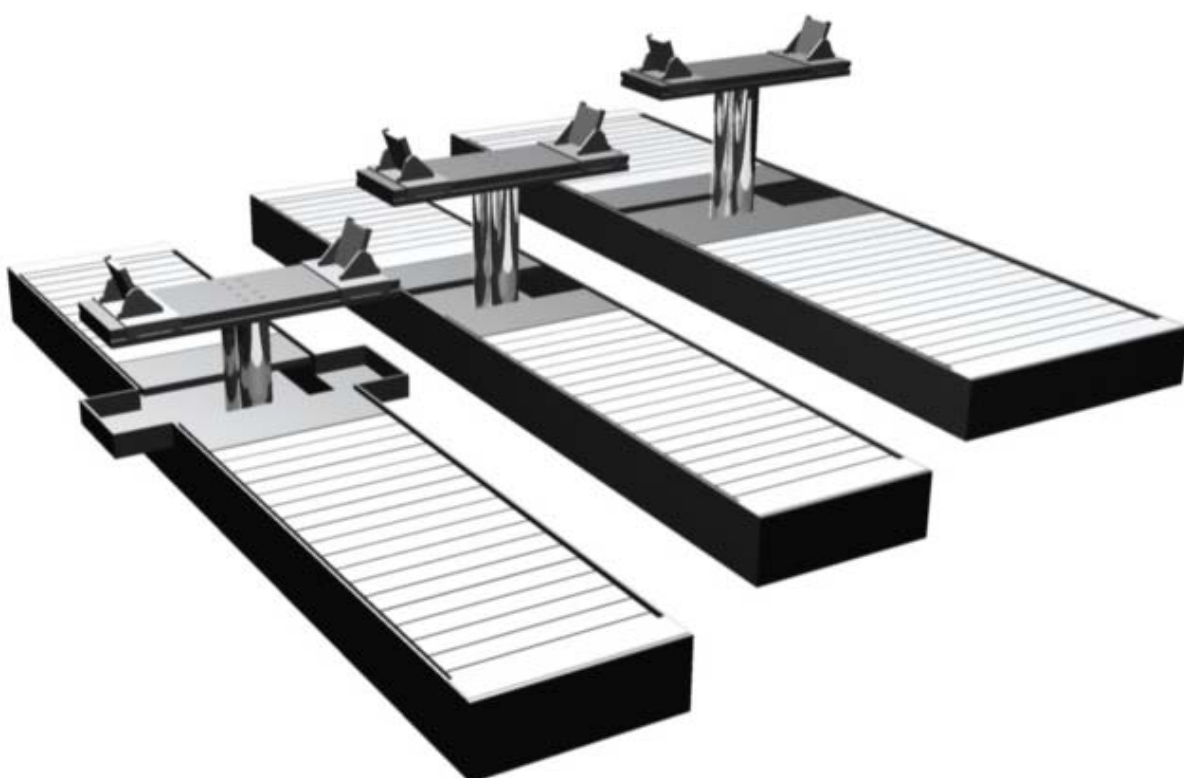


Original Operating Instructions



ES DUAL 8.0 / 14.0



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Manufacturer

MAHA Maschinenbau Haldenwang GmbH & Co. KG

Hoyen 20

87490 Haldenwang

Germany

Phone: +49 (0)8374 5850

Fax: +49 (0)8374 585499

Fax Parts: +49 (0)8374 585565

Internet: <http://www.maha.de>

E-Mail: maha@maha.de

Hotline: +49 (0)1806 624260 for Brake Testers and Test Lanes

+49 (0)1806 624280 for Automotive Lifts

+49 (0)1806 624290 for Dynamometers and Emission Testers

Service

AutomoTec GmbH

Maybachstraße 8

87437 Kempten

Germany

Phone: +49 (0)1806 624250

Fax: +49 (0)1806 624255

Internet: <http://www.automo-tec.com>

E-Mail: service@automo-tec.com

Table of contents

	Chapter	Page
Description of the lifting system	1	1
Technical data	2	3
Regular checks prescribed in accordance with BGR 500	3	5
Important notes for these operating instructions	4	7
Use of the lifting system in accordance with regulations	5	7
Safety	6	9
Safety equipment associated with the lifting system	6.1	9
Meaning of symbols and pictograms	6.2	10
Safety begins before commissioning	6.3	10
Safety regulations for lifting system operation	6.4	11
Safety regulations in normal operation	6.5	12
Safety regulations for servicing and repair activities	6.6	12
For tasks on electrical components and equipment	6.7	13
Modifications to the lifting system	6.8	14
For environmental protection	6.9	14
Risks in accordance with hazard analysis	7	15
Operating units: Switching cabinet and suspended switches	8	16
List of the operating elements and their function	8.1	17
Commissioning	9	23
Description of the working area, activity of the operating personnel	9.1	24
Requirements and qualifications for operating personnel	9.2	24
Operation	10	25
General notes for operation	10.1	25
Sliding pieces (vehicle-dependent load supports)	10.2	25
Selecting the operating unit using the keyswitch	10.3	26
"Manual" operating mode	10.4	27
Switching on the lifting system	10.4.1	27
Selection / activation of the cylinder units	10.4.2	29
Park out	10.4.3	30
Fitting the sliding pieces (load supports)	10.4.4	31
Positioning a vehicle	10.4.5	32
Horizontal traversing and positioning the load supports	10.4.6	33
Vertical traversing: Installing and lifting the load supports	10.4.7	34
Vertical traversing: Synchronous lifting	10.4.8	35
Vertical traversing: Synchronous lowering	10.4.9	37
Parking (only necessary when the means of fitting has a narrow roll cover and a shaft for retractable load supports)	10.4.10	38



Table of contents

	Chapter	Page
Special Features	10.4.11	39
Lifting/lowering individual cylinder units under load	10.4.11.1	39
2+2 operation	10.4.11.2	41
Supplementary options	10.4.12	43
Programmed parking out position	10.4.12.1	43
Programmed parking position	10.4.12.2	43
"Automatic" operating mode	10.5	45
Switching on the lifting system	10.5.1	45
Checking the vehicle approach direction through axle relationship	10.5.2	47
Park out	10.5.3	49
Fitting the sliding pieces (load supports)	10.5.4	50
Storage locations for manufacturers and vehicle types	10.5.5	50
Saving and editing vehicles	10.5.6	51
Selecting saved vehicles	10.5.7	55
Positioning a vehicle that is not saved	10.5.8	56
Positioning a saved vehicle	10.5.9	57
Automatic horizontal positioning of load supports	10.6.0	58
Vertical traversing: Installing and lifting the load supports	10.6.1	59
Vertical traversing: Synchronous lifting	10.6.2	60
Vertical traversing: Synchronous lowering	10.6.3	62
Parking	10.6.4	63
Special Features	10.6.5	64
Lifting/lowering individual cylinder units under load	10.6.5.1	64
2+2 operation	10.6.5.2	66
Help with faults – determination of defects	11	69
Emergency lowering	12	73
Emergency lowering using the suspended switch or control box	12.1	74
Emergency lowering using compressed air (pneumatic release)	12.2	75
Maintenance, care and servicing	13	77
Care	13.1	78
Taking the lifting platform out of service	14	81
Warranty, claims	15	83
Additional information	16	85

1. Description of the lifting system

The ES DUAL is a set of multiple-piston lifting system, developed to receive and raise commercial vehicles and buses.

The ES DUAL system consists of at least two and at most four cylinder units that can be combined together, where there is always at least one cylinder unit that cannot be moved.

The ES DUAL system is available in a very wide variety of versions, as a result of being able to combine cylinder units with different numbers and types.

Raising with the lifting system ensures that there is full access to the vehicle in the vicinity of its wheels and its undersurface. In this way it is possible to perform maintenance, servicing and repair tasks on the vehicle.

The lifting system can be operated from the switching cabinet or from the suspended switch(es). The appropriate operating element can be selected by means of a keyswitch at the switching cabinet.

The vehicles are securely supported by a large number of exchangeable sliding pieces (load supports).

All traverses that are activated from the switching cabinet or from the suspended switch only remain active as long as the appropriate button remains depressed. If the button is released the procedure is immediately interrupted/deactivated ("dead man's control").

The "roll cover" is carried along when the cylinder units move horizontally.
This ensures that the pit is always covered.

The horizontal traversing is implemented by a chain drive driven by a geared electric motor.

The 2+2 operation is a special feature. With this option it is possible for a set of lifting system with four cylinder units to be divided into two sets of lifting systems that can be operated independently (optionally available / retrofitting possible).



Original Operating Instructions

ES DUAL 8.0 / 14.0

2. Technical data

Technical details of the cylinder units	8.0	14.0			
Number of cylinder units for the complete lifting system	2	2	3	4	4
Number of moveable cylinder units for the complete lifting system	1	1	2	2	3
Number of fixed cylinder units for the complete lifting system	1	1	1	2	1
Lifting capacity per cylinder unit [kg]	8,000	14,000			
Lifting height [mm]	1900	1900			
Piston rod diameter [mm] (2 piston rods per cylinder unit)	90	125			
Lifting time [seconds]	approx. 60				
Lifting speed [m/sec.]	approx. 0.03				
Lowering speed [m/sec.]	approx. 0.03				
Operating pressure [bar] (at 14,000 kg lifting capacity per cylinder unit)	approx. 70				
Mounted with "fitting frame or fitting pit liner" with wide roll cover					
Roll cover can be driven over with a wheel load of [kg]	1400				
Distance over which the moveable cylinder units can move [nm]	3720	4020			
Mounted with "fitting frame or fitting pit liner" with narrow roll cover					
Roll cover can be driven over with a wheel load of [kg]	4000				
Distance over which the moveable cylinder units can move [nm]	3720	4020			
Drive, connected electrical loads and sound pressure level					
Drive	electro-hydraulic				
Connected loads	3x230/400V – 50Hz				
Fuse protection [to be provided by customer]	25 AT	25 AT	35 AT	50 AT	50 AT
Sound pressure level [dB (A)]	< 70				
Hydraulic power and data					
Hydraulic pump capacity [cm³/U]	8	16			
Hydraulic oil capacity [liters]	56	95			
Hydraulic oil / type designation	HLP-D 22				



Original Operating Instructions

ES DUAL 8.0 / 14.0

3. Regular checks prescribed in accordance with BGR 500

In accordance with the "lifting platforms" accident prevention regulations (BGR 500, previously VBG 14), checks are prescribed for lifting platforms, according to design and application, before initial commissioning, as are regular checks at intervals of one year at most, and also extraordinary checks after modifications to the design or after significant repairs on load-bearing parts. They must be undertaken by persons who are technical experts and specialists for lifting platforms (§ 38 to 42).

Lifting platforms that have not been supplied in an operationally ready condition must be checked before initial commissioning for readiness for operation by a specialist. This applies also to lifting platforms of proven design that are delivered as component parts and are assembled by the operating company. Readiness for operation includes fault-free functioning of all safety devices.

For lifting platforms that have undergone an acceptance check by a technical expert at the installation site, an additional check by the specialist is not required.

The regular checks are essentially visual and functional checks.

They include:

- the condition of parts and equipment, including determination as to whether any modifications have been undertaken,
- the integrity and effectiveness of the safety devices and
- the completeness of the test book.

Checking by technical expert:

Technical experts are persons who, on the basis of their specialised training and experience, have acquired specialist knowledge in the field of lifting platforms and are familiar with the relevant national worker protection regulations and generally recognised technical directives (such as VDE regulations, DIN sheets). They should be able to check out lifting platforms and provide an authoritative assessment report.

For the checks that must be performed by technical experts, the following can, for example, be called on:

- technical monitoring experts, i.e. from the Technical Monitoring Associations, also in Hamburg from the Office for Worker Protection and in Hessen from the Technical Monitoring Offices,
- specialist engineers from the manufacturer
- specialist engineers from the operating company, and also
- independent specialist engineers.

Checking by specialists:

Specialists are persons who on the basis of their specialist training and experience have competent knowledge in the field of lifting platforms and are familiar with the relevant national worker protection regulations, accident prevention regulations, and generally recognised technical directives (such as VDE regulations, DIN sheets) to the extent that they are able to assess the safe working condition of lifting platforms.

For the checks that must be performed by specialists, the following can, for example, be called on (in addition to the technical experts):

- operations engineers,
- operations supervisors, and
- customer service fitters from the manufacturer.

The entries for each of the checks must be documented in the test book.



Original Operating Instructions

ES DUAL 8.0 / 14.0

4. Important notes for these operating instructions

Before attempting to operate the lifting system these operating instructions must be read carefully. The operating instructions must be retained in an accessible location at all times.

It must be ensured that all persons who are to carry out activities on the lifting system are able to refer to the operating instructions at all times. In addition to the operating instructions there are other directives relating to worker protection legislation and work equipment regulations that must also be made available.

When the lifting system is being operated the following safety notes must be observed without fail. In this manner life-threatening injuries to persons, damage of machinery and other objects can be avoided. See "Safety" in Section 6.

The lifting system may only be introduced or used in accordance with regulations. See "Use of the lifting system in accordance with regulations", Section 5.

"Requirements and qualifications for operating personnel" must be observed - see Section 9.2.

5. Use of the lifting system in accordance with regulations

The purpose of the lifting system is to lift motor vehicles safely. The permissible lifting capacity, as defined on the type plate, may not be exceeded.

The lifting system is designed so that persons can remain under the load supports. It is not designed to be stepped on to, or for conveyance of persons. The installation of the lifting system at sites where there is a risk of fire or explosions is prohibited.

Use in accordance with regulations includes reading of these operating instructions and observance of all the details contained in them – in particular the safety notes. It also includes performance of all inspection and maintenance tasks at the prescribed time intervals.

If the lifting system is not used in accordance with regulations, the safety of lifting system operation cannot be guaranteed.

Modifications to the lifting system are prohibited as a matter of principle. The operating instructions must be followed in their entirety.

The manufacturer is not responsible for any personal injury or damage to property that arises from use not in accordance with regulations – the responsibility is that of the lifting system operating company.



Original Operating Instructions

ES DUAL 8.0 / 14.0

6. Safety

This lifting system has been developed and produced having given consideration to a hazard analysis, and after careful selection of the standards to be observed and of other technical specifications. It therefore represents state of the art technology and ensures a very high level of safety.

