Technical Manual

ZEPRO Z 1500/2000

ZEPRO ZDK 250

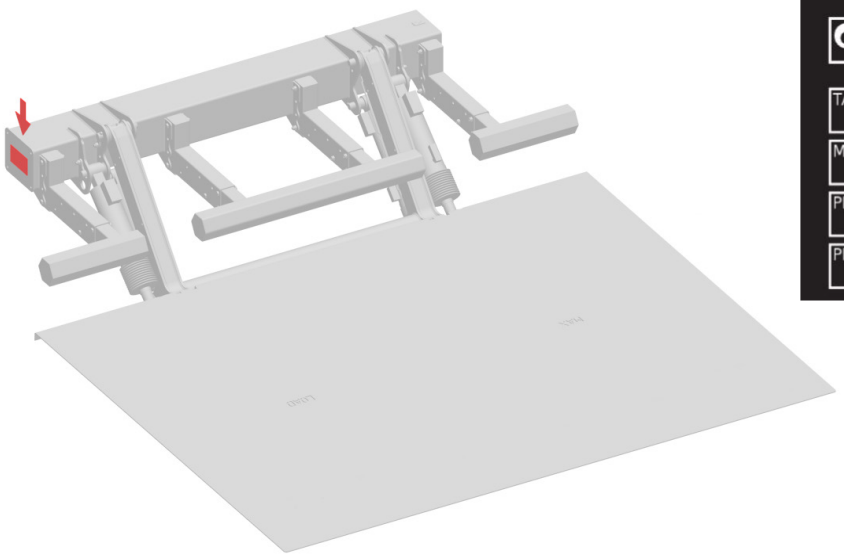
WALTCO HDC

ZEPRO

1. Product overview
1.1. Product variants and identification
1.1.1. The type sign
The Z 1500/2000 product family is available in a number of different variants with varying levels of functionality. The control systems, cylinder configurations, available control units and sensors can vary between the variants. It is therefore crucial to first identify the variant at hand to be able to find the correct technical information for it.

The first step in the process of identifying the variant is locating the type sign and reading the information in the tail lift type-field. The location of the typesign varies between different tail lift models but it is always riveted onto the support beam of the lift with the most common location being shown on the figure below. There should also be a sticker showing the same information in the users manual and on the door sill on the drivers side of the vehicle.

The information contained in this document is only valid for the Zepro Z/ZL 1500/2000 family of tail lifts, the Zepro ZDK 250 and the Waltco HDC.



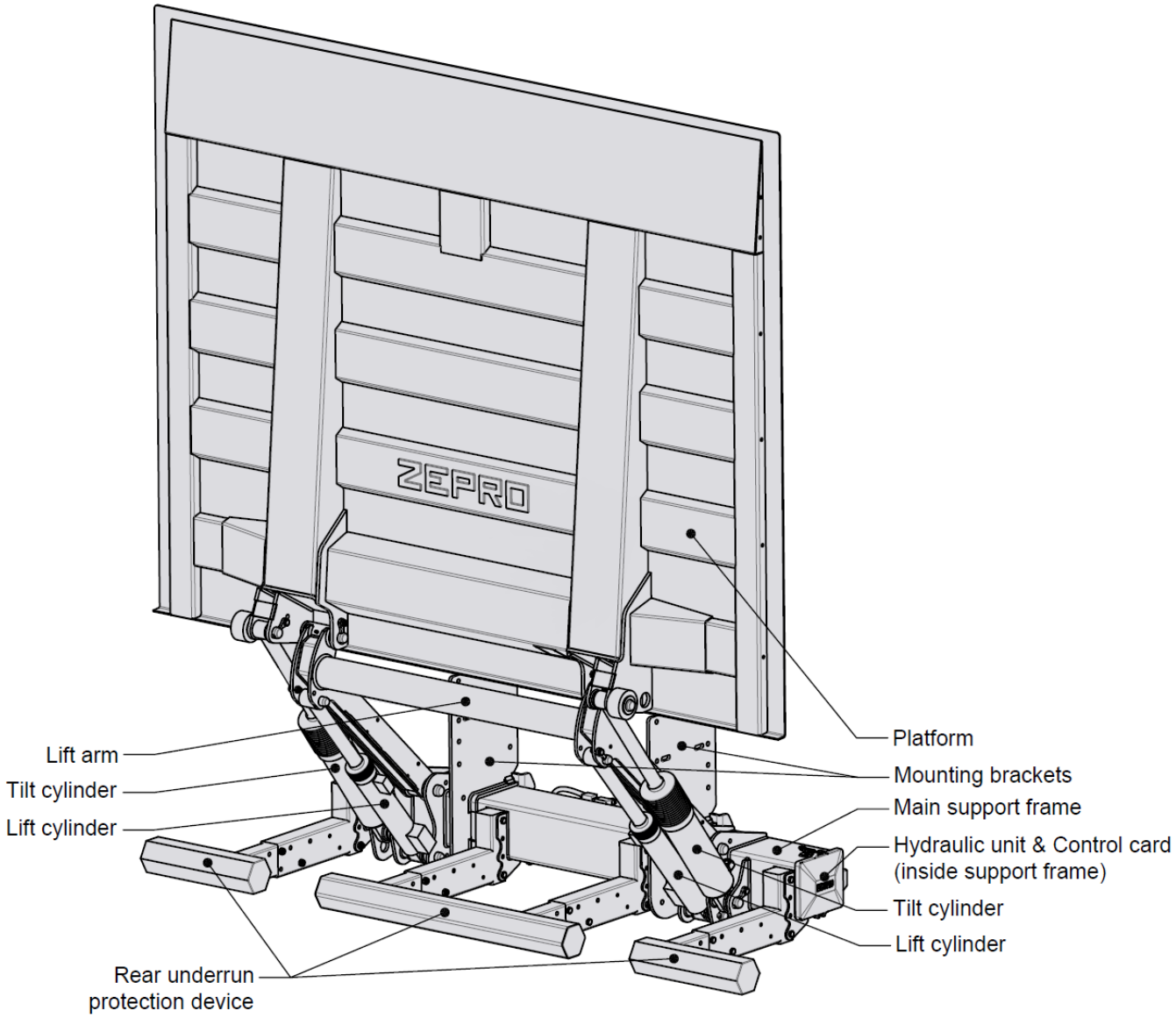
The nomenclature used by Zepro is as follows:

Model	Capacity	Lifting height	Cylinder configuration	System voltage
Z / ZL	1500 / 2000	135 / 155 / 175	MA / DA	12V / 24V

The four digit number after the model designation denotes the lifting capacity of the tail lift, in kilograms and the three digit number is the approximate maximum lifting height of the lift in centimeters.

1.1.2. Main components

All variants of the Z 1500/2000 model family consist of the same main components shown in the figure below.



1.1.3. Cylinder configurations

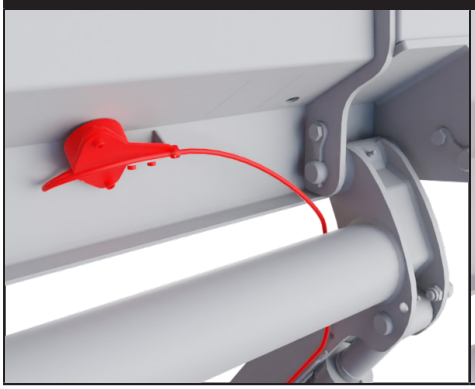
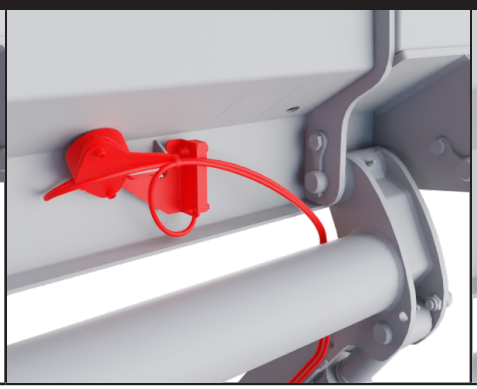
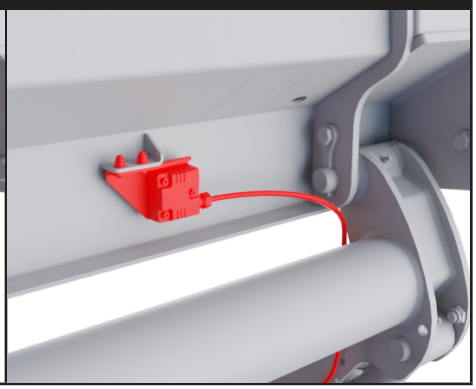
The Z 1500/2000 is available with two cylinder configurations: MA and DA, denoting the following:

Cyl. config.	Lift cylinders	Tilt cylinders
MA	Single acting	Double acting, adjustable
DA	Double acting	Double acting, adjustable

A double acting cylinder uses hydraulic pressure for both extension and compression. A single acting cylinder, on the other hand, uses hydraulic pressure only in one direction and uses an outside force (gravity) in the other direction. Double acting tilt cylinders allow for more consistent operational speeds over a wide temperature range which is especially useful when opening and closing the platform against the box body in colder climate.

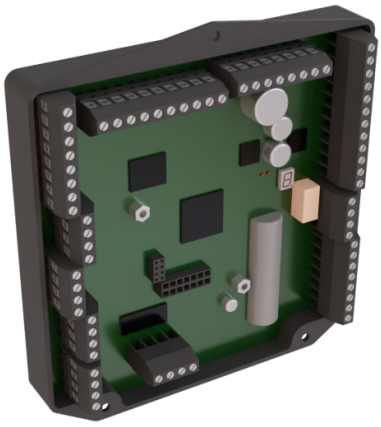
1.1.4. Auto tilt

A tail lift equipped with auto tilt functionality automatically tilts the platform down when the platform reaches the ground and then tilts is back up to horizontal without any additional input from the user other than keeping the lower/raise button pressed throughtout the motion. The Z 1500/2000 can be equipped with two types of electrical auto tilt systems, one based on a digital auto tilt sensor and one based on a analog sensor. It can also be without any auto tilt functionality. Whether the tail lift is equipped with auto tilt functionality or not cannot be determined by reading the information on the type sign. Instead the type and number of sensors installed on the platform should be checked.

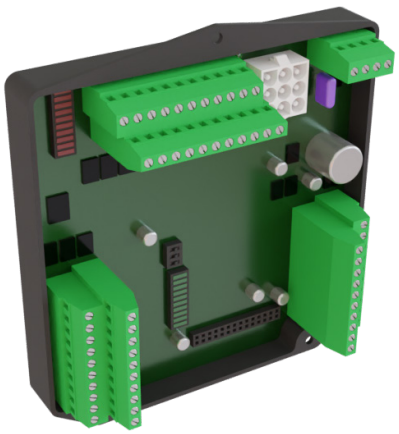
No auto tilt	Digital auto tilt	Analog auto tilt
		

1.1.5. Control cards

The control card converts the inputs from the user and the sensors into outputs to the motor solenoid and the valves which accomplish the desired motion. The Z 1500/2000 can be equipped with one of two models of control cards, depending on market and required functionality. The first control card is the ZePRO1 control card which is an advanced processor based circuit card. The second is the simpler TLC B1 card which is based on solid state relay technology.



ZePRO1



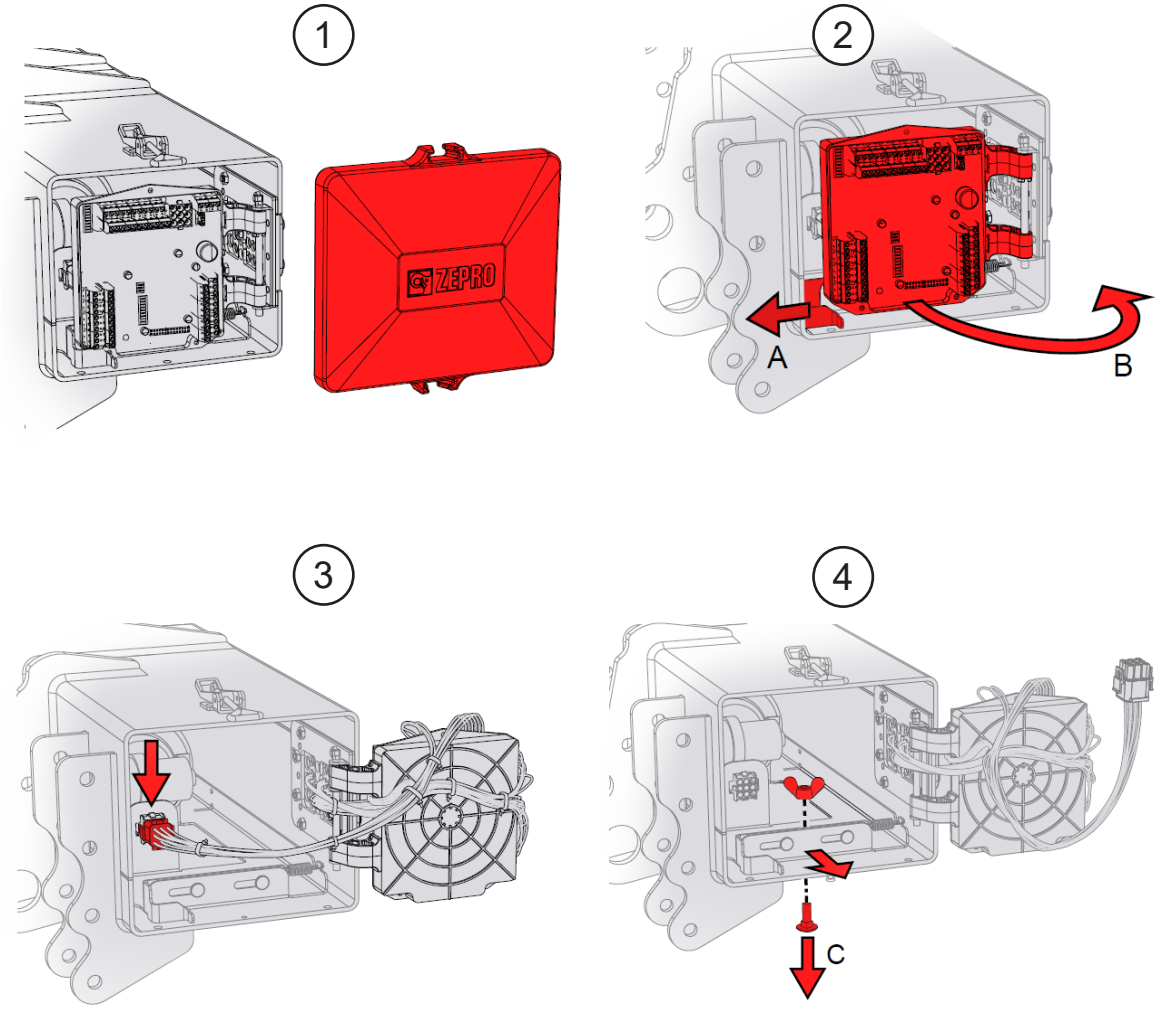
TLC B1

The cylinder configuration and the auto tilt functionality or lack there of has an impact on the software configuration of the control card required to operate the tail lift. Using a software configuration not meant for a particular cylinder configuration can lead to the tail lift nor functioning properly or in some cases, not functioning at all. Every card has a decal showing its configuration. On the ZePRO1 circuit card the configuration is also displayed every time the card is powered on, see section xxx for details. On the TLC B1 card the configuration can be determined by examining the position of the three switches on the block in the middle of the card, see section xxx for details. The following table shows the required configurations for the different variants of the Z 1500/2000.

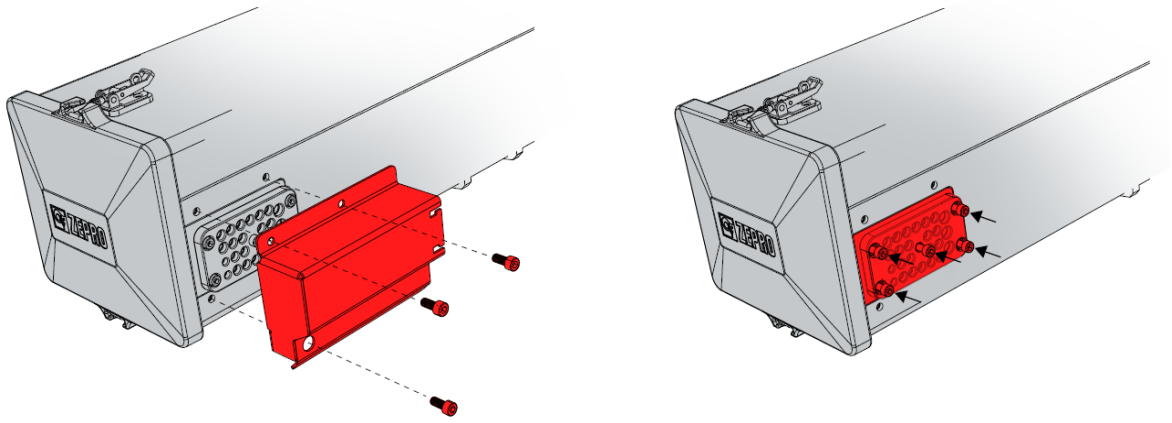
Cylinder config.	Auto tilt	ZePRO1 config.	TLC B1 config.
MA	No	14	000
	Yes, digital	14	000
	Yes, analog	14 (firmware 9.8 or later)	Not supported by card
DA	Not available on DA	16	Not supported by card

1.2. Accessing the card and hydraulic unit

The control card and the hydraulic unit are housed inside the main support frame of the tail lift. The card is accessed by removng the protective plastic cap on the right side of the tail lift. The hydraulic is accessed by swiveling the card to the side, disconnecting the cable harness, and removing the securing bolt. The unit can then be slid out.



On the front of the support frame there is a cable grommet for passing cables through from the outside to the inside of the tail lift. Cables going from the card to the sensors, control devices, cabin switch and outer valves are passed through the grommet. Five screws are used to achieve a seal around the cables and there is a protective cover for additional protection.

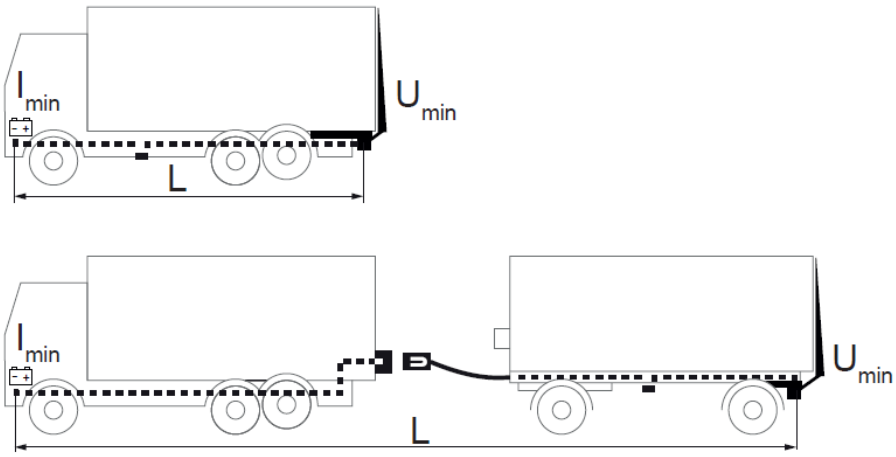


1.3. Battery and cable requirements

For proper function of the tail lift the electrical system needs to be sized per the following:

Item	12V	24V
Minimum battery capacity (I_{min})	180Ah	170Ah
Minimum voltage during operation (U_{min})	9V	18V
Cross sectional area of power cable, length up to 8m	35mm^2	35mm^2
Cross sectional area of power cable, length 8-15m	50mm^2	35mm^2
Cross sectional area of power cable, length over 15m	Not possible	50mm^2

The given cross sectional areas are valid for copper cables. If other conductor material is used proper conversion needs to be made in order to properly size the connection. The total length of the cable is measured according to the following figure.



Some vehicle models have restrictions regarding the amount of current the lift can access from the existing battery. Some vehicle models do not fully charge the battery. It may therefore be necessary to switch to a battery and sometimes also to a charger with a larger capacity.

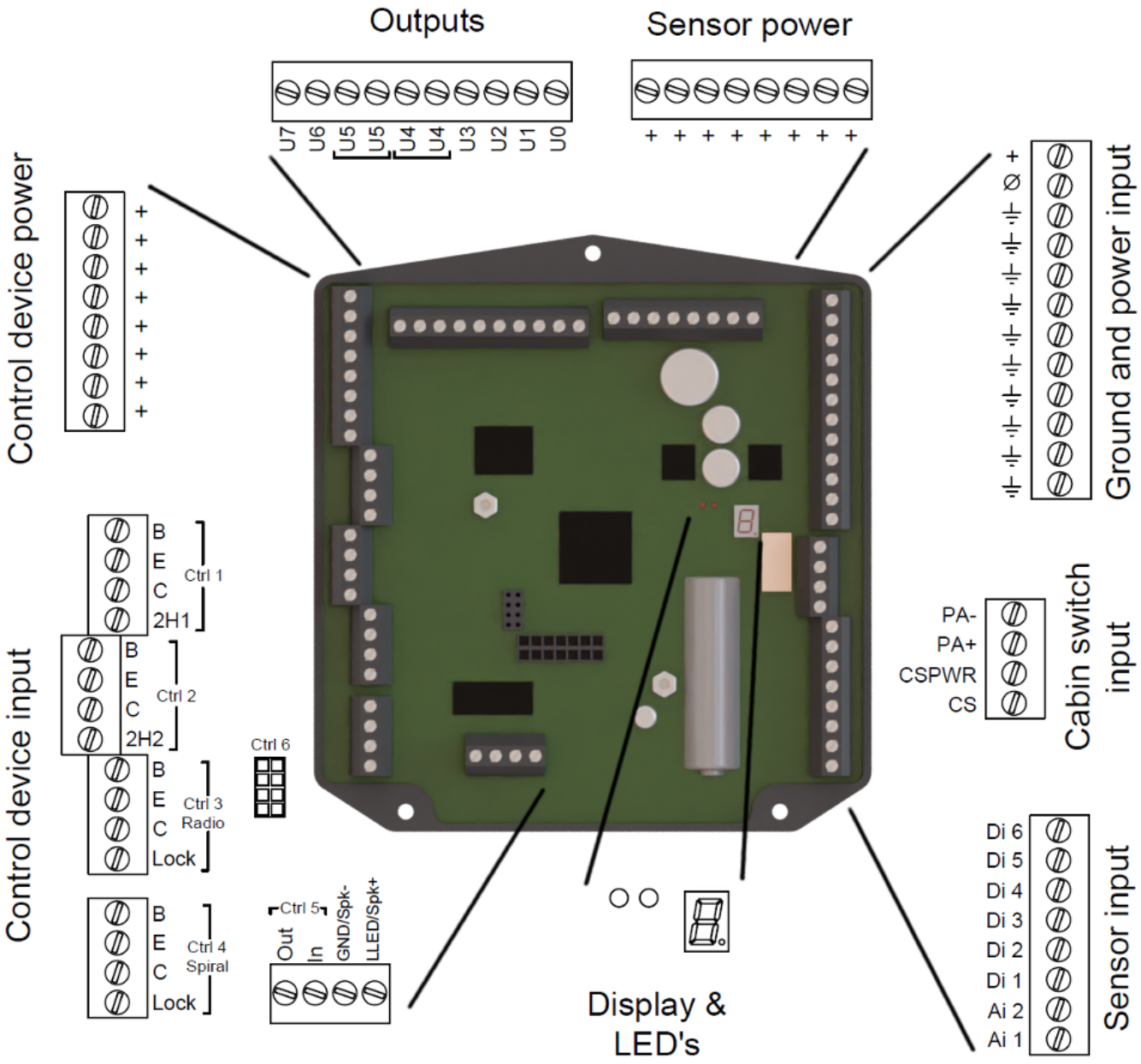
1.4. Weights

The weights of different vairants of the Z 1500/2000 are given below as well as the weights for different platforms.

Tail lift	Weight (kg)
Z 1500-135	315
Z 1500-155	328
Z 1500-175	344
Z 2000-135	321
Z 2000-155	373
Z 2000-175	373

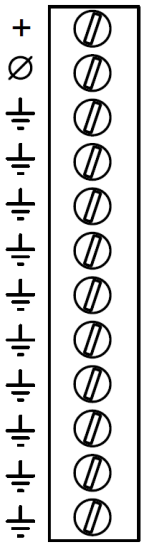
Platform material	Weight (kg)
Aluminium 1705x2540	161
Aluminium 2005x2540	180
Aluminium 2205x2540	194
Steel 1700x2540	285
Steel 2000x2540	335
Steel 2200x2540	374

2. Control cards
2.1. ZePRO1 circuit card
2.1.1. Overview
The ZePRO1 control card can be split into different functional sections as shown in the following figure. In-depth explanations of each section are contained in the following chapters.



2.1.2. Ground and power input

The ground and power input section is used for powering the card and as a ground connection for sensors and control devices. The top pin is used as a voltage supply to the card. Without input voltage to this pin the card will not power on. The second pin from the top is not used and the rest of the pins are all ground connections.

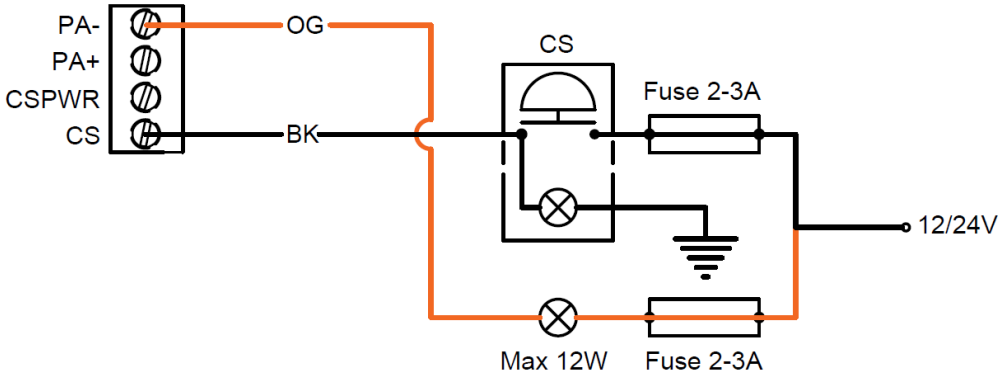


2.1.3. Cabin switch input

The tail lift shall be equipped with a system to prevent any unauthorized operation in the absence of the operator. This can be accomplished in two ways:
a) by switching the card off with a dedicated switch connected to the cabin switch input on the card
b) by cutting the power supply from the battery to the tail lift using a main power switch.

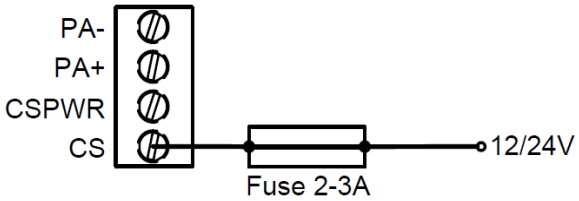
Using both is also an option.

The Zepro cabin switch conssits of a button with a built-in LED that indicates that the tail lift is active and a supplementary LED used fot the open platform alarm. The switch and the supplementary LED are connected to the cabin switch input on the card and a power source, as shown below.



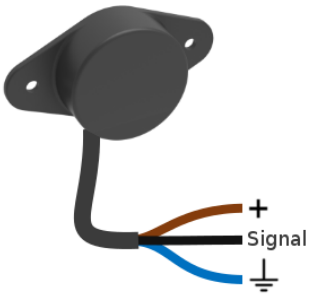
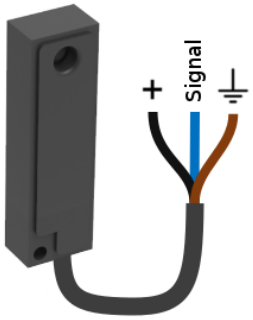
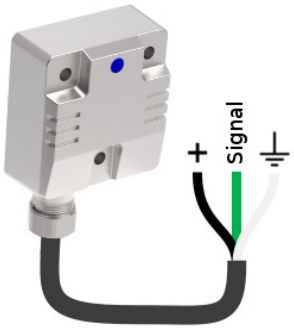
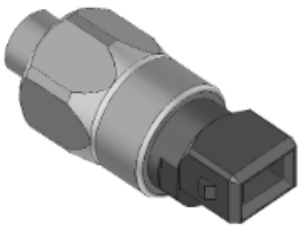
The location of the switch is up to the discretion of the installer and the end user but is affected by local laws and regulations. For countries where the EN 1756 standard is in effect, the only approved location for the cabin switch is inside the cabin or a similar compartment that is locked by a key or a code.

When a cabin switch is not used the CS input on the card is powered directly as shown below.



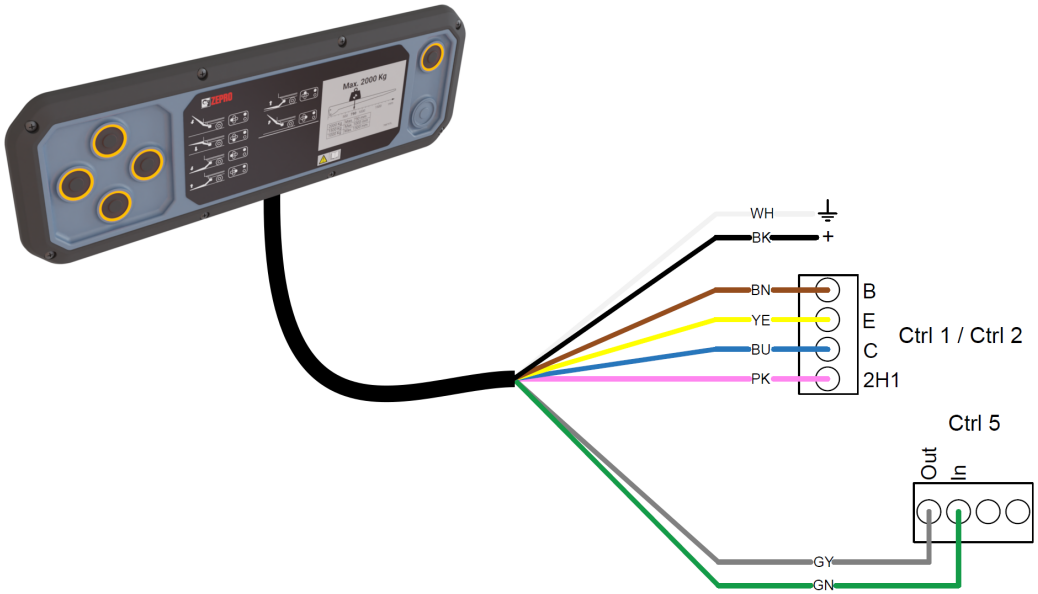
2.1.4. Sensor input and power

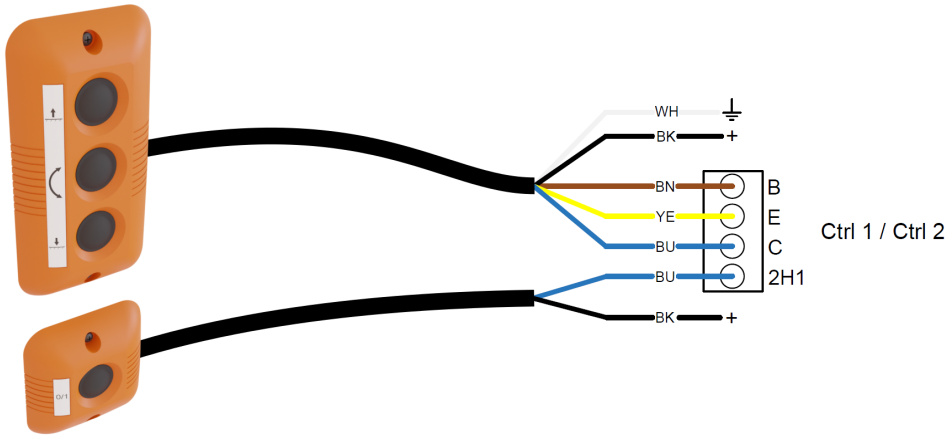
Sensors are used to provide added functionality when certain conditions are met or limit certain functionality for safety reasons. The ZePRO1 control card has input pins for up to 6 digital sensors, Di1 through Di6, as well as 2 analog sensors, Ai1 and Ai2. The card can accomodate the sensors shown in the table. Different variants of the Z 1500/2000 use different types and number of sensors, see the functional descriptions and schematics chapter for more information.

