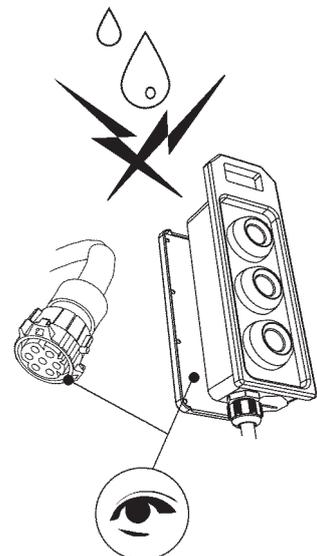
### Action

Check the connections and measure the voltage between the + and GND terminals on connector 8 to which the hydraulic unit is connected.



### Possible cause

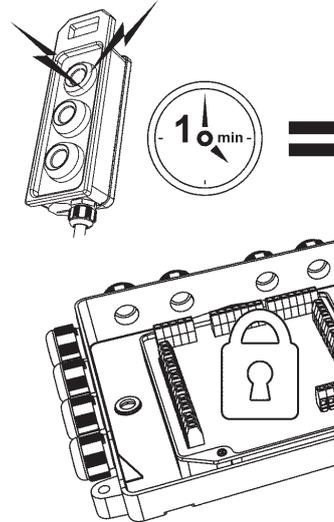
1.2 Short circuiting or bridging can impair control functions. If there is any water or moisture in any of the connections or terminals in the electronic card or the control unit itself, ensure that it is dried-up, cleaned and protected with grease.



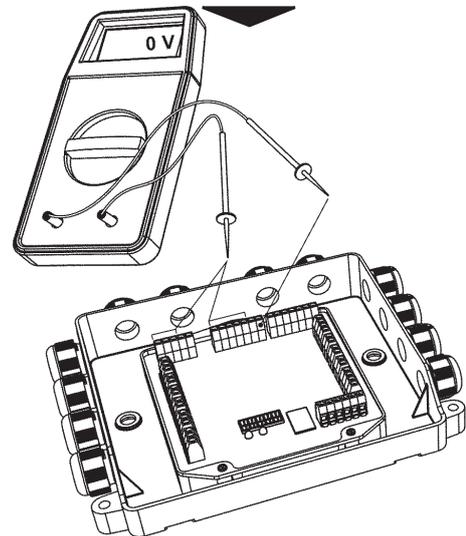
**Possible cause**

1.3

If a button sticks or if there is a constant signal to a control unit input for 1 minute the lift will shut down. The internal timer built into the card ensures that no valve can be activated for more than 1 minute. The display reads E1 or E2 depending on which control unit input is supplying the constant signal. If the fault is solved, the card waits for 3 minutes to check for reoccurrence. E1/E2 is shown during this time that the card regains full function.

**Action**

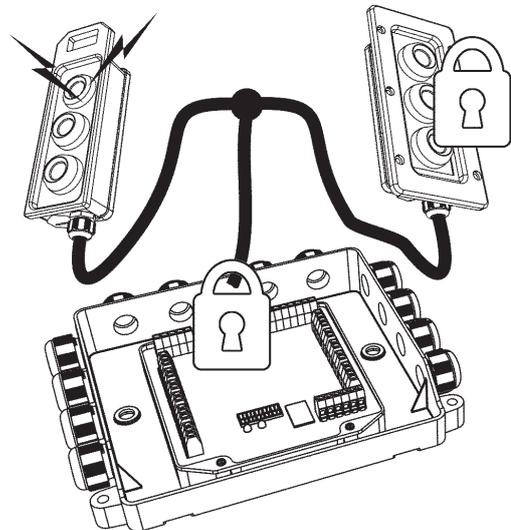
Measure the voltage between connector 6 and/or 7 to which the control unit is connected. Measure between GND and the various inputs (B, E, C, OUT, IN). The voltage should be 0V if no button is stuck. Also see paragraph 1.2.

**Possible cause**

1.4

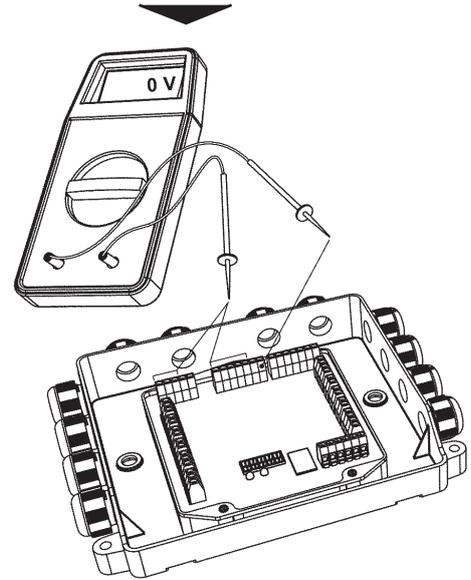
If a button sticks or if there is a constant signal to a control unit input when the the cabin switch (CS on connector 9) is activated the card will ignore that command and show either E1 or E2 on the display.

This means that if more than 1 control units are connected together to the same control unit connector (6 or 7) that particular connector will not function, and hence nor will the control units. If the button is released or the short circuit is remedied the card will then return to normal function after 3 min.



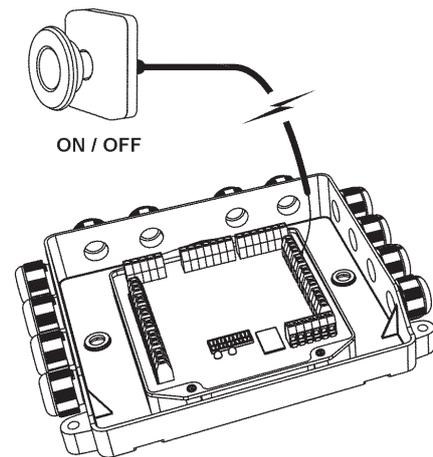
**Action**

Measure the voltage between connector 6 and/or 7 to which the control unit is connected. Measure between GND and the various inputs (B, E, C, OUT, IN). The voltage should be 0V if no button is stuck. Also see paragraph 1.2.