In practice, however, this level of safety can only be maintained if all necessary measures are taken. It is part of the duty of care of the lifting system operating company to plan for these measures and to check that they are carried out.

6.1 Safety equipment associated with the lifting system

- Each cylinder unit consists of two separately operating lift cylinders that are supplied from a common hydraulic unit (with two separate hydraulic systems).
Each of the two lift cylinders here has been dimensioned for the maximum permitted loading of the cylinder unit. If either of the two lift cylinders should fail, the cylinder unit has been designed in such a way that the remaining intact lift cylinder can continue to bear the full load. Controlled lowering of the maximum permitted load with only one intact lift cylinder remains possible.
- The lifting and lowering procedure during synchronous operation is only possible within pre-defined limits. This ensures that the vehicle is always in a horizontal position. If it is not possible to carry out the lifting and lowering procedures within the limits, it is interrupted automatically, and a fault signal is generated.
- If a cylinder unit meets an obstruction during horizontal traversing, the traverse is interrupted by a clutch. The clutch has not been designed for frequently meeting an obstruction (or the end stop).
- Protection against undesired movements (e.g. lifting and lowering processes) of the lifting system: Traverses are only carried out for as long as the operator continues to depress the appropriate button (operating element) ("dead man's control"). If the button is released the traverse is immediately halted.
- The operating unit is selected by means of a keyswitch at the control box.
Operating units that have not been selected are inactive. This prevents another operator from carrying out unwanted operations on the lifting system. Once the operating unit has been selected, the key should be removed from the keyswitch and kept in a safe place.
- The lifting system is fitted with EMERGENCY OFF switches. They are located:
 1. on the suspended switch(es)
 2. The main switch on the switching cabinet also acts as the EMERGENCY OFF switch.
- Pressure limiting valves prevent lifting of the cylinder units with more than the permitted load.

The control continuously carries out self-checks. If important program procedures cannot be carried out, or cannot be carried out within a pre-specified time, the traverse is interrupted immediately and an fault message is generated.

6.2 Meaning of symbols and pictograms

Symbols and pictograms identify warnings and risks, but also highlight notes at important points in the documentation.

In this documentation the following designations must be observed:



Warning symbol signifies that partial or total failure to follow instructions can endanger personnel.



Attention symbol signifies that partial or total failure to follow instructions can lead to damage of the equipment or facility.



Information symbol signifies provision of additional or special details.

Injuries to personnel that arise from non-observance of these operating instructions are not covered by product liability legislation.

The MAHA Company does not accept any liability for damage to the lifting system or vehicles that arises as a result of non-observance of the safety notes.

6.3 Safety begins before commissioning

The lifting system may only be introduced into operation by technical service personnel from the MAHA Company or authorised service partners.

The standard design of lifting system should not be installed at sites where there is a risk of fire or explosions, because the lifting system is not fitted with an explosion protection system.

Before each start-up the following activities must be performed:

- Before any operation of the lifting system a visual inspection must be performed. Any faults that are identified must be removed immediately or reported to the supervisory personnel.
- All items of equipment and other material that are not required for operation of the lifting system must be removed from the working area around the lifting system.

6.4 Safety regulations for lifting system operation

The operator must in particular ensure that:

- The lifting system is only operated in a fault-free, fully functional condition and the safety devices are regularly checked to ensure that they are fully functional,
- Necessary personal protective measures for operating, servicing and repair personnel are available and used,
- The operating instructions are always available in a legible condition and complete at the point of use of the lifting system,
- Only sufficiently qualified, trained and authorised personnel operate, service and repair the lifting system,
- These personnel are regularly instructed in all relevant questions regarding work safety and environmental protection, and are familiar with the operating instructions and in particular the safety notes included in them,
- All plates on the lifting system providing safety notes and operating notes are always in an easily legible condition. Damaged or illegible plates must be replaced immediately,
- The permitted lifting capacity as defined on the type plate is not to be exceeded,
- The lifting system is secured against unauthorised use (by closing off the main switch with a padlock),



- **No persons may be transported with the lifting platform,**
- **Vehicle and lifting platform must always be kept under observation during the lifting and lowering procedures,**
- **During the lifting and lowering procedures persons are not allowed to remain in the area of movement of the vehicle and platform,**
- **Climbing on to the vehicle or lifting platform when lifted is prohibited,**
- **Legal requirements for accident prevention must be observed,**
- **Vehicles may only be raised on the load bearing points and these must be in a fault-free state (e.g. not rusted through)**

6.5 Safety regulations in normal operation

- The lifting system must only be operated by means of the operating elements provided (switching cabinet or suspended switch).
- The operating personnel; must be confident before lifting vehicles that these must be lifted only on the load bearing points and that these are in a fault-free state (e.g. not rusted through).
- When the lifting platform has been switched off the operating personnel must wait until all moveable parts are stationary. Only then may they leave the lifting platform.

At least once per day the following checks must be performed:

- The lifting platform must be checked for externally visible damage,
- The functionality of all safety devices must be checked.



- **During operation of the lifting platform no safety devices may be removed or deactivated.**
- **The operating personnel must ensure that during operation (lifting and lowering procedures) no persons remain in the working area around the lifting platform.**
- **If a vehicle begins to roll or tilt as a result of incorrect positioning, both the immediate area of danger and the area indirectly at risk must be vacated immediately!**
Staff must be warned of the risks by shouting.

6.6 Safety regulations for servicing and repair activities

Before maintenance tasks are performed the following points must be observed:

- Before all repair, servicing or start-up activities the main switch must be switched off and secured so that it cannot be switched back on inadvertently.
- If the lifting system is fitted with optional submergible pumps their electrical power must be disconnected. This is done at the switching cabinet, and must only be performed by service technicians.
- Pressurised parts of the facility (hydraulic cylinder, supply lines, valves and their components) can remain pressurised even when the lifting system has been switched off. Before working on these parts, they must be depressurised.
- Block off access to the working area around the lifting system and ensure that no unauthorised persons remain in this area.
- Servicing or repair tasks may only be performed by service technicians from the MAHA Company or authorised servicing partners.
- Tasks on the electrical parts of the lifting system may only be performed by electrical specialists.
- The maintenance tasks prescribed in the operating instructions such as adjustments, cleaning, lubricating, servicing or inspection must be performed at the correct intervals.

6.7 For tasks on electrical components and equipment

- Before all repair and servicing tasks the main switch must be switched off and secured so that it cannot be switched back on inadvertently.
- All tasks on the electrical components and equipment of the lifting system must as a matter of principle only be performed by trained electrical specialists.
- Check electrical fittings regularly: Tighten up loose connections. Replace immediately any damaged lines or cables.
- Keep the switching cabinet and all electrical power supply units locked. Access is only permitted for authorised persons using a key or special tool.
- For all tasks on high voltage parts of the lifting system or lines a second person must always be present who in an emergency can switch off the main switch.
- Never clean electrical equipment using water or similar fluids.

After concluding the maintenance tasks, and before starting up the lifting system, the following points must be observed:

- Check whether all protection devices that have previously been removed, such as covers, lids, gauzes, and filters, have been reinstalled correctly,
- Ensure that all tools, materials and other items of equipment used have been removed from the working area,
- Clean the working area and if necessary remove traces of any fluids or similar substances that have escaped,
- Ensure that all safety devices for the lifting system once again function in a fault-free manner.



6.8 Modifications to the lifting system

For safety reasons no unauthorised modifications may be undertaken on the lifting system. This applies also to welding tasks on load-bearing parts.

In certain circumstances after an unauthorised rebuild of the lifting platform the company MAHA GmbH & Co. KG may no longer be viewed as the manufacturer of the lifting platform. In such cases the procedure to obtain the CE mark must be carried out again in its entirety.

All planned modifications must be approved in writing by the company MAHA GmbH & Co. KG.

Use only original spare parts, consumables, and accessories – these parts have been specially designed for this lifting system. For parts procured from elsewhere there is no guarantee that these have been designed and produced to meet the load and safety requirements.

Parts and special equipment that have not been produced by the MAHA Company are not cleared for use on the lifting system.

6.9 For environmental protection

For all tasks on and with the lifting system the regulations regarding avoidance of waste and the correct recycling and disposal of waste must be observed.

In particular for installation and maintenance tasks, and also when taking the lifting platform out of service, care must be taken that materials such as greases, oils, coolants, cleaning agents containing solvents, and similar, which have the potential to damage the ground water, do not pollute the ground or enter the sewerage system. These substances must be captured, stored, transported and disposed of in suitable containers.

7. Risks in accordance with hazard analysis

Life-threatening injuries to people and damage to machinery can occur as a result of improper usage. Serious physical injuries can occur as a result of careless use of personal protective measures. Serious injuries to persons and damage to objects can occur as a result of incorrect reactions to operational malfunctions. It is therefore essential for operators to ensure that they are familiar with the regulations regarding operational malfunctions and safety.

Some work functions necessitate positions of the lifting system that also introduce some risk at the same time.

Exactly when an operating condition becomes dangerous depends on the type of vehicle that is being worked on and the vigilance of the operator.

Risks caused by noise:

Attention must be paid to the fact that when machinery is running spoken communication and the perception of acoustic signals can be impaired. Warning signals from other facilities or the shouts of a colleague can easily be ignored.

Depending upon local conditions (such as during inspection tasks) higher sound pressure levels can also occur. In this case suitable personal protective measures must be made available to the maintenance personnel as necessary.



- For inspection, servicing and cleaning tasks or other lifting and lowering procedures that do not correspond to normal operation, crush and shear points can arise in the vicinity of the load supports (depending upon the design variant).
- Risk of poisoning from exhaust gases:
After driving the vehicle into position and before leaving the vehicle the engine must always be turned off. Never lift the vehicle or carry out tasks underneath the vehicle with the motor running.
- Risk caused by inadvertent operation:
Operation by a third party can result in a devastating accident.
- Beware of opportunities for tripping up:
Load supports that are in position on the floor are opportunities for tripping up that are easy to overlook.
Vehicles that are in the raised position can have the effect of reducing the amount of light available. Depressions in the floor are not so easy to spot when the load supports are raised. Here too there is a risk of injury caused by falling in or tripping up.

For all the above named activities a heightened awareness is required during the lifting or lowering procedures for the load supports. The hazard area must be observed.

The installation or removal of heavy vehicle components, or the application of force, can cause the centre of gravity of the vehicle to shift. In this way the secure location of the vehicle can be affected and there is a risk that it may fall. Should a shift in the centre of gravity or application of force (as described above) be necessary, suitable safety measures must be taken by the operating personnel to ensure the location of the vehicle remains secure.

The following conditions can lead to the vehicle falling:

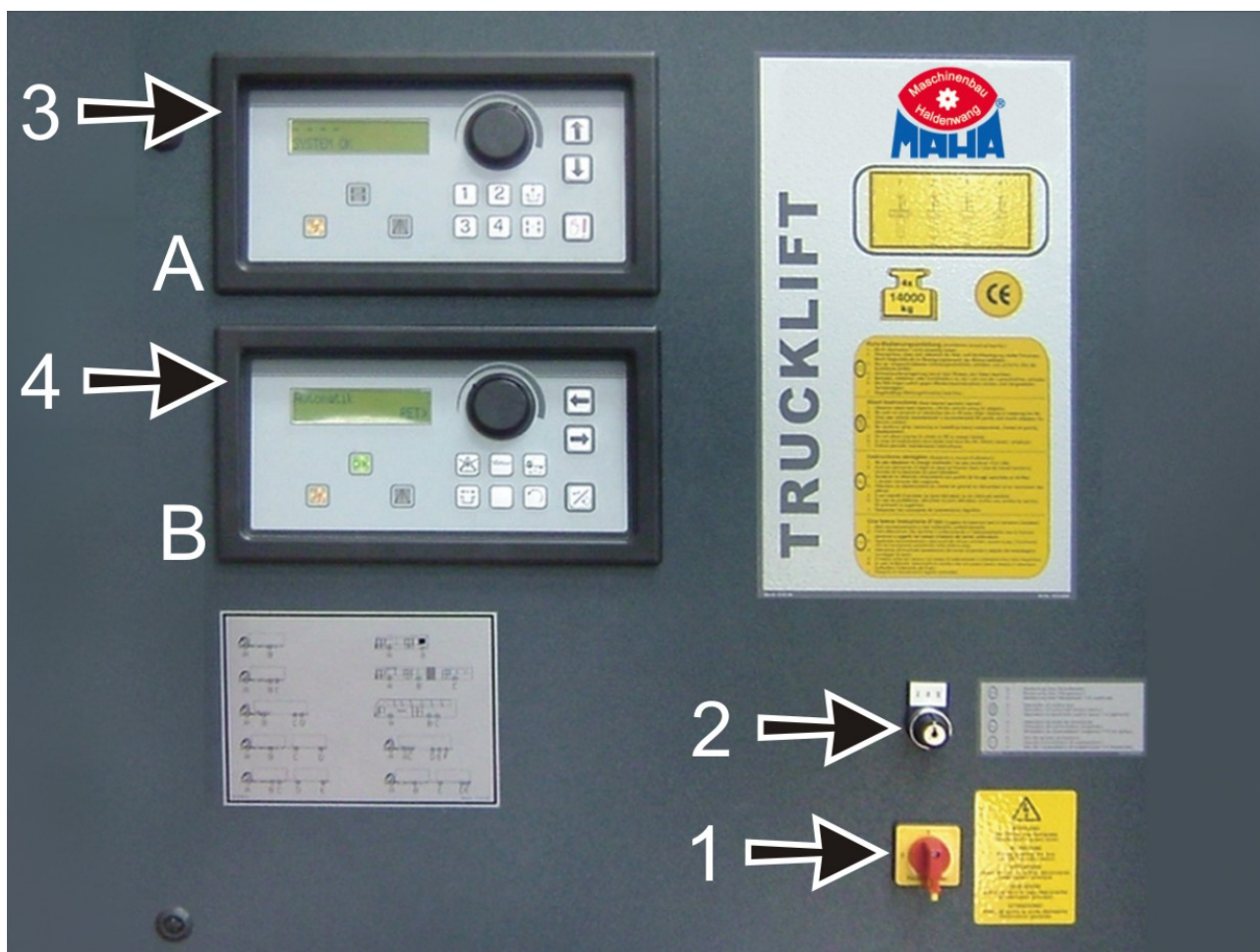
- the vehicle is not correctly positioned before lifting,
- incorrect load supports are used.