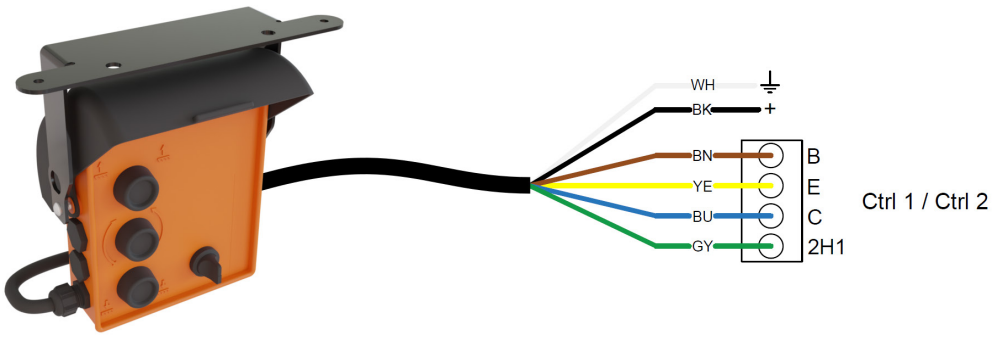
Type	Picture	Explanation
Digital angle sensor		A sensor that uses an articulating ball to output an On/Off signal for certain angle ranges. Usually mounted on the platform and used to control the two hand safety requirement.
Digital angle sensor (IFM)		A sensor that uses a fluid to measure the angle and outputs an On/Off signal for certain angle values. More accurate than the ball type sensor. Mounted on the platform on tail lifts equipped with digital auto tilt on which it is used to stop the auto tilt up motion of the platform when it reaches horisontal level.
Analog angle sensor (Inclinometer)		Advanced analog angle sensor that outputs 0-4,5 V depending on angle. Mounted on the platform on tail lifts equipped with analog auto tilt with angle setting function on which it is used to measure the platform angle relative to gravity.
Pressure sensor		Outputs an On/Off signal if the pressure exceeds (rising pressure sensor) or falls below (falling pressure sensor) a predetermined value. It is most often used for the open platform alarm, in which case it is mounted on the positive hydraulic connection to one of the tilt cylinders. It can also be used for the auto tilt function in which case it is mounted on the positive hydraulic connection to one of the lift cylinders.

2.1.5. Control device input and power

The control devices are connected to the control device input section and powered by the control device power section of the control card. They are used to input user comands into the control card so that they can be interpreted and executed. The control devices can be grouped into two groups depending on their functionality: primary and secondary devices. Primary devices can operate all functions of the tail lift including those that require two-handed operation for safety reasons. Secondary devices do not offer the possibility of two-handed operation and therefore unable to operate certain functions. The most common primary control devices for the Z 1500/2000 are shown below.



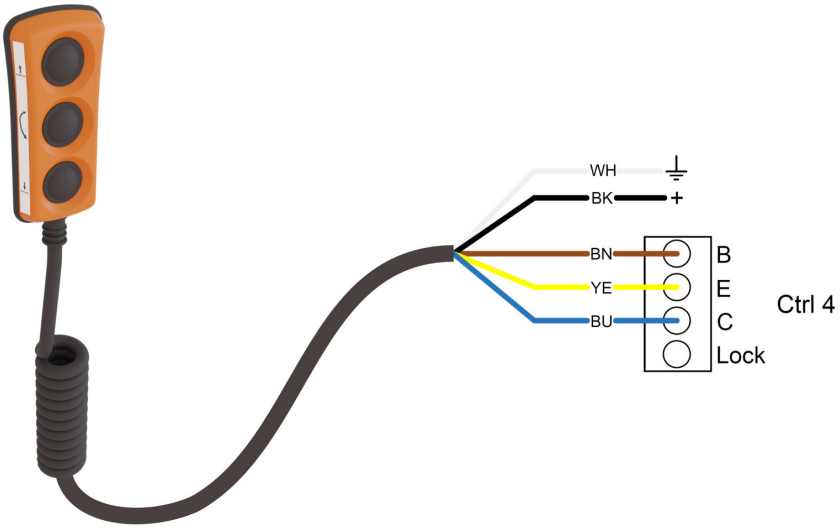


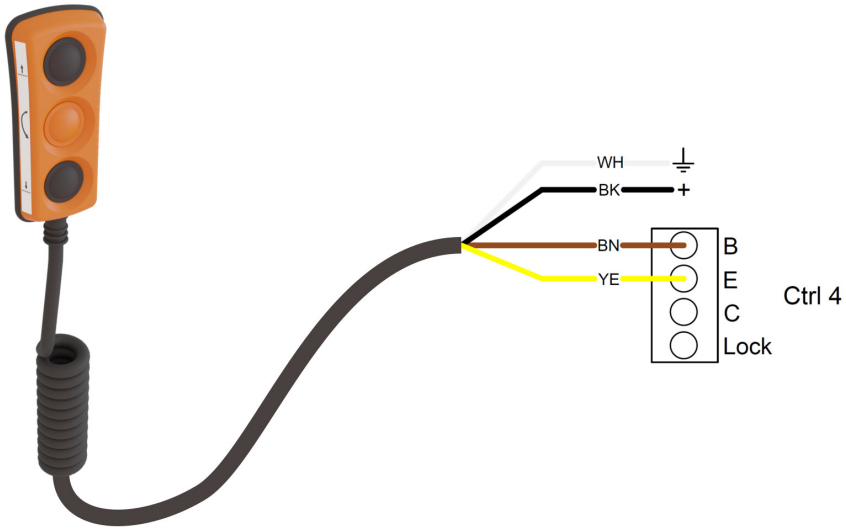


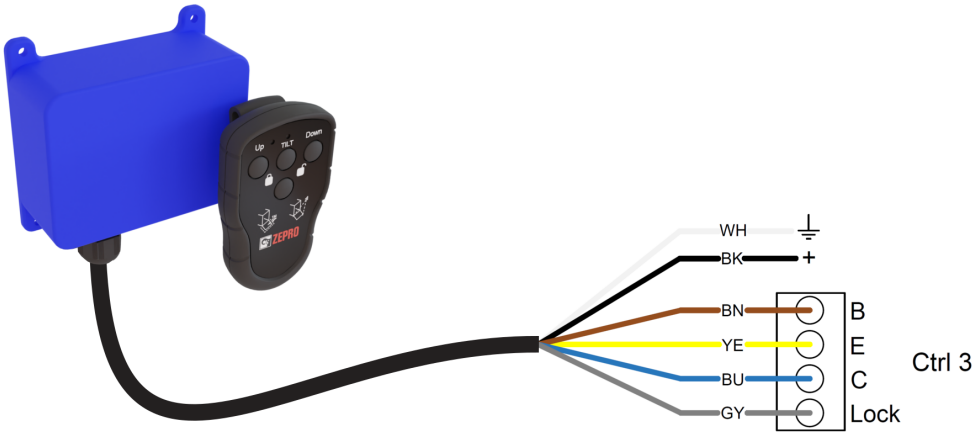
The ZePRO1 control card has six control device inputs Ctrl 1 through Ctrl 6.

- Ctrl 1 - Input for a primary control device. Can control all tail lift functions apart from slide in / slide out.
- Ctrl 2 - Input for a primary control device. Same functionality as Ctrl 1.
- Ctrl 3 - Input for a secondary control device such as radio control device with externally mounted receiver.
- Ctrl 4 - Input for a secondary control device such as in-box mounted device with a spiral cable.
- Ctrl 5 - Input used for the slide out / slide in functionality of sliders. Not used on the Z 1500/2000.
- Ctrl 6 - Input used for the receiver of the radio control device. Same functionality as Ctrl. 3.

The most common secondary control devices for the Z 1500/2000 are shown below.







2.1.7. Display and LED’s

The control card is equipped with two LED’s and an alphanumeric display with a status point on the lower right corner which provide useful information about the system.

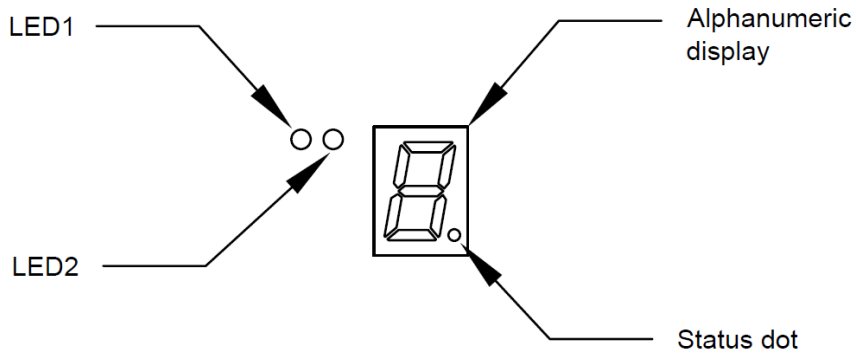
The status dot has three states:

Off: no supply voltage to control card.

On: supply voltage is available but the cabin switch is switched off.

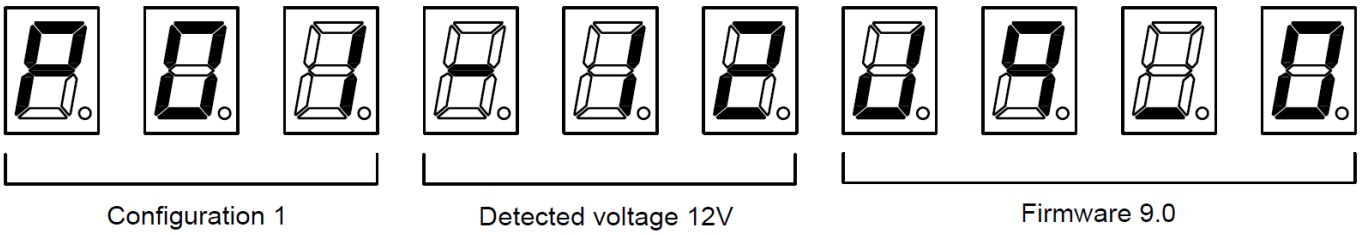
Flashing: supply voltage is available and the cabin switch is switched on. The card is awaiting input signal.

When a button press is being registered by the card, LED1 is lit and when the signal from the control device and sensors is registered and approved by the card, LED2 is lit to indicate an active output.



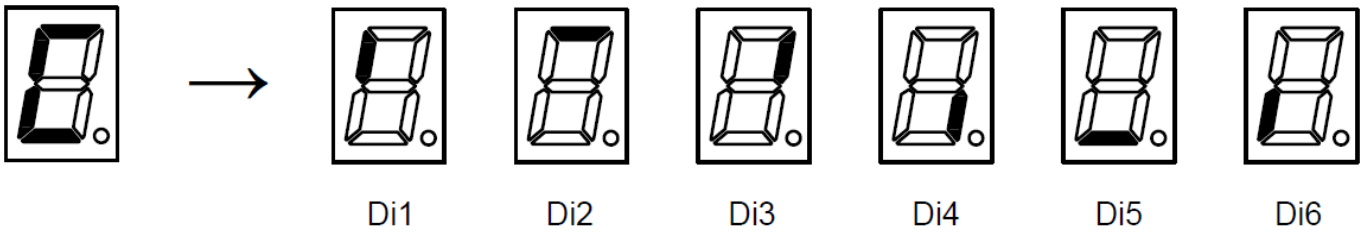
Startup sequence

Every time the card is switched on, either by turning the cabin switch off and then back on or by cutting the power to the lift and turning it back on, a startup sequence is displayed on the display. The software configuration is displayed first, followed by the detected voltage and the firmware version number. It is crucial that the software configuration is the correct one for the tail lift it is installed on, see the software configurations chapter for more information.



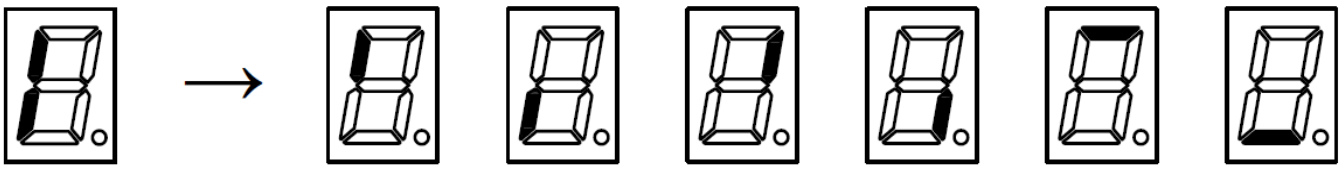
Sensor input indication

As long as no buttons are pressed and no faults are detected, the display will show the sensors that are active at the time. This is displayed by the letter “C” followed by lit sector(s) corresponding to a sensor input as shown below. Note that more than one sensor can be active at the same time in which case more than one sector will be lit at the same time.



Control unit input indication

When a button is pressed on a control unit this is indicated on the display. The active control unit (1-6) is shown first, followed by the active button according to the figure below. If more than one button is pressed at the same time, the sectors denoting all buttons will lit up at the same time.



Raise (B) Lower (E) Tilt (C) 2-Hand (X) Slide in Slide out

A flashing number when no buttons are pressed indicates the control device to which the control system is locked. This can happen when the “lock” button is pressed on a control unit that offers that functionality or more commonly due to the time delay for switching between control units. This primarily applies to secondary control units such as radio and coil control units, as other control units have such a short time delay that there is no time to see the indication.

Locked control device indication

Once a button has been released, the control system for the current control device is locked for a while to ensure that no other person operates the lift from another control device. The current control device number (1-7) will flash on the display while the control system is locked to it. This primarily applies to radio and coil control devices, as other control devices have such a short locking period that there is hardly time to see the indication.

Control devices with spiral cable can be equipped with a locking function activated by a button on the device. When the button is pressed, the control card is locked to the current control device until it is unlocked manually by pressing on the button again.

The radio control device is also equipped with a locking function. The lock status is indicated by the lock function LED on the transmitter, which lights up when the lock is activated. In the event of a fault in the remote control, it can be unlocked by turning the cabin switch (CS) Off/On. If the remote control is in the locked position and the lift has been unlocked by switching the cabin switch (CS) Off/On, the lift will be locked again as soon as any button on the remote control is pressed.

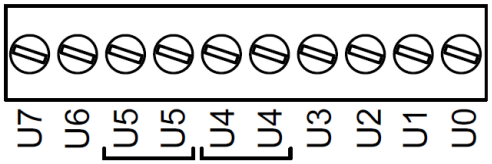
Fault indication

If a fault arises, the fault code will be shown in the display in the form of a letter for identifying the fault, followed by a number(s) and/or segments for additional information. If the system discovers several faults, only the fault code for the fault with the highest priority will be shown automatically. The display is prioritised in the order in the table below, L/H, E, F and A. When the cabin switch is turned off, the system scrolls through a list of the last five errors detected before the display turns off after approx. 5 minutes, the control card then goes into sleep mode.

ID	Explanation	Notes
L	Low volatage	Id is followed by a number between 7 and 35 indication the measured voltage. Resets automatically when voltage decreases to an acceptable level.
H	High voltage	Id is followed by a number between 7 and 35 indication the measured voltage. Resets automatically when voltage increases to an acceptable level.
E	Locked control device	Id is followed by a number between 1 and 7 indicating the locked control device where: 1-6: Control device 1 through 6 7: Cabin switch The number is followed by a segment (see control unit input indication) indicating which button was used to lock the device. Resets automatically if the control system has not received a signal from the relevant control device for 6 minutes.
F	Short circuit / High current	Id is followed by a number between 0 and 9 indication the faulty output where: 0-7: Output U0 through U7 8: Control power output 9: Sensor power output Resets automaticallt if function is verified to be running.
A	Internal fault	The tail lift can be used as normal unless it’s malfunctioning in which case please contact support.

2.1.6. Outputs

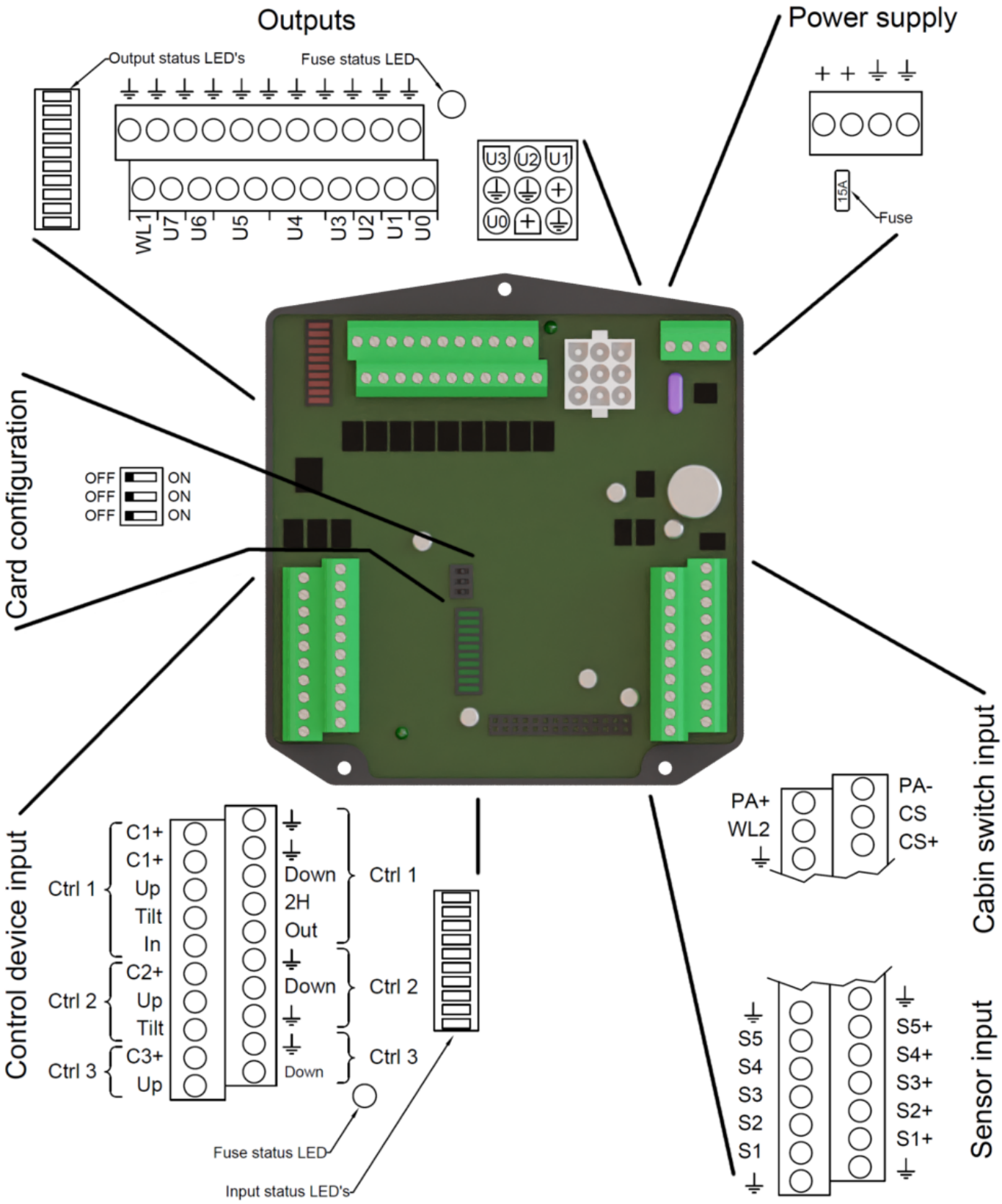
The output section is used for power delivery to the solenoid and the valve coils. It consists of 10 pins in total out of which four are interconnected in two pairs for cases where two coils need the same signal. The U0 output is reserved for the motor solenoid. U1-U3 are usualy used for valves V1, V2 and V3. U4 and U5 are usually used for the safety valves on the tilt and lift cylinders and the remaining ouput pins are used for adidional valves. See the functional descriptions and schematics chapter for more information.



2.2 TLC B1 relay card

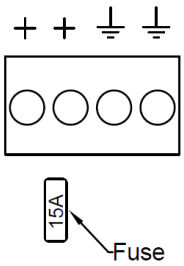
2.2.1 Overview

The TLC B1 control card can be split into different functional sections as shown in the following figure. In-depth explanations of each section are contained in the following chapters.



2.2.2. Power supply

The control card is powered through the power supply block in the top right corner of the card and is protected by the 15A fuse right beneath it.

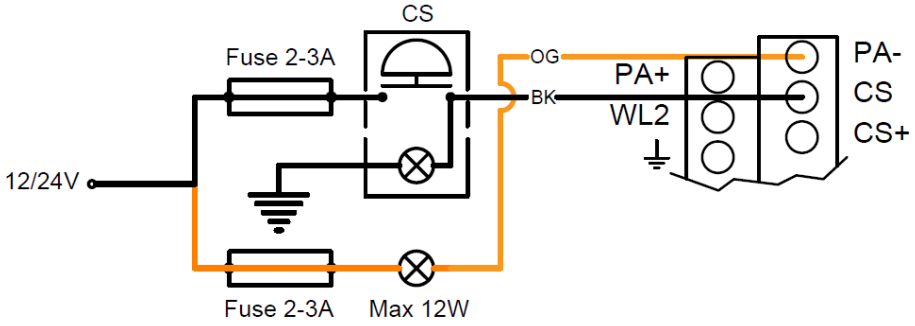


2.2.3. Cabin switch input

The tail lift shall be equipped with a system to prevent any unauthorized operation in the absence of the operator. This can be accomplished in two ways:
a) by switching the card off with a dedicated switch connected to the cabin switch input on the card
b) by cutting the power supply from the battery to the tail lift using a main power switch.

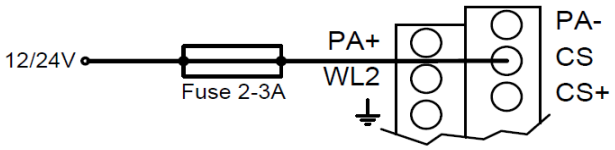
Using both is also an option.

The Zepro cabin switch conssits of a button with a built-in LED that indicates that the tail lift is active and a supplementary LED used fot the open platform alarm. The switch and the supplementary LED are connected to the cabin switch input on the card and a power source, as shown below.



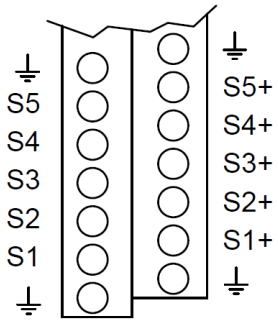
The location of the switch is up to the discretion of the installer and the end user but is affected by local laws and regulations. For countries where the EN 1756 standard is in effect, the only approved location for the cabin switch is inside the cabin or a similar compartment that is locked by a key or a code.

When a cabin switch is not used the CS input on the card is powered directly as shown below.

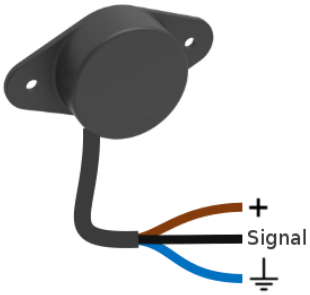
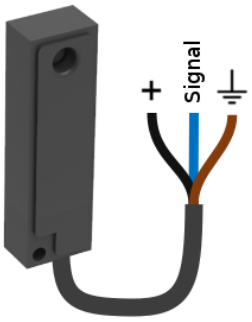
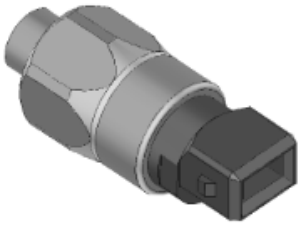


2.2.4. Sensor input

Sensors are used to provide added functionality when certain conditions are met or limit certain functionality for safety reasons. The TLC B1 control card has input pins for up to 4 different sensors, S2 through S5. The S1 input is used to power the S5 so together they act as a single input. The S1+S5 input is most often used for the auto tilt functionality on some variants.

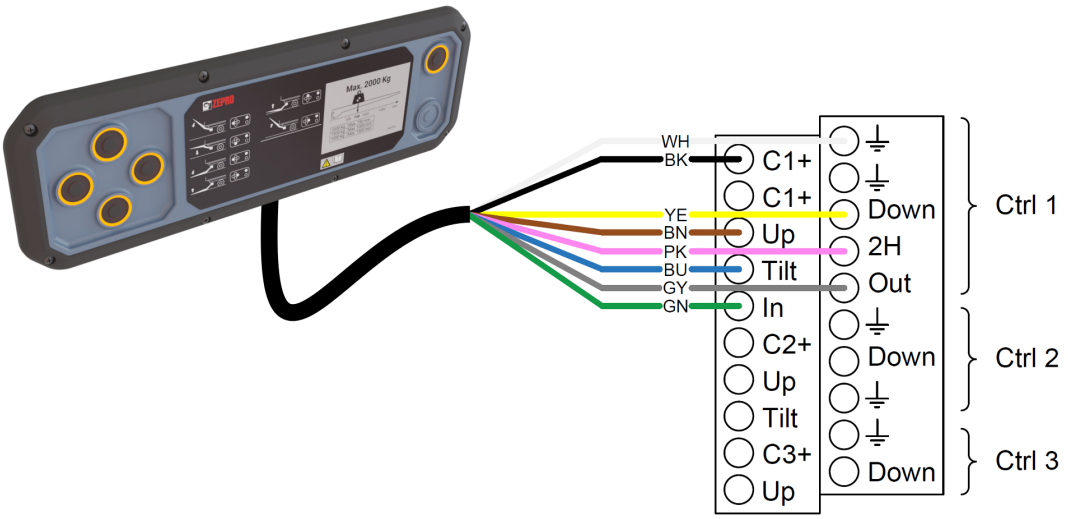


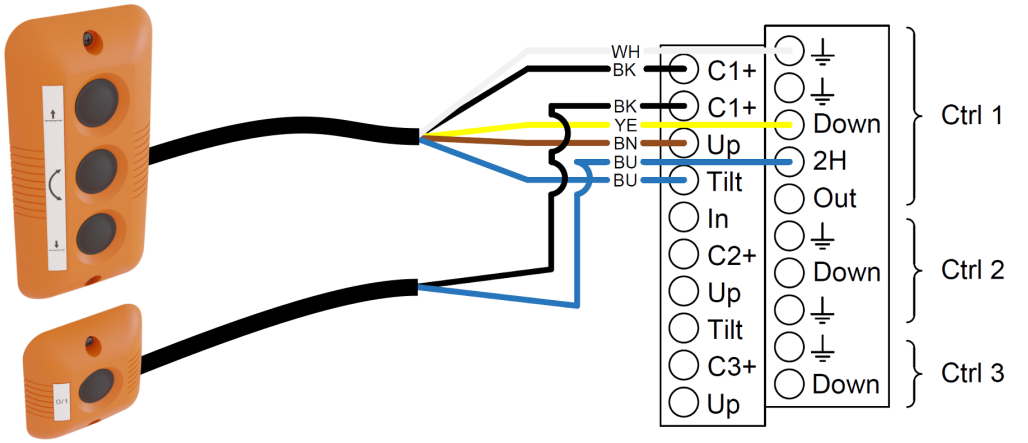
The TLC B1 card can accomodate the sensor types shown in the table below. Different variants of the Z 1500/2000 use different types and number of sensors depending on functionality. See the functional descriptions and schematics chapter for connection information.

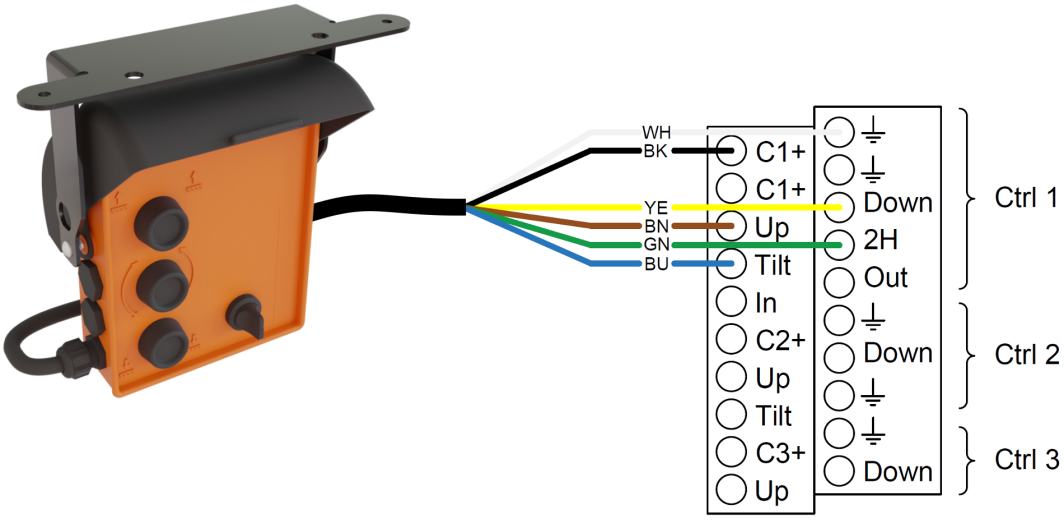
Type	Picture	Explanation
Digital angle sensor		An angle sensor that uses an articulating ball to output an On/Off signal for certain angle ranges. Usually mounted on the platform and used to control the two hand safety requirement.
Digital angle sensor (IFM)		Uses a fluid to measure the angle and outputs an On/Off signal for certain angle values. More accurate than the ball type sensor. Mounted on the platform on tail lifts equipped with digital auto tilt on which it is used to stop the auto tilt up motion of the platform when it reaches horisontal level.
Pressure sensor		Outputs an On/Off signal if the pressure exceeds (rising pressure sensor) or falls below (falling pressure sensor) a predetermined value. It is most often used for the open platform alarm, in which case it is mounted on the positive hydraulic connection to one of the tilt cylinders. It can also be used for the auto tilt function in which case it is mounted on the positive hydraulic connection to one of the lift cylinders.