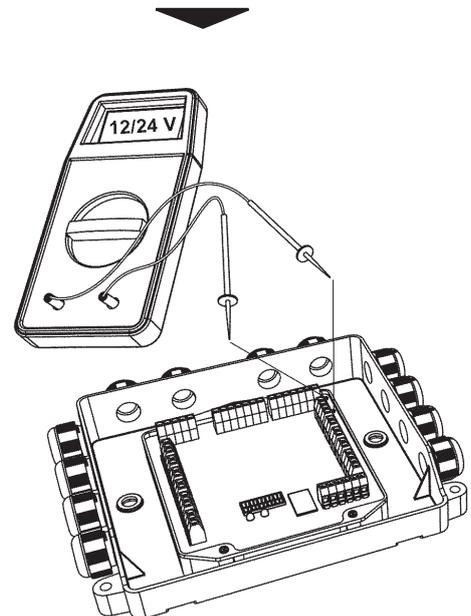
**Possible cause**

- 1.5 The card can lack current to input CS connector 9. CS is the input from the cabin switch that gives the card the signal to perform operations/commands.



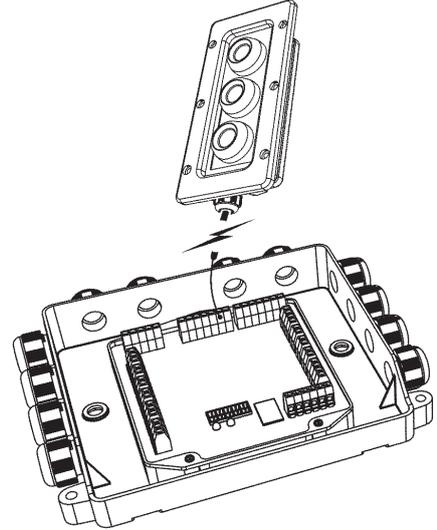
**Action**

Measure the voltage between GND and CS. It should be the same as the battery's voltage if the cabin switch is on.

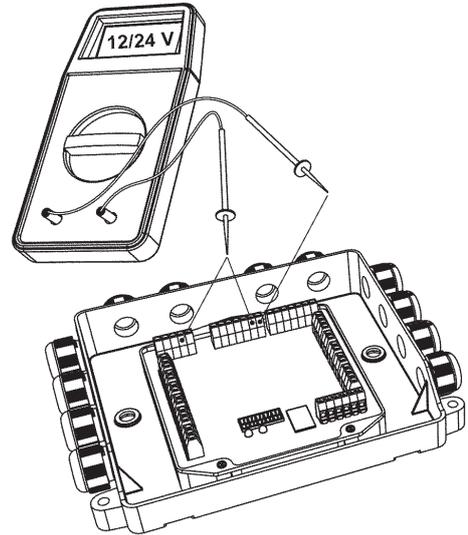


**Possible cause**

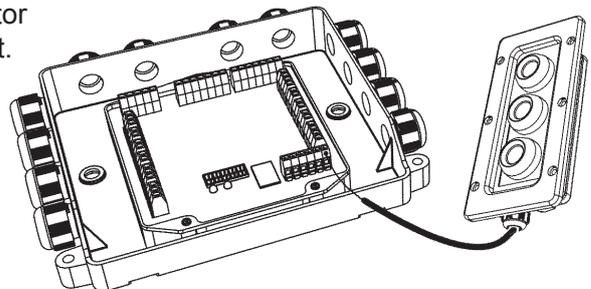
- 1.6 The control unit has no current.

**Action**

Measure the voltage between + and GND on connector 6 or 7 where the control unit is connected. The voltage should be the same as the battery voltage when input CS is active.

**Action**

If it isn't you will have to change the card or connect the control unit to the accessory connector (14) in order to give it current.

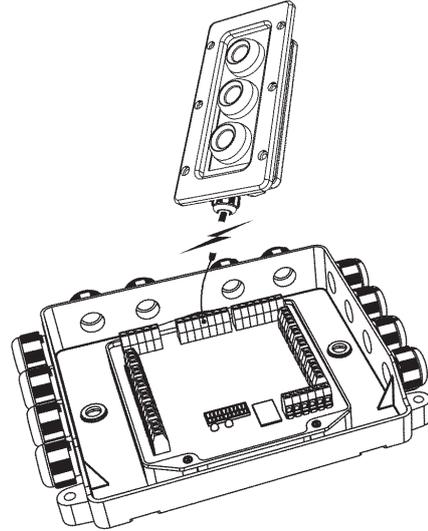


**Symptom**

2. The control unit functions partially.

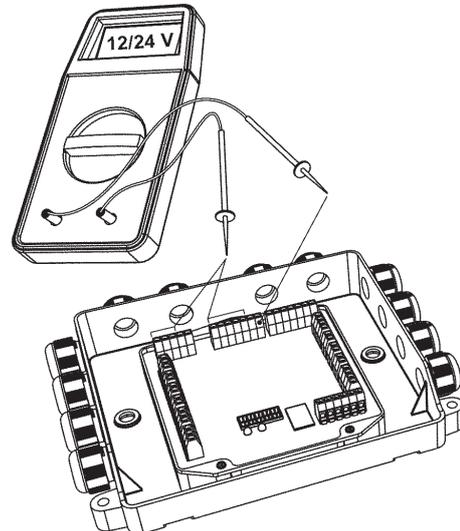
**Possible cause**

2.1 The control unit has current but the signal doesn't reach the card.



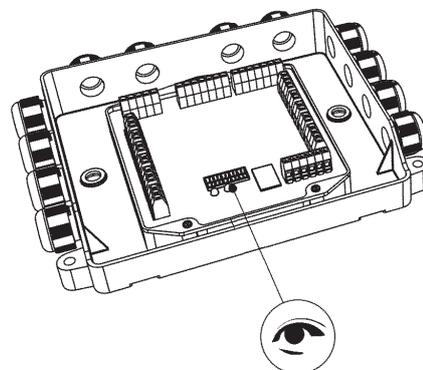
**Action**

Measure if the signal reaches the control unit input connector 6 and/or 7.