8. Operating units: Switching cabinet and suspended switches

All the operating elements illustrated here refer to the description under "List of the operating elements and their function". See Section 8.1.

Basic configuration of the operating elements (configuration can deviate according to the variant delivered)

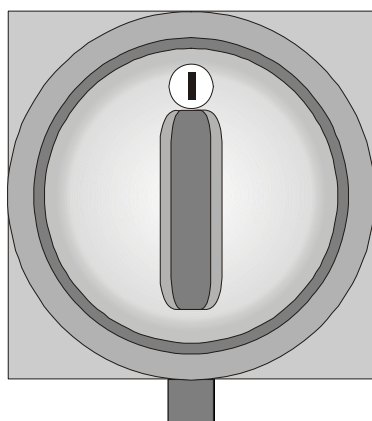
Switching cabinet:



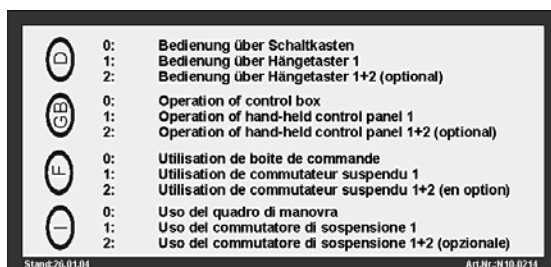
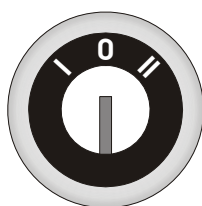
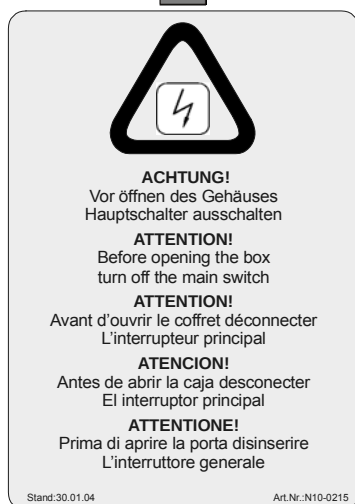
Main switch [1] can be secured with a padlock in the switched off state (switch position "0") against unauthorised access.

8.1 List of the operating elements and their function

Position Number	Name	Function
1	Main switch	On/off and emergency off
2	Keyswitch	Switch for selecting the operating units (switching cabinet and suspended switches)
3	Operating unit "A"	Operation of the cylinder units
4	Operating unit "B"	Operation of the drive unit and programming

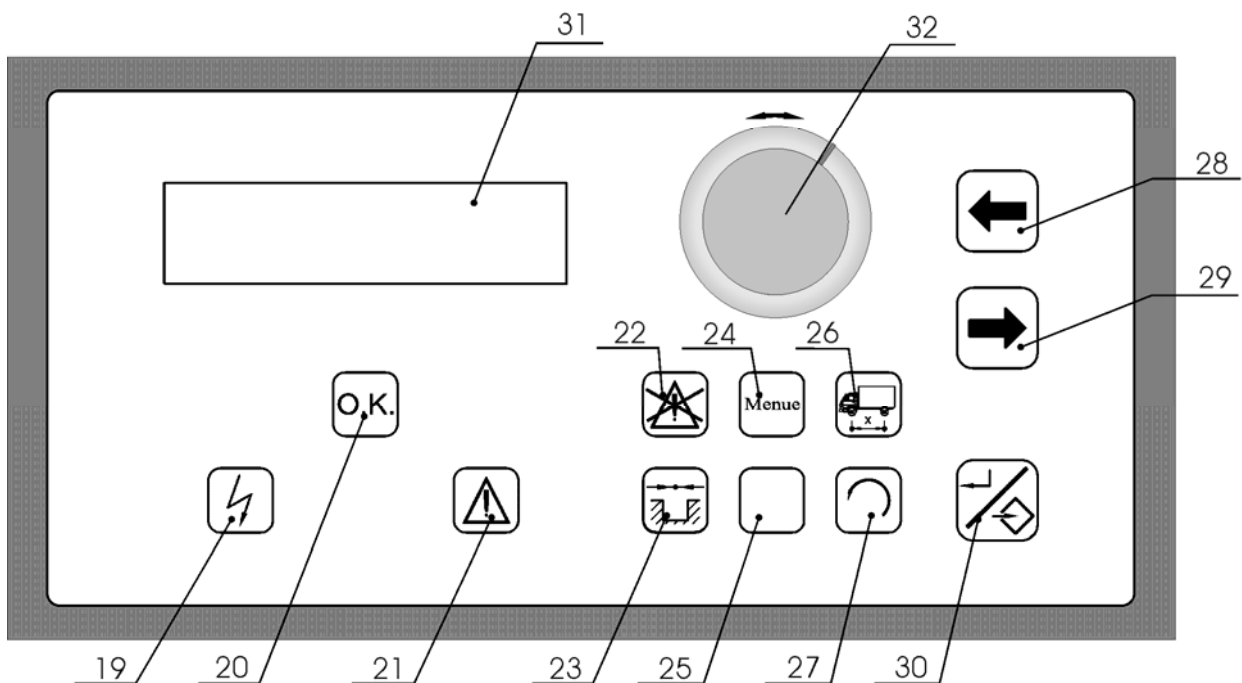
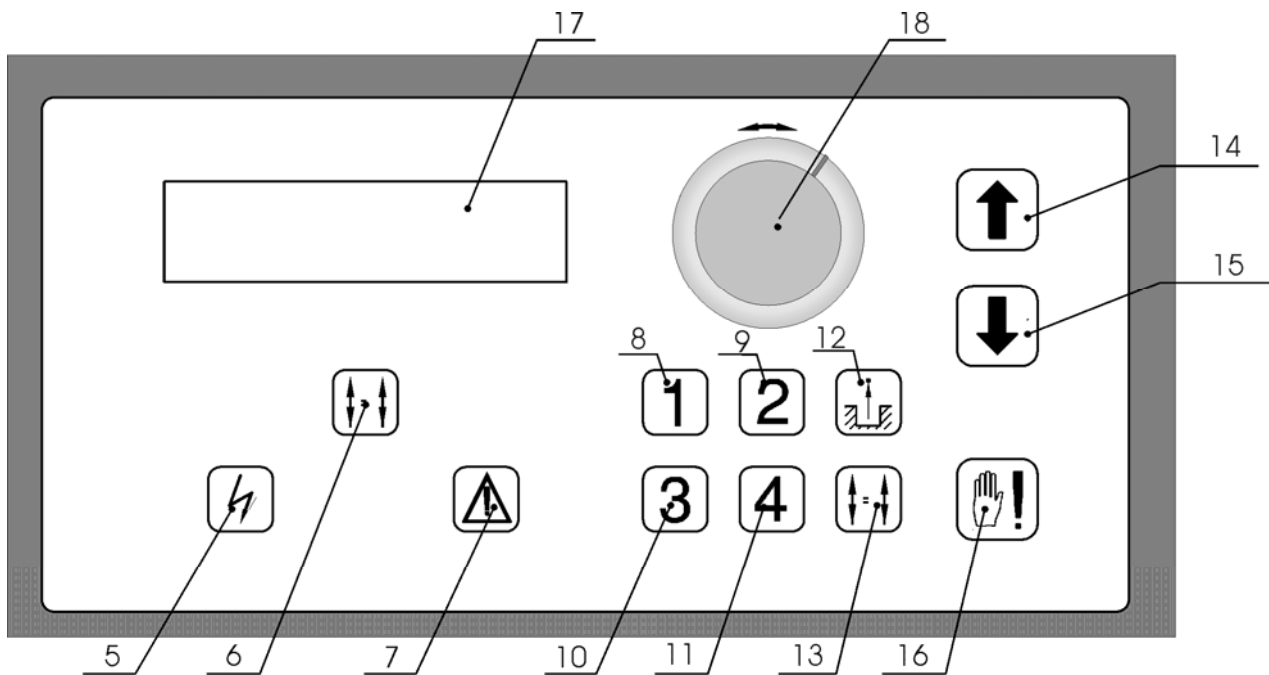


Enlarged illustration of the main switch [1]



Enlarged illustration of the keyswitch [2]

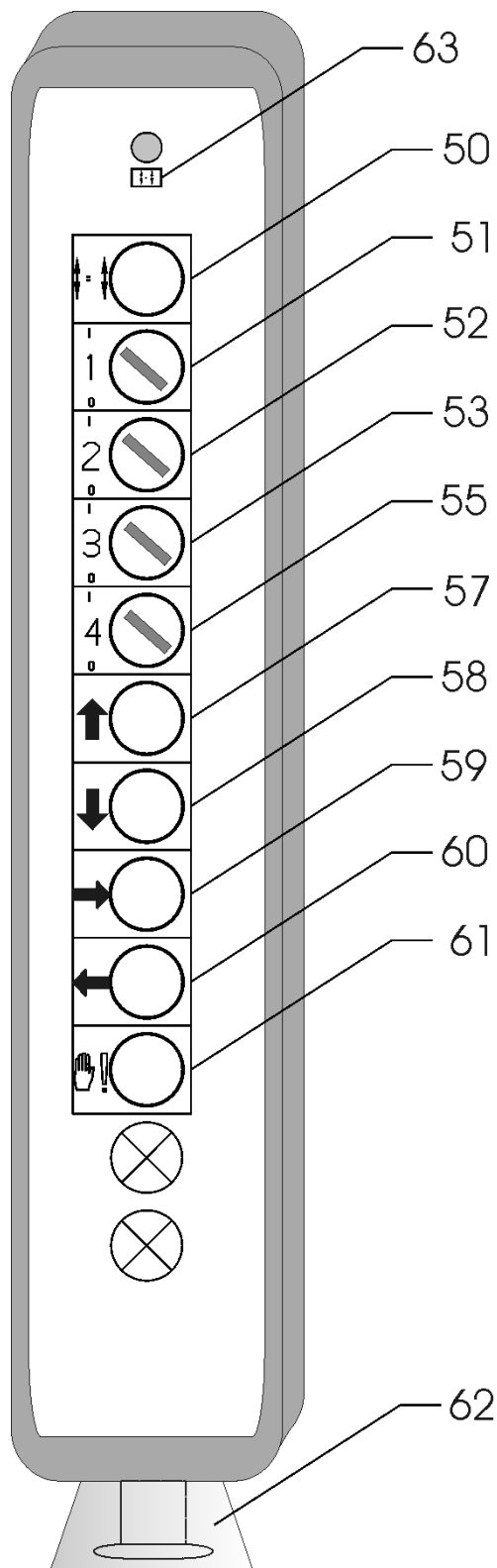
Operating units [A] and [B] (switching cabinet):



For 8.1: List of the operating elements and their function

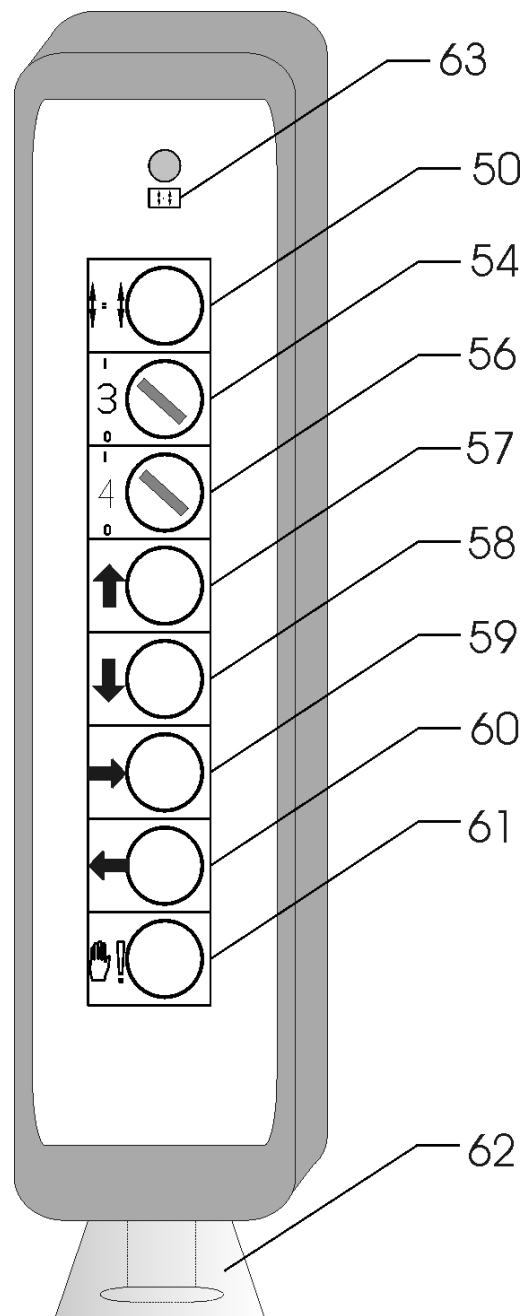
Position Number	Name	Function – operating units A and B
5	Indicator lamp (orange)	Displays: mains voltage is present
6	Indicator lamp (green)	Displays: synchronous operation active
7	Indicator lamp (red)	Displays: fault
8	Button	Activate / deactivate cylinder unit 1
9	Button	Activate / deactivate cylinder unit 2
10	Button	Activate / deactivate cylinder unit 3
11	Button	Activate / deactivate cylinder unit 4
12	Button	Lift from parking position (active cylinder units)
13	Button	Activate / deactivate synchronous lifting / lowering (active cylinder units)
14	Button	Lift (active cylinder units)
15	Button	Lower (active cylinder units)
16	Button	Activate user intervention
17	Display 1	Display the operating state of the lifting system
18	Rotary knob	Function not assigned
19	Indicator lamp (orange)	Displays: mains voltage is present
20	Indicator lamp (green)	Operating state of the lifting system
21	Indicator lamp (red)	Displays: fault
22	Button	Reset fault
23	Button	Approach parking position (active cylinder units)
24	Button	Activate menu (menu selection)
25	Button	Not assigned
26	Button	Drive to saved vehicle position
27	Button	Clear last input / return to previous menu item or previous input
28	Button	Move to the left (active cylinder units)
29	Button	Move to the right (active cylinder units)
30	Button	Save positions / vehicle data / settings
31	Display 2	Display menu items / maintenance messages / faults
32	Rotary knob	Selection of menu items / selection of letters and numbers during vehicle programming and setup

Suspended switch 1



Suspended switch 1

Suspended switch 2



Suspended switch 2

For 8.1: List of the operating elements and their function

Position Number	Name	Function – suspended switches 1 and 2
50	Button	Activate / deactivate synchronous lifting / lowering (active cylinder units)
51	Selection switch	Activate / deactivate cylinder unit 1
52	Selection switch	Activate / deactivate cylinder unit 2
53	Selection switch	Activate / deactivate cylinder unit 3 (Suspended switch 1)
54	Selection switch	Activate / deactivate cylinder unit 3 (Suspended switch 2)
55	Selection switch	Activate / deactivate cylinder unit 4 (Suspended switch 1)
56	Selection switch	Activate / deactivate cylinder unit 4 (Suspended switch 2)
57	Button	Lift (active cylinder units)
58	Button	Lower (active cylinder units)
59	Button	Move to the right (active cylinder units)
60	Button	Move to the left (active cylinder units)
61	Button	Activate user intervention
62	Mushroom-type button	EMERGENCY OFF
63	Indicator lamp (green)	Displays: synchronous operation active



Original Operating Instructions

ES DUAL 8.0 / 14.0

9. Commissioning

After initial commissioning the following points must be checked:

- The checks are performed by a specialist. The check results must be documented in the test book.
- Check whether the "OK" indicator lamp is lit at the switching cabinet, and that no fault is being reported.
- Using a torque wrench, check that all fixing bolts have been fitted with the correct tightening torque (see following values):
 - Fixing bolts for the load supports
(Load supports – cylinder unit): M20-10.9, tightening torque 200 Nm
 - Fixing bolts for the cylinder unit in the fitting pit liner / frame
(Cylinder unit – fitting pit liner / fitting frame): M20-10.9, tightening torque 200 Nm
- Check that all the hydraulic drive units are free from leaks.
- Check that the chain is under sufficient tension.
- Check that trailing cables can move freely.
- Check the electronic synchronization control (synchronous operation of the lifting system).
- Before each start-up, check that no tools or extraneous parts have remained in the vicinity of the lifting system.