2.2.5. Control device input

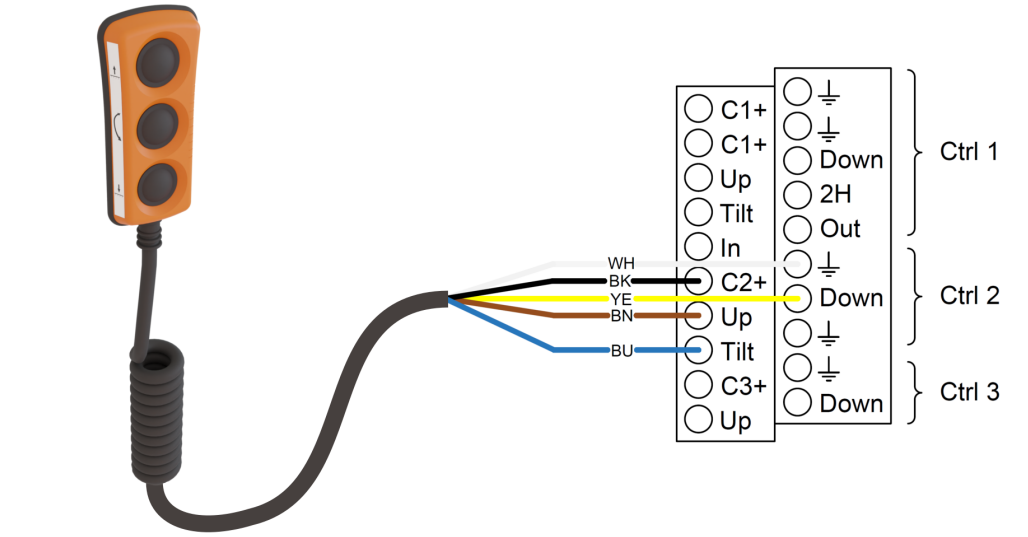
The control devices are connected to the control device input section and powered by the control device power section of the control card. They are used to input user comands into the control card so that they can be interpreted and executed. The control devices can be grouped into two groups depending on their functionality: primary and secondary devices. Primary devices can operate all functions of the tail lift including those that require two-handed operation for safety reasons. Secondary devices do not offer the possibility of two-handed operation and are therefore unable to operate certain functions. The most common primary control devices for the Z 1500/2000 are shown below.

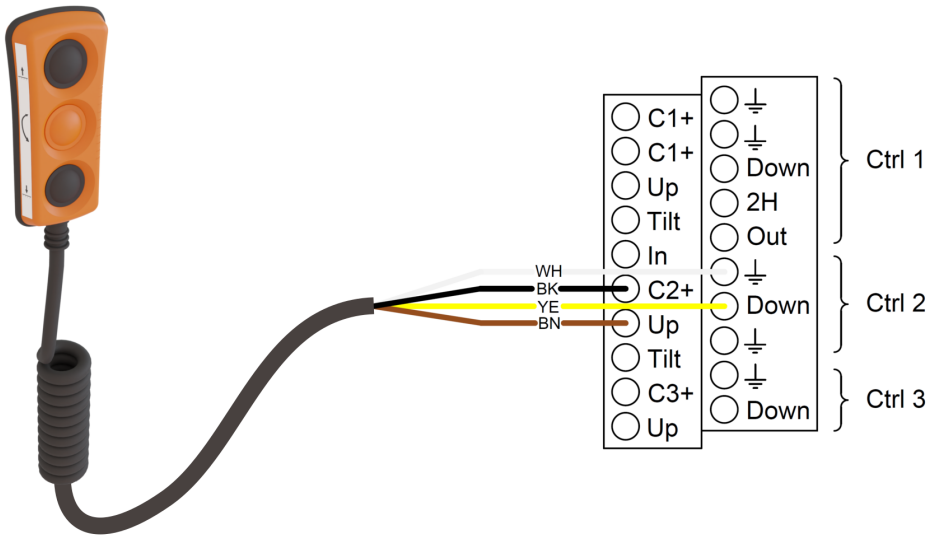


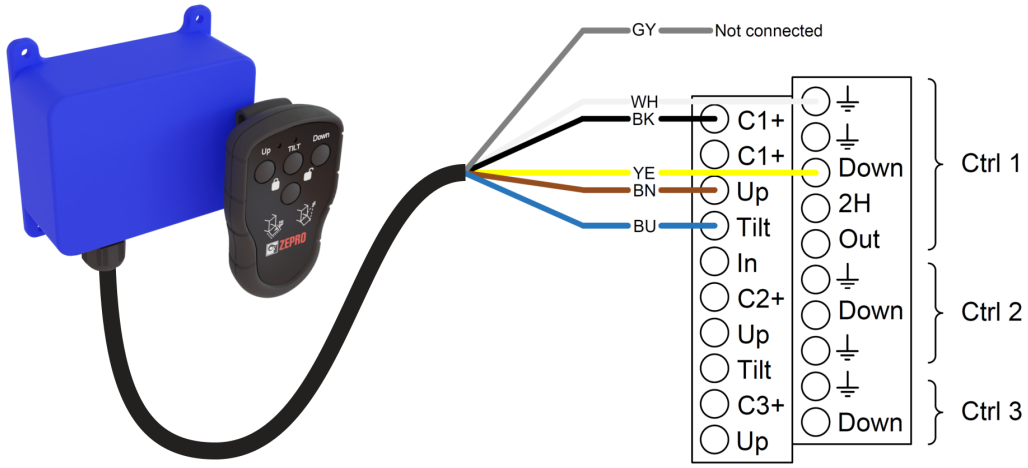




The most common secondary control devices for the Z 1500/2000 are shown below.

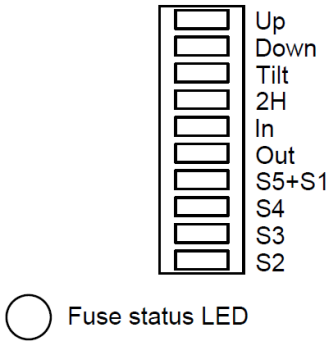






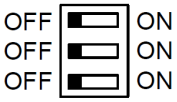
Right next to the control device input block, there is a single LED and a strip with ten LED's. The single LED is the status light for the input fuse. Unlit LED means a short circuit or that the card is switched off. Lit LED means that there is voltage to the ouput section.

The LED strip indicates that the card is receiving a signal from a sensor and/or a control device. Each function has its own dedicated LED on the strip. Sesnors S2 through S4 have their own dedicated LED's as well while S5 and S1 are grouped together into one LED.



2.2.6 Card configuration

The card configuration block is a block with three switches that determines the configuration of the card. For the Z 1500/2000 tail lift family, only the 000 configuration is used which means that all three switches are in their OFF position as shown below.



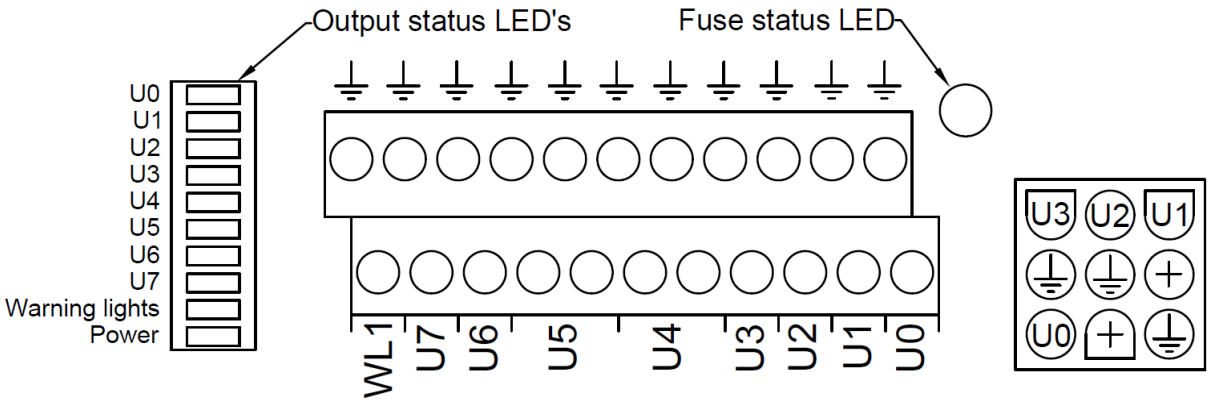
2.2.7 Outputs

The output section is used for power delivery to the solenoid and the coils that control the valves and thereby the motion of the tail lift. The output block consists of 22 pins in total split into 2 rows. The top row consists of 11 ground points used for the coils and the solenoid. Four of these pins are interconnected in two pairs for cases where two coils need the same signal. The bottom row conssists of 11 pins for power delivery to the coils, solenoid and in some cases warning lights.

On the right side of the output block there is a square white quick connector that is sometimes used for output to U0 through U3 instead of the output pins on the output block.

To the right of the output block there is a single LED used for output fuse status indication. It lights up green when there is voltage to outputs. Unlit LED means a short circuit or that the relay card is switched off.

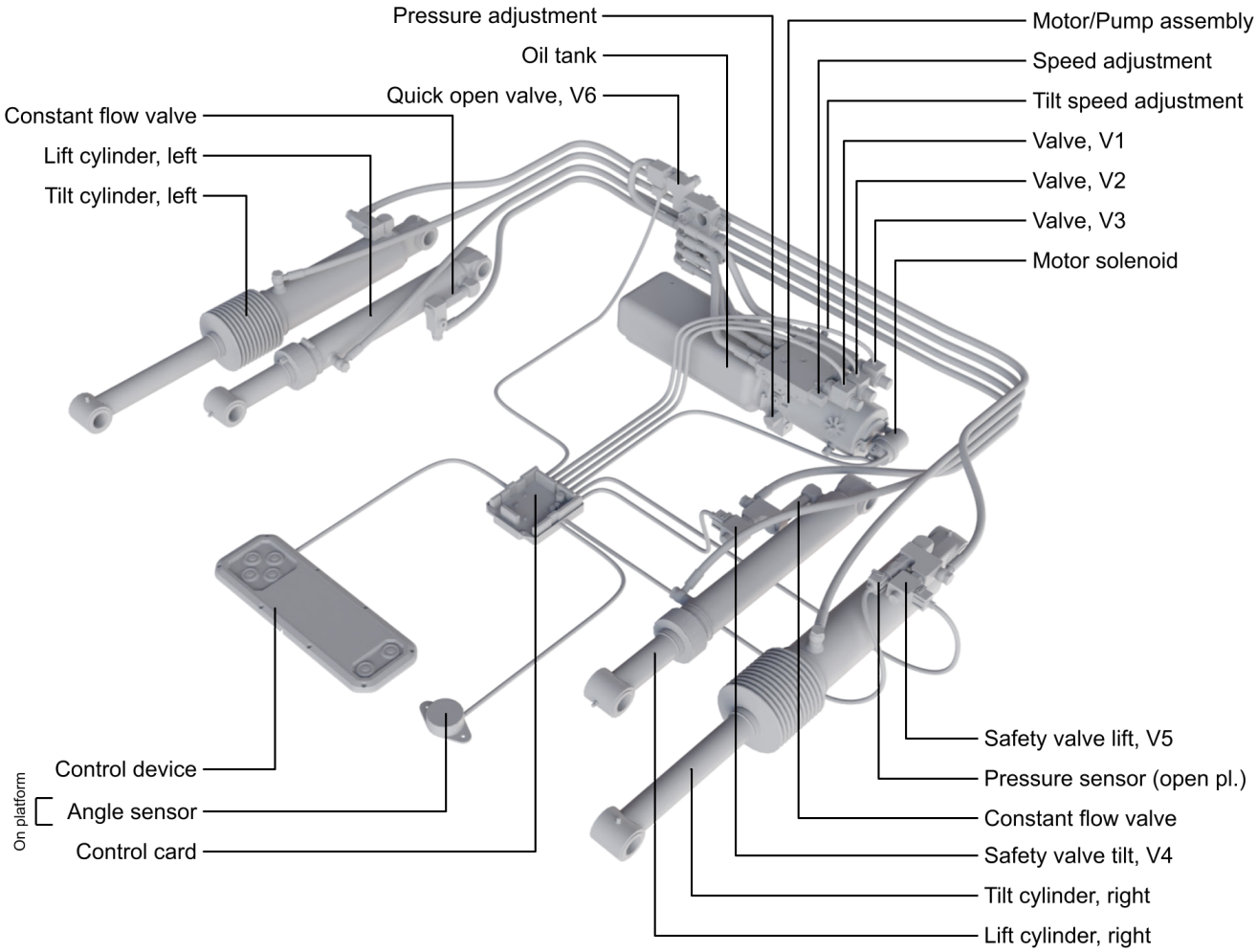
To the left of the output block there is a LED strip with 10 LED's used for active output indication. The bottom LED lights up when the control card is powered. It should stay lit constantly during normal operation. The top 9 LED's are used to indicate active output with each output having its own dedicated LED.



3. Functional descriptions and schematics
3.1. Z 1500/2000 MA

Description

The Z 1500/2000 MA variant is a tail lift with double acting tilt cylinders, single acting lift cylinders and no auto tilt functionality. It is equipped with a quick opening valve that increases the opening speed of the platform when certain conditions are met.



Sensors used:

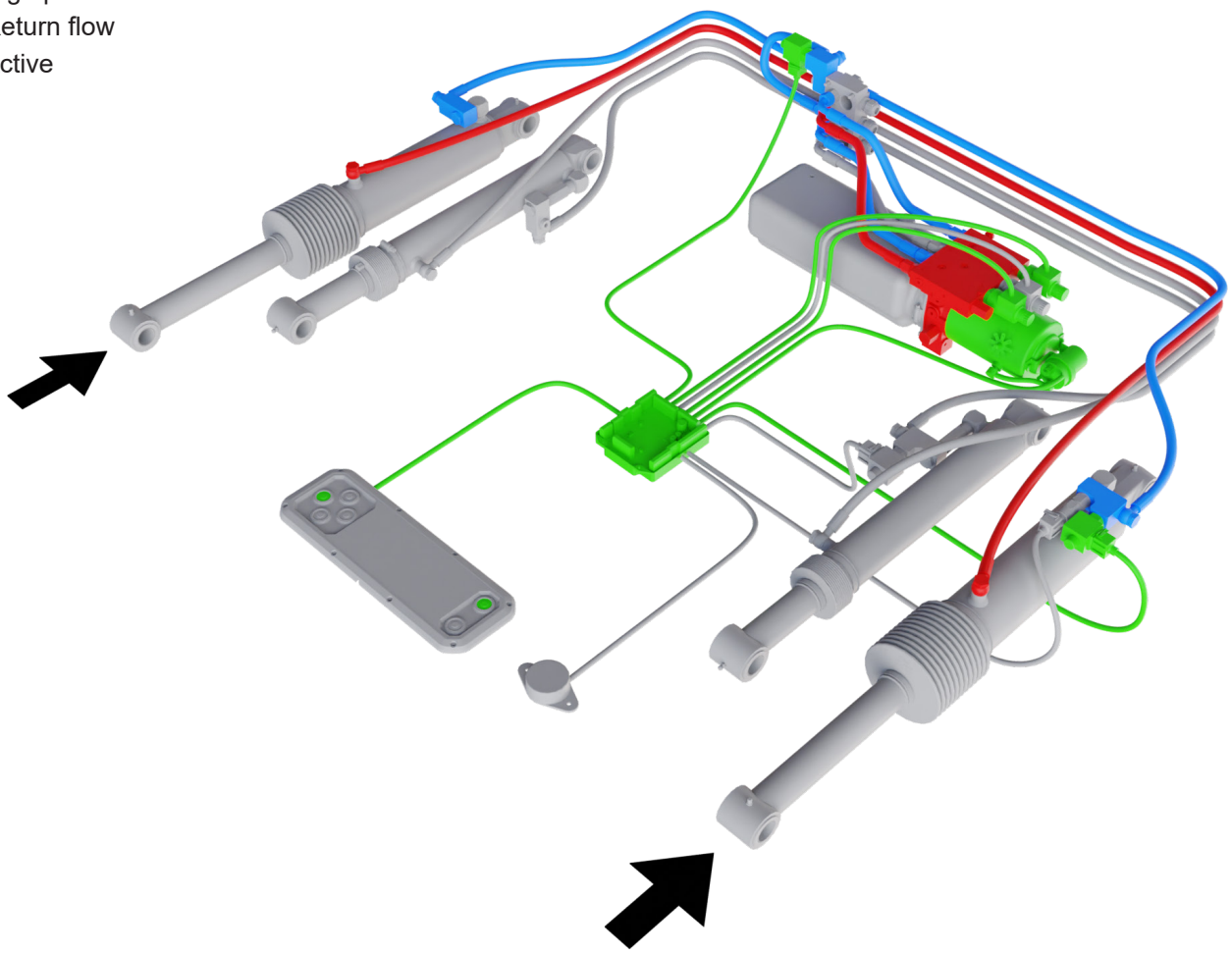
Angle sensor located on the platform used for the safety requirement for two hand operation when opening and closing against the boxy body. The sensor is inactive when the platform angle is within 45 degrees from vertical and within this range the two hand control is required. If the platform is closer to horizontal, the sensor is active and the requirement is removed. This sensor is connected to Di3 on ZePRO1 and to S3 on TLC B1.

Pressure sensor located on the positive hydraulic feed to the tilt cylinder used to activate the open platform alarm. The sensor is active when the pressure drops below 60 bar which enables the Pa+ and Pa- pins on cabin switch section of the control card. This sensor is connected to Di4 on the ZePRO1 card and to S4 on the TLC B1 card.

Function: quick open

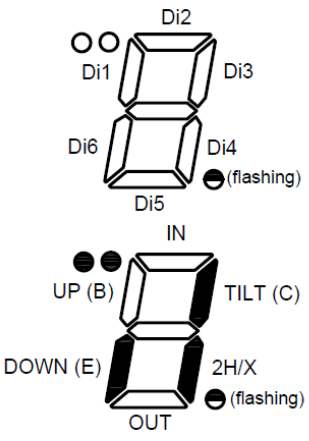
Description: Platform opening from fully closed against box body to horizontal.
Control input: Down + Tilt + 2H. Available on primary control devices only.
Sensor input: None required for function. Angle sensor must be inactive at start of motion.

High pressure
Return flow
Active

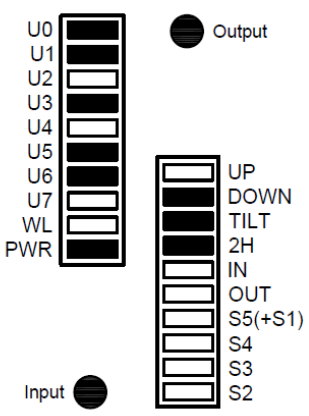


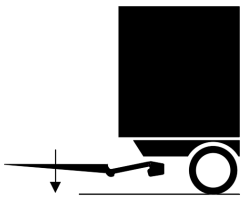
Card indication

ZePRO1



TLC B1

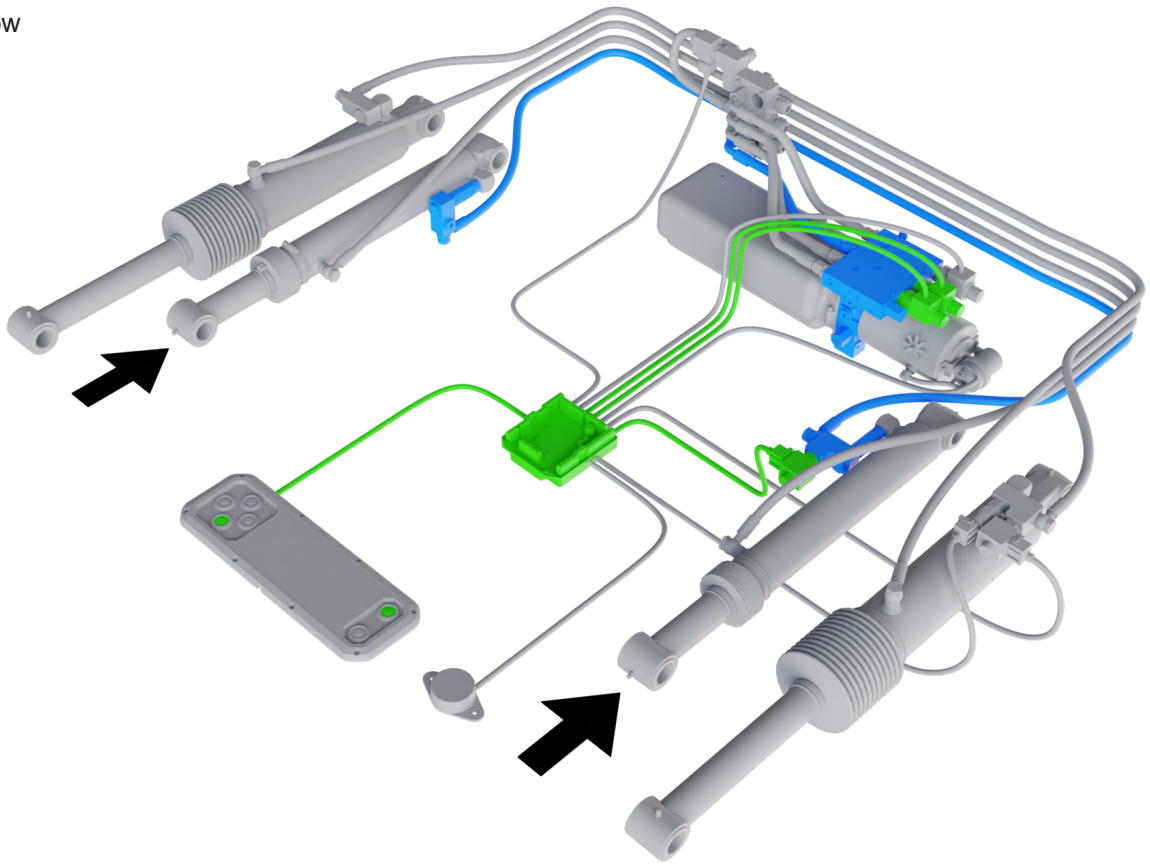




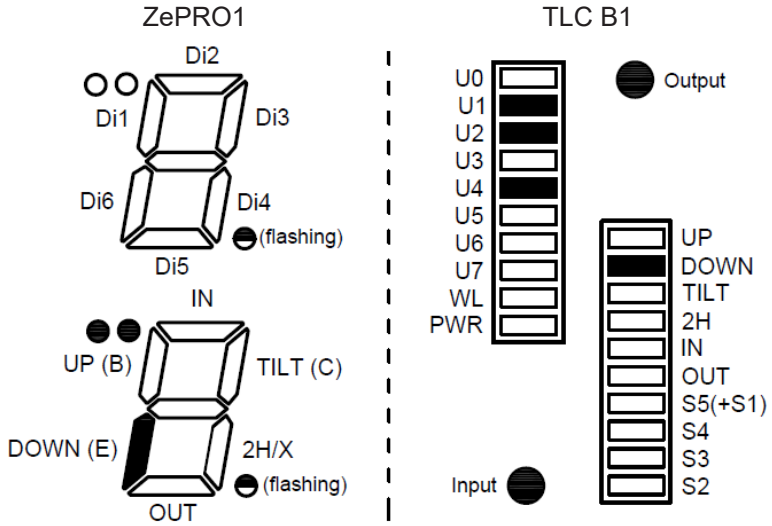
Function: lower

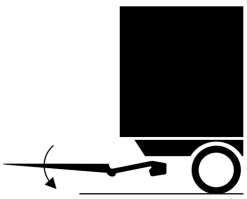
Description: Vertical platform lowering.
Control input: Down. Available on all control devices.
Sensor input: None required for function.

High pressure
Return flow
Active



Card indication

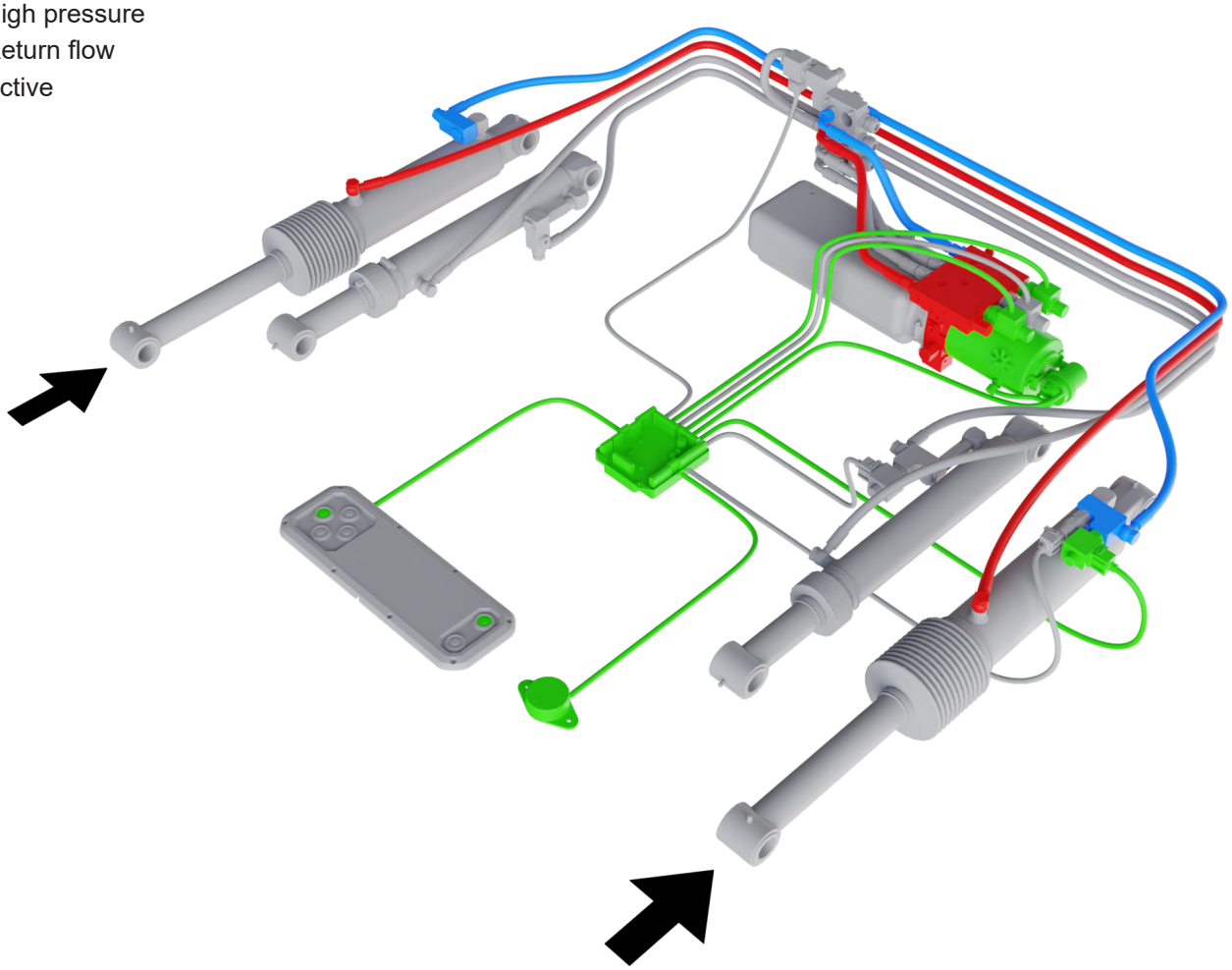




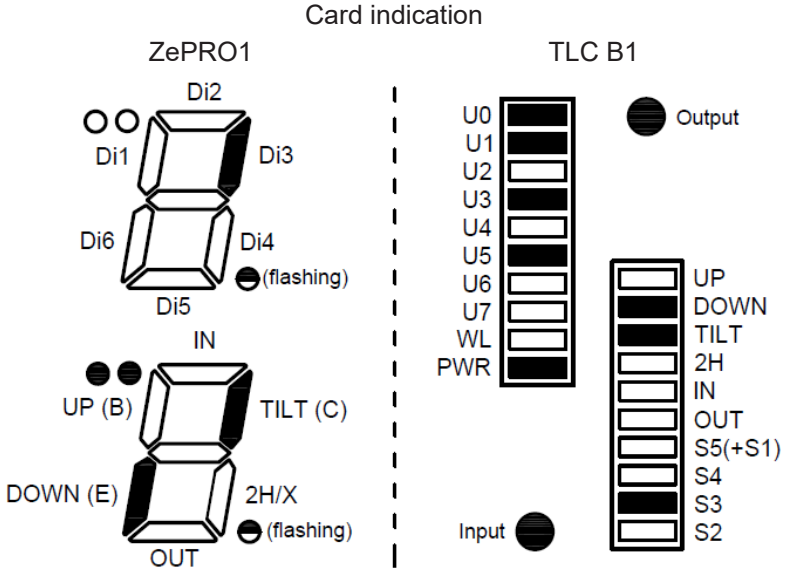
Function: tilt down

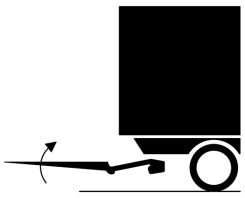
Description: Tilting down within +45/-10 degrees from horizontal.
Control input: Down + Tilt. Available on all control devices.
Sensor input: Active angle sensor on platform.