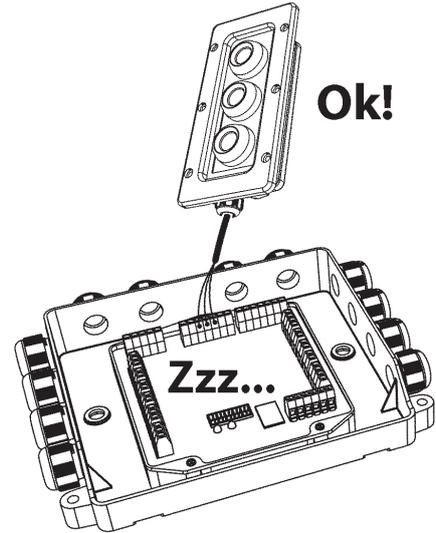
**Action**

Check if pressing buttons on the control unit makes LED 1 react (ie. that an input is active).

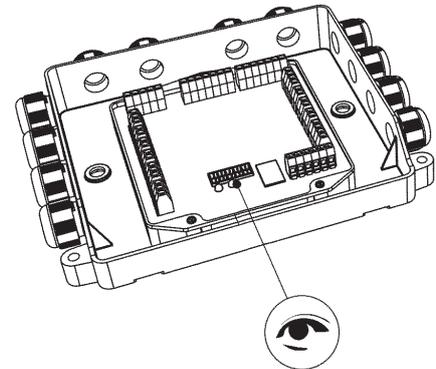


**Possible cause**

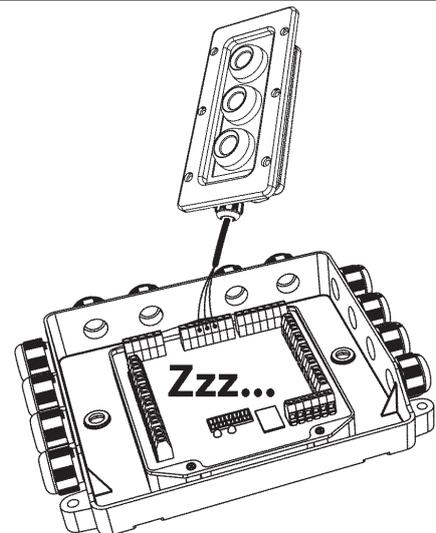
- 2.2 The card is receiving current to 1 or more inputs on the control unit connector, however, the tail lift and card do not react

**Ok!****Action**

LED 1 indicates if the card receives an input signal. If LED 1 does not react when current is fed to the input, then the card is faulty and must be replaced or the other control unit connector (6 or 7) is to be used.

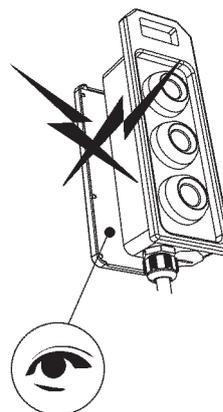
**Possible cause**

- 2.3 The card receives a signal but nothing happens.



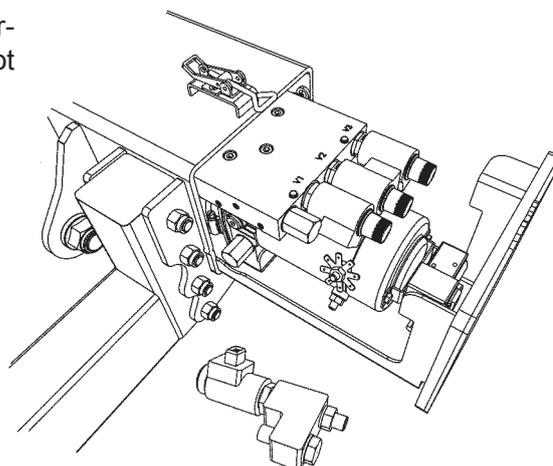
**Action**

If the card simultaneously receives a signal on both lifting and lowering circuits, all functions are disabled until the buttons are released. This can even be caused by a short circuit somewhere in the installation of the control unit. Also see paragraph 1.2.



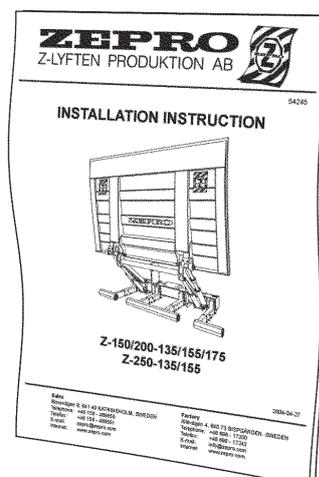
**Possible cause**

2.4 The card receives signals correctly, but the valves do not operate as they should.



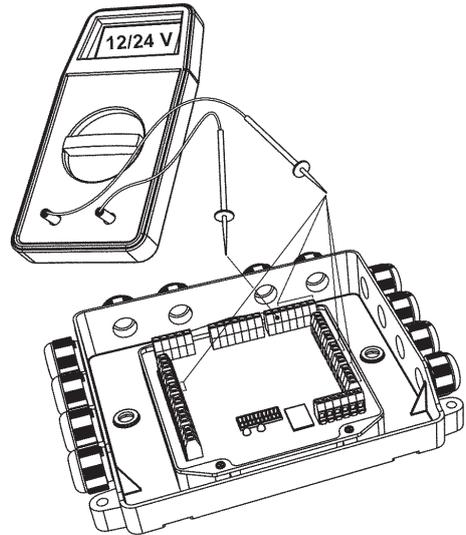
**Action**

In the installation instructions there is a description of which valves are activated during each movement phase of the tail lift.