When commissioning the lifting system the following particular risks must be taken into account:



Incorrect connections can cause the horizontal / vertical positioning units of the lifting system to start up unexpectedly.

- Interchanged electrical connections cause an incorrect direction of motor rotation – this can lead to serious damage.



- Incorrectly wired up electrical connections can destroy the electrical / electronic components.
- Electrostatic processes / power interrupts can present a hazard to the electronic components and also lead to software errors.

In order to avoid damage to the facility or life-threatening injuries during commissioning of the lifting system the following points must be observed:

- Commissioning of the lifting system may only be performed by qualified, trained and authorised persons with observance of the safety information details.
- All EMERGENCY OFF switches must be easily reached and freely accessible.
- Before first starting, check the electrical connections / hydraulic connections / and the indicators on the two displays at the switching cabinet for any faults.
Observe particular protective measures (such as earthing) for the electrostatically at risk components.



9.1 Description of the working area, activity of the operating personnel

Two operating components for operating staff are present on all lifting systems.

The operating element is selected by the position of the keyswitch at the switching cabinet.

The first operating unit for operating staff is located at the switching cabinet.

The position of the switching cabinet is determined at assembly time.

The second operating unit for operating personnel is located along the lifting system. The operating unit (or units) can be carried along an optional running rail.

Not all the lifting system's functions can be controlled from the suspended switch(es).

9.2 Requirements and qualifications for operating personnel

The lifting system may only be operated by persons who are trained, instructed and authorised for this equipment. These persons must be familiar with the operating instructions and act accordingly. The precise authorities of the operating personnel must be clearly defined.

The lifting system may only be operated by means of the specified operating units.

If several persons work on the lifting system together, a supervisor must be designated.

When operations are in progress only the operating personnel may remain in the vicinity of the lifting system.

The operating personnel must fulfil the following cited requirements:

- Mentally and physically fit to operate the lifting system
- At least 18 years of age
- Participation in instruction on operating the lifting system
- Authorised for operation by the operating company
- Has read and understood the operating instructions

The following activities may only be performed by persons who are trained, competent, instructed and authorised to do so:

- Transportation
- Installation
- Commissioning
- Instruction
- Fault removal
- Maintenance
- Servicing
- Repair

The following activities may only be performed by persons who are instructed, competent and authorised to do so:

- Cleaning

The following activities may only be performed by persons who are trained, instructed and authorised to do so:

- Taking the lifting platform out of service

Operating personnel who are still in training may in the first instance only work under the supervision of an experienced person on the lifting system. Successful completion of a course of instruction should be confirmed in writing. Documentation of the course of instruction is a task for the operating company.

All control and safety devices may as a matter of principle only be actuated by instructed persons.

All persons who perform activities on the lifting system must have read the operating instructions and by their signature must confirm that they have understood the operating instructions.

10. Operation

10.1 General notes for operation

When operating the lifting system normally the following particular risks must be taken into account:

- If the "Fault" lamp lights, the cause of the fault must be found. If the cause of the malfunction cannot be established MAHA Customer Service must be informed. The lifting system must be switched off and secured against any unauthorised attempt to switch it on again by a third party.
- After an EMERGENCY OFF switch off the multiple-piston lifting system must be secured against any unauthorised attempt to switch it on again by a third party.
- If the lifting system is to remain switched off and unsupervised for a more extended period of time the main switch must be secured with a padlock against any unauthorised attempt to switch it on again.
- After switching off the lifting system at the main switch [1], or after the EMERGENCY OFF function has been triggered by means of the mushroom-type button [62], the lifting system is completely switched off. When it is switched on again, those functions that were active before switching off (active cylinder units, synchronous operation) are returned to their original state (deactivated).

10.2 Sliding pieces (vehicle-dependent load supports)

Only original accessories may be used or fitted. Actions such as adapting the sliding pieces from third parties to a MAHA load support is forbidden. All warranty claims become void if this is not observed.

Appropriate sliding pieces must be used and exchanged, according to the particular situation.

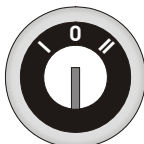
MAHA's "Technical Service/Spare Parts Information" department is available to answer further questions on the use of the correct load support devices.

See "Warranty, claims", Section 15, for further information.

10.3 Selecting the operating unit using the keyswitch

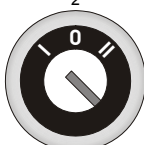
The desired operating unit is selected by positioning the keyswitch.

Turn the keyswitch [2] at the switching cabinet to position "0", "I" or "II" to change the operating unit.



Key position "0":

Operation only possible through the switching cabinet operating unit



Key position "I":

Operation only possible through the operating unit on suspended switch 1



Key position "II":

Operation possible through the operating units on suspended switches 1 and 2

For safety reasons, active cylinder units are deactivated when changing from the switching cabinet to suspended switch "1" or suspended switches "1" and "2". If synchronous operation of cylinder units is switched on, the synchronous operation is deactivated / cancelled.

Cylinder units that are required must be activated again, and synchronous operation switched on if necessary.

In practice:

Changing from switching cabinet to suspended switches:

All active cylinder units are deactivated, including those that are operating synchronously.

Changing from suspended switches to switching cabinet:

All cylinder units that are active remain so.



The "Automatic" operating mode is only possible when the keyswitch is not in position "0". When switching between the suspended switches and the switching cabinet, the "User intervention" function is not maintained. The "User intervention" message shown on the display [17] goes out when switching to a different operating unit.

10.4 "Manual" operating mode

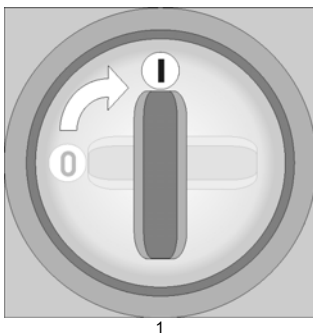


The following examples of the "Manual" operating mode assume that the lifting system is fully fitted out. It is possible that the supplied version does not contain all of the functions or options mentioned below.

All the operating elements and displays described here refer to the description under "List of the operating elements and their function". See Section 8.1.

The position numbers assigned to the components and operating elements are presented in square brackets. Example indicator lamp [19].

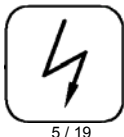
10.4.1 Switching on the lifting system



On the switching cabinet turn the main switch [1] to position "I" to switch on the lifting system.



EMERGENCY OFF function is achieved by turning the main switch [1] to position "0".



Indicator lamps [5] and [19] (orange) light up at the switching cabinet; mains voltage is present.

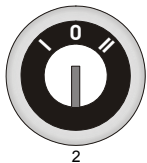


Indicator lamp [20] (green) lights up at the switching cabinet, indicating that the electrical components of the lifting system are operating without faults.

The system status is displayed a few seconds after switching the lifting system on. Display [17]



Turn the keyswitch [2] at the switching cabinet to position "0", "I" or "II" to select the operating unit.



Key position "0": Operation only possible through the switching cabinet operating unit



Key position "I": Operation only possible through the operating unit on suspended switch 1



Key position "II": Operation possible through the operating units on suspended switches 1 and 2

See "Selecting the operating unit using the keyswitch", Section 10.3

The lifting system is now ready for operation.

10.4.2 Selection / activation of the cylinder units



For an accurate summary of the arrangement of operating elements, see "List of the operating elements and their function", Section 8.1

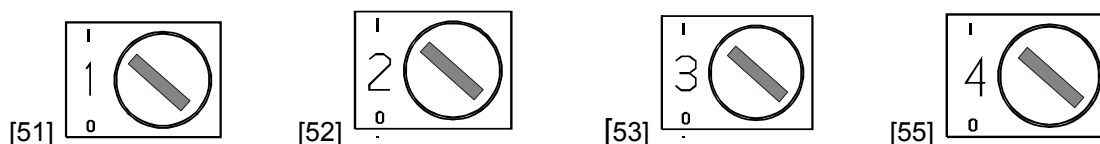
Operation via the switching cabinet:

Activating or deactivating the cylinder units by pressing the appropriate button once:



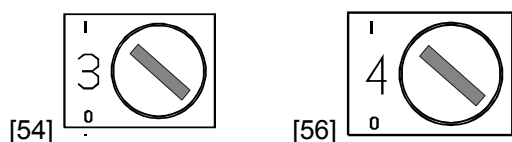
The cylinder units can also be activated or deactivated by means of the selection switches on the suspended switches.

Operation with suspended switch 1: The selection switches



are used to activate or deactivate cylinder units.

Operation with suspended switch 2: The selection switches



are used to activate or deactivate cylinder units.

Activated cylinder units are illustrated with their corresponding number on the display [17].

Example a):

Cylinder units 1, 2 and 4 are active.



Example b):

Cylinder units 2, 3 and 4 are active.



10.4.3 Park out

(only necessary when the means of fitting has a narrow roll cover and a shaft for retractable load supports)



It is necessary to park out the load support(s) in order to mount sliding pieces and/or to move cylinder units horizontally.

Activate or deactivate the appropriate cylinder units using the buttons [8, 9, 10, 11] at the switching cabinet or using the selection switches on the suspended switches [51, 52, 53, 55] and [54, 56].



14 / 57

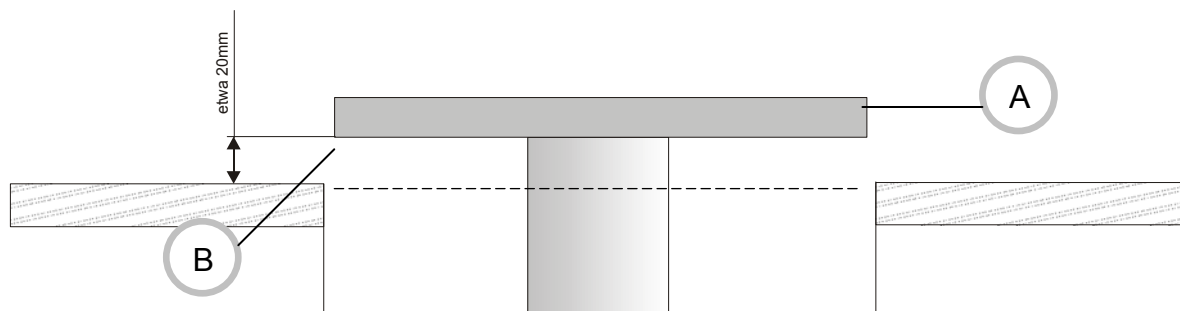
Press the button [14] (on the switching cabinet), or button [57] (on the suspended switch) in order to begin the lifting process. Hold it down until the load support (A) has been lifted out of the parked position to a horizontal, freely moveable position (B). A suitable safety clearance must be allowed for.



12

Option: Drive to parking out height.

Press button [12] (switching cabinet) in order to raise all the active cylinder units to the pre-programmed park out height. Hold button [12] (switching cabinet) pressed until the cylinder units stop automatically.

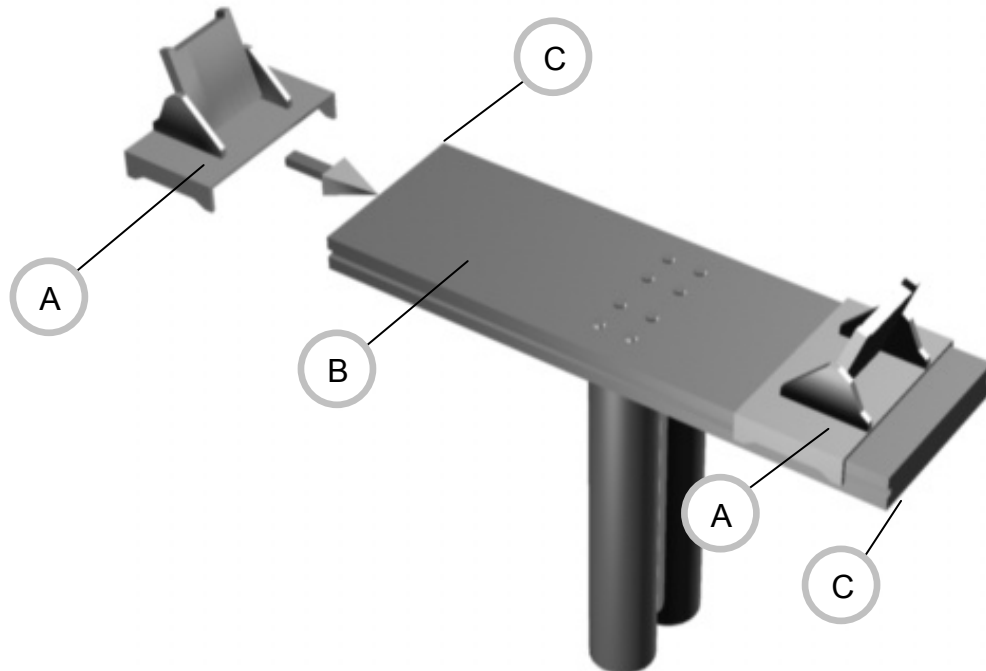


A: Load support device

B: Freely moveable position

10.4.4 Fitting the sliding pieces (load supports)

Fit or exchange the sliding pieces [A] by pushing them sideways on the load support [B].