High pressure
Return flow
Active



Card indication

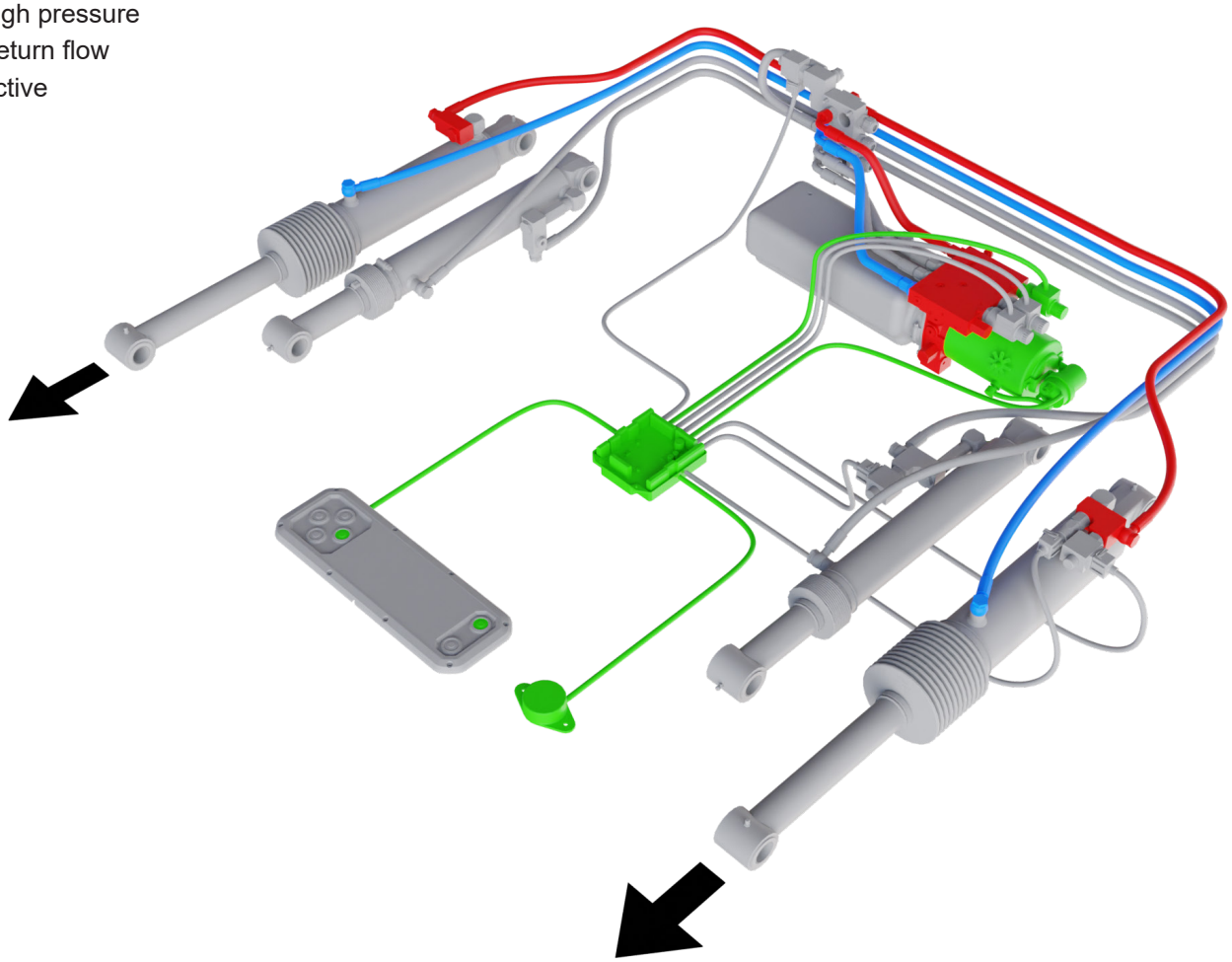




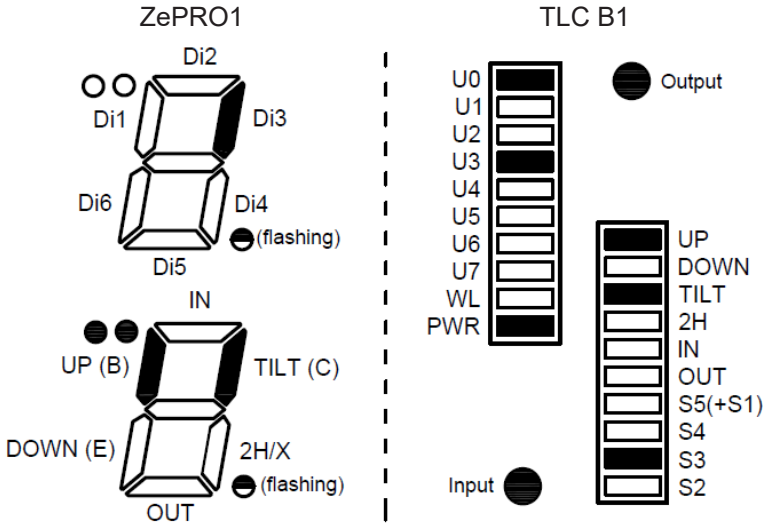
Function: tilt up

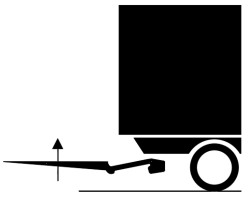
Description: Tilting up within +45/-10 degrees from horizontal.
Control input: Up + Tilt. Available on all control devices.
Sensor input: Active angle sensor on platform.

High pressure
Return flow
Active



Card indication

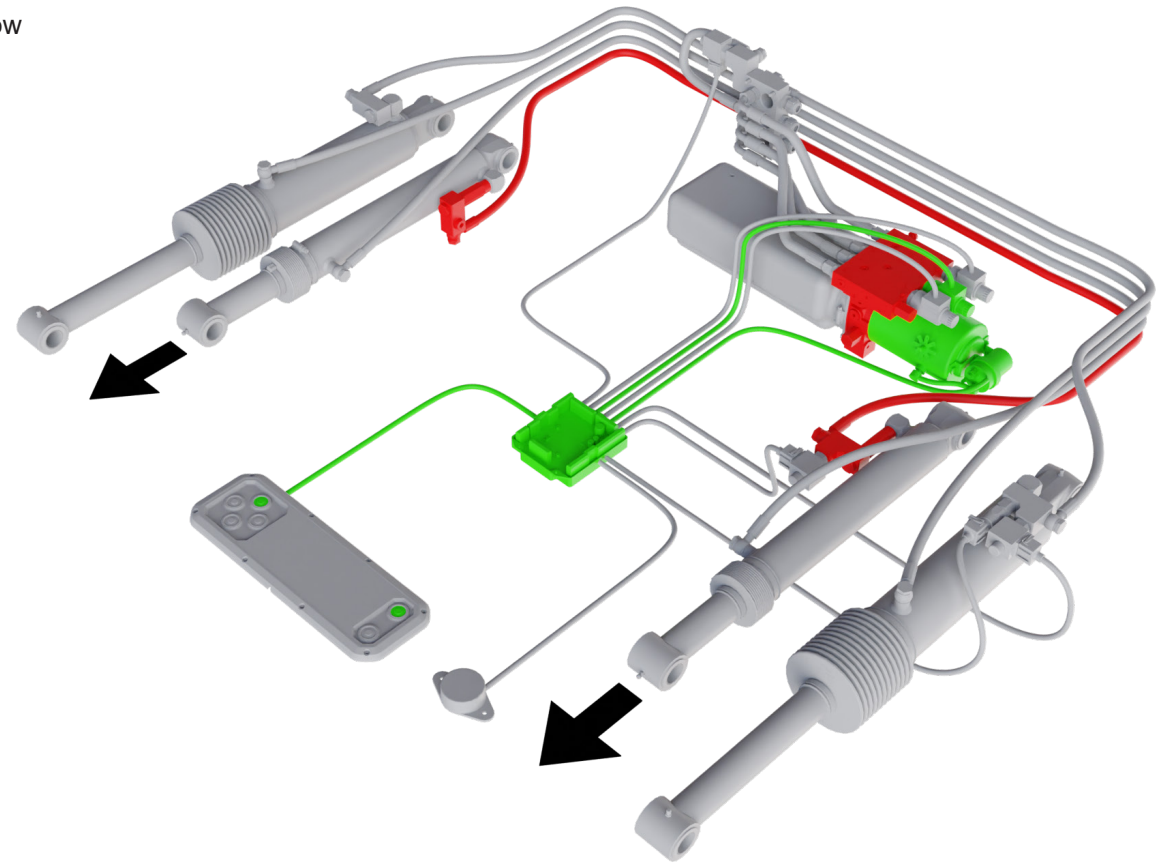




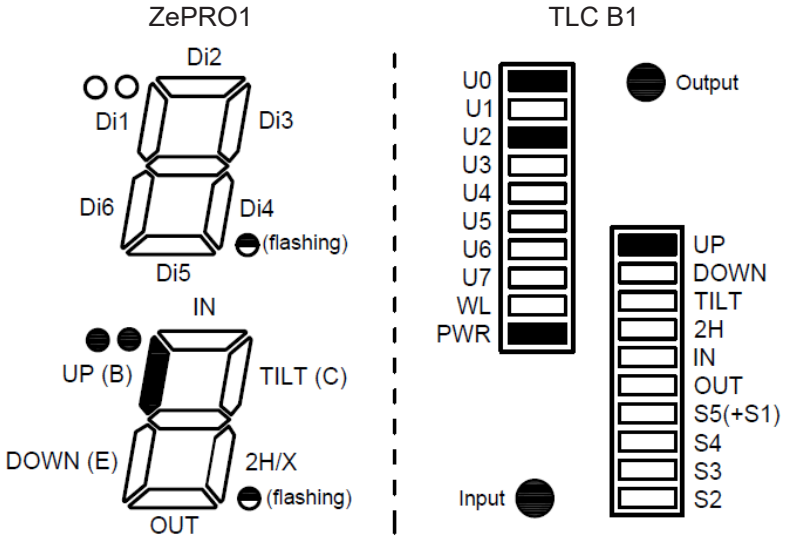
Function: raise

Description: Vertical platform raising.
Control input: Up. Available on all control devices.
Sensor input: None required for function.

High pressure
Return flow
Active



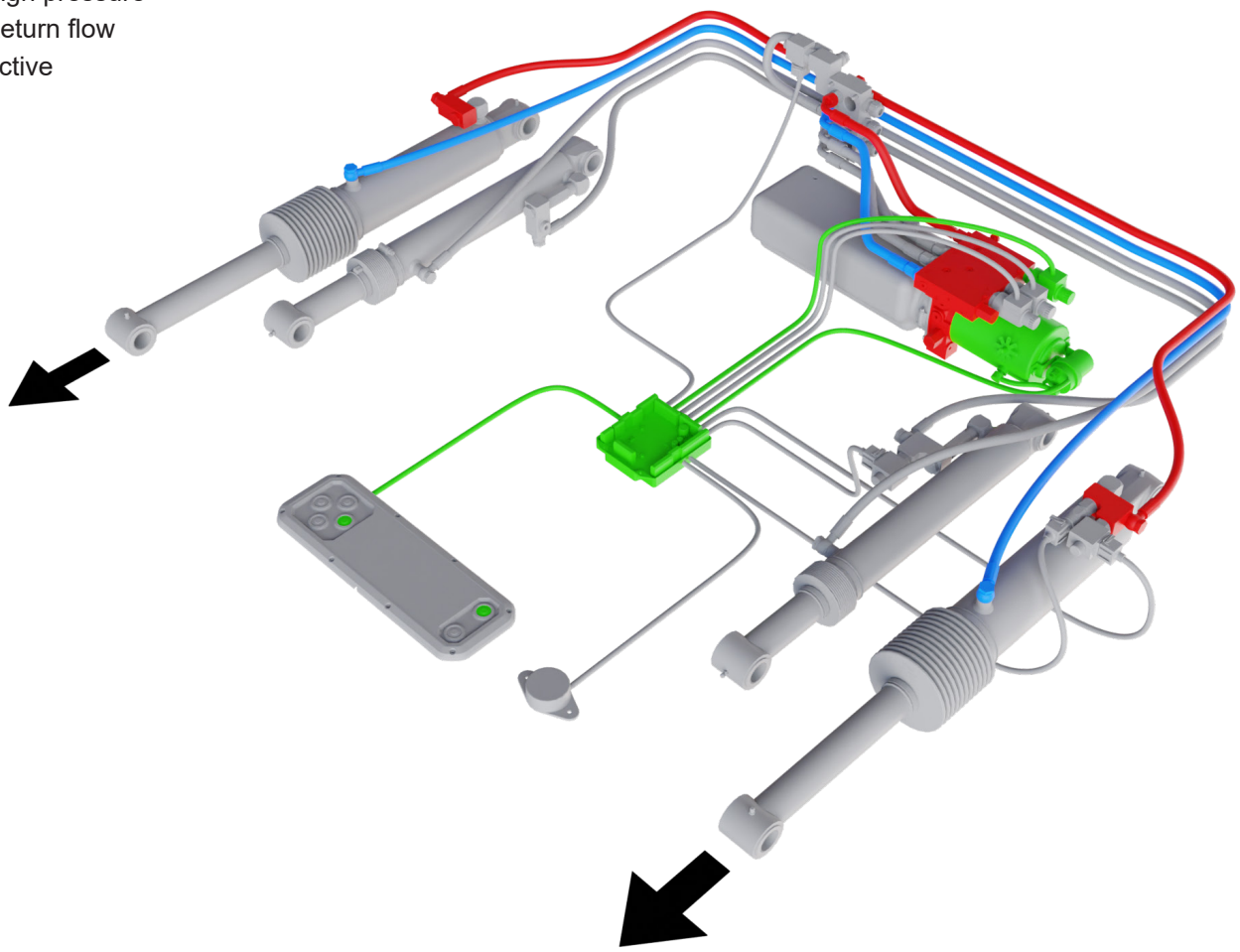
Card indication



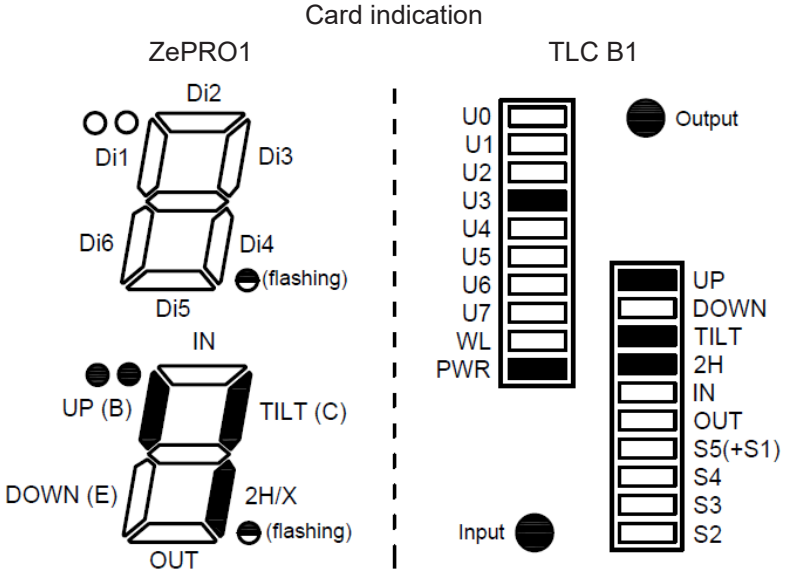
Function: close

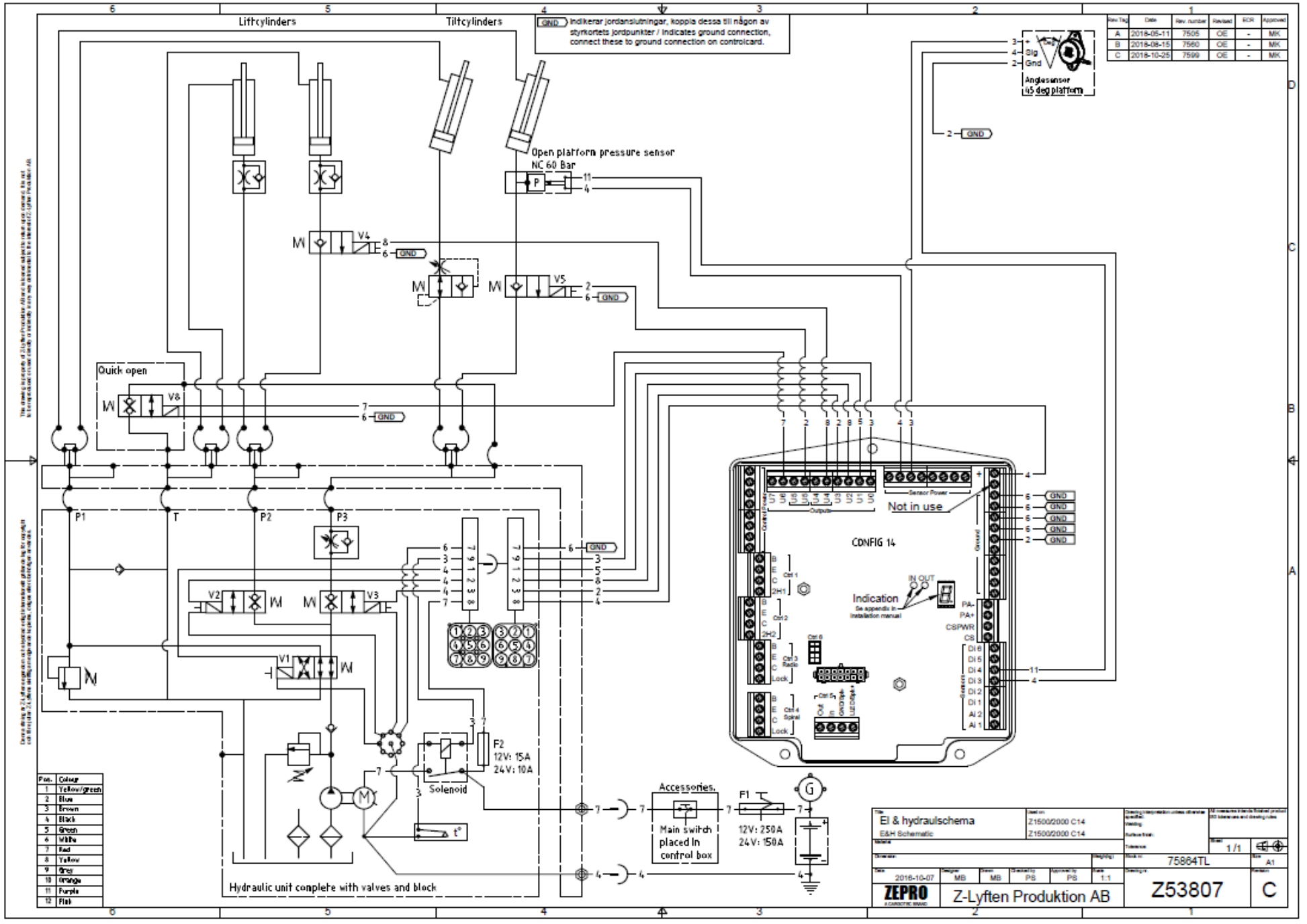
Description: Closing fully against the box body.
Control input: Up + Tilt + 2H. Available on primary control devices only.
Sensor input: None required for function.

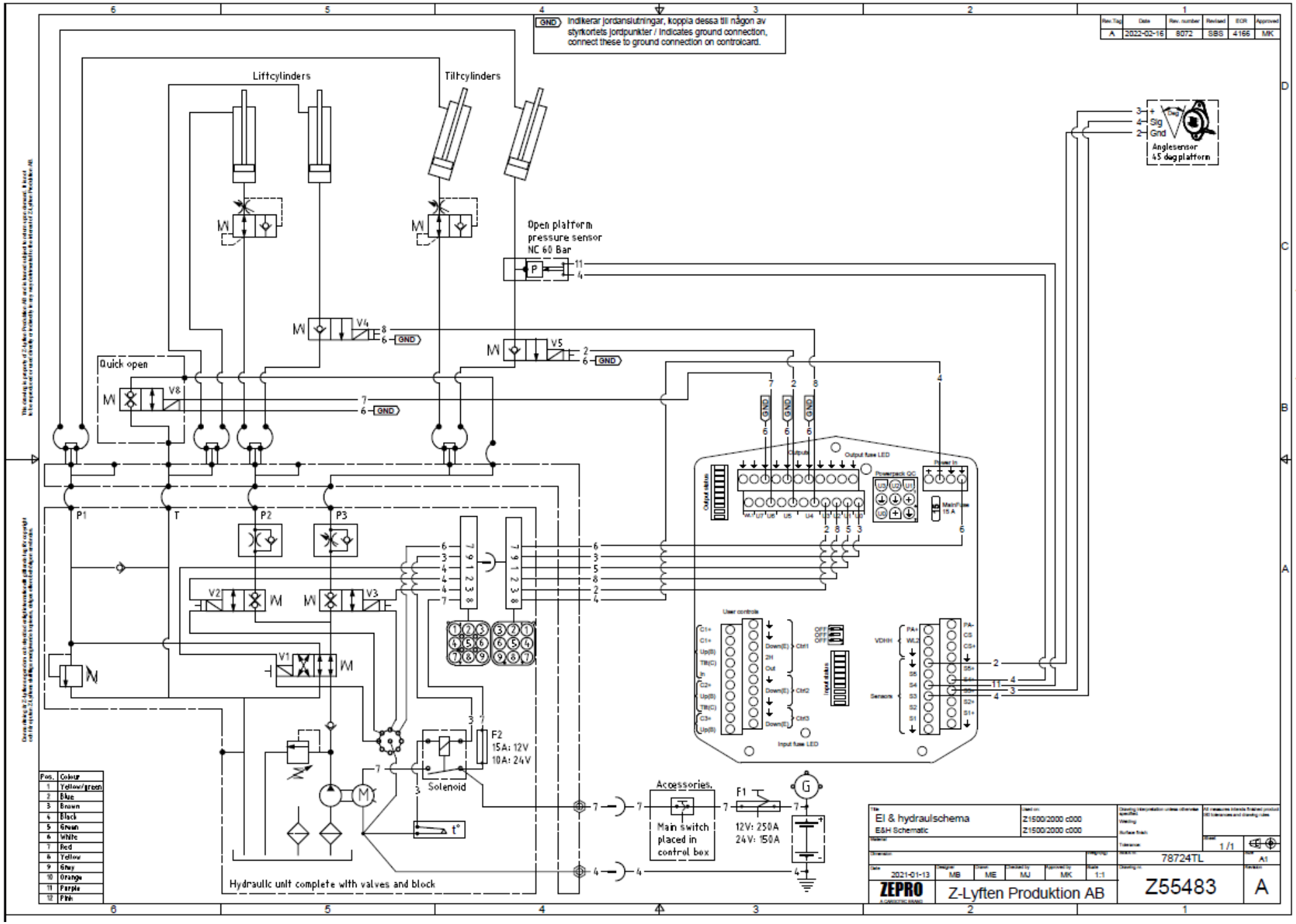
High pressure
Return flow
Active



Card indication



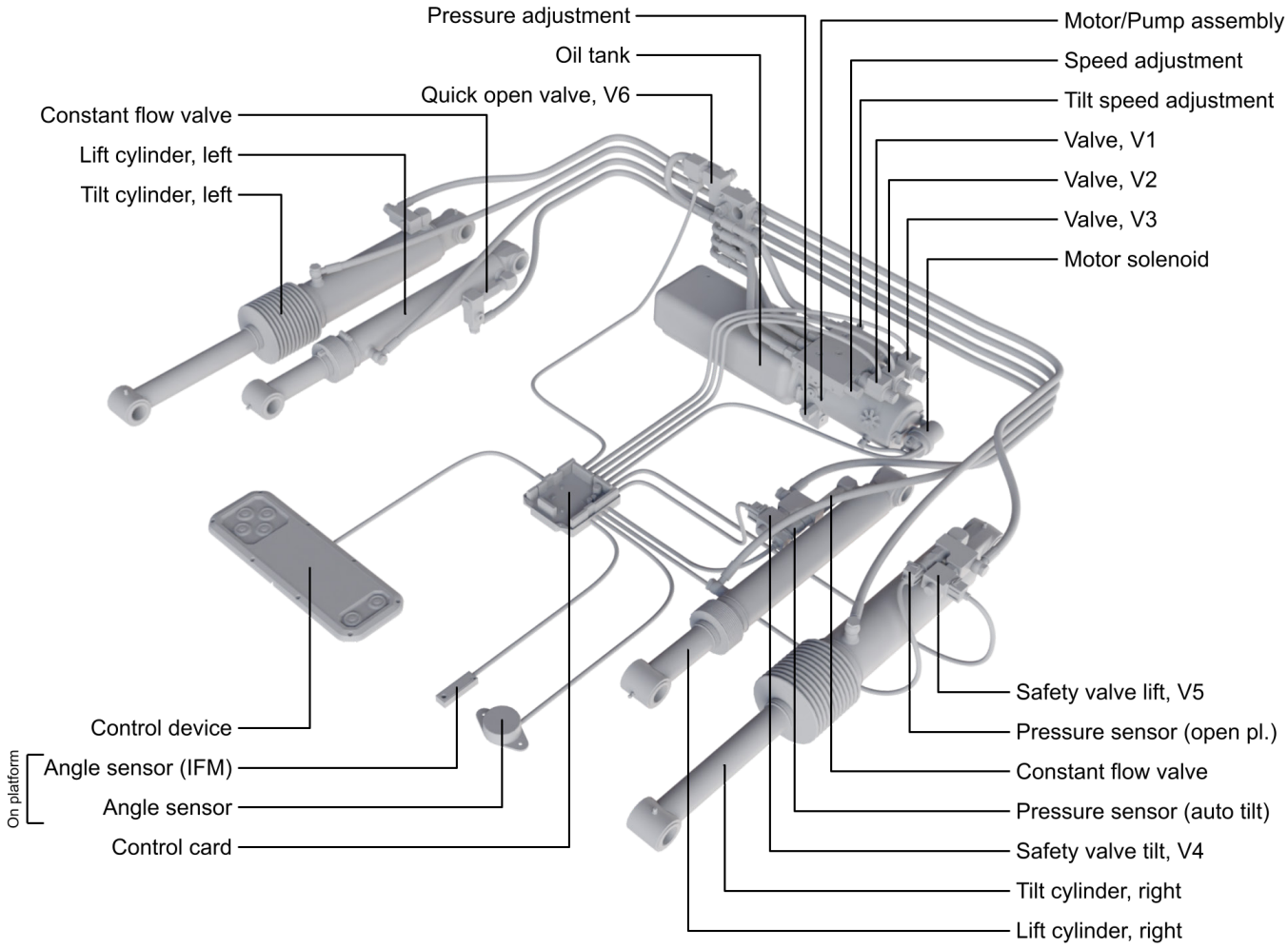

Liftcylinders
Tiltcylinders
GND Indikerar jordanslutningar, koppla dessa till någon av styrkortets jordpunkter / Indicates ground connection, connect these to ground connection on controlcard.
Open platform pressure sensor
NC 60 Bar
Anglesensor 45 deg platform
Quick open
V1
V2
V3
V4
V5
V8
P1
T
P2
P3
F2
12V: 15A
24V: 10A
Solenoid
Accessories.
Main switch placed in control box
F1
12V: 250A
24V: 150A
Hydraulic unit complete with valves and block
CONFIG 14
Not in use
Indication
See appendix in installation manual
Pos. Colour
1 Yellow/green
2 Blue
3 Brown
4 Black
5 Green
6 White
7 Red
8 Yellow
9 Grey
10 Orange
11 Purple
12 Pink
El & hydraulschema
E&H Schematic
Z1500/2000 C14
Z1500/2000 C14
75864TL
2016-10-07
MB
MB
PS
PS
1:1
A1
1/1
ZEPRO
Z-Lyften Produktion AB
Z53807
C


GND Indikerar jordanslutningar, koppla dessa till någon av styrkortets jordpunkter / Indicates ground connection, connect these to ground connection on controlcard.
Liftcylinders
Tiltcylinders
Open platform pressure sensor NC 60 Bar
Quick open
V1
V2
V3
V4
V5
V8
P1
T
P2
P3
F2 15A: 12V 10A: 24V
Solenoid
Accessories.
Main switch placed in control box
F1
12V: 250A 24V: 150A
Hydraulic unit complete with valves and block
Anglesensor 45 deg platform
Sig
Gnd
Output fuse LED
Input fuse LED
Main Fuse 15 A
Pos. Colour
1 Yellow/green
2 Blue
3 Brown
4 Black
5 Green
6 White
7 Red
8 Yellow
9 Grey
10 Orange
11 Purple
12 Pink
El & hydraulschema
E&H Schematic
Z1500/2000 c000
Z1500/2000 c000
78724TL
2021-01-13
MB
ME
MJ
MK
1:1
ZEPRO
Z-Lyften Produktion AB
Z55483
A

3.2. Z 1500/2000 MA with digital auto tilt

Description

The Z 1500/2000 MA with electronic auto tilt is a variant with double acting tilt cylinders and single acting lift cylinders. It is equipped with a quick opening valve that increases the opening speed of the platform when certain conditions are met. It is also equipped with digital auto tilt functionality with adjustable auto tilt angle that is adjusted by physically changing the angle on the IFM sensor.



Sensors used:

Angle sensor located on the platform used for the safety requirement for two hand operation when opening and closing against the boxy body. The sensor is inactive when the platform angle is within 45 degrees from vertical and within this range the two hand control is required. If the platform is closer to horizontal, the sensor is active and the requirement is removed. This sensor is connected to Di3 on ZePRO1 and to S3 on TLC B1.

Pressure sensor located on the positive hydraulic feed to the tilt cylinder used to activate the open platform alarm. The sensor is active when the pressure drops below 60 bar which enables the Pa+ and Pa- pins on cabin switch section of the control card. This sensor is connected to Di4 on the ZePRO1 card and to S4 on the TLC B1 card.

IFM-type angle sensor located on the platform used to control the auto tilt functionality. The sensor is activated when the platform is tilted down from horisontal and remains active until the platform is tilted back to horizontal. This sensor is connected to Di2 on ZePRO1 and to S2 on TLC B1.

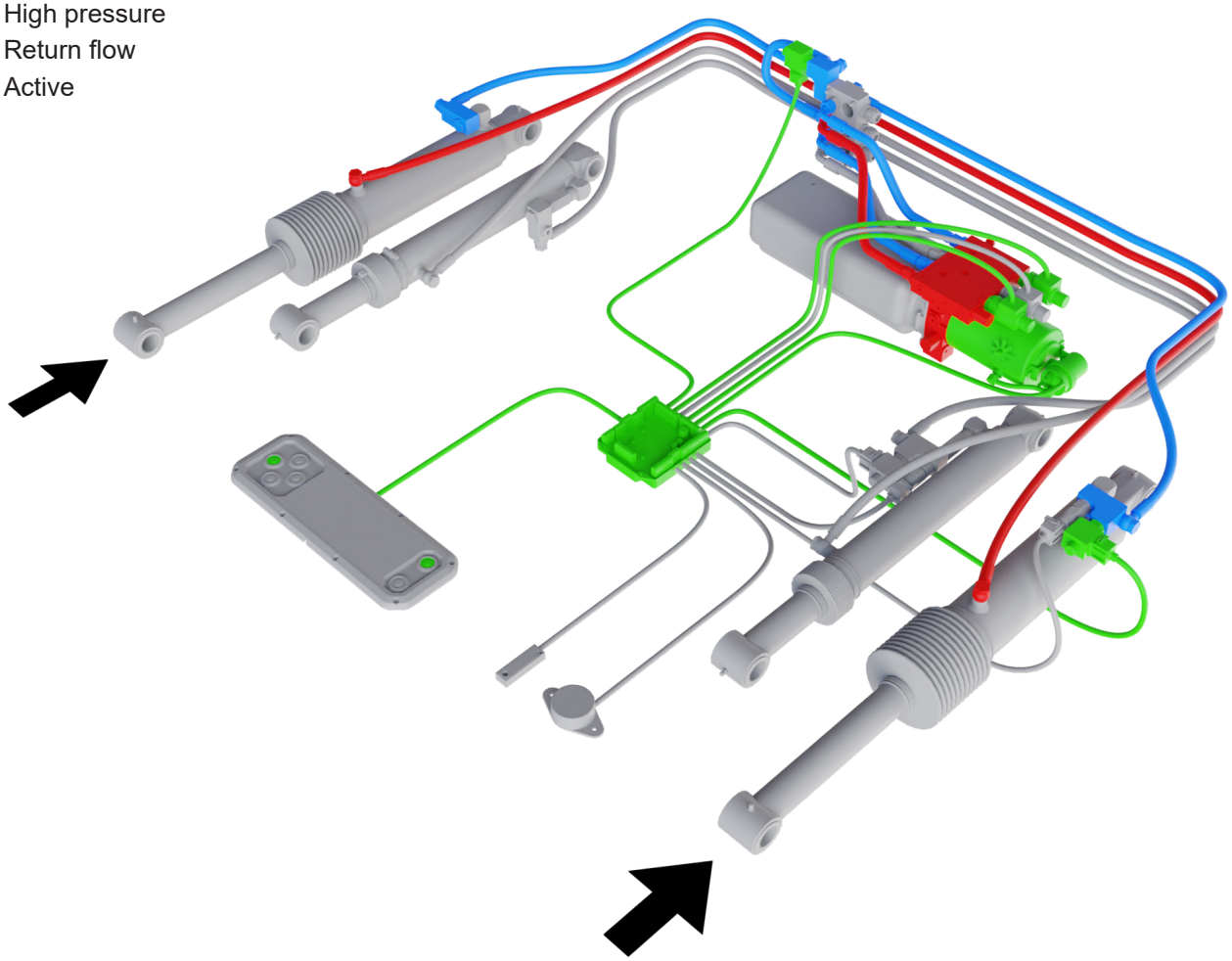
Pressure sensor located on the positive hydraulic feed to the lift cylinder. The sensor is used to sense when the platform reaches the ground level at which point the auto tilt down function is activated. The sensor is activated when the pressure in the hydraulic line drops below 2,5 bar. This sensor is connected to Di5 on ZePRO1 and to S5 on TLC B1

For proper auto tilt function, the Di1 is bridgded to sensor power on ZePRO1. On TLC B1, S3 is bridged to S3+.