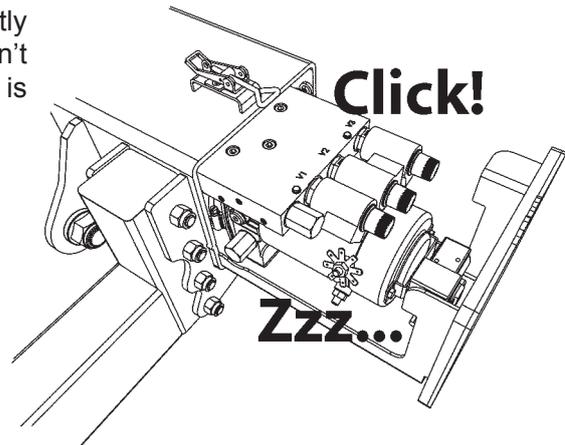
**Action**

Activate the inputs and simultaneously measure output after output. One or more outputs or the valve cables can be defective.



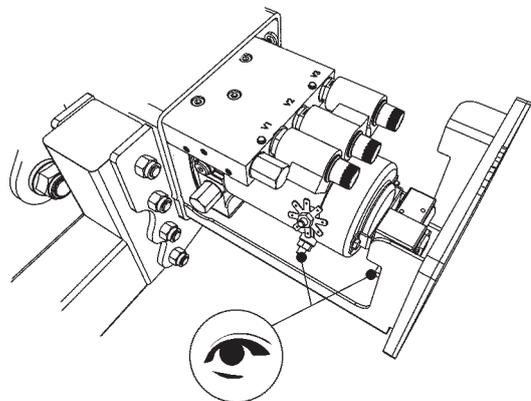
**Possible cause**

2.5 The valves function correctly but the electric motor doesn't start when the lift function is activated.



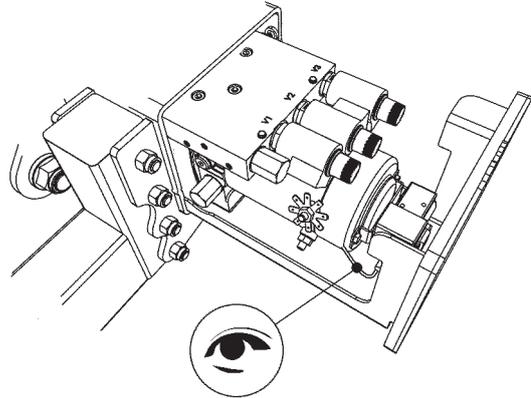
**Action**

Check the cables and their connections to the motor and solenoid in the hydraulic unit. Also check the earthing point in the hydraulic unit.



**Action**

Check that the solenoid is correctly earthed. The earth cable from the motor's heat guard can be faulty. Check this by connecting the solenoid earth directly to the earth terminal on the motor.



**Symptom**

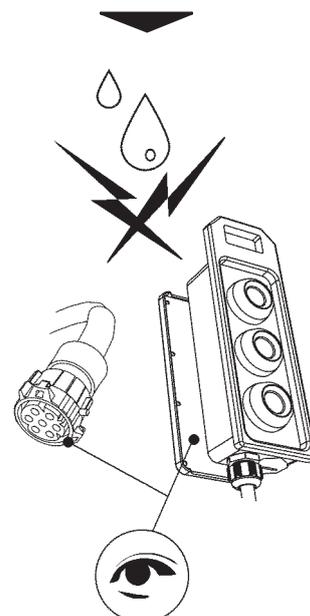
3. The tail lift moves without buttons being activated.

**Possible cause**

3.1 The tail lift moves even if no control unit is being used or continues to move after all buttons are released.

**Action**

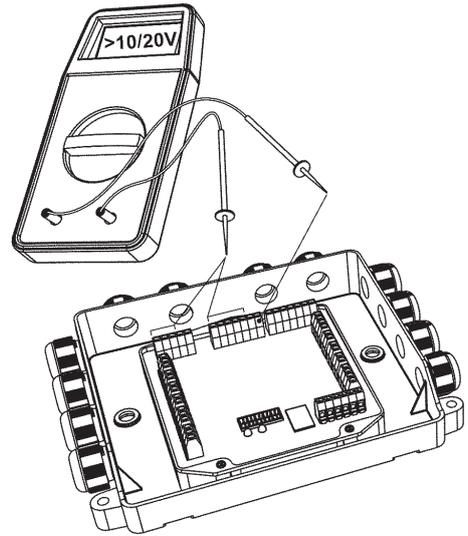
Moisture or water in the control unit and connectors can cause short circuits. Buttons can stick.



**Action**

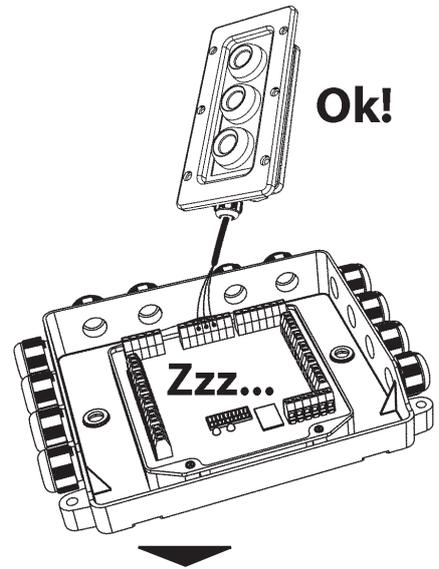
Measure the voltage at the control unit input connectors 6 and/or 7. Measure between GND and the various inputs (B, E, C, OUT, IN).

If the measured value is less than the battery's voltage, this is probably due to moisture. If the voltage is around the battery's voltage this is probably due to a short circuit or a button that has stuck. In order for the card to be activated by an input, the voltage must be > for 12V lift and over 20V for a 24V lift.



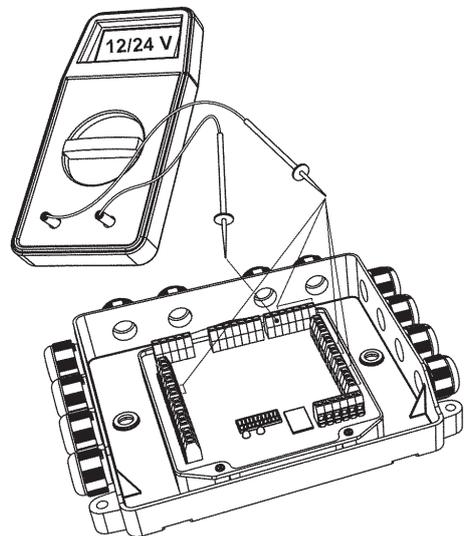
**Possible cause**

3.2 If the control unit checks out



**Action**

Measure the voltage of the outputs to check if any of the outputs has a constant signal. If this is the case the card is faulty and must be replaced.