The sliding piece(s) is/are secured by the set screw [C] on each side.



After fitting or exchanging the sliding pieces [A] it is necessary to check whether the set screws [C] have been tightened before beginning operation again!

Permissible sliding pieces: see "Sliding pieces (vehicle-dependent load supports)", Section 10.2

10.4.5 Positioning a vehicle

**Risk of collision!**

To avoid collisions, check before driving a vehicle onto the lifting system that the load support devices have been sufficiently lowered. Special attention is required when positioning low-floor vehicles. It may be necessary to get the help of a second person to watch the positioning procedure.

**Observe the maximum load capacity of the roll cover!**

The load capacity of the roll cover, which depends on the version supplied, must not be exceeded. Permissible loads can be found in Section 2, "Technical data".

Before driving on a vehicle, its expected position must be estimated and suitable sliding pieces fitted. Suitable sliding pieces are to be mounted on the load supports, the cylinder units involved in the lifting process.



It is possible to mount the sliding pieces later (after the vehicle has been driven on), but it is not recommended, because the vehicle then either fully or partially covers the associated load support devices.

If the vehicle has pneumatic suspension ensure that it is not active, and that the vehicle is resting on the lower mechanical stop.

The vehicle is to be positioned centrally with respect to the lifting system's longitudinal axis. Slight misalignment of the vehicle has been allowed for in the design of the cylinder unit.

To keep the misalignment small, we recommend that a visual guide (such as a mirror or guiding line) is used, or that help is obtained from someone else who can provide instructions. This ensures that the load supports do not collide with the wheels when the hydraulic piston extends.

To avoid tipping to the side, load bearing points specified by the vehicle manufacturers should be selected.

Special features of the vehicle may be found in the operating and servicing instructions of the vehicle to be lifted.



To ensure that vehicles are always positioned at the same place, wheel centering units (consisting of two pieces) are optionally available for an axle. Normally the wheel centering unit is found on the cylinder unit without traverse base.

The aids mentioned above can minimize the risk of a collision between the wheels and the load supports.

10.4.6 Horizontal traversing and positioning the load support material

Requirements for horizontal traversing and positioning:

If the means of fitting has a small roll cover and a shaft for retractable load support devices, the load suspension material must be parked out. (See Chapter 10.4.3)



Risk of collision!

The traversing procedure must be watched continuously. Load supports or sliding pieces can collide if the vehicle is not entirely central.



The center of the axle is not always centre line of a wheel.



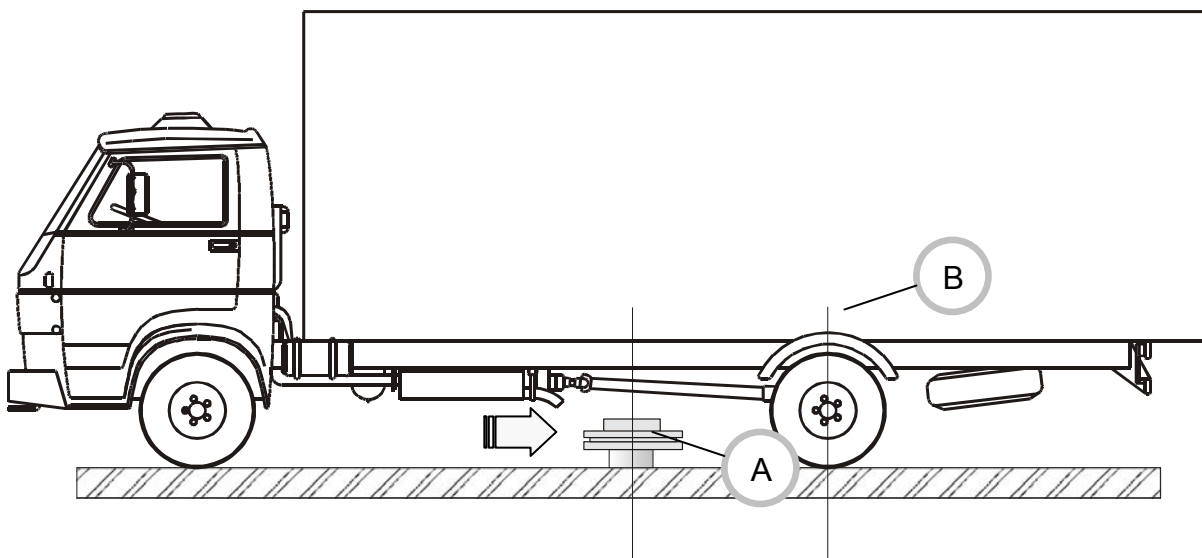
Using buttons [28] and [29] (control cabinet) or buttons [59] and [60] (suspended switch), traverse the active cylinder units [A] until they are precisely underneath the vehicle's pickup position [B]. The cylinder units can be traversed together.



However, because of the risk of a collision, it is recommended that they are traversed individually.

We recommend that the cylinder units are traversed and positioned individually.

If, as it is traversing horizontally, a cylinder unit meets an obstacle, then a clutch becomes active when the torque exceeds a pre-defined value, and this minimizes damage to the traversing drive. The slip clutch mentioned above is an additional item of safety equipment. This safety equipment is not designed for horizontal positioning as far as the mechanical end stop (driving to the end stop).



10.4.7 Vertical traversing: Installing and lifting the load supports

Requirement for vertical traversing:

Suitable sliding pieces must be mounted on the load supports. Sliding pieces must be correctly positioned under the vehicle load bearing points.



Technical considerations: When sliding pieces are placed at a vehicle load bearing point, pressure switches send a signal to the control unit when a factory-set reaction is reached, and the lift process is halted. The cylinder units stop until button [14] (control cabinet) or button [57] (suspended switch) is pressed.



Serious personal injury if the load slides.

If button [14] (control cabinet) or button [57] (suspended switch) is pressed again, the active cylinder units extend uncontrolled. This situation can occur with one or more cylinder units.

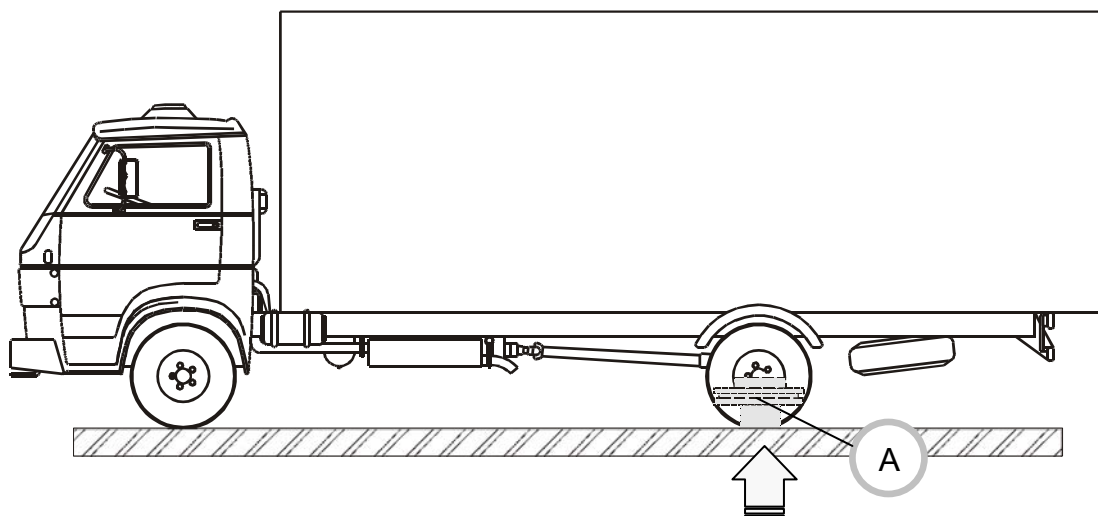


The cylinder units can be set up together. It is nevertheless recommended that they are set up individually. When the cylinder units are set up individually, the cylinder unit that is to be set up must be activated before the setting up process. After successful setting up, the cylinder unit must be deactivated again.



14 / 57

Press the button [14] (on the switching cabinet), or button [57] (on the suspended switch) in order to begin the lifting process. Hold button [12] (control cabinet) or button [38] (suspended switch) pressed until the load support (A) is set up and the lift process automatically ends.



Cylinder units that have been set up are represented by an underscore on display 1 [17].



A special case is presented by the vehicles whose construction gives them a very low dead weight on one axle. If the weight at the vehicle's suspension point is not sufficient to trigger the pressure switch, the load supports must be positioned manually by the operator. The vehicle must not be lifted during manual placement. In this special case, synchronous operation must be activated manually by user intervention. See "Lifting/lowering individual cylinder units under load", paragraph 10.4.11.1, for information regarding the user intervention function.

10.4.8 Vertical traversing: Synchronous lifting

Requirement for synchronous lifting:

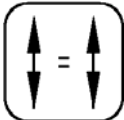
Sliding pieces must be positioned at the vehicle load bearing points (see "Vertical traversing: Installing and lifting the load supports", Chapter 10.4.7)



Technical considerations on synchronous operation:

In synchronous operation, the active cylinder units are readjusted as they are lifted or lowered in order to ensure equal movement. Unequal rates of movement resulting from different load distributions on the cylinder units are therefore corrected. The tolerance between the positions of the cylinder units is specified through pre-defined limits. The controller monitors the difference in height between the individual cylinder units, and switches into a fault state if the maximum tolerance value is exceeded (if the equipment moves out of the limits).

If synchronous operation is deactivated while the load is raised, further lifting or lowering must only be carried out with particular care.



13 / 50

Synchronous control is activated by pressing button [13] (switching cabinet) or button [50] (suspended switch). (Only active cylinder units are synchronized.)

It is still possible to deactivate synchronous control by pressing button [13] (switching cabinet) or button [50] (suspended switch) again.

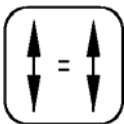


Synchronous operation is indicated on the display [17] by the plus sign (+).

Example of activated and synchronized cylinder units: 1,2,3,4



The underlining of the activated cylinder units indicates that the sliding pieces have been put in place.



6

Display at the switching cabinet:

Indicator lamp [6] (green) lights up: synchronous operation is active.

Indicator lamp [6] (green) does not light up: synchronous operation is not active.



63

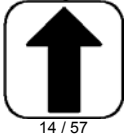
Display at the suspended switch (only if activated by the keyswitch):

Indicator lamp [63] (green) lights up: synchronous operation is active.

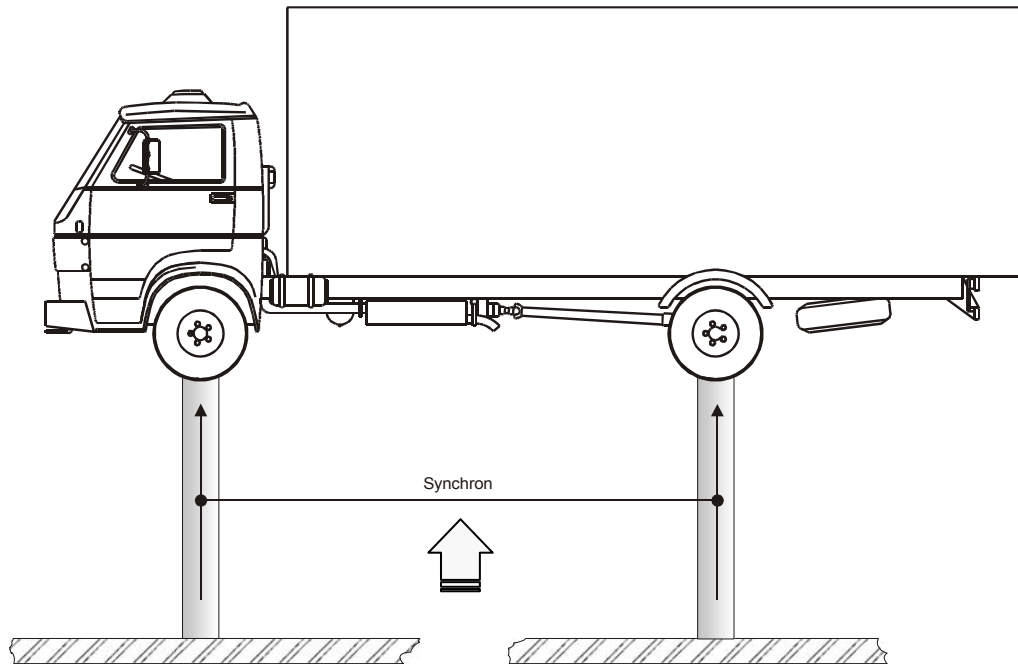
Indicator lamp [63] (green) does not light up: synchronous operation is not active.

Lifting in synchronous operation will electronically lock the synchronization circuit. It is no longer possible to deactivate synchronous control by pressing button [13] (switching cabinet) or button [50] (suspended switch) again.

Special case: Lowering a cylinder unit while the load is raised (see "Special features", Section 10.4.11).



When synchronous operation is active, hold down button [14] (switching cabinet) or button [57] (suspended switch) until the desired lifting height has been reached.



SYNCHRON = Synchronous

10.4.9 Vertical traversing: Synchronous lowering

Before lowering, check that all the load-bearing cylinder units have been selected, and that they are indicated on the display with a plus sign (+), or that the indicator lamp [63] (green) on the suspended switch is lit.

Example:

Activated and synchronized cylinder units 1, 2, 3, 4

The underlining of the activated cylinder units indicates that the sliding pieces have been put in place.



Press button [15] (switching cabinet) or button [58] (suspended switch) in order to start the lowering procedure. Lowering is not completed until the vehicle that has been raised has been fully put down once again. No load must remain on the load supports.