Function: quick open

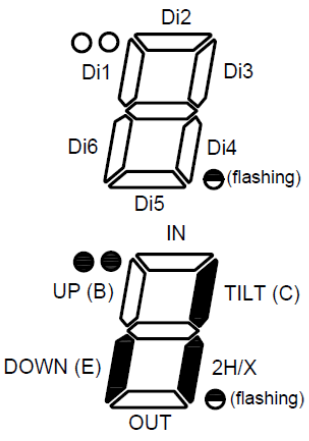
Description: Platform opening from fully closed against box body to horizontal.
Control input: Down + Tilt + 2H. Available on primary control devices only.
Sensor input: None required for function. Angle sensor must be inactive at start of motion.

High pressure
Return flow
Active

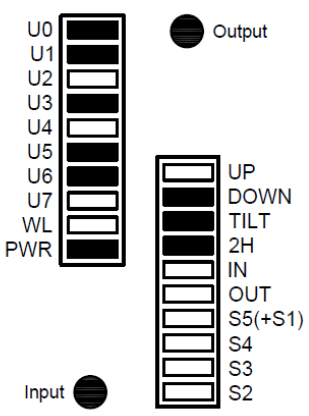


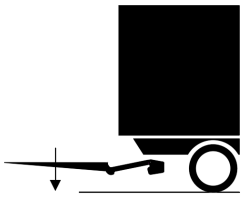
Card indication

ZePRO1



TLC B1

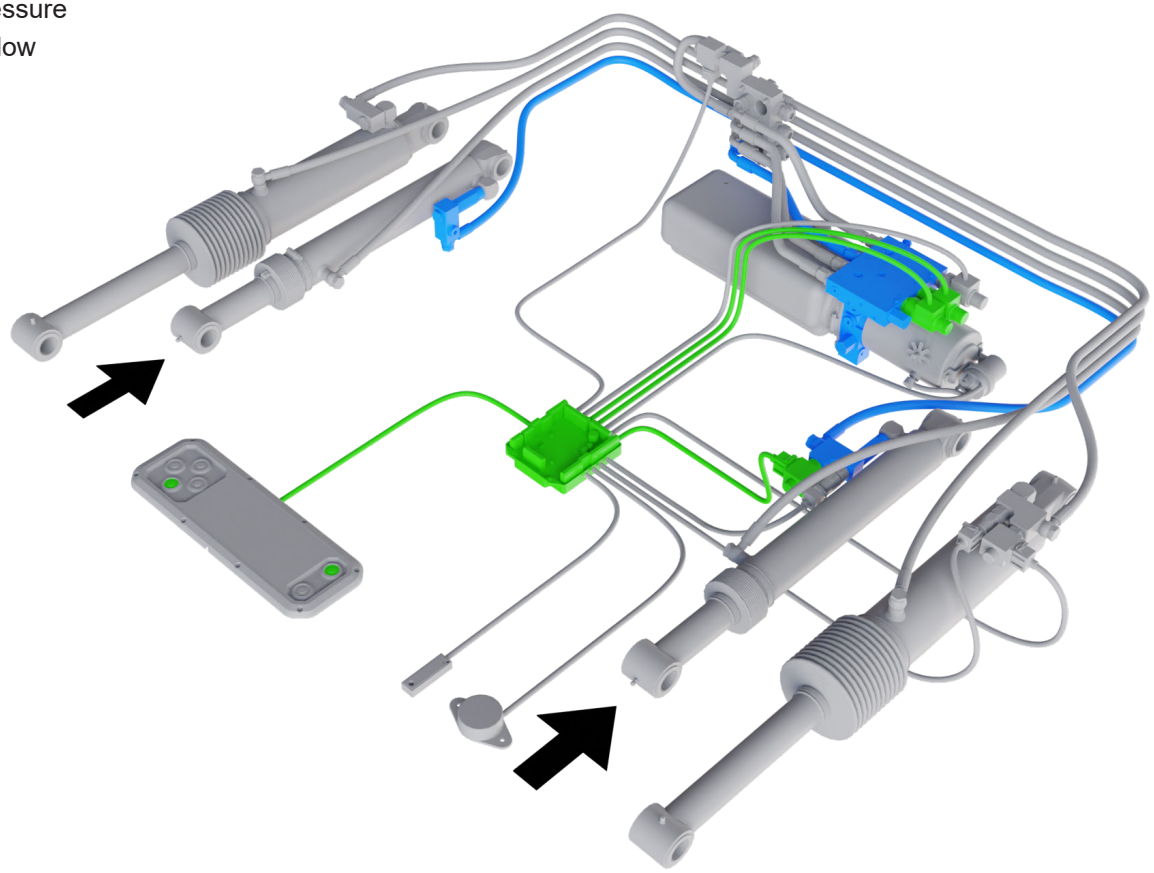




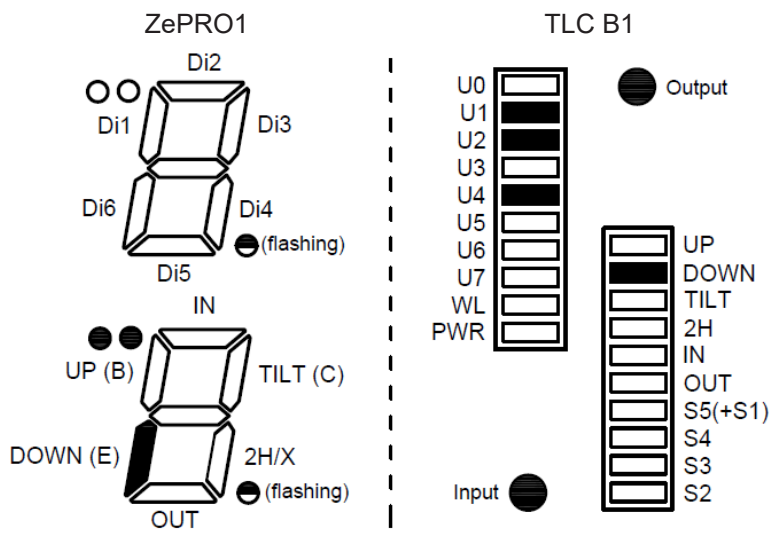
Function: lower

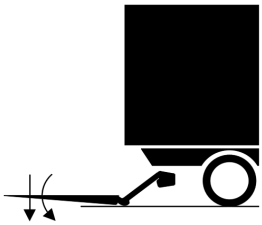
Description: Vertical platform lowering.
Control input: Down. Available on all control devices.
Sensor input: None required for function.

High pressure
Return flow
Active



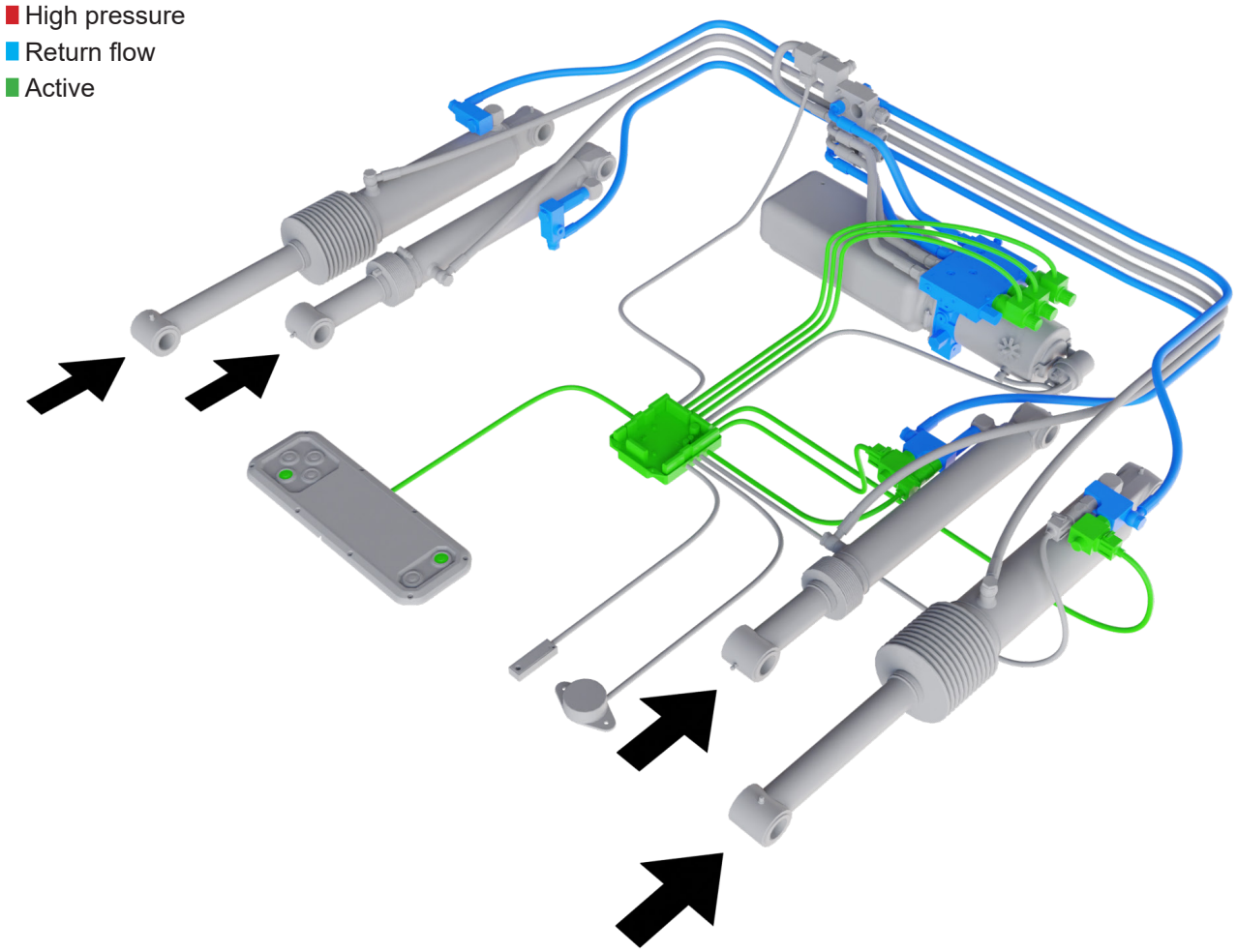
Card indication



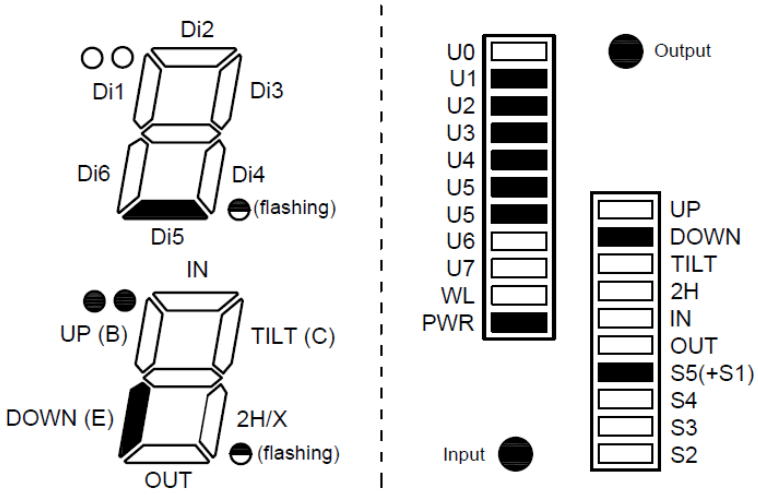


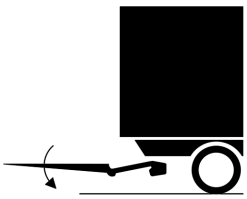
Function: auto tilt down

Description: Automatic down tilting of the platform once ground level has been reached.
Control input: Down. Available on all control devices.
Sensor input: Active pressure sensor on lift cylinder.



Card indication

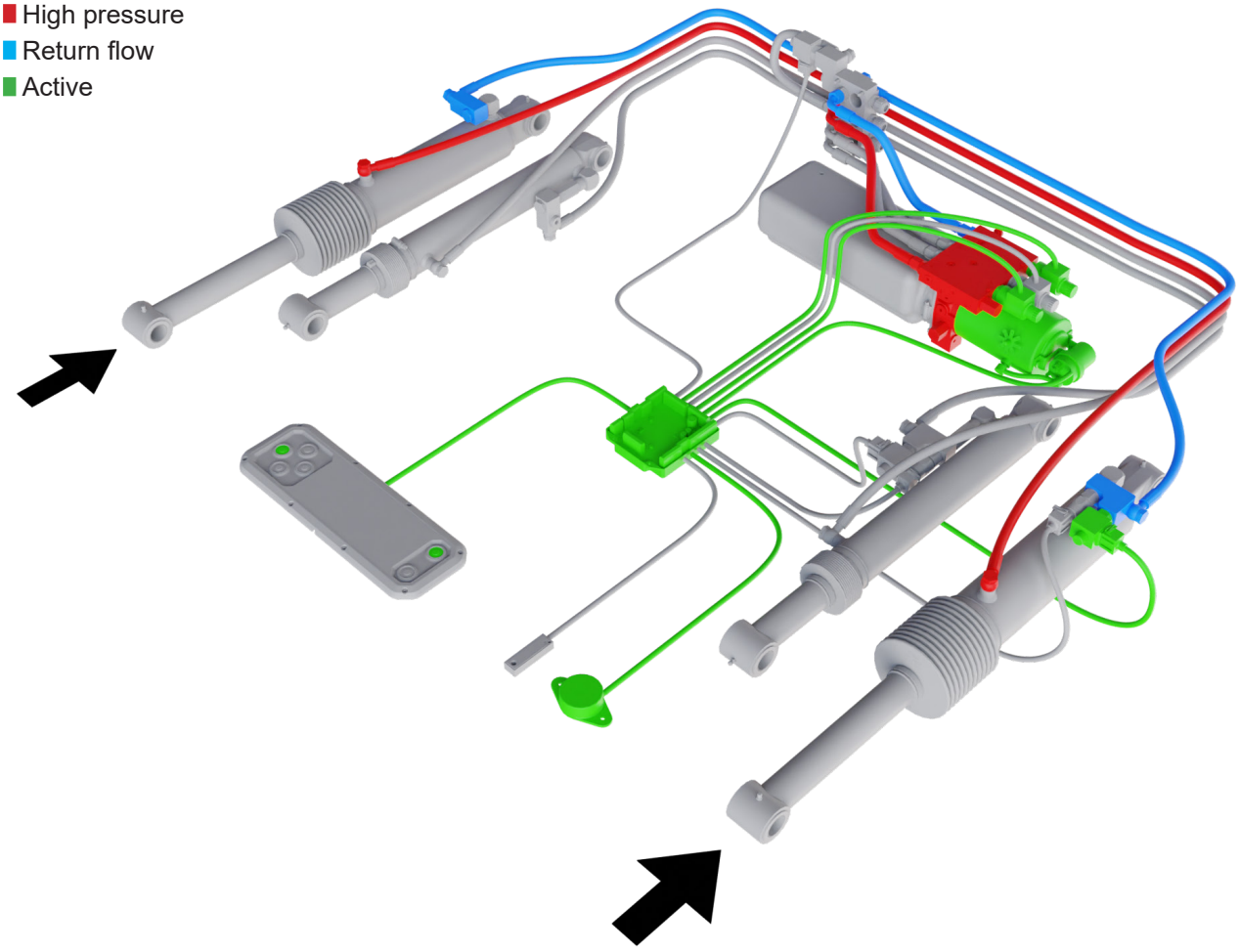




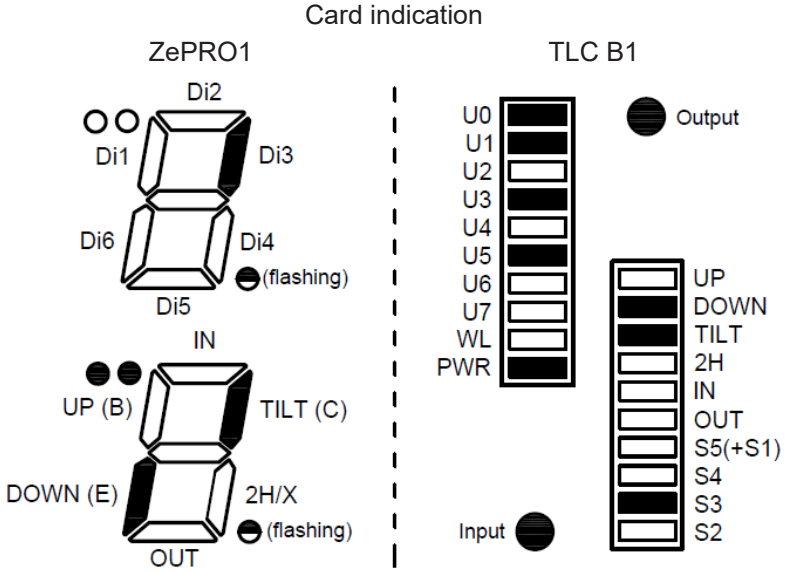
Function: manual tilt down

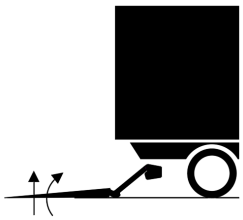
Description: Tilting down within +45/-10 degrees from horizontal.
Control input: Tilt + Down + 2H button on all control devices.
Sensor input: Active angle sensor on platform.

High pressure
Return flow
Active



Card indication

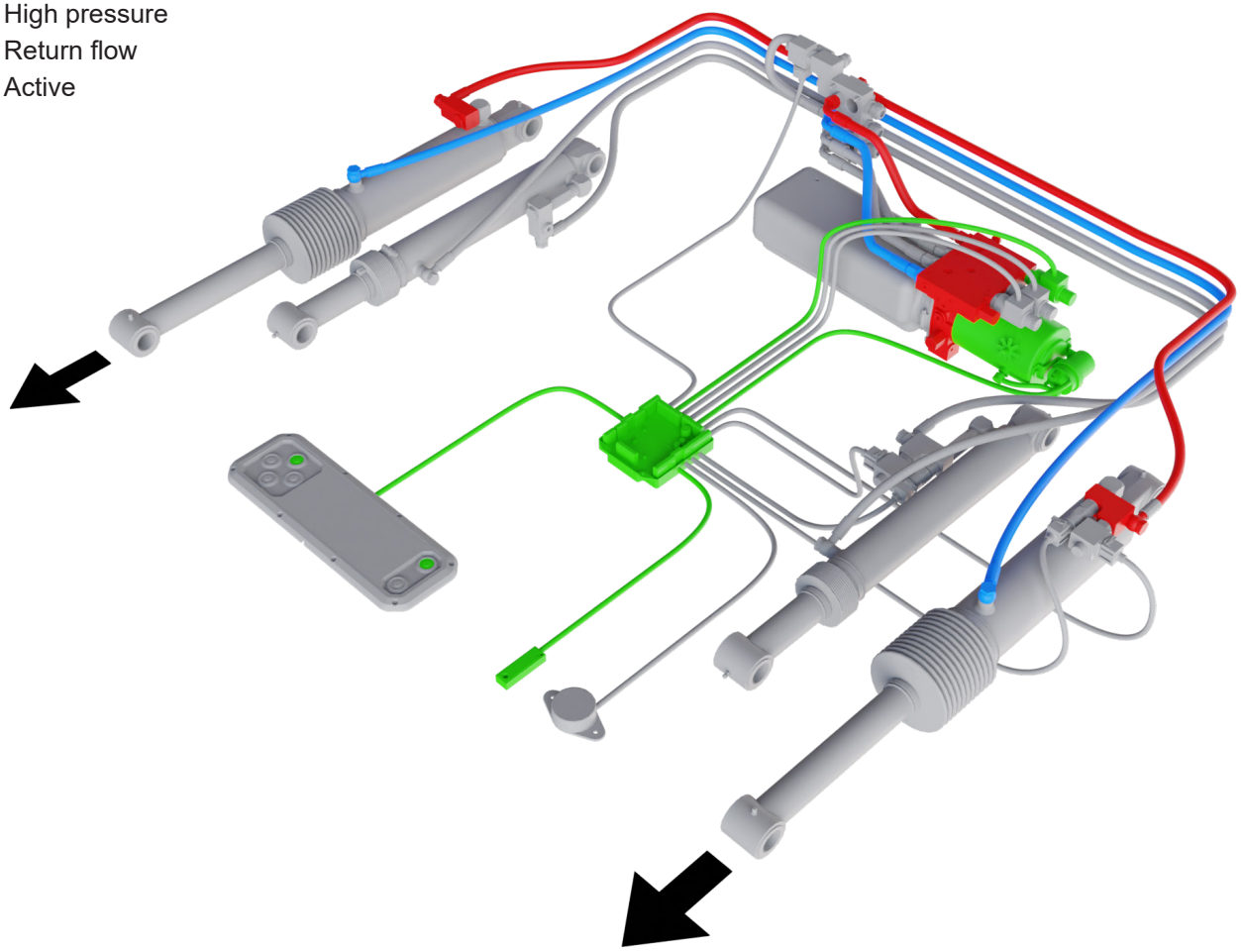




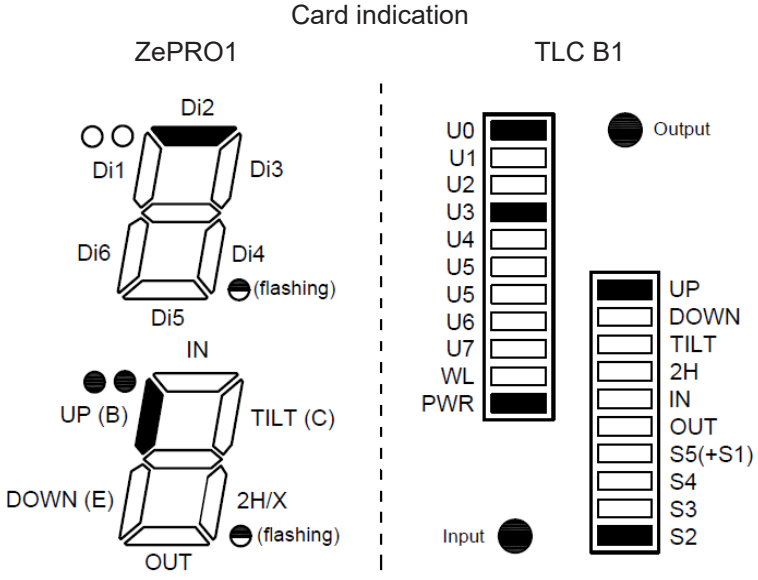
Function: auto tilt up

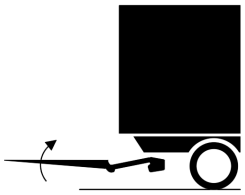
Description: Automatic up tilting of the platform untill it is tilted back to horizontal.
Control input: Up. Available on all control devices.
Sensor input: Active IFM type angle sensor on platform.

High pressure
Return flow
Active



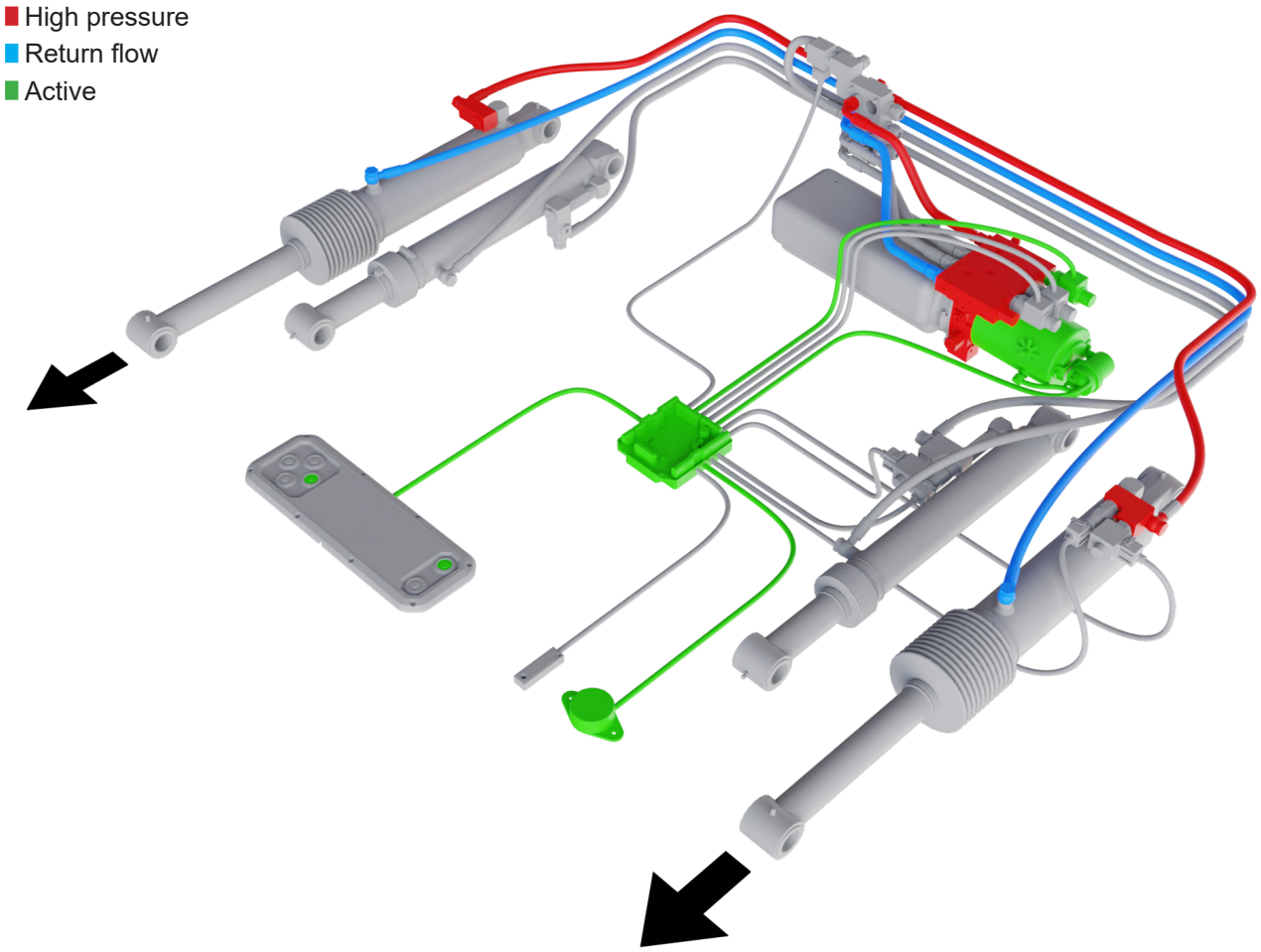
Card indication



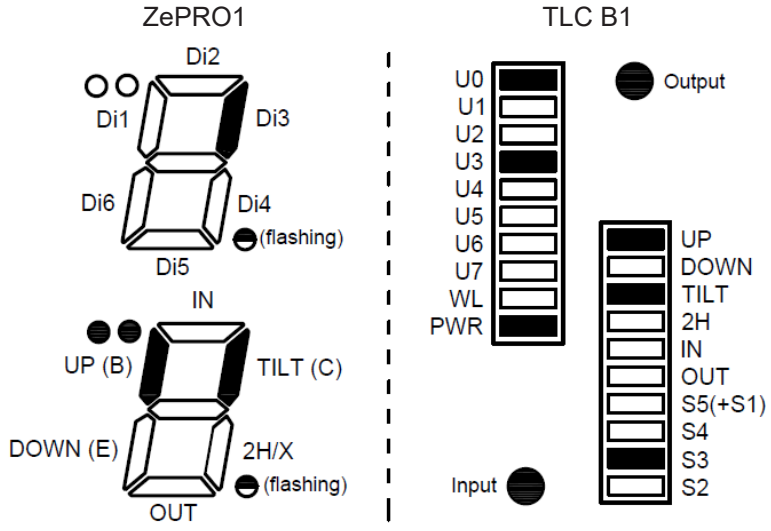


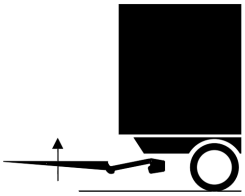
Function: manual tilt up

Description: Tilting up within +45/-10 degrees from horizontal.
Control input: Tilt + Up on any of the connected control devices.
Sensor input: Active angle sensor on platform.