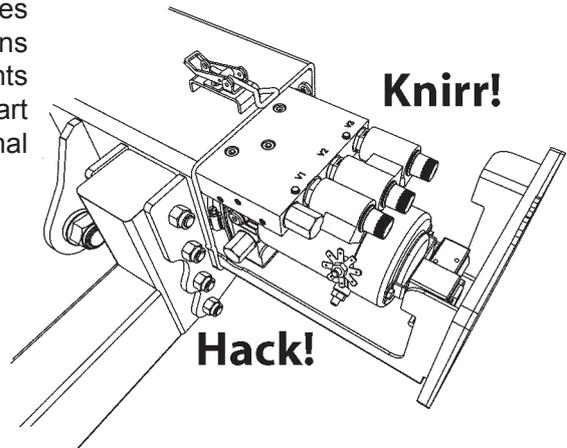


**Symptom**

4. The tail lift starts with irregular movements.

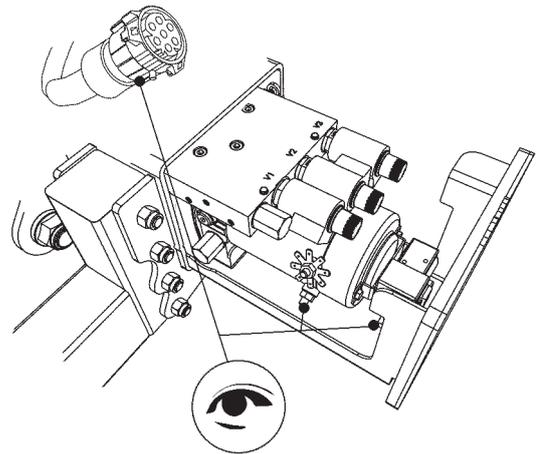
**Possible cause**

4.1 The tail lift's hydraulic unit does not start properly when buttons are pressed. The movements are irregular, either from start or after a seemingly normal start.

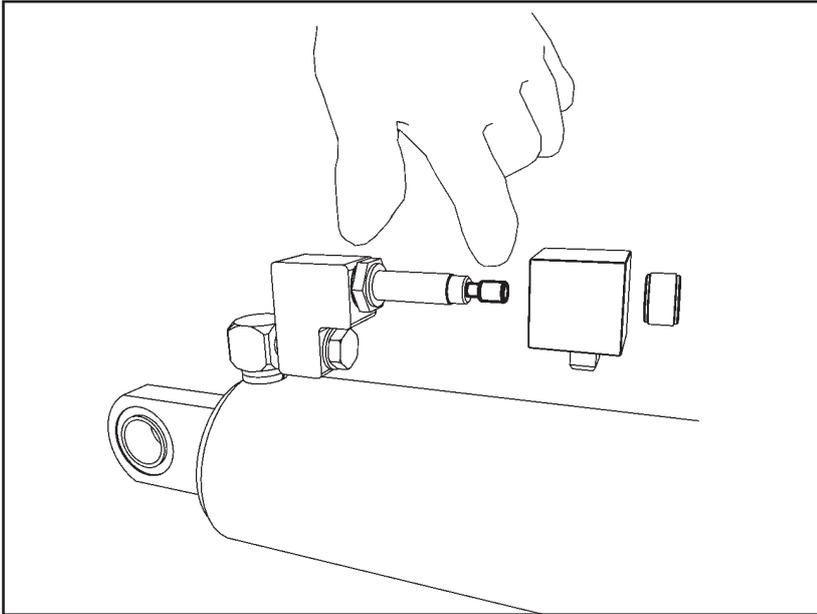


**Action**

Check the current carrying cables, connection cables and earths in the hydraulic unit. Check the battery voltage.