Special case:

If the vehicle load bearing point is too close to the ground, it is possible that not all load supports will be completely released. In that case, synchronous operation must be deactivated manually through user intervention.

See "Lifting/lowering individual cylinder units under load", chapter 10.4.11.1, for information regarding user intervention.

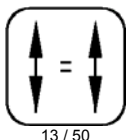
The following applies to means of fitting with the narrow roll cover or with a narrow roll cover and a shaft for retractable load supports:

The load supports will stop automatically with a safety clearance from the ground.



Load supports in the different versions:

If the equipment is mounted with a narrow roll cover and shaft for retractable load supports, it must be positioned horizontally above the parking position after this first stop. Only after this parking position has been reached can the load supports be fully retracted. (See also "Programmed parking position", Chapter 10.4.12.2)



When all load has been taken off the load supports, the synchronous circuit is electronically released, and can be deactivated by pressing button [13] (switching cabinet) or button [50] (suspended switch).

Ensure that the load supports have been fully retracted before driving the vehicle off the lifting system. Depending on the construction of the sliding pieces that are used, they may need to be folded in or possibly even dismantled to avoid collision with the vehicle.

10.4.10 Parking

Requirement for parking (applies to the narrow roll cover with retractable load supports, see also the previous page):

Retractable load supports must be moved to their parking position through horizontal traversing. This requires the cylinder units to be individually activated and moved.



28 / 60



29 / 59

Press button [28] or [29] (switching cabinet) or button [60] or [59] (suspended switch) to move the activated cylinder unit above the parking position.



23

Option: Approaching the parking position

All the activated cylinder units move to their pre-programmed parking position by pressing button [23] (switching cabinet). Exact positioning of the load supports above shaft before lowering is carried out by the controller.

Completely lowering the load supports:



15 / 58

Press the button [15] (on the switching cabinet), or button [58] (on the suspended switch) in order to begin the lowering process. The lowering is completed when the load supports have come down to floor level.

10.4.11 Special Features

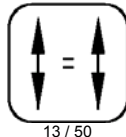
10.4.11.1 Lifting/lowering individual cylinder units under load

In order to remove various assemblies, or to improve the accessibility of the vehicle's assemblies, it is possible to move vertically individual cylinder units while under load. Particular care is required when working in this operating mode, since it is possible for changes in load distribution to cause the raised vehicle to tilt. Suitable safety precautions must be taken, appropriate to the particular case.



Serious personal injury if improperly or carelessly used!
Load may need to be secured against slipping or tilting.

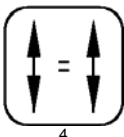
In order to be able to lower one cylinder unit while the load is raised, synchronous operation must be deactivated:



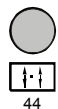
Press button [16] (switching cabinet) or button [61] (suspended switch), "Activate user intervention", and hold it down. Synchronous operation is then switched off by additionally pressing the button [13] (switching cabinet) or button [50] (suspended switch).



The fact that synchronous operation has been cancelled is indicated by "User intervention" being shown on the display [15], and by the disappearance of the plus sign (+).
Example: Cylinder units 1, 2 and 4 are active.



Display at the switching cabinet:
Indicator lamp [4] (green) does not light up: synchronous operation is not active.



Display at the suspended switch:
Indicator lamp [44] (green) does not light up: synchronous operation is not active.

Deactivate all those cylinder units that are not to be moved vertically using buttons [8, 9, 10, 11] at the switching cabinet or the selection switches [51, 52, 53, 55] and [54, 56] at the suspended switch. Only the cylinder unit that is to be moved may remain active. The active cylinder unit is shown on the display.



14 / 57



15 / 58

Cautiously (using inching mode) proceed with lifting or lowering using button [14] or [15] (switching cabinet), or button [57] or [58] (suspended switch). The vehicle must be watched closely for any changes in its position while the traversing procedure is carried out.

In order to associate a cylinder unit again with synchronous operation, the load supports must be set up again (see "Vertical traversing: Installing and lifting the load supports", see Chapter 10.4.7).



Only when the pressure switch senses a reaction and provides a release signal to the control unit can this cylinder unit be included in synchronous operation again.

Synchronous operation can, however, also be activated again at any time through "Activate user intervention".

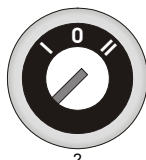
All those cylinder units that have been extended are activated again using buttons [8, 9, 10, 11] at the switching cabinet or the selection switches [51, 52, 53, 55] and [54, 56] at the suspended switch. Activate synchronous operation again by pressing button [13] (switching cabinet) or button [50] (suspended switch). The load can now be lifted or lowered synchronously.

10.4.11.2 2+2 Operation

If the lifting system is fitted with four cylinder units, they can be divided into two sets of lifting system that can be operated independently.

Cylinder units 1 and 2 are referred to as lifting system 1, while cylinder units 3 and 4 are referred to as lifting system 2.

Operation of the multiple-piston lifting platform that has been divided in this way is not in principle different from the operations already described. The cylinder units are activated and traversed (vertically/horizontally) as described above.



Changing the operating unit by turning the keyswitch [2] to position 2.

Any time the operating unit is changed, cylinder units that were previously active are deactivated. It is necessary to reactivate the desired cylinder units at the newly chosen operating unit.

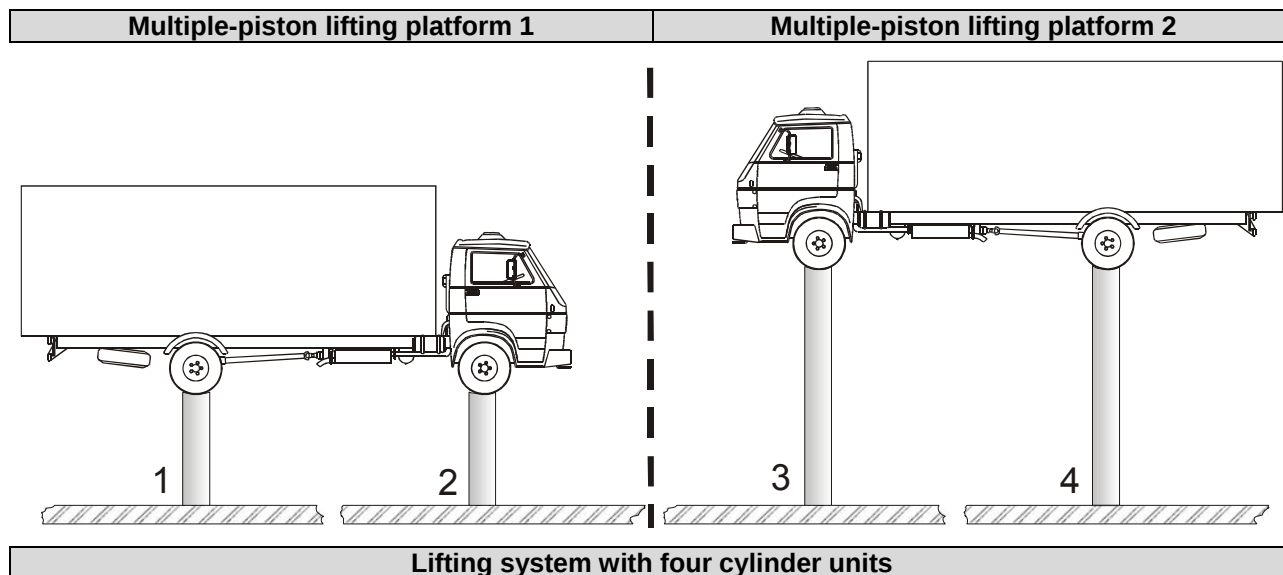
Note that:

in 2+2 operation lifting system 1 is operated by suspended switch 1, and lifting system 2 by suspended switch 2.

It is not possible to operate the lifting system via the control box in this operating mode.

If lifting system 1 and lifting system 2 are in synchronous operation at the same time, the display [17] shows the following:

1+2 3+4





Original Operating Instructions

ES DUAL 8.0 / 14.0

The lifting system is operated using the suspended switch(es) as described in these sections:

"Selection/activation of the cylinder units", see Section 10.4.2

"Park out", see Section 10.4.3

"Horizontal traversing and positioning of load supports", see Section 10.4.6

"Vertical traversing: Installing and lifting the load supports", see Chapter 10.4.7

"Vertical traversing: Synchronous lifting", see Section 10.4.8

"Vertical traversing: Synchronous lowering", see Section 10.4.9

"Parking", see Section 10.4.10 or 10.5.13



Regardless of the operating mode, the EMERGENCY OFF switch(es) [43] on the suspended switch(es) are always operable.

10.4.12 Supplementary options

10.4.12.1 Programmed parking out position

When the equipment is mounted with the narrow roll cover, or mounted with the narrow rolling cover and shaft for retractable load supports, activated cylinder units can be individually or simultaneously moved to the pre-programmed park out position.



Hold down switch 12 (switching cabinet) until the selected load supports have reached the pre-programmed park out position. After reaching the park out height, the vertical movement of the load supports is halted.

10.4.12.2 Programmed parking position

When the equipment is mounted with the narrow roll cover, or mounted with the narrow rolling cover and shaft for retractable load supports, activated cylinder units can be individually or simultaneously moved to the pre-programmed park out position.



Hold down button 23 (switching cabinet) until the pre-programmed parking positions have been reached and the load supports halts above the parking position.



Original Operating Instructions

ES DUAL 8.0 / 14.0

10.5. "Automatic" operating mode

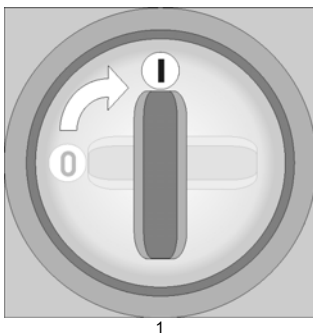


The following examples of the "Automatic" operating mode assume that the lifting system is fully fitted out. It is possible that the supplied version does not contain all of the functions or options mentioned below.

All the operating elements and displays described here refer to the description under "List of the operating elements and their function" in Section 8.1.

The position numbers assigned to the components and operating elements are presented in square brackets. Example: Indicator lamp [19].

10.5.1 Switching on the lifting system



On the switching cabinet turn the main switch [1] to position "I" to switch on the lifting system.



EMERGENCY OFF function is achieved by turning the main switch [1] to position "0".



Indicator lamps [5] and [19] (orange) light up at the switching cabinet; mains voltage is present.

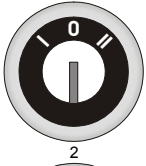


Indicator lamp [20] (green) lights up at the switching cabinet, indicating that the electrical components of the lifting system are operating without faults.

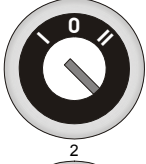
The system status is displayed a few seconds after switching the lifting system on. Display [17]



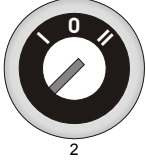
Turn the keyswitch [2] at the switching cabinet to position "0", "I" or "II" to select the operating unit.



Key position "0": Operation only possible through the switching cabinet operating unit



Key position "I": Operation only possible through the operating unit on suspended switch 1



Key position "II": Operation possible through the operating units on suspended switches 1 and 2

For reasons of safety, activated cylinder units are deactivated any time the operating unit is changed. If synchronous operation of cylinder units is switched on, the synchronous operation is deactivated / cancelled. Cylinder units that are required must be activated again, and synchronous operation switched on if necessary.



The "Automatic" operating mode is only possible when the keyswitch is not in position "0". When switching between the suspended switches and the switching cabinet, the "User intervention" function is not maintained. The "User intervention" message shown on the display [17] goes out when switching to a different operating unit.

See "Selecting the operating unit using the keyswitch", Section 10.3

The lifting system is now ready for operation.

10.5.2 Checking the vehicle approach direction through axle relationship

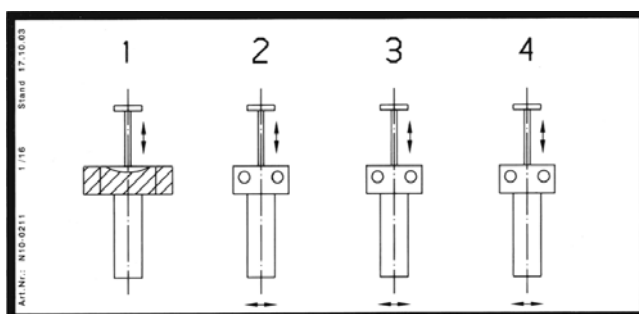
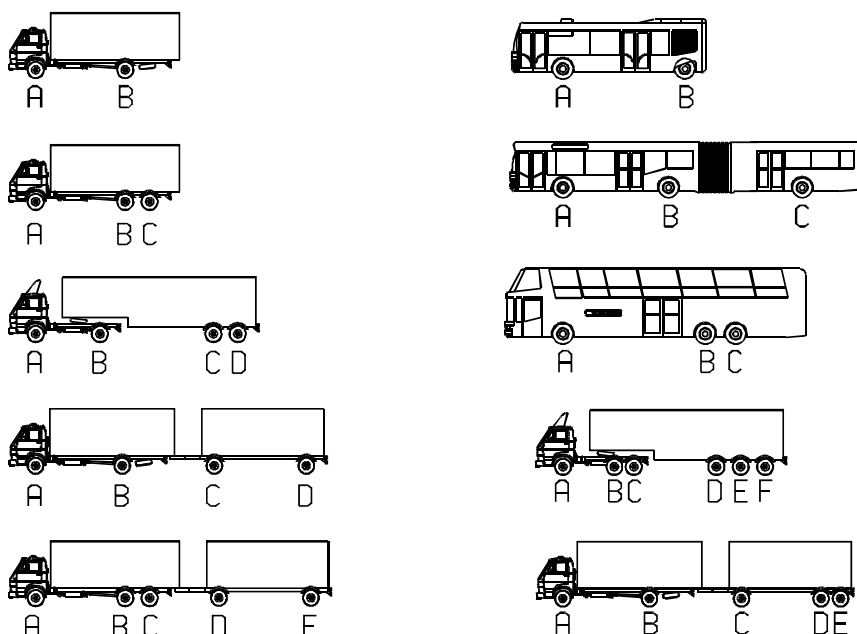
Before the vehicle is driven onto the lifting platform, the direction of approach must be checked. Suitable sliding pieces must also be mounted on the load supports.