Card indication

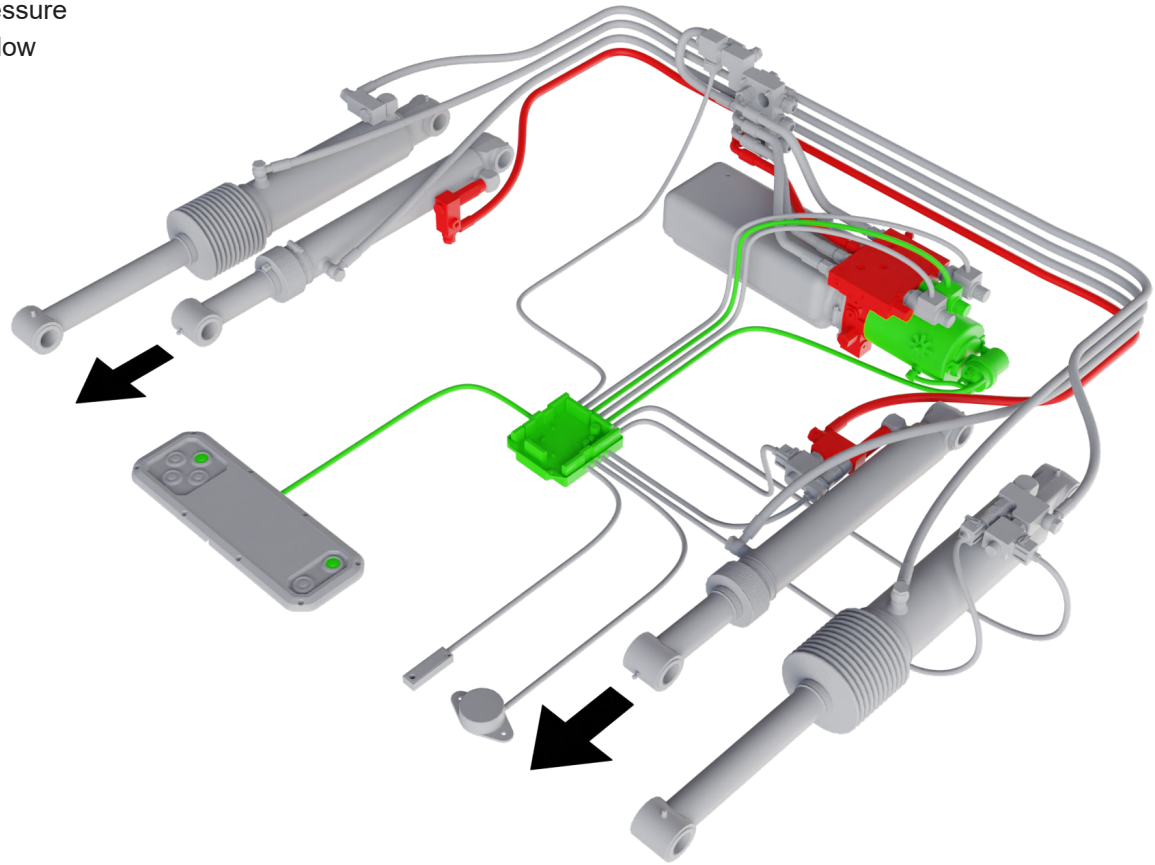




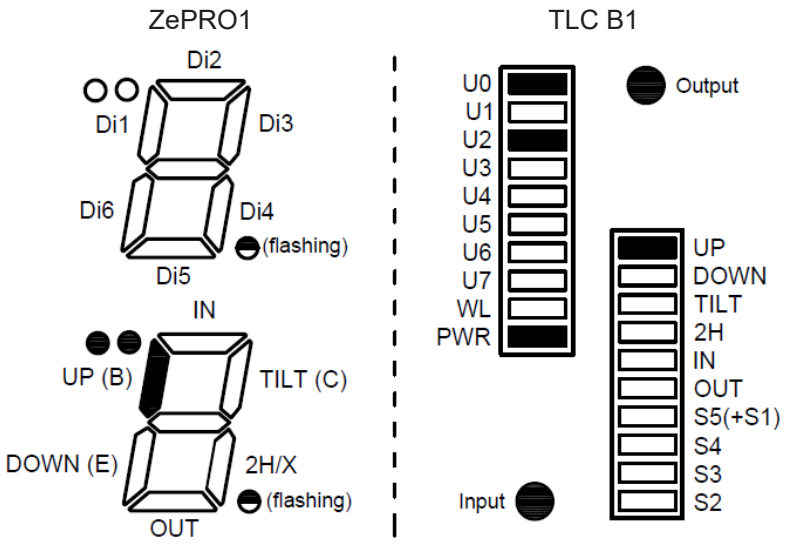
Function: raise

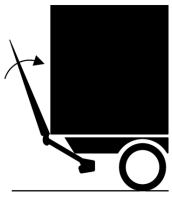
Description: Vertical platform raising.
Control input: Up on any of the connected control devices.
Sensor input: None required for function.

High pressure
Return flow
Active



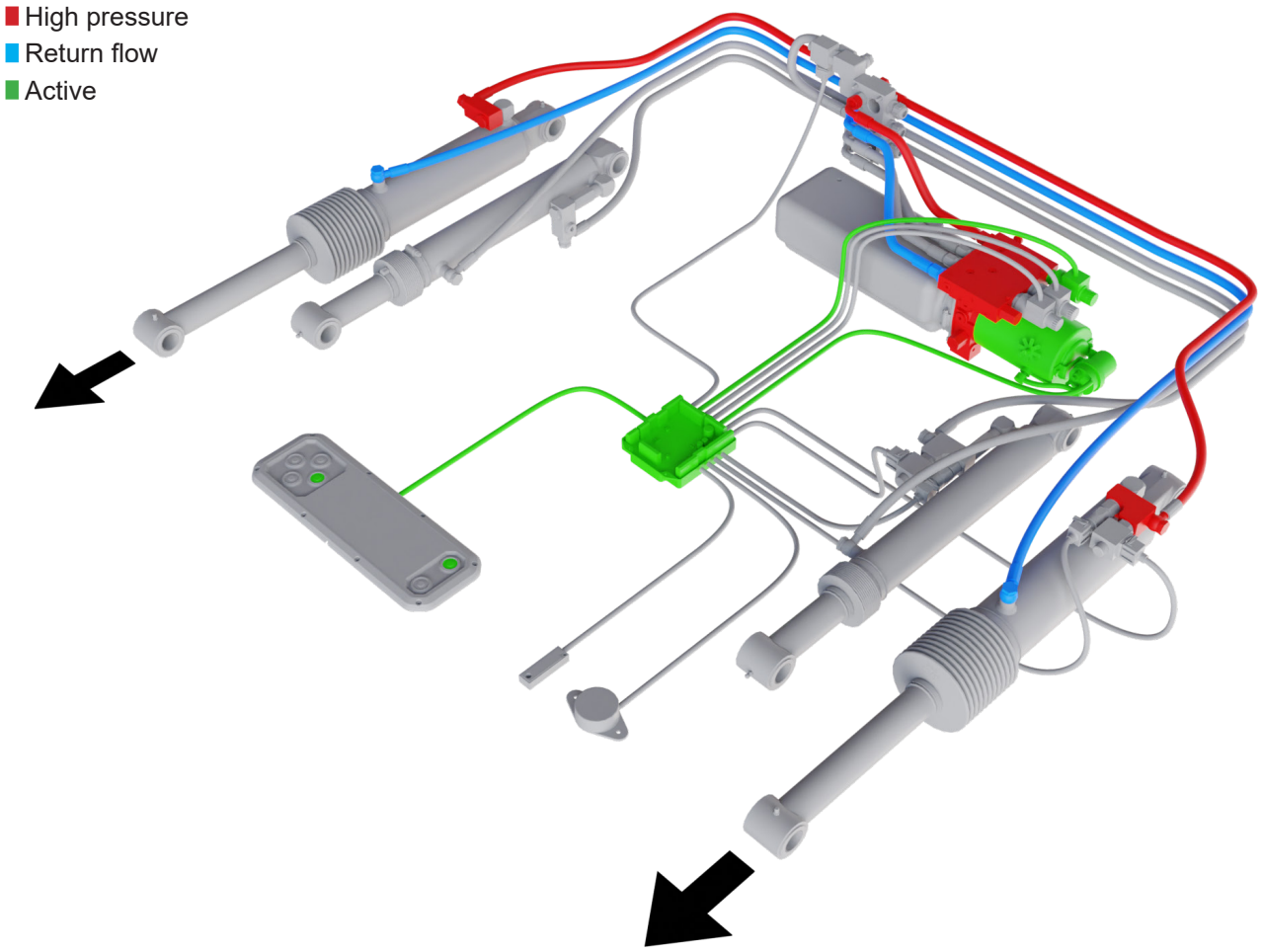
Card indication



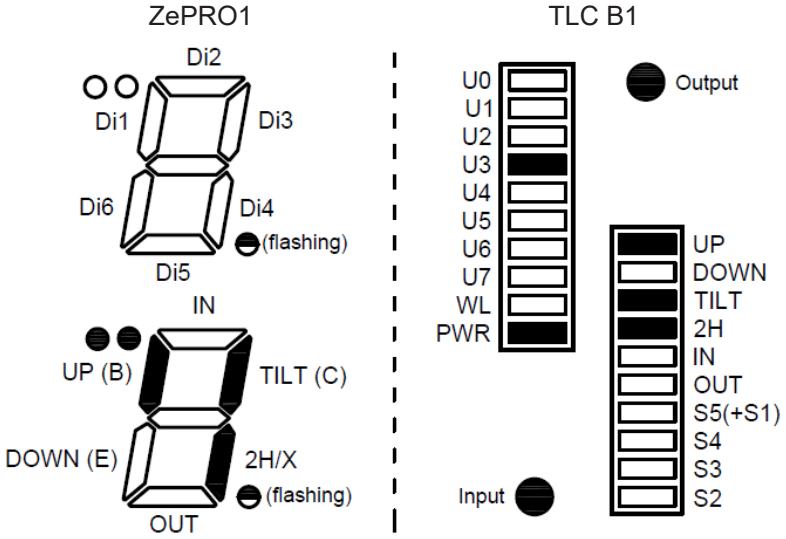


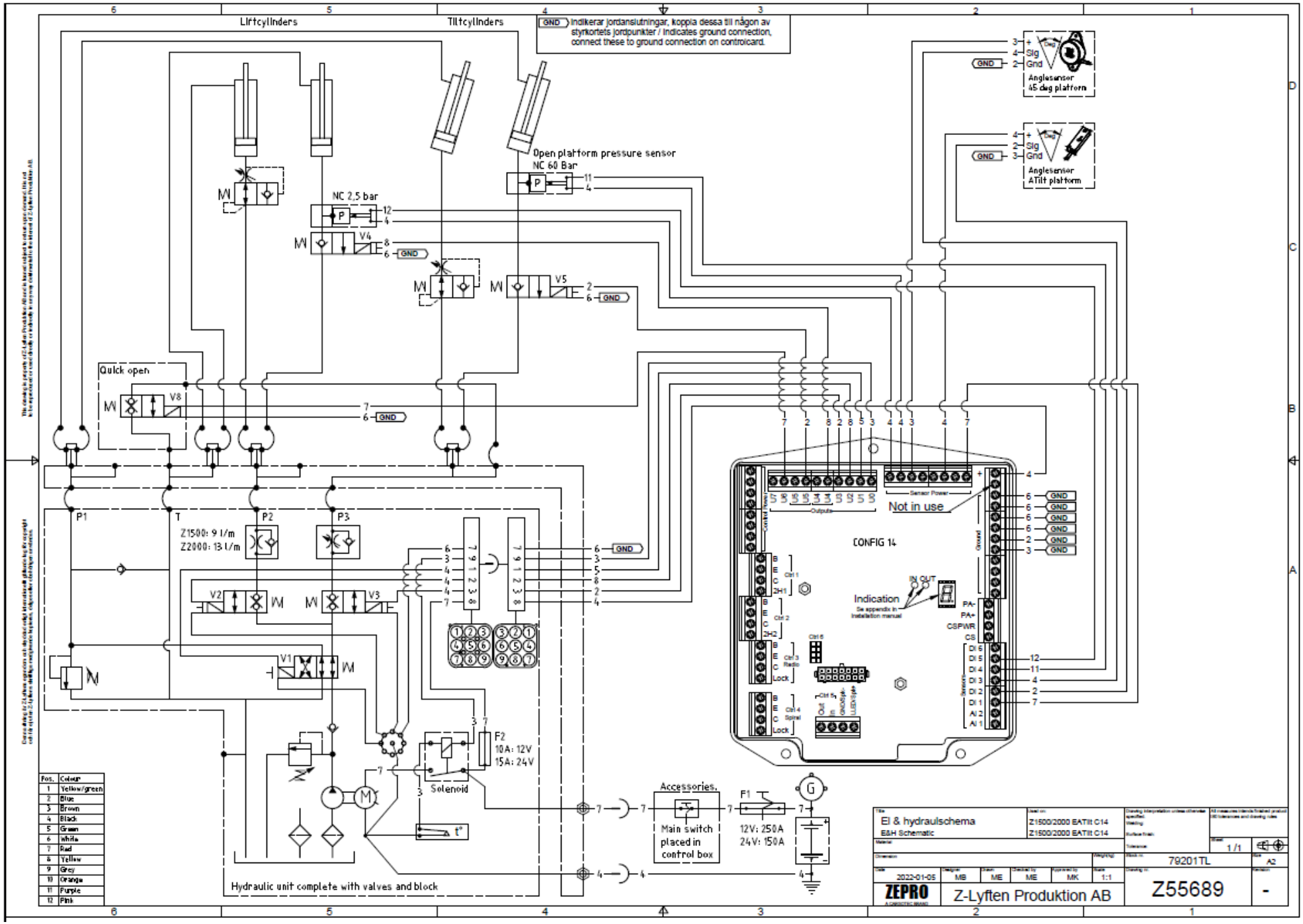
Function: close

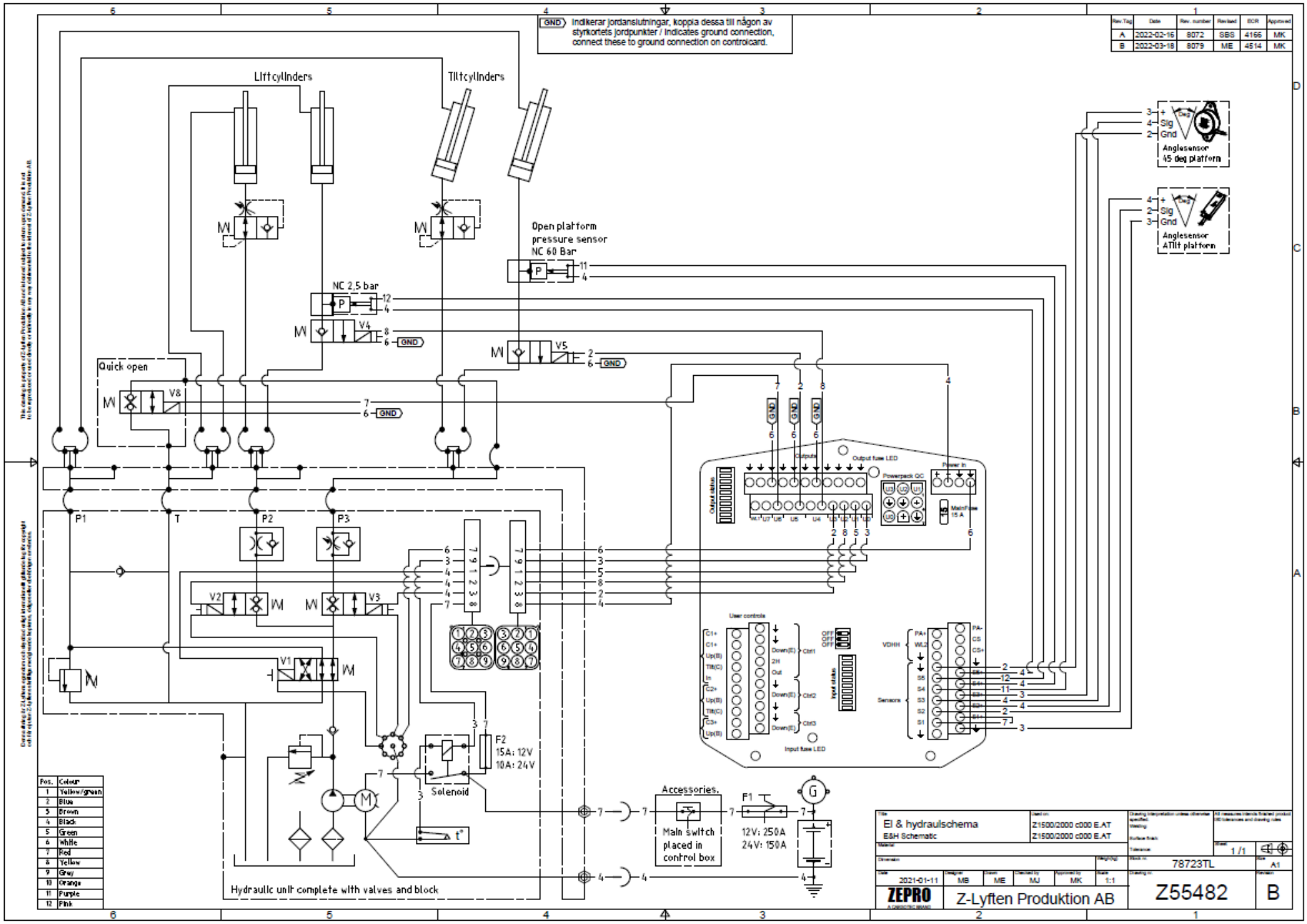
Description: Closing fully against the box body.
Control input: Tilt + Up + 2H button on primary control device(s).
Sensor input: None required for function.



Card indication




Liftcylinders
Tiltcylinders
GND Indikerar jordanslutningar, koppla dessa till någon av styrkortets jordpunkter / Indicates ground connection, connect these to ground connection on controlcard.
Open platform pressure sensor
NC 60 Bar
NC 2,5 bar
V4
V5
Quick open
V8
Anglesensor 45 deg platform
Anglesensor ATilt platform
Sig
Gnd
P1
P2
P3
T
Z1500: 9 l/m
Z2000: 13 l/m
V1
V2
V3
F2
10A: 12V
15A: 24V
Solenoid
Accessories.
Main switch placed in control box
F1
12V: 250A
24V: 150A
Hydraulic unit complete with valves and block
CONFIG 14
Not in use
Indication
Sensor Power
Outputs
Ground
Sensors
Fos. Colour
1 Yellow/green
2 Blue
3 Brown
4 Black
5 Green
6 White
7 Red
8 Yellow
9 Grey
10 Orange
11 Purple
12 Pink
El & hydraulschema
E&H Schematic
Z1500/2000 EATIII C14
Z1500/2000 EATIII C14
1 /1
79201TL
A2
2022-01-05
MB
ME
ME
MK
1:1
ZEPRO
Z-Lyften Produktion AB
Z55689
-


GND Indikerar jordanslutningar, koppla dessa till någon av styrkortets jordpunkter / Indicates ground connection, connect these to ground connection on controlcard.
Rev.Tag | Date | Rev. number | Revised | ECR | Approved
A | 2022-02-16 | 8072 | SBS | 4166 | MK
B | 2022-03-18 | 8079 | ME | 4514 | MK
Liftcylinders
Tiltcylinders
Open platform pressure sensor NC 60 Bar
NC 2,5 bar
Quick open
V1
V2
V3
V4
V5
V8
P1
T
P2
P3
F2 15A: 12V 10A: 24V
Solenoid
Accessories.
Main switch placed in control box
F1
12V: 250A 24V: 150A
Hydraulic unit complete with valves and block
Anglesensor 45 deg platform
Anglesensor ATilt platform
Sig
Gnd
Output fuse LED
Powerpack OC
Power in
Main Fuse 15 A
User controls
Input fuse LED
VDHH
Sensors
Pos. | Colour
1 | Yellow/green
2 | Blue
3 | Brown
4 | Black
5 | Green
6 | White
7 | Red
8 | Yellow
9 | Grey
10 | Orange
11 | Purple
12 | Pink
El & hydraulschema
E&H Schematic
Used on
Z1500/2000 c000 E.AT
Z1500/2000 c000 E.AT
78723TL
2021-01-11
MB
ME
MJ
MK
1:1
A1
1 / 1
ZEPRO
Z-Lyften Produktion AB
Z55482
B

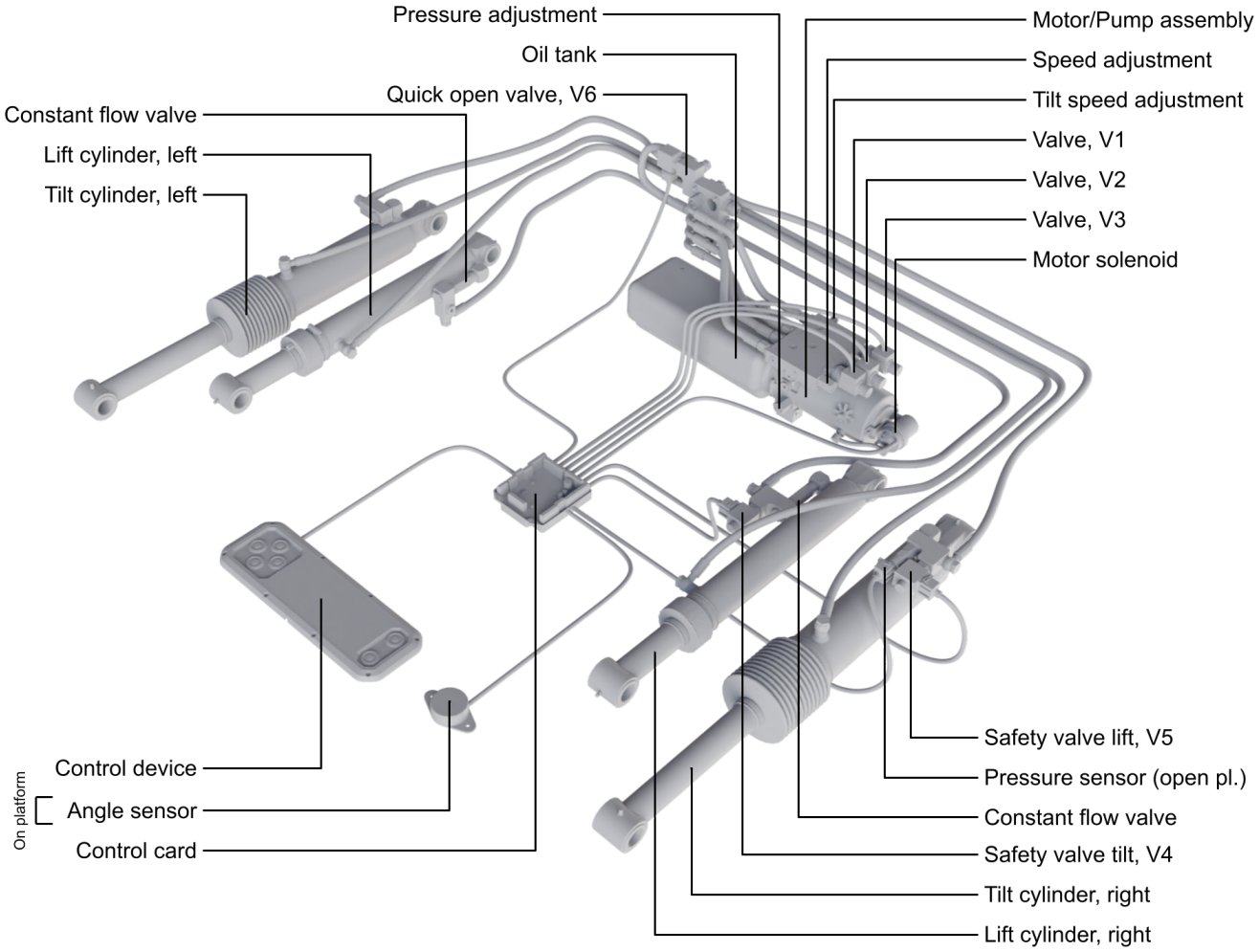
3.3. Z 1500/2000 MA with analog auto tilt

(Not done yet)

3.4. Z 1500/2000 DA

Description

The Z 1500/2000 DA is a variant with double acting tilt cylinders and double acting lift cylinders. It is equipped with a quick opening valve that increases the opening speed of the platform when certain conditions are met. It has no auto tilt functionality.



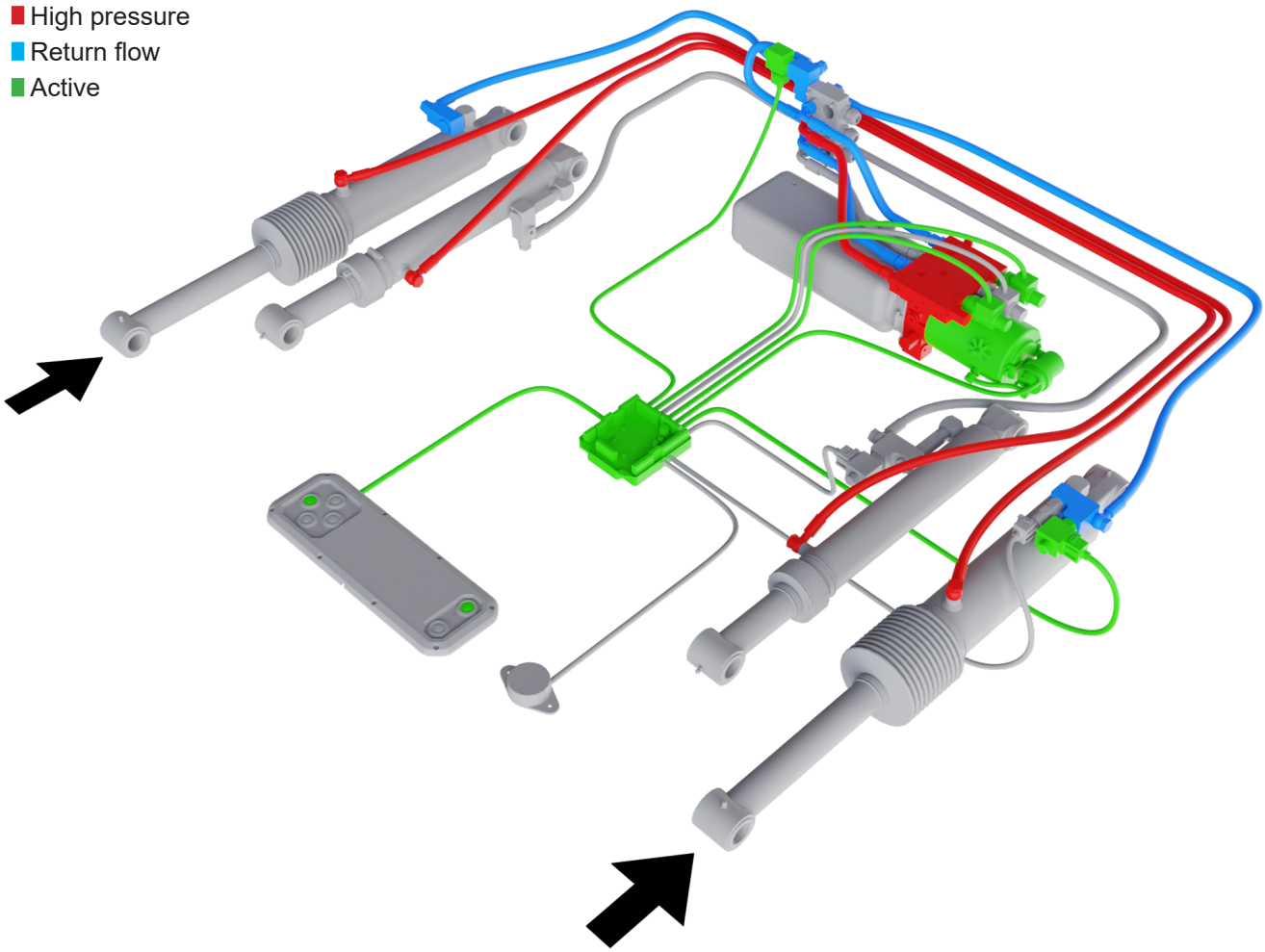
Sensors used:

Angle sensor located on the platform used for the safety requirement for two hand operation when opening and closing against the boxy body. The sensor is inactive when the platform angle is within 45 degrees from vertical and within this range the two hand control is required. If the platform is closer to horizontal, the sensor is active and the requirement is removed. This sensor is connected to Di3 on ZePRO1.

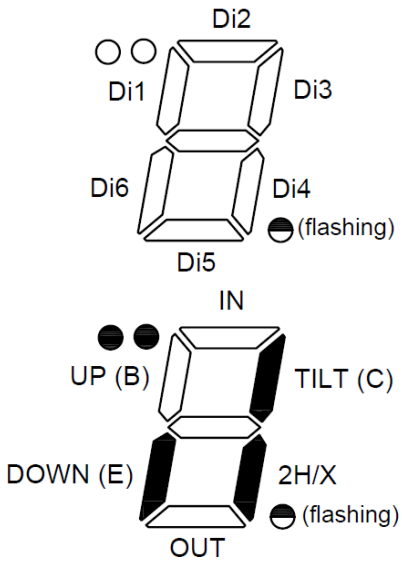
Pressure sensor located on the positive hydraulic feed to the tilt cylinder used to activate the open platform alarm. The sensor is active when the pressure drops below 60 bar which enables the Pa+ and Pa- pins on cabin switch section of the control card. This sensor is connected to Di4 on the ZePRO1.

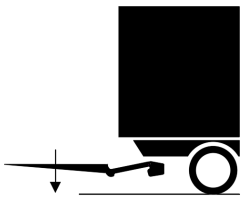
Function: quick open

Description: Platform opening from fully closed against box body to horizontal.
Control input: Down + Tilt + 2H. Available on primary control devices only.
Sensor input: None required for function. Angle sensor must be inactive at start of motion.



Card indication
ZePRO1

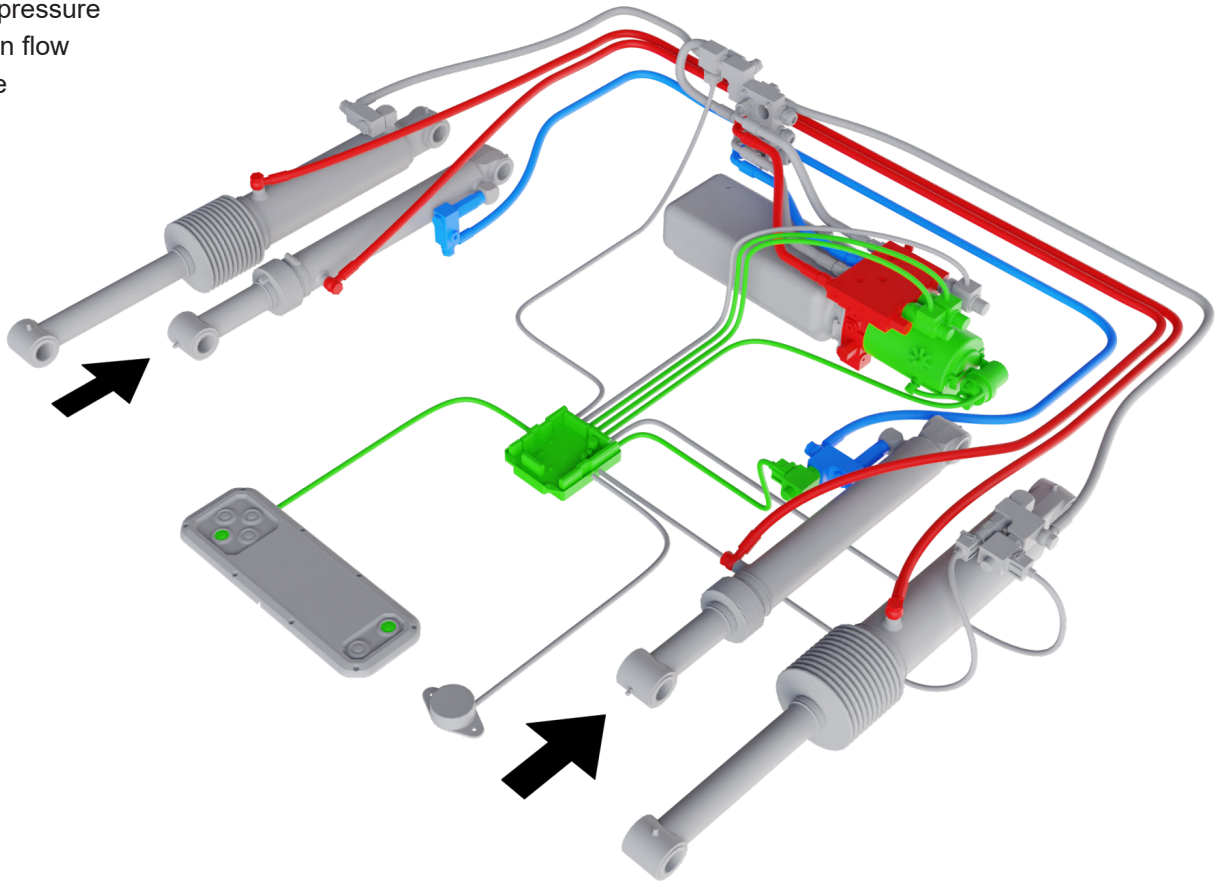




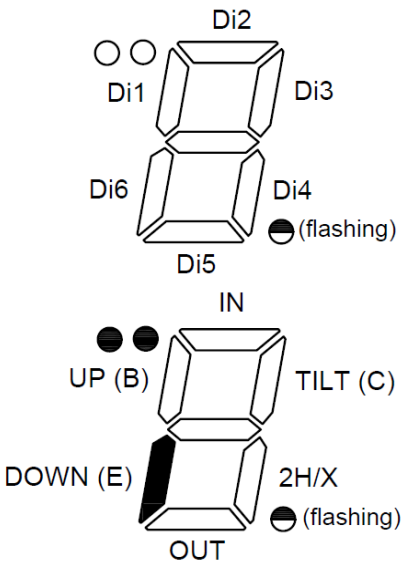
Function: lower

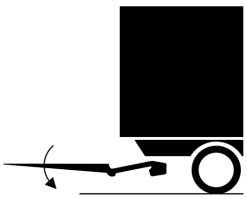
Description: Vertical platform lowering.
Control input: Down. Available on all control devices.
Sensor input: None required for function.