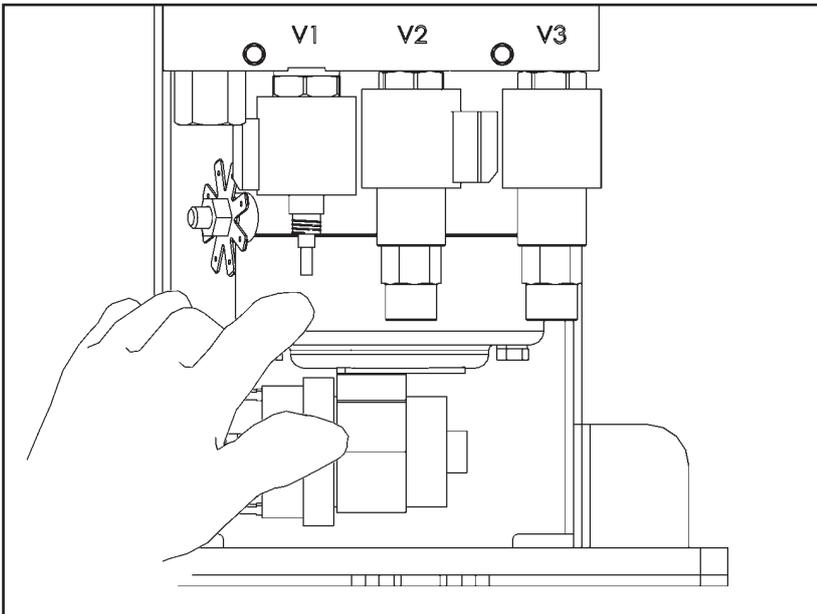


## Manual Control, tilting down



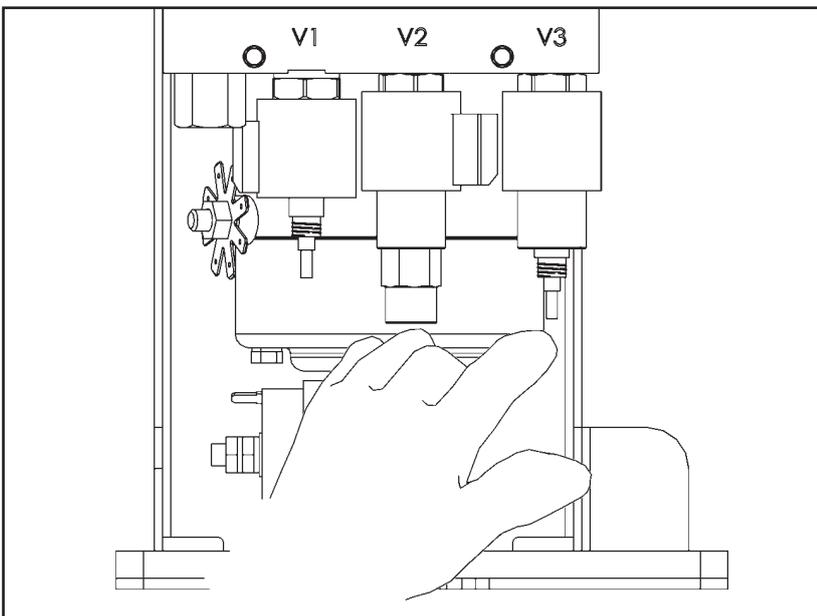
Electric safety valve on tilt cylinder (V5)

Remove the magnet on the valve. Screw off the top of the valve.



Hydraulic unit, valve (V1)

Screw off the hat on the magnet.



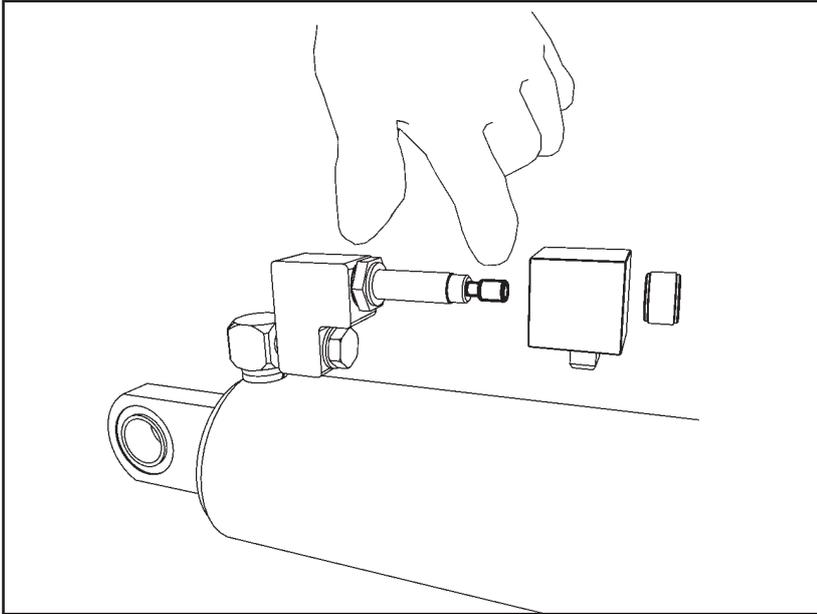
Hydraulic unit, valve (V3)

Screw off the hat on the magnet. When the pins are pressed inward, the lift tilts down. Release valve V3 to stop this function.

**Note!**

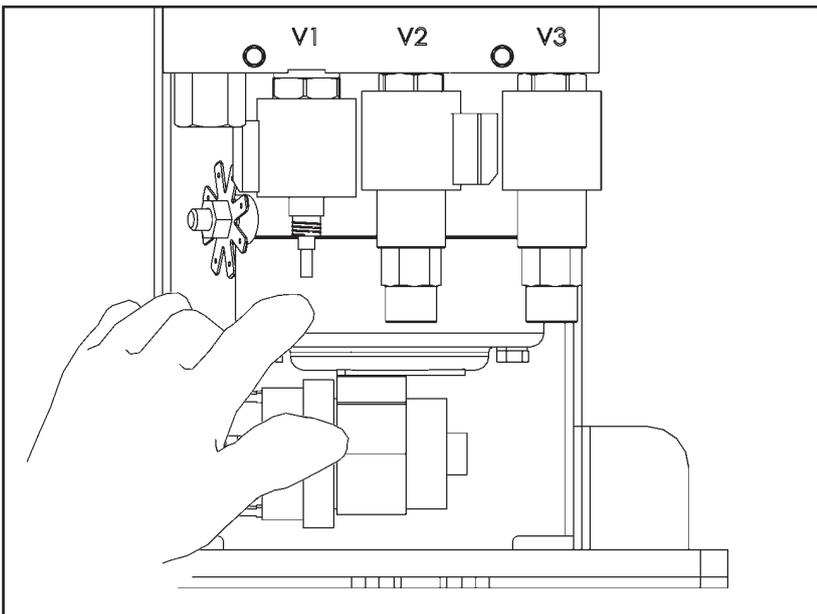
When emergency operation is completed, make sure to screw/connect everything back to its original positions.

## Manual Control, lowering



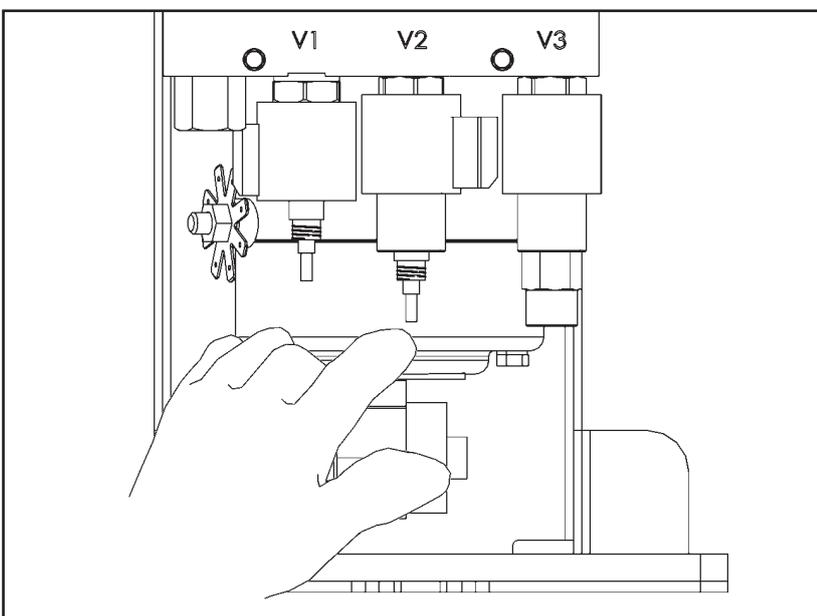
Electric safety valve on the lift cylinder (V4)

Remove the magnet on the valve. Screw off the top of the valve.