The check is made by calling up the stored vehicle.



Detailed notes on calling up a vehicle may be found in "Selecting saved vehicles", Section 10.5.6

The axle relationships associated with the vehicle that has been called up are shown on the display [17]. The assignment of the vehicle axles is displayed on the label at the switching cabinet.



The number, type (fixed/moveable), and arrangement of the cylinder units are displayed on this label.

In this version cylinder unit 1 is fixed, while cylinder units 2, 3 and 4 are moveable.

Example (A) illustrates a vehicle with two axles on a lifting system with four cylinder units.

1	2	3	4
A		b	

Example (B) illustrates the same vehicle, but driven on in a different approach direction.

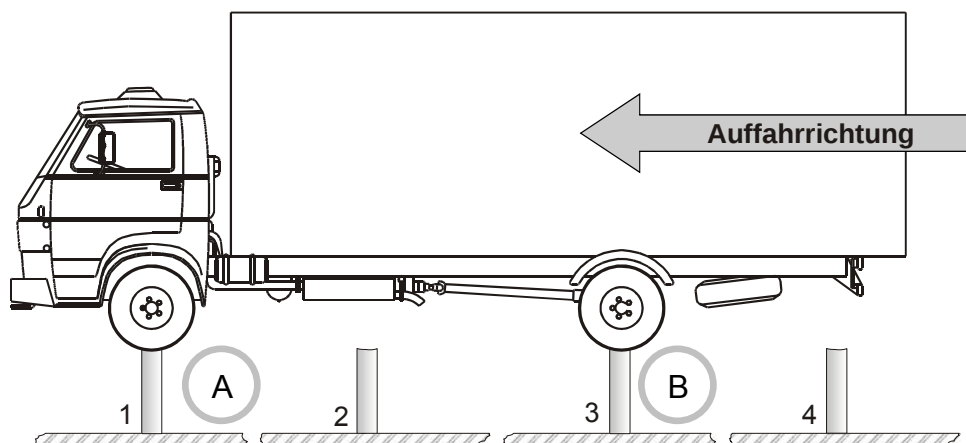
1	2	3	4
b		a	



Even though cylinder unit "1" displayed in this example is not moveable, it is still taken into account when assigning the axle relationships.

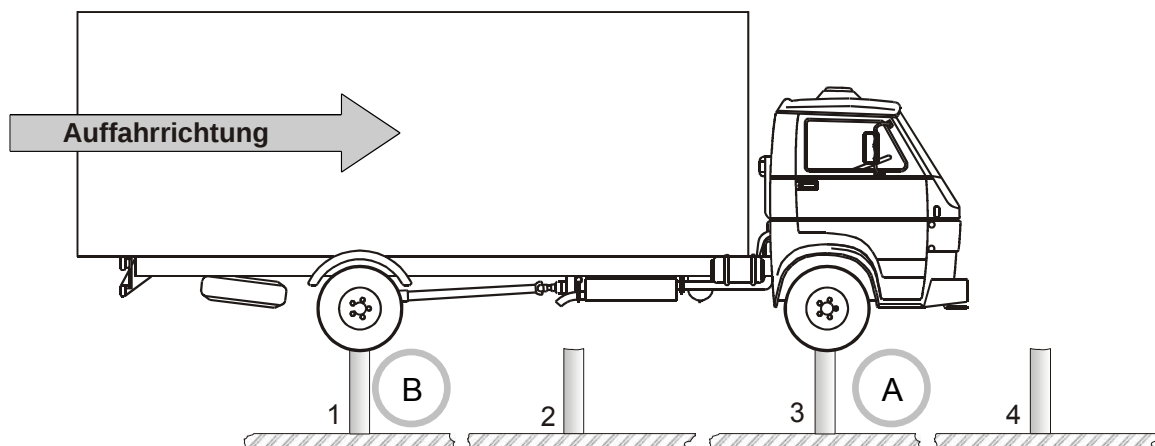
For clarification:

Example (A) illustrates a vehicle with two axles on a lifting system with four cylinder units.



Approach direction

Example (B) illustrates the same vehicle, but driven on in a different approach direction.



When the approach direction has been found, the load supports are to be parked out as described under "Park out", Section 10.4.3 or 10.5.3 so that the appropriate sliding pieces can be mounted. After mounting the sliding pieces, the load supports are to be lowered again, so that the vehicle can drive on. Reposition the vehicle and drive it on; see "Positioning a vehicle", Section 10.4.5 or 10.5.8.

10.5.3 Parking out (only necessary for load supports flush with the floor/retractable with the narrow roll cover).

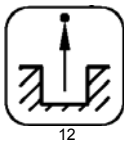


It is necessary to park out the load support(s) in order to mount sliding pieces and/or to move cylinder units horizontally.

Activate or deactivate the appropriate cylinder units using the buttons [8, 9, 10, 11] at the switching cabinet or using the selection switches on the suspended switches [51, 52, 53, 55] and [54, 56].

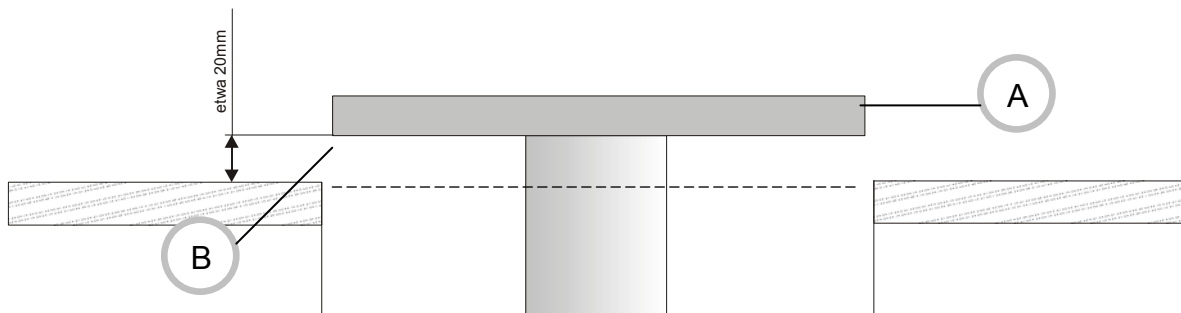


Press button [14] (switching cabinet) or button [57] (suspended switch) in order to begin lifting, and hold it down until the load support (A) has been lifted from the parked position into a position (B), where it is free to move horizontally. A suitable safety clearance must be allowed for.



Option: Drive to parking out height.

Press button [12] (switching cabinet) in order to raise all the active cylinder units to the pre-programmed park out height. Hold button [12] (switching cabinet) pressed until the cylinder units stop automatically.



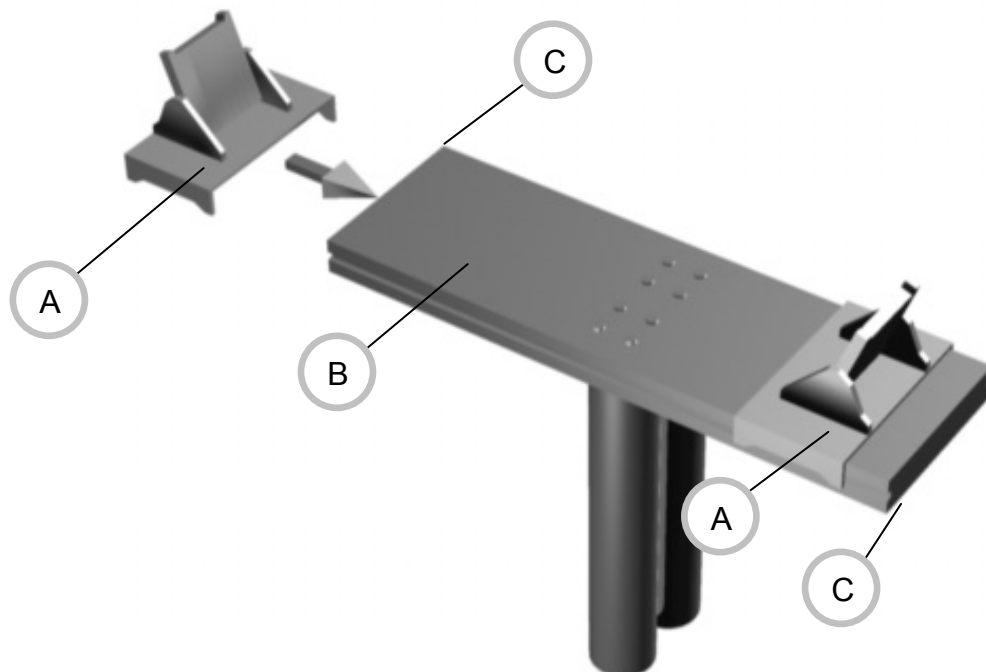
A: Load support device

B: Freely moveable position

Approximately 20 mm

10.5.4 Mounting the sliding pieces

Fit or exchange the sliding pieces [A] by pushing them sideways on the load support [B].



The sliding piece(s) is/are secured by the set screw [C] on each side.



After fitting or exchanging the sliding pieces [A] it is necessary to check whether the set screws [C] have been tightened before beginning operation again!

Permissible sliding pieces: see "Sliding pieces (vehicle-dependent load supports)", Section 10.2

10.5.5 Storage locations for manufacturers and vehicle types

The number of vehicle manufacturers that can be stored is limited to 10.

20 or 40 vehicle types can be stored, depending on which option is purchased.

When no more storage capacity is available, a message is issued (display [31]): "Limit reached"

10.5.6 Saving and editing vehicles

The following conditions must be fulfilled in order to save vehicles

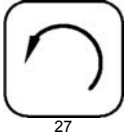
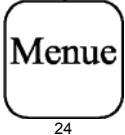
The vehicle must be correctly positioned (driven on to the lift).

(See "Positioning a vehicle", Section 10.4.5 or 10.5.8)

Load supports must be horizontally positioned under the vehicle's load bearing points.

(See "Automatic horizontal positioning of load supports", Section 10.5.9)

Sliding pieces must be set at the load bearing points in order to achieve precise positioning. (See "Vertical traversing: Installing and lifting the load supports", Section 10.5.10)

i		Press switch [27] (control cabinet) to go back one step through the menu. This allows incorrect decisions when selecting to be corrected.
		Press switch [24] (control cabinet) to reach the "Manual" menu starting point. Operating mode "Automatic" is shown on the display [31]. Press button [30] in order to change to the "Automatic" operating mode.

Ensure that all the cylinder units that are to be saved are active. Inactive cylinder units are not included in the save.



If "Setup" is shown as a possible selection on the display [31], turn rotary knob [32] until "Automatic" is shown on the display [31].



Press button [30] in order to confirm the "Automatic" menu selection, and to move on to the next menu selection.



Turn rotary knob [32] in order to select between "Call", "Learn" and "Delete". Turn rotary knob [32] until "Learn" is shown on the display [31].



Press button [30] to confirm the "Learn" menu selection.

If vehicles have already been stored, they will be available for further editing under "Learn", as will the "New?" menu item. Turn the rotary knob [32] to "New?" in order to create a new vehicle manufacturer.



Press button [30] in order to confirm the "New?" menu selection, and to move on to the "Enter manufacturer:" menu item.



32



30

Enter the manufacturer:

Turn rotary knob [32] to browse through the letters A-Z in alphabetical order. Confirm the selection (letter or number) with button [30], and the cursor will jump forwards to the next empty field.



30

Saving the input (manufacturer):

Hold button [30] down for about three seconds in order to save.

The message "Saved!" will appear.

After saving, the display [31] will show: "Call", "Learn", "Delete "



32

Turn rotary knob [32] until "Learn" is shown on the display [31].



30

Press button [30] to confirm the "Learn" selection.



32

Turn rotary knob [32] in order to select between vehicle types that have already been saved or "New?".



30

Press button [30] to confirm the "New?" selection.



32



30

Enter the type:

Turn rotary knob [32] to browse through the letters A-Z in alphabetical order. Confirm the selection (letter or number) with button [30], and the cursor will jump forwards to the next empty field.



30

Saving the input (of the type):

Hold button [30] down for about three seconds in order to save.

The message "Saved!" will appear.

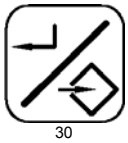
After saving, the display [31] will now show: "Cylinder/axle"



The cylinder units are assigned to the vehicle axles starting with "Cylinder unit 1". Depending on the number of cylinder units, the assignment process will take up to four steps. Cylinder units that are not assigned are marked with a "-" (hyphen). Assigned cylinder units are labeled: A, B, C, D, E, F, depending on how many vehicle axles there are. The assignment of the vehicle axles is taken from the label at the control cabinet.

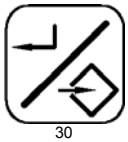


Turn rotary knob [32] in order to select the letter or hyphen assigned to the axle.

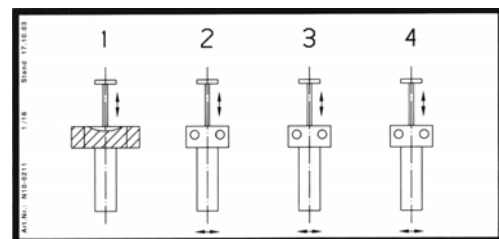
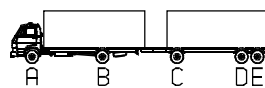
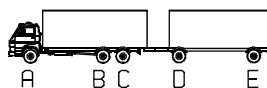
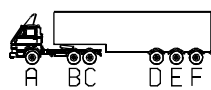
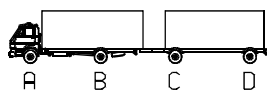
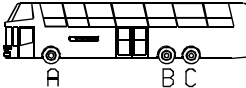
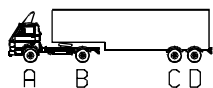
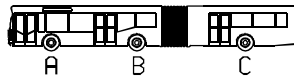
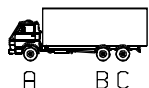
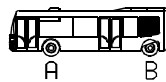
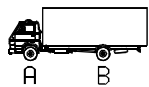


Press button [30] to confirm the selection that has been made. After the confirmation, the axle assignment for the remaining cylinder units will be queried.

When all cylinder units have been assigned, the vehicle type is saved, together with the assigned positions of the load supports and their axle relationships.