High pressure
Return flow
Active



Card indication
ZePRO1

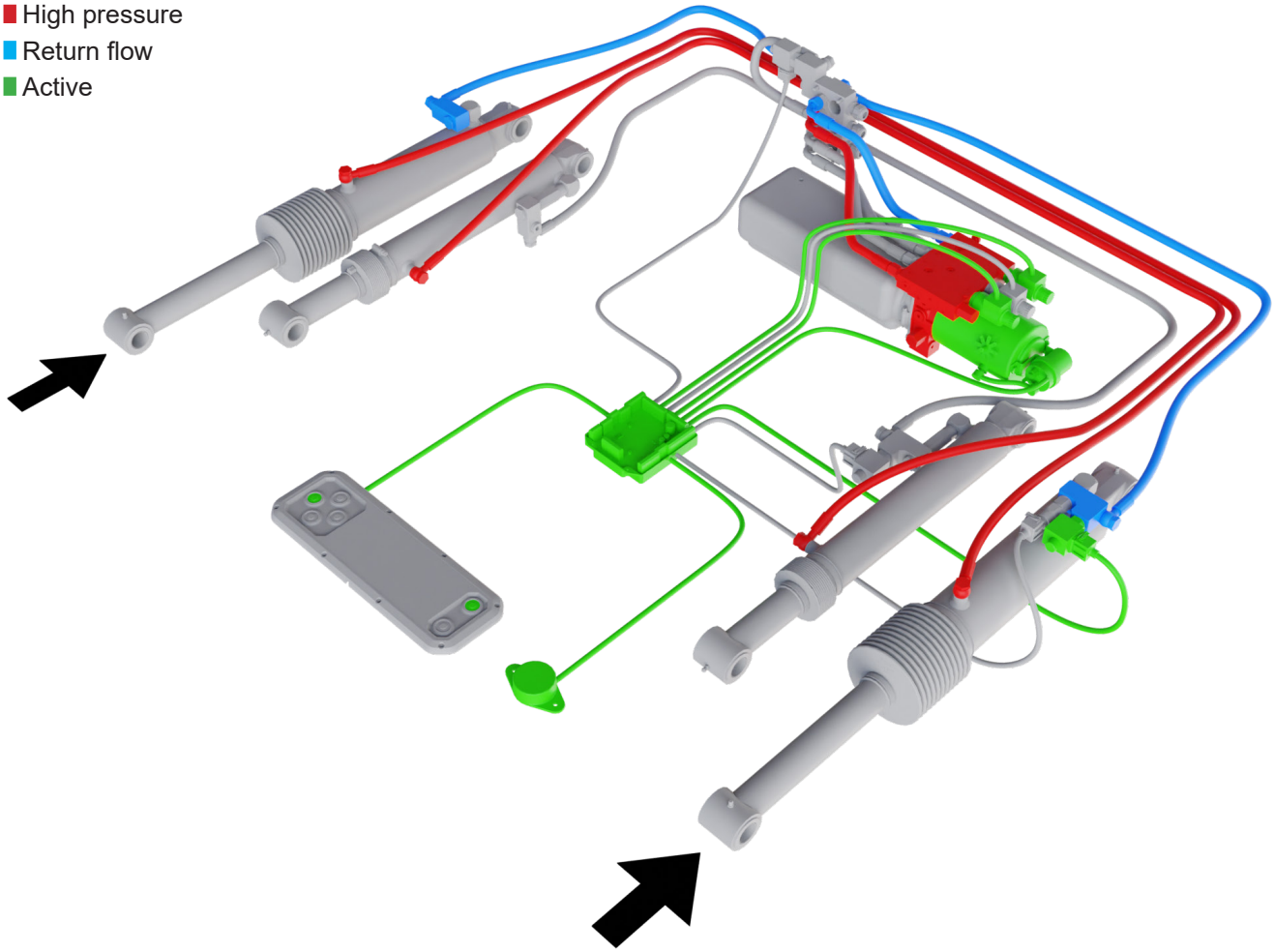




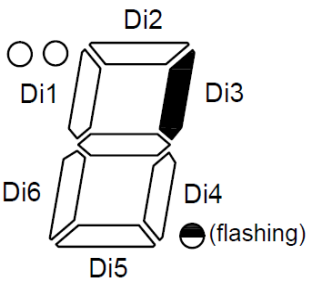
Function: tilt down

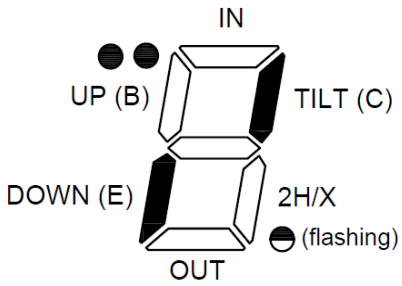
Description: Tilting down within +45/-10 degrees from horizontal.
Control input: Down + Tilt. Available on all control devices.
Sensor input: Active angle sensor on platform.

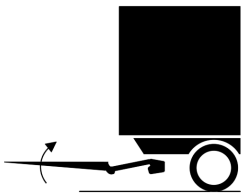
High pressure
Return flow
Active



Card indication
ZePRO1

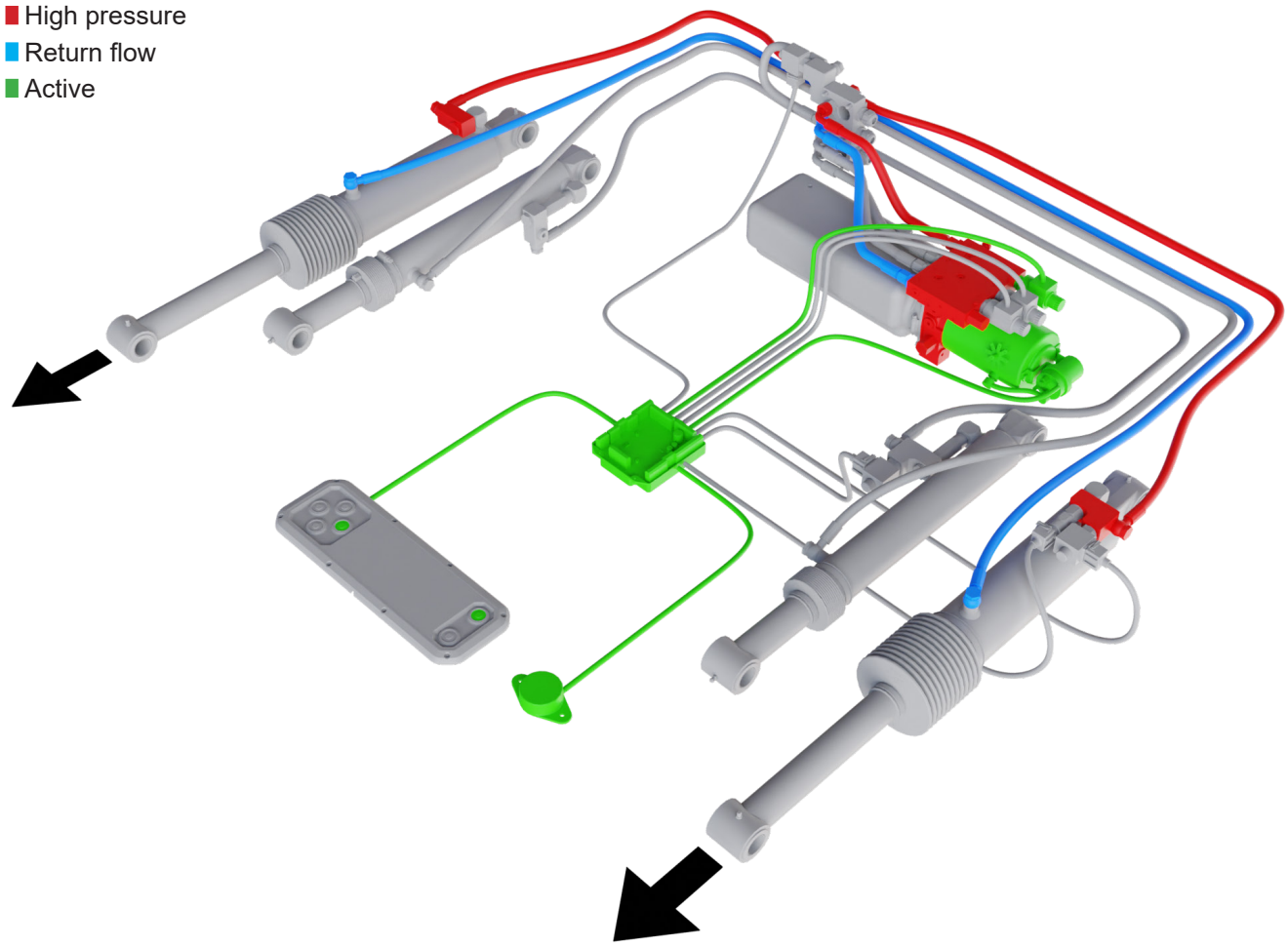




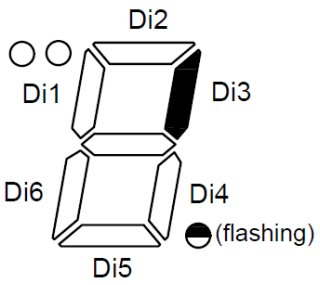


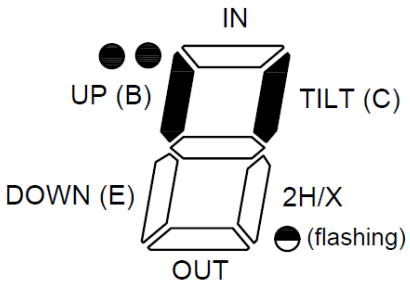
Function: tilt up

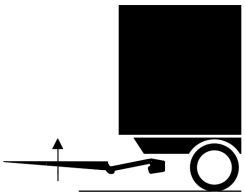
Description: Tilting up within +45/-10 degrees from horizontal.
Control input: Up + Tilt. Available on all control devices.
Sensor input: Active angle sensor on platform.



Card indication
ZePRO1



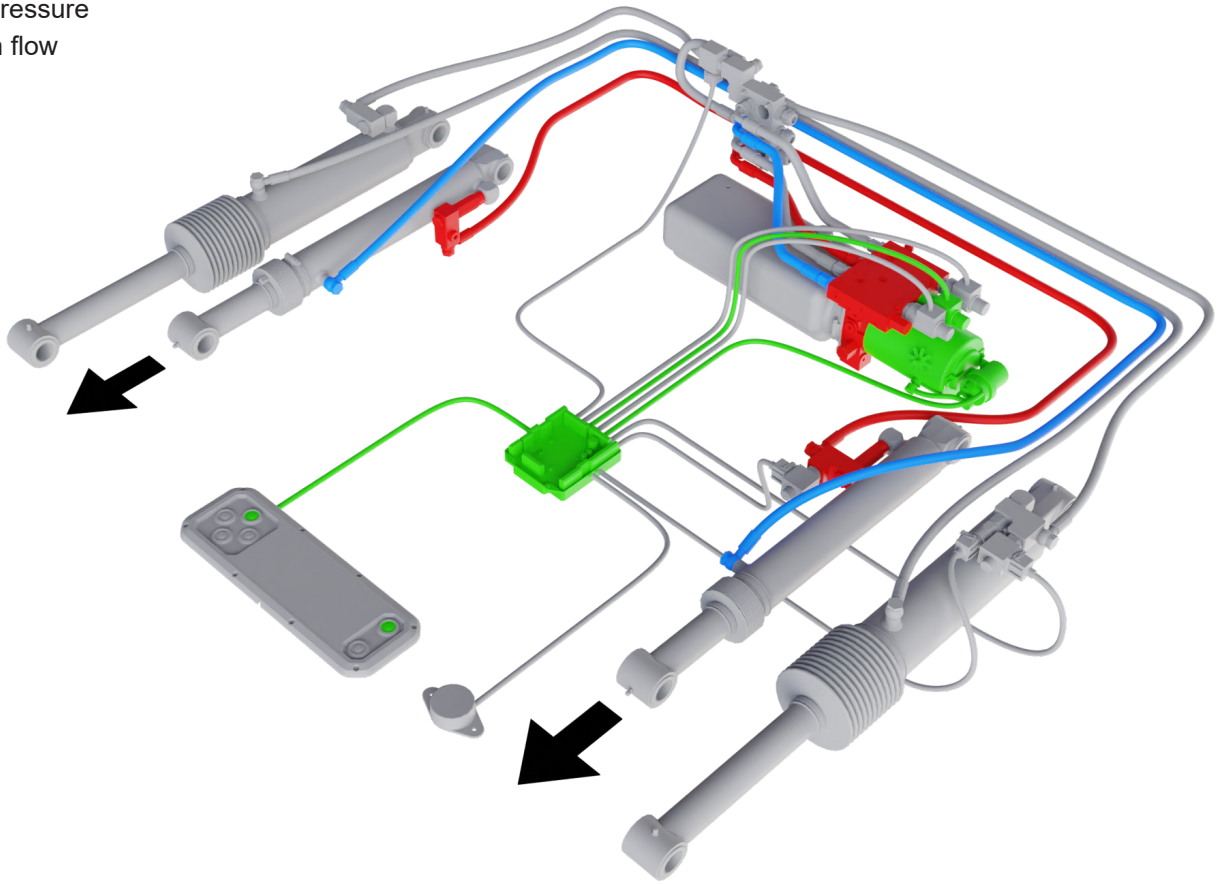




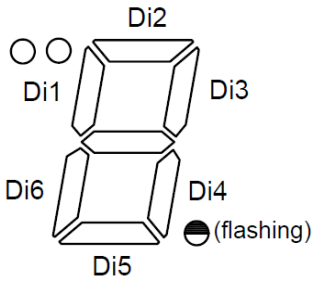
Function: raise

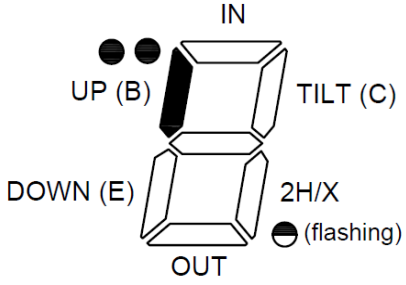
Description: Vertical platform raising.
Control input: Up. Available on all control devices.
Sensor input: None required for function.

High pressure
Return flow
Active



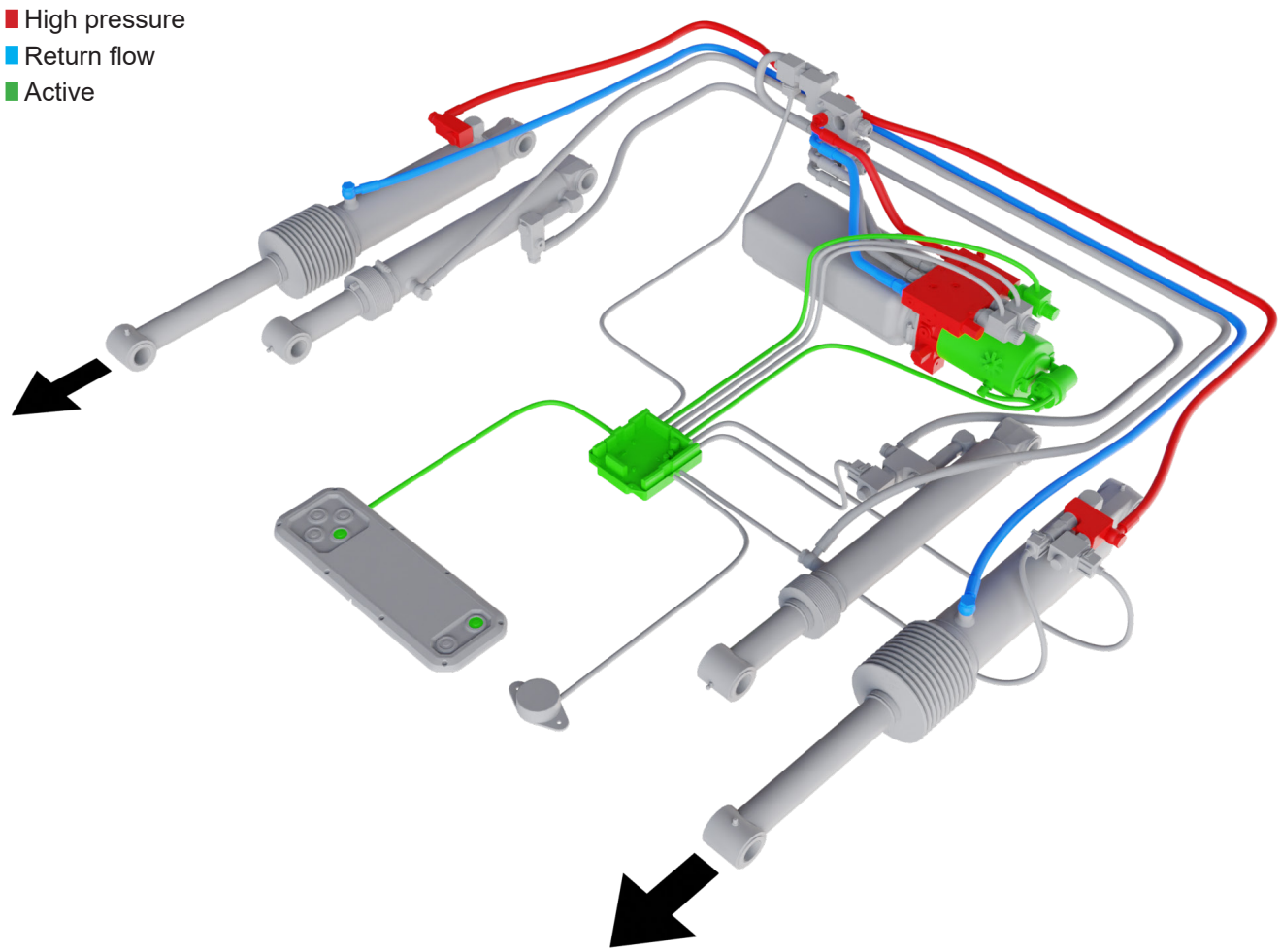
Card indication
ZePRO1



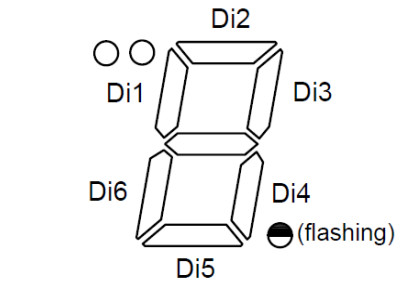


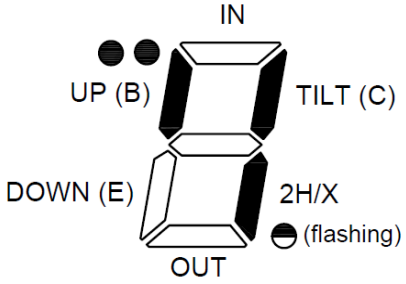
Function: close

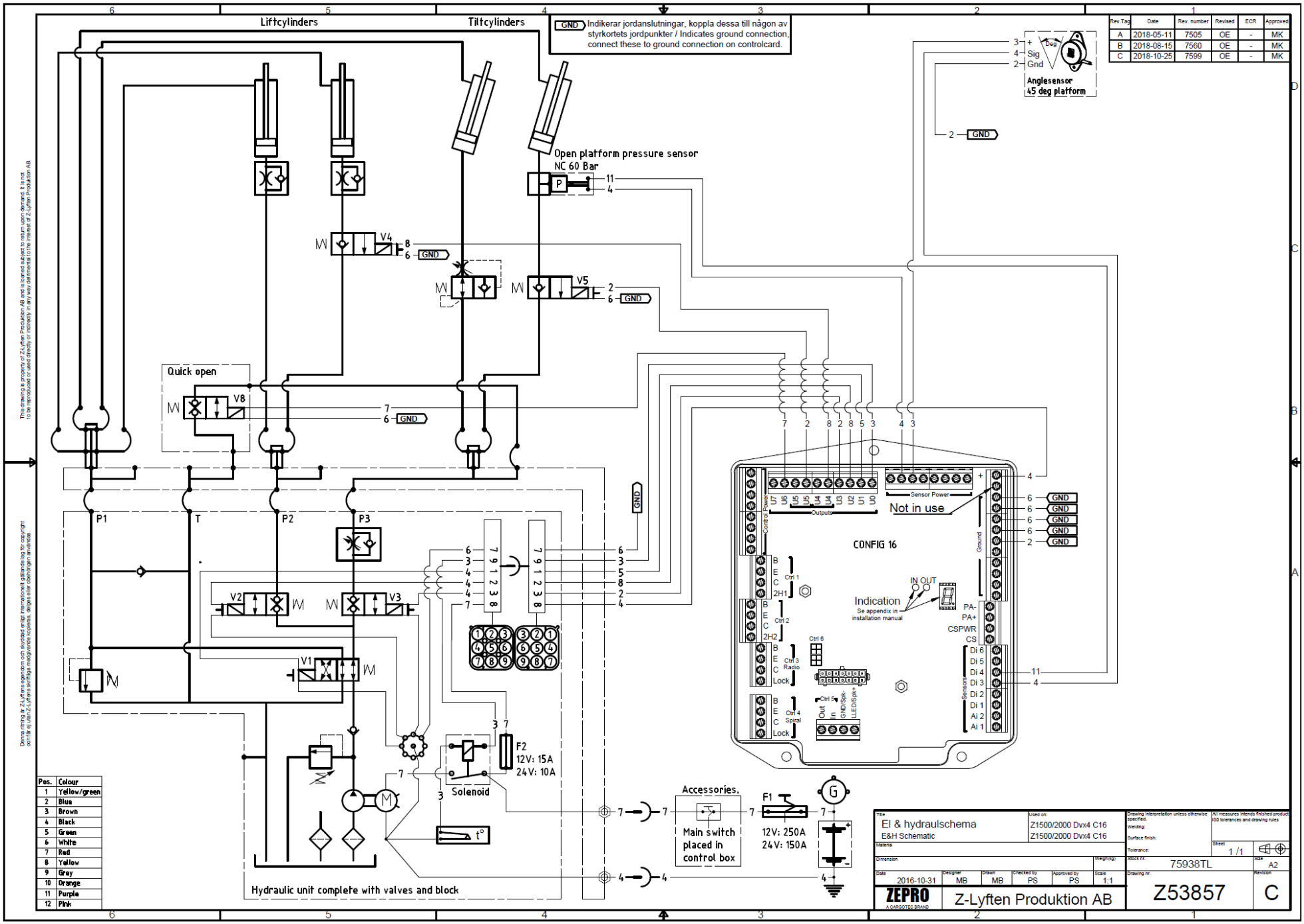
Description: Closing fully against the box body.
Control input: Up + Tilt + 2H. Available on primary control devices only.
Sensor input: None required for function.



Card indication
ZePRO1






Liftcylinders
Tiltcylinders
GND Indikerar jordanslutningar, koppla dessa till någon av styrkortets jordpunkter / Indicates ground connection, connect these to ground connection on controlcard.
Open platform pressure sensor
NC 60 Bar
Anglesensor
45 deg platform
Quick open
V1
V2
V3
V4
V5
V8
P1
T
P2
P3
Solenoid
F2
12V: 15A
24V: 10A
F1
12V: 250A
24V: 150A
Accessories.
Main switch placed in control box
Hydraulic unit complete with valves and block
CONFIG 16
Not in use
Indication
Se appendix in installation manual
Sensor Power
Outputs
Control Power
Ground
Sensors
PA-
PA+
CSPWR
CS
Ctrl 1
Ctrl 2
Ctrl 3 Radio Lock
Ctrl 4 Spiral Lock
Ctrl 5
Ctrl 6
Pos. Colour
1 Yellow/green
2 Blue
3 Brown
4 Black
5 Green
6 White
7 Red
8 Yellow
9 Grey
10 Orange
11 Purple
12 Pink
Rev.Tag Date Rev. number Revised ECR Approved
A 2018-05-11 7505 OE - MK
B 2018-08-15 7560 OE - MK
C 2018-10-25 7599 OE - MK
Title El & hydraulschema
E&H Schematic
Used on: Z1500/2000 Dvx4 C16
Z1500/2000 Dvx4 C16
Material
Dimension
Weight(kg)
Drawing interpretation unless otherwise specified.
Welding:
Surface finish:
Tolerance:
All measures intends finished product. ISO tolerances and drawing rules
Sheet 1 /1
Block nr. 75938TL
Size A2
Date 2016-10-31
Designer MB
Drawn MB
Checked by PS
Approved by PS
Scale 1:1
Drawing nr. Z53857
Revision C
ZEPRO A CARGOTEC BRAND
Z-Lyften Produktion AB
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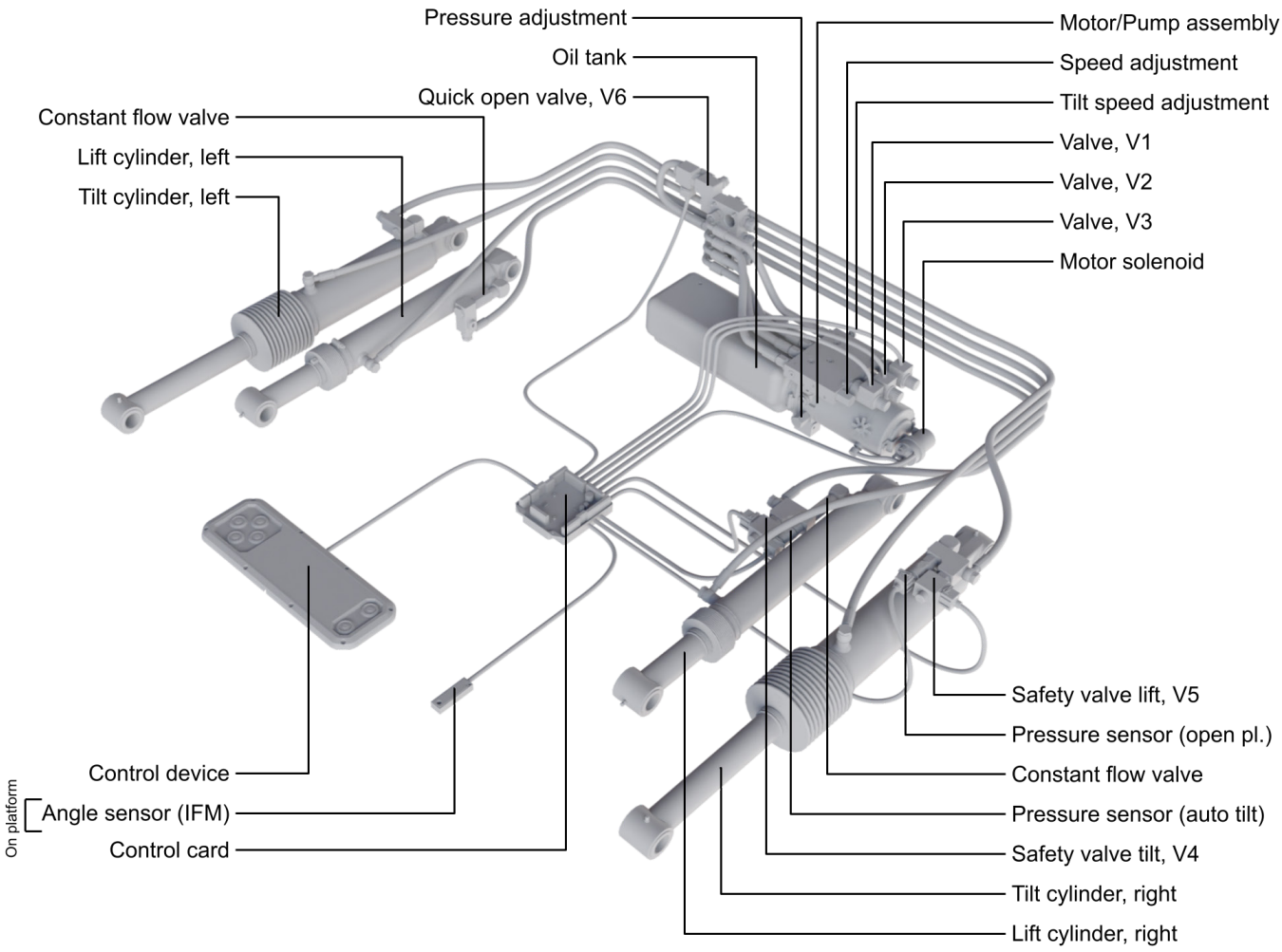
3.5. Waltco HDC 33/44

Description

The Waltco HDC is a variant with double acting tilt cylinders and single acting lift cylinders. It is equipped with a quick opening valve that increases the opening speed of the platform when certain conditions are met. It is also equipped with digital auto tilt functionality with adjustable auto tilt angle that is adjusted by physically changing the angle on the IFM sensor.



Sensors used:

Pressure sensor located on the positive hydraulic feed to the tilt cylinder used to activate the open platform alarm. The sensor is active when the pressure drops below 60 bar which enables the Pa+ and Pa- pins on cabin switch section of the control card. This sensor is connected to S4 on the TLC B1 card.

IFM-type angle sensor located on the platform used to control the auto tilt functionality. The sensor is activated when the platform is tilted down from horisontal and remains active until the platform is tilted back to horizontal. This sensor is connected to S2 on TLC B1.