Hydraulic unit, valve (V1)

Screw off the hat on the magnet.



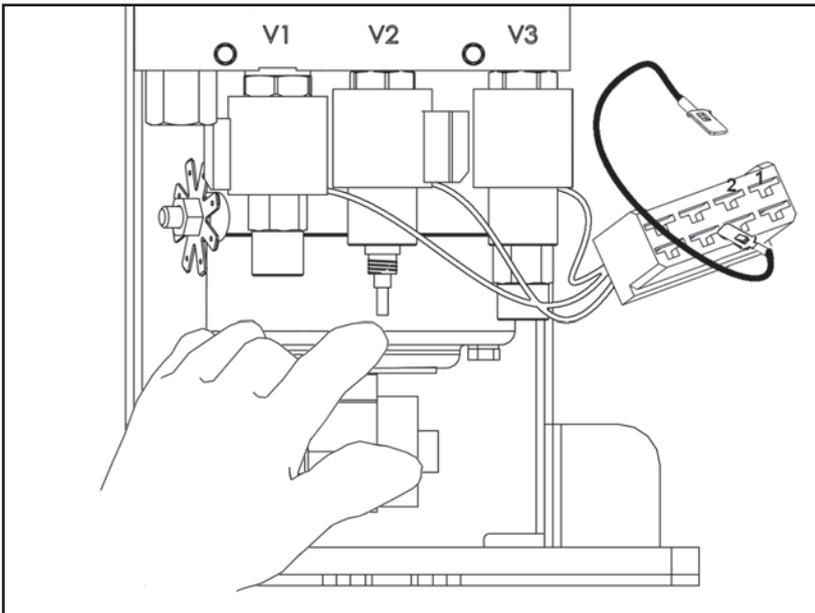
Hydraulic unit, valve (V2)

Screw off the hat on the magnet. When the pins are pressed inward, the lift lowers. Release valve V2 to stop this function.

**Note!**

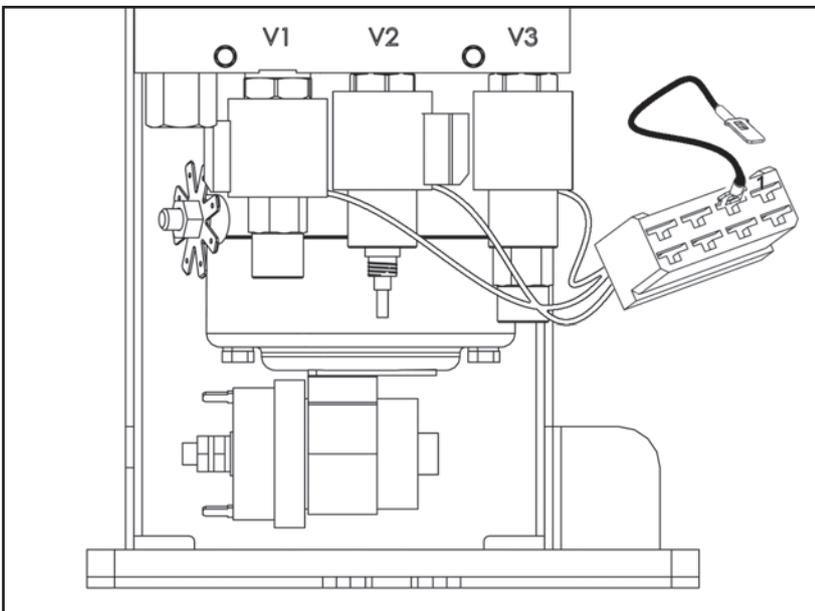
When emergency operation is completed, make sure to screw/connect everything back to its original positions.

## Manual Control, lift



Hydraulic unit, valve (V2)

Screw off the hat on the magnet.

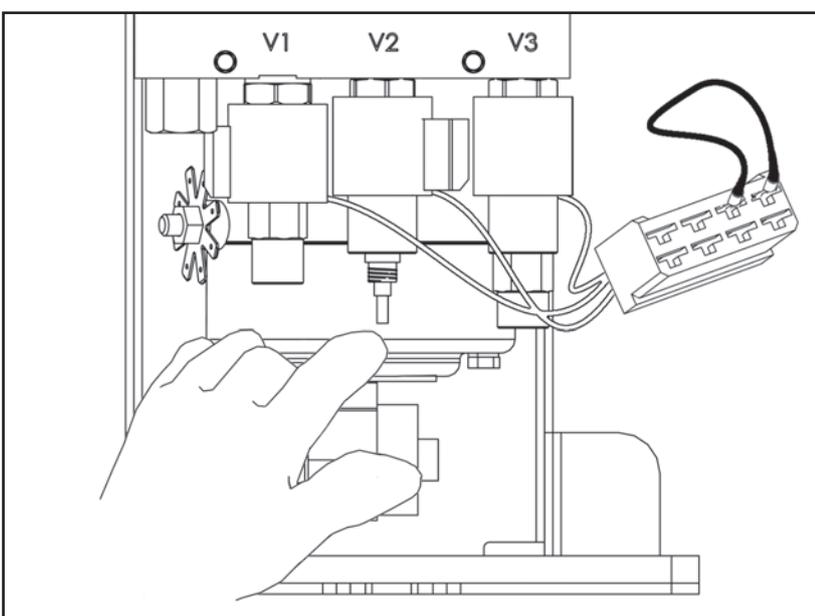


Hydraulic unit,  
block terminal

Take apart the block terminal.  
**Note!** Make sure to connect the cable to opening 2 first, before the cable is connected to opening 1\*,

\*The power supply goes through opening 1.

Opening 1 = red cable  
Opening 2 = brown cable



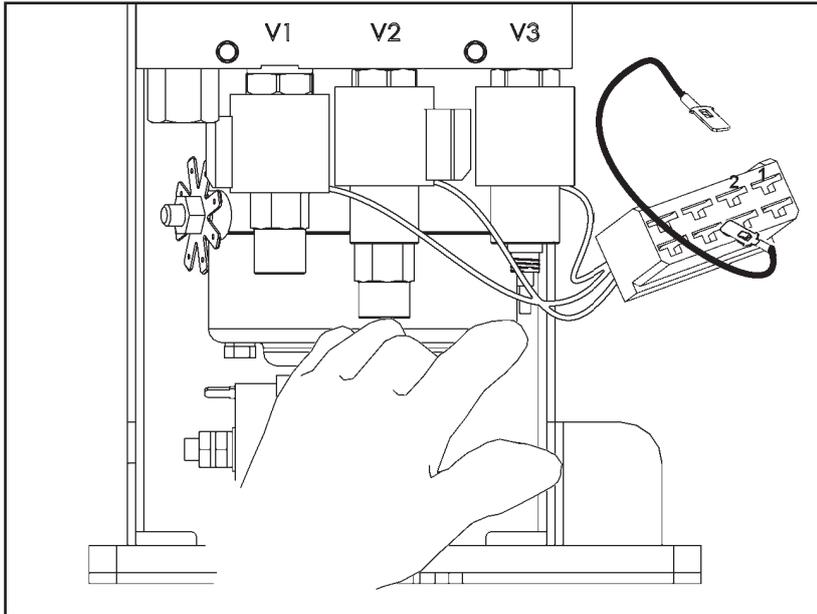
Hydraulic unit,  
block terminal

As the cable is connected to opening 1, press the pin inward to start the lift function. Release the pin to stop lifting.

**Note!**

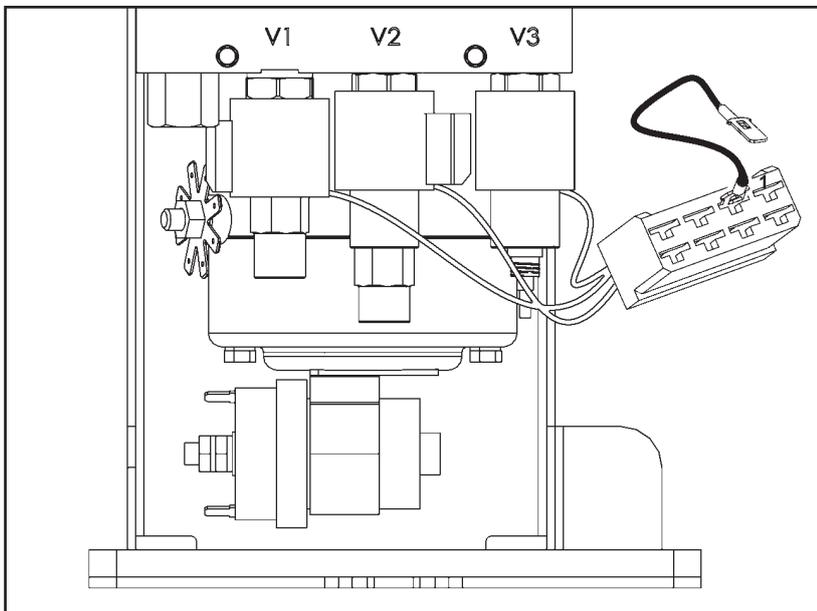
When emergency operation is completed, make sure to screw/connect everything back to its original positions.

## Manual Control, tilting up



Hydraulic unit, valve (V3)

Screw off the hat on the magnet.

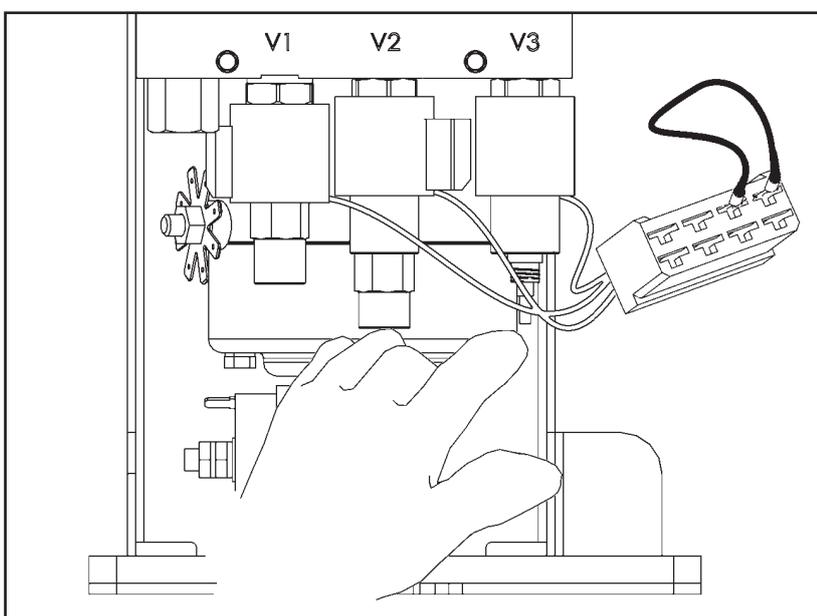


Hydraulic unit,  
block terminal

Take apart the block terminal.  
**Note!** Make sure to connect the cable to opening 2 first before connecting to opening 1\* ,

\*The power supply goes through opening 1.

Opening 1 = red cable  
Opening 2 = brown cable



Hydraulic unit,  
block terminal

As the cable is connected to opening 1, press the pin inward to start the lift function. Release the pin to stop lifting.

**Note!**

When emergency operation is completed, make sure to screw/connect everything back to its original positions.