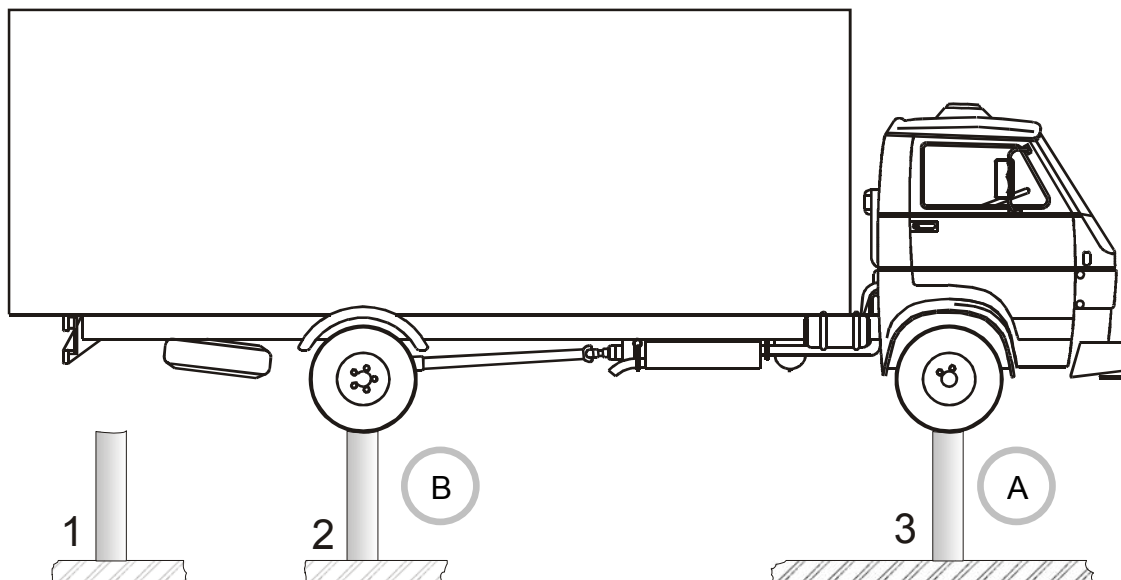


Hold button [30] down for about three seconds in order to save. The message "o.k." will appear.



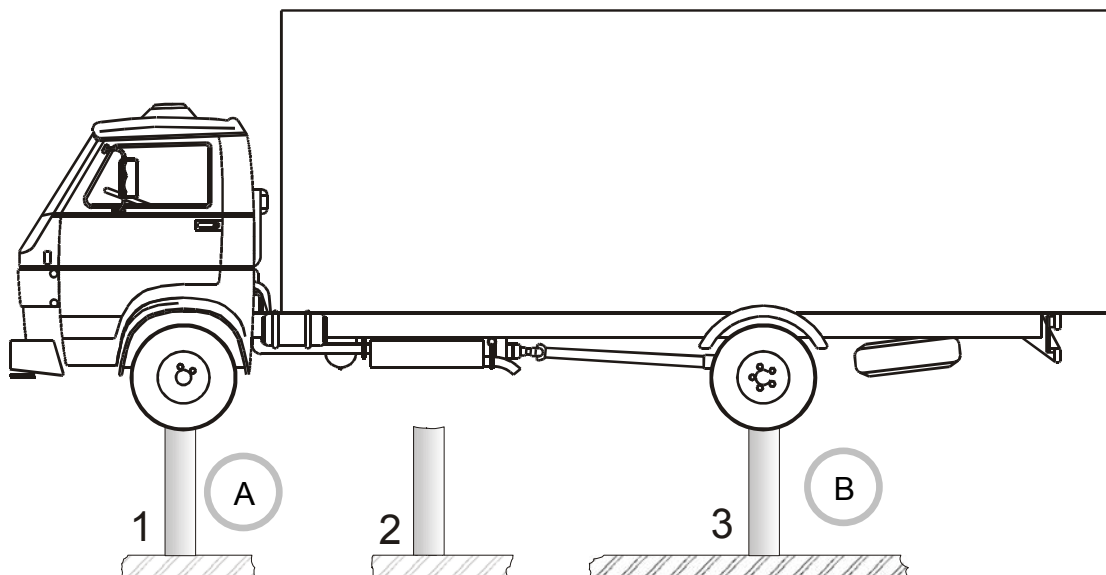
Example of lifting system with three cylinder units. The vehicle used in this example is a truck with two axles.

Example 1:



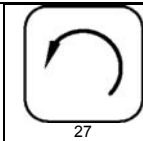
Cylinder unit 1 = vehicle axle? -
 Cylinder unit 2 = vehicle axle? B
 Cylinder unit 3 = vehicle axle? A

Example 2:



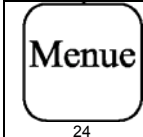
Cylinder unit 1 = vehicle axle? A
 Cylinder unit 2 = vehicle axle? -
 Cylinder unit 3 = vehicle axle? B

10.5.7 Selecting saved vehicles

i

27

Press switch [27] (control cabinet) to go back one step through the menu. This allows incorrect decisions when selecting to be corrected.



24

Press switch [24] (control cabinet) to reach the "Manual" menu starting point. Operating mode "Automatic" is shown on the display [31]. Press button [30] in order to change to the "Automatic" operating mode.



32

If "Setup" is shown as a possible selection on the display [31], turn rotary knob [32] until "Automatic" is shown on the display [31].



30

Press button [30] in order to confirm the "Automatic" menu selection, and to move on to the next menu selection.



32

Turn rotary knob [32] in order to select between "Call", "Learn" and "Delete". Turn rotary knob [32] until "Call" is shown on the display [31].



30

Press button [30] in order to confirm the "Call" menu selection, and to move on to the next menu selection, "Manufacturer".



32

Turn rotary knob [32] until the desired manufacturer is shown on the display [31].



30

Press button [30] in order to confirm the selection of the desired manufacturer, and to move on to the next menu selection, "Type".



32

Turn rotary knob [32] until the desired vehicle type is shown on the display [31].



30

Press button [30] in order to confirm the selection of the desired vehicle type, and to move on to the next menu selection, "Cylinder/axle relationship OK?". After confirmation, the axle relationship: "Cylinder" / "axle" is shown on the display [31].

10.5.8 Positioning a vehicle that is not saved

**Risk of collision!**

To avoid collisions, check before driving a vehicle onto the lifting system that the load support devices have been sufficiently lowered. **Special attention is required when positioning low-floor vehicles. It may be necessary to get the help of a second person to watch the positioning procedure.**

**Observe the maximum load capacity of the roll cover!**

The load capacity of the roll cover, which depends on the version supplied, must not be exceeded. Permissible loads can be found in Section 2, "Technical data".

Before driving on a vehicle, its expected position must be estimated and suitable sliding pieces fitted. Suitable sliding pieces are to be mounted on the load supports, the cylinder units involved in the lifting process.



It is possible to mount the sliding pieces later (after the vehicle has been driven on), but it is not recommended, because the vehicle then either fully or partially covers the associated load support devices.

If the vehicle has pneumatic suspension ensure that it is not active, and that the vehicle is resting on the lower mechanical stop.

The vehicle is to be positioned centrally with respect to the lifting system's longitudinal axis. Slight misalignment of the vehicle has been allowed for in the design of the cylinder unit.

To keep the misalignment small, we recommend that a visual guide (such as a mirror or guiding line) is used, or that help is obtained from someone else who can provide instructions. This ensures that the load supports do not collide with the wheels when the hydraulic piston extends.

To avoid tipping to the side, load bearing points specified by the vehicle manufacturers should be selected.

Special features of the vehicle may be found in the operating and servicing instructions of the vehicle to be lifted.



To ensure that vehicles are always positioned at the same place, wheel centering units (consisting of two pieces) are optionally available for an axle. Normally the wheel centering unit is found on the cylinder unit without traverse base.

The aids mentioned above can minimize the risk of a collision between the wheels and the load supports.

10.5.9 Positioning a saved vehicle

The axle relationships should be checked before positioning, see Section 10.5.2.



Risk of collision!

The load supports must be lowered sufficiently to avoid a collision before driving a vehicle onto the lifting system. Special attention is required when positioning low-floor vehicles. It may be necessary to get the help of a second person to watch the positioning procedure.

Observe the maximum load capacity of the roll cover!

The load capacity of the roll cover, which depends on the version supplied, must not be exceeded. Permissible loads can be found in Section 2, "Technical data".

Before driving the vehicle on, suitable sliding pieces should be mounted on the assigned load supports.



It is possible to mount the sliding pieces later (after the vehicle has been driven on), but it is not recommended, because the vehicle then either fully or partially covers the associated load support devices.

If the vehicle has pneumatic suspension ensure that it is not active, and that the vehicle is resting on the lower mechanical stop.

The vehicle is to be positioned centrally with respect to the lifting system's longitudinal axis. Slight misalignment of the vehicle has been allowed for in the design of the cylinder unit.

To keep the misalignment small, we recommend that a visual guide (such as a mirror or guiding line) is used, or that help is obtained from someone else who can provide instructions. This ensures that the load supports do not collide with the wheels when the hydraulic piston extends.

To avoid tipping to the side, load bearing points specified by the vehicle manufacturers should be selected.

Special features of the vehicle may be found in the operating and servicing instructions of the vehicle to be lifted.



To ensure that vehicles are always positioned at the same place, wheel centering units (consisting of two pieces) are optionally available for an axle. Normally the wheel centering unit is found on the cylinder unit without traverse base.

The aids mentioned above can minimize the risk of a collision between the wheels and the load supports.

10.6.0 Automatic horizontal positioning of load supports

Requirements for horizontal traversing and positioning:

If the means of fitting has a small roll cover and a shaft for retractable load support devices, the load suspension material must be parked out. (See Chapter 10.5.3)

Call the vehicle that has driven on through control panel 2.

(See "Selecting saved vehicles", Section 10.5.7)



Risk of collision!

The traversing procedure must be watched continuously. Load supports or sliding pieces can collide if the vehicle is not entirely central.



Press button [26] in order to move the activated cylinder units to the saved vehicle position.



Press button [30] in order to confirm that the saved vehicle position has been reached.

If, as it is traversing horizontally, a cylinder unit meets an obstacle, then a clutch operates as the torque exceeds a pre-defined value, and this minimizes damage to the traversing drive. The slip clutch mentioned above is an additional item of safety equipment.



It is possible to mount the sliding pieces later (after the vehicle has been driven on), but it is not recommended, because the vehicle then either fully or partially covers the associated load support devices.

An error message with a corresponding code number is issued on the display [31]. The cylinder unit concerned is displayed with the associated number.

If activated cylinder units meet an obstacle while being moved, the number of the cylinder unit that has met an obstacle flashes on the display [17].

10.6.1 Vertical traversing: Installing and lifting the load supports

The requirement for vertical movement:

Suitable sliding pieces must be mounted on the load supports. Sliding pieces must be correctly positioned under the vehicle load bearing points.



Technical considerations: When sliding pieces are placed at a vehicle load bearing point, pressure switches send a signal to the control unit when a factory-set reaction is reached, and the lift process is halted. The cylinder units stop until button [14] (control cabinet) or button [57] (suspended switch) is pressed.



Serious personal injury if the load slides.

If button [14] (control cabinet) or button [57] (suspended switch) is pressed again, the active cylinder units extend uncontrolled. This situation can occur with one or more cylinder units.

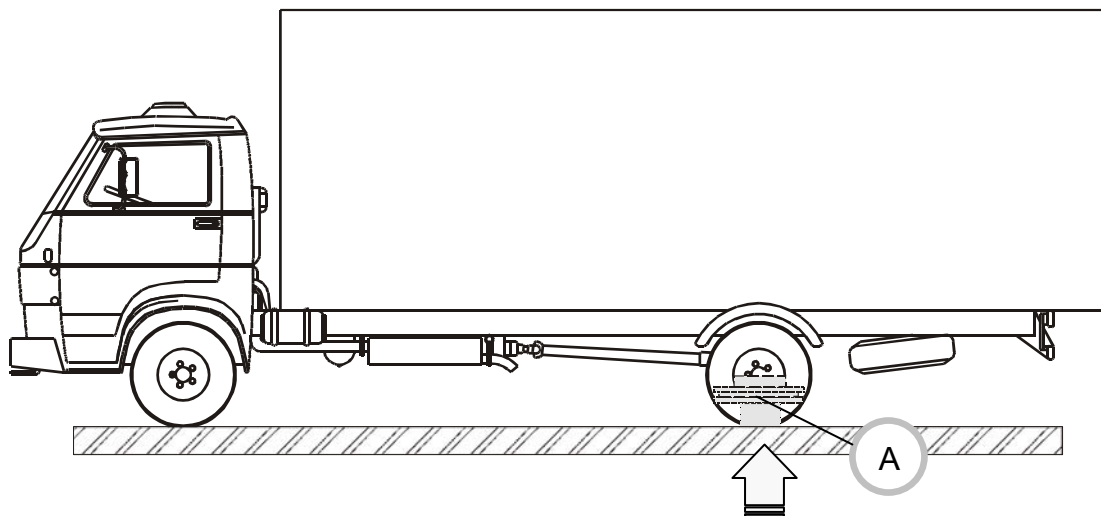


The cylinder units can be set up together. It is nevertheless recommended that they are set up individually. When the cylinder units are set up individually, the cylinder unit that is to be set up must be activated before the setting up process. After successful setting up, the cylinder unit must be deactivated again.



14 / 57

Press the button [14] (on the switching cabinet), or button [57] (on the suspended switch) in order to begin the lifting process. Hold button [12] (control cabinet) or button [38] (suspended switch) pressed until the load support (A) is set up and the lift process automatically ends.



Cylinder units that have been set up are represented by an underscore on display 1 [17].



A special case is presented by the vehicles whose construction gives them a very low dead weight on one axle. If the weight at the vehicle's suspension point is not sufficient to trigger the pressure switch, the load supports must be positioned manually by the operator. The vehicle must not be lifted during manual placement. In this special case, synchronous operation must be activated manually by user intervention. See "Lifting/lowering individual cylinder units under load", paragraph 10.4.11.1, for information regarding the user intervention function.

10.6.2 Vertical traversing: Synchronous lifting

Requirement for synchronous lifting:

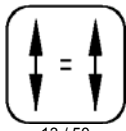
Sliding pieces must be positioned at the vehicle load bearing points (see "Vertical traversing