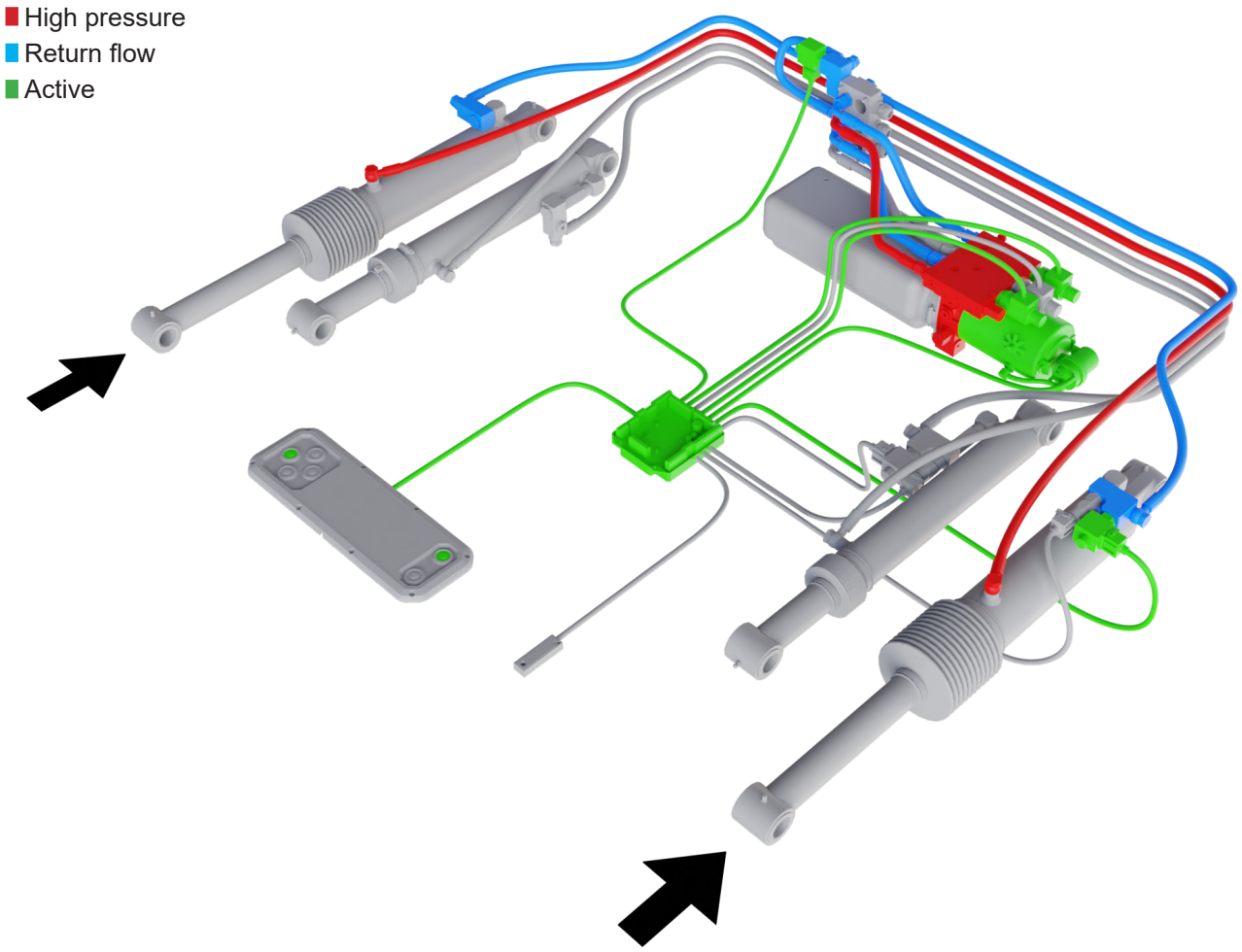
Pressure sensor located on the positive hydraulic feed to the lift cylinder. The sensor is used to sense when the platform reaches the ground level at which point the auto tilt down function is activated. The sensor is activated when the pressure in the hydraulic line drops below 2,5 bar. This sensor is connected to S5 on TLC B1.

The S1 sensor input is bridged to sensor power for proper auto tilt function.

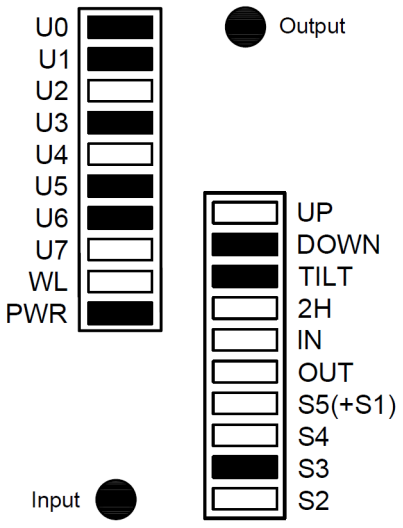
The S3 sensor input is bridged to sensor power to remove the two hand control requirement.

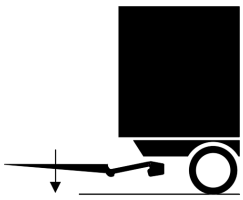
Function: quick open

Description: Platform opening from fully closed against box body to horizontal.
Control input: Down + Tilt. Available on all control devices with a tilt button.
Sensor input: None required for function.



Card indication
TLC B1

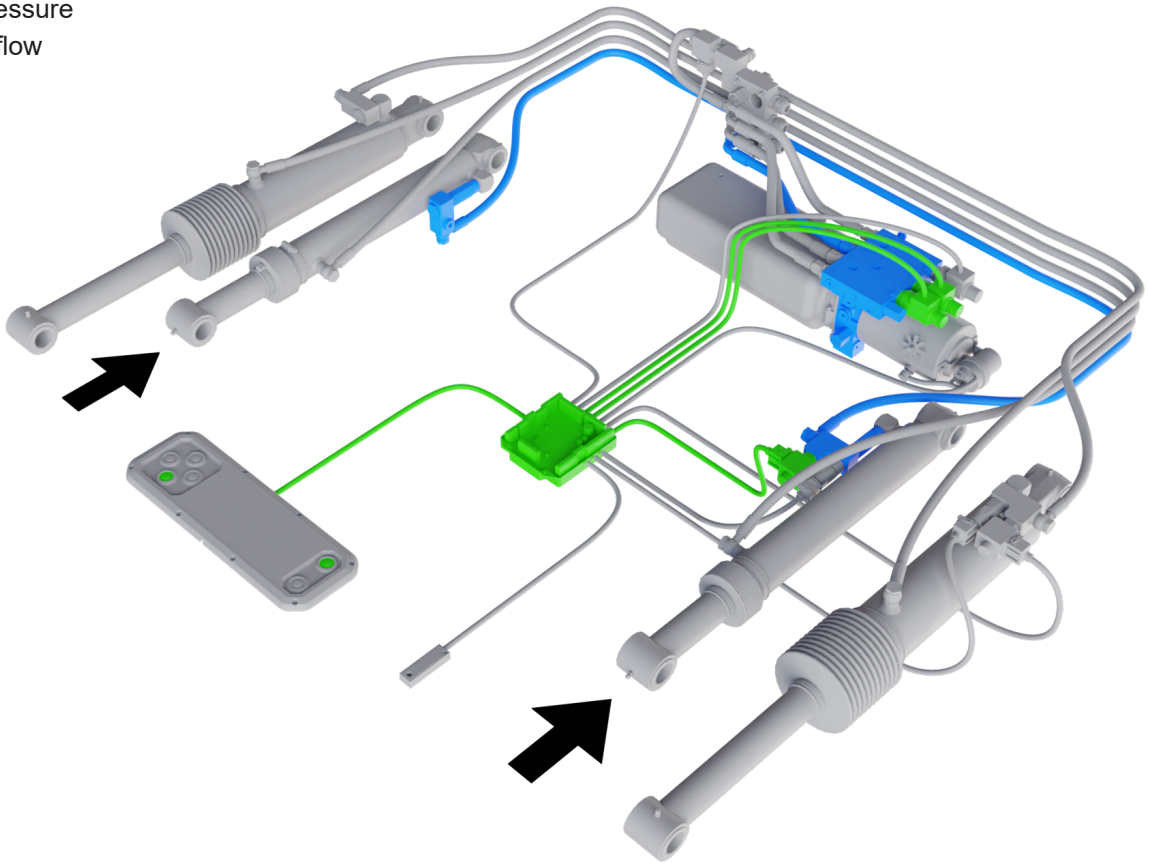




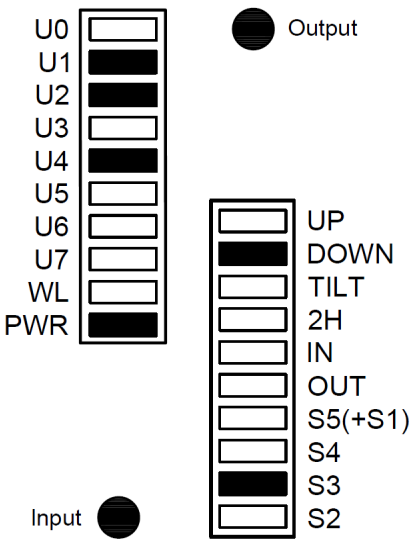
Function: lower

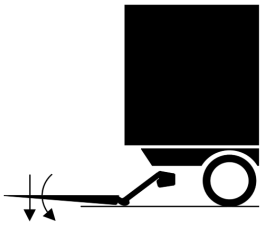
Description: Vertical platform lowering.
Control input: Down. Available on all control devices.
Sensor input: None required for function.

High pressure
Return flow
Active



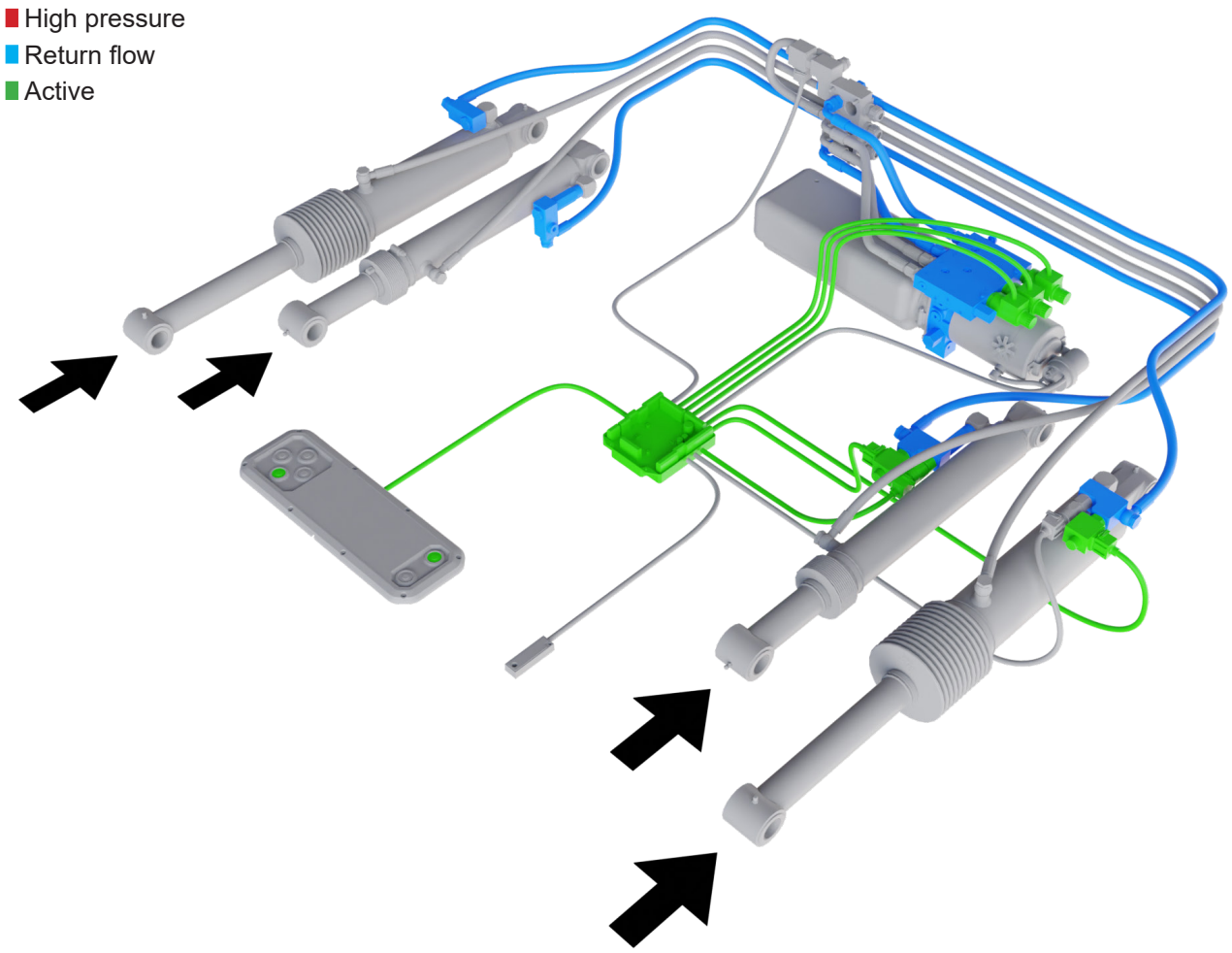
Card indication
TLC B1



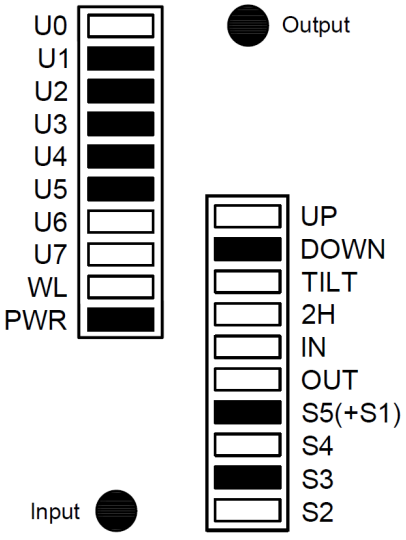


Function: auto tilt down

Description: Automatic down tilting of the platform once ground level has been reached.
Control input: Down. Available on all control devices.
Sensor input: Active pressure sensor on lift cylinder.

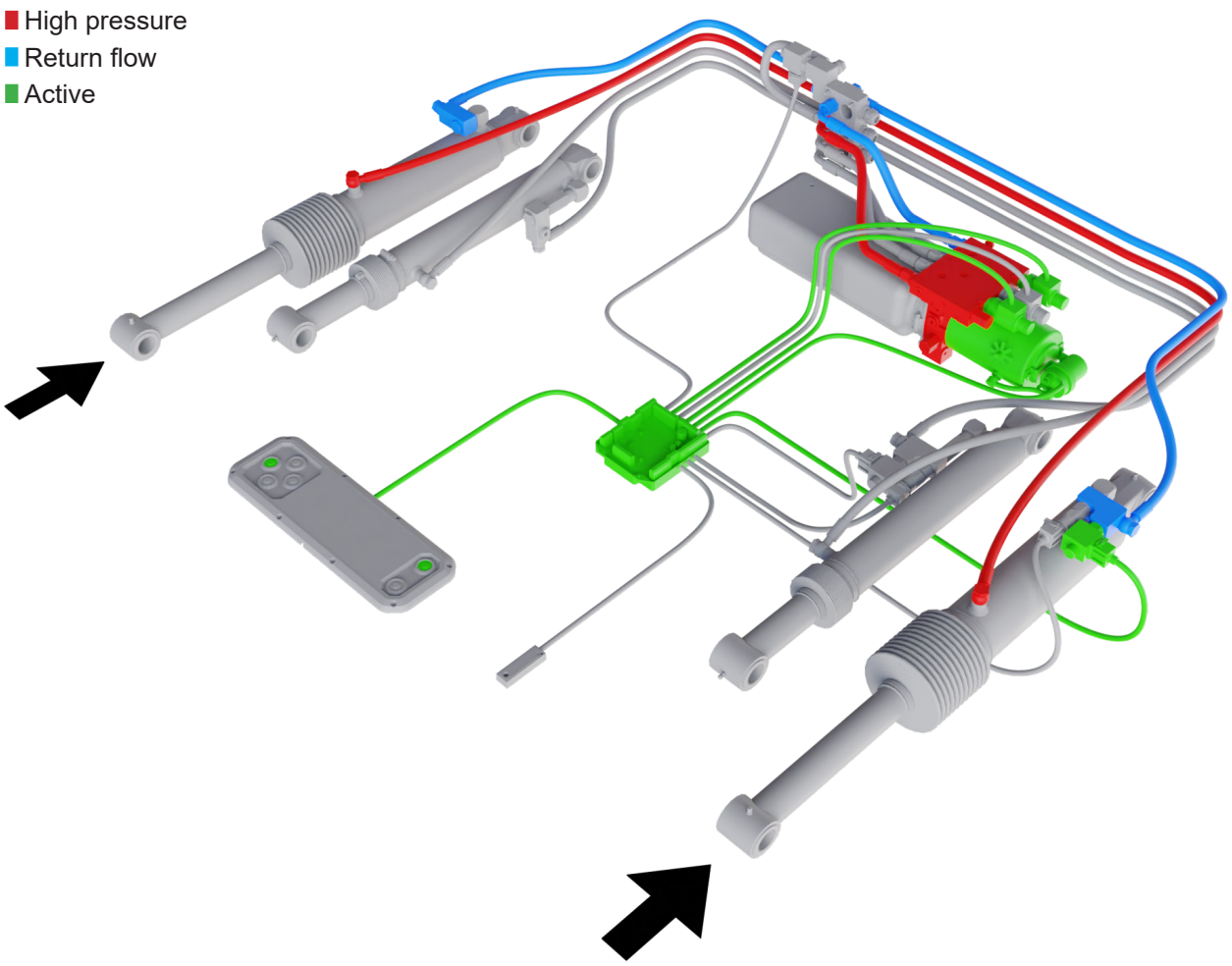


Card indication
TLC B1

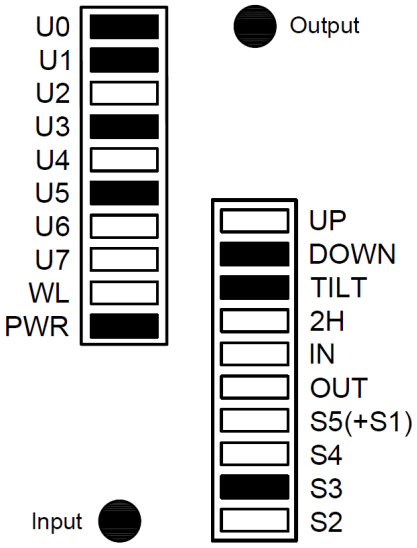


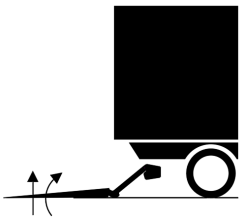
Function: manual tilt down

Description: Tilting down within +45/-10 degrees from horizontal.
Control input: Tilt + Down. Available on all control devices with a tilt button.
Sensor input: Active S3 input (achieved by the bridge between S3 and S3+)



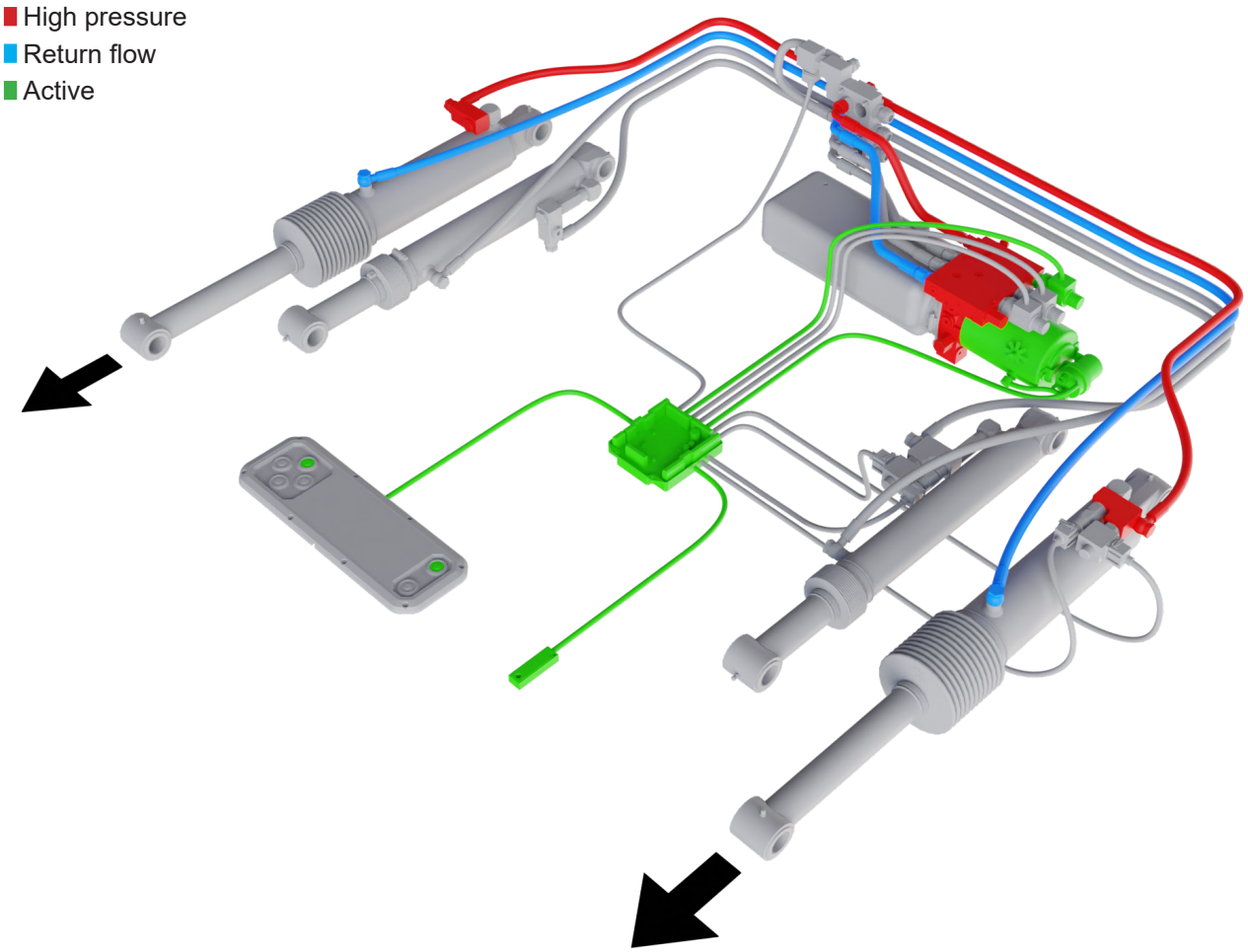
Card indication
TLC B1



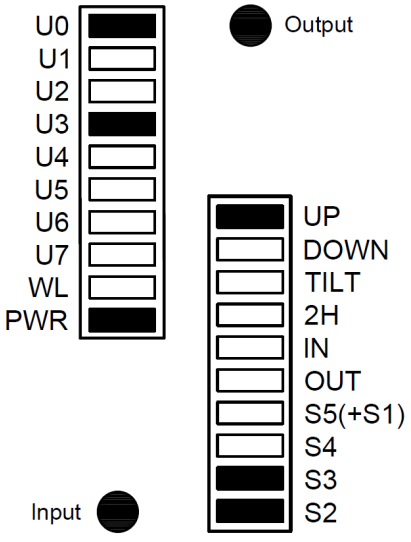


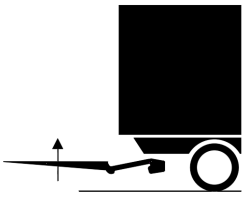
Function: auto tilt up

Description: Automatic up tilting of the platform untill it is tilted back to horizontal.
Control input: Up. Available on all control devices.
Sensor input: Active IFM type angle sensor on platform.



Card indication
TLC B1

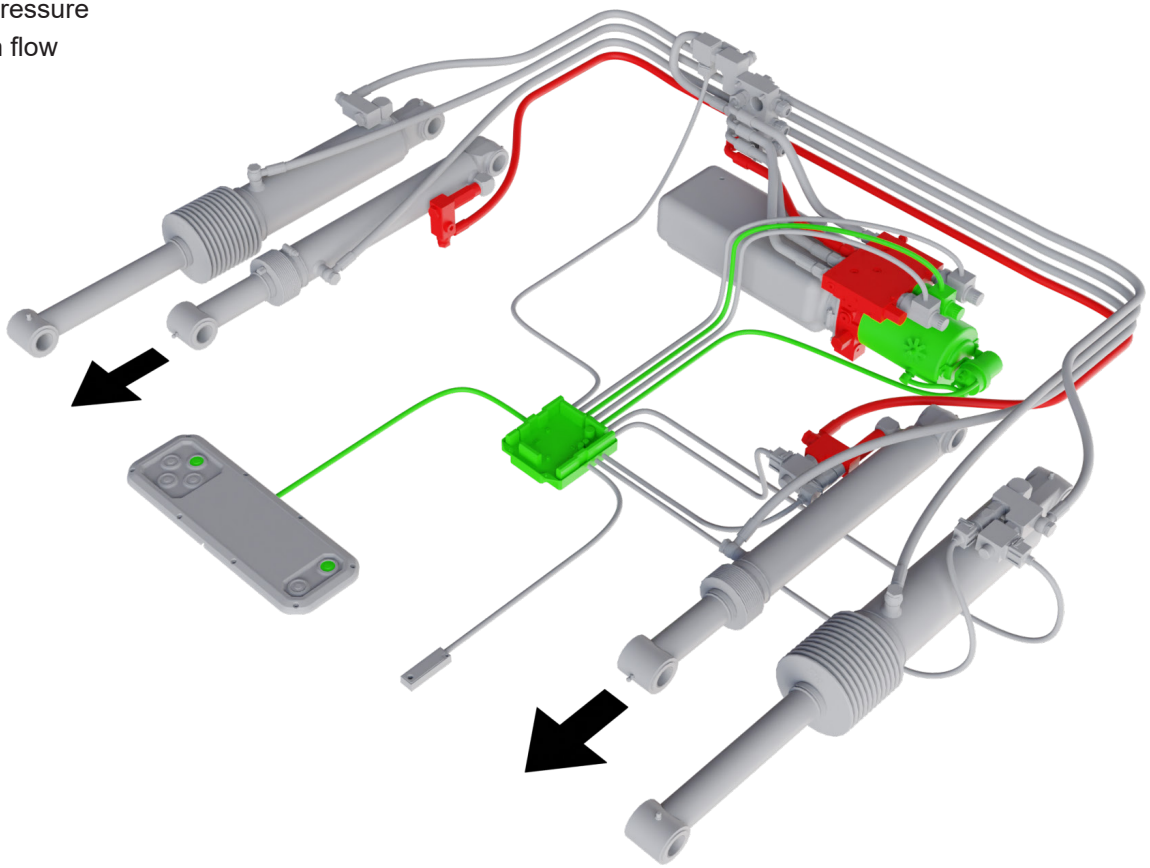




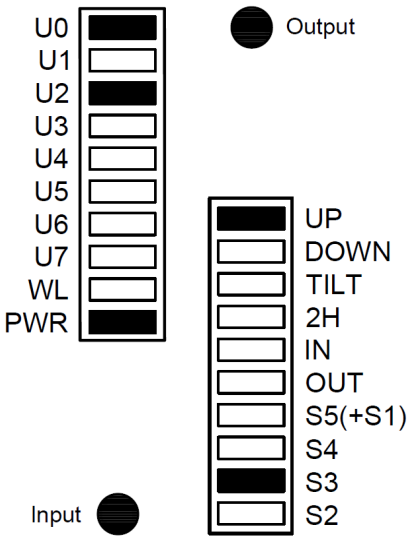
Function: raise

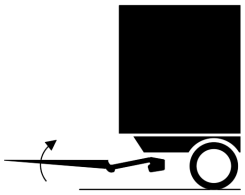
Description: Vertical platform raising.
Control input: Up. Available on all control devices.
Sensor input: None required for function.

High pressure
Return flow
Active



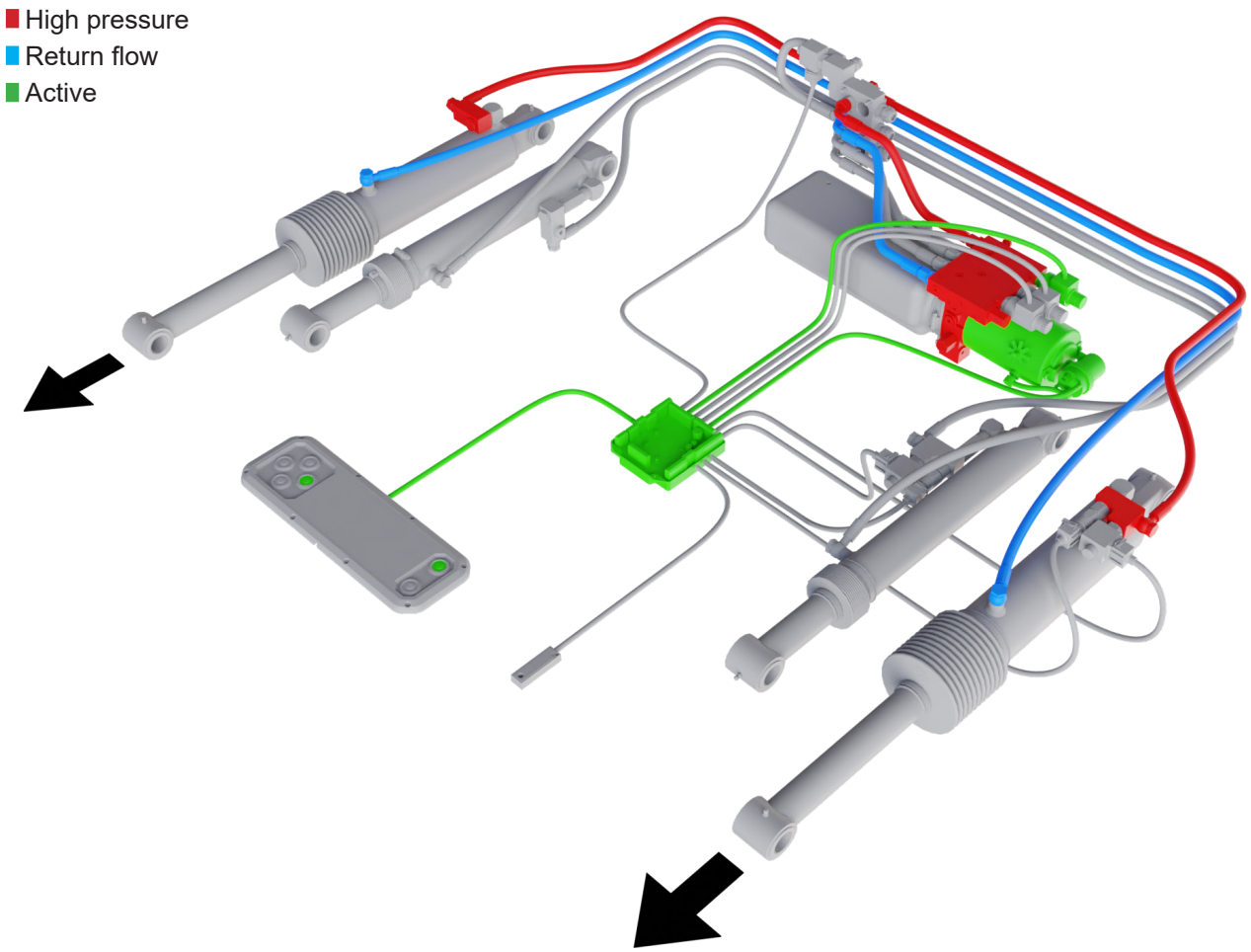
Card indication
TLC B1





Function: manual tilt up & close

Description: Tilting up within +45/-10 degrees from horizontal.
Control input: Tilt + Up on any of the connected control devices.
Sensor input: Active S3 input (achieved by the bridge between S3 and S3+)



Card indication
TLC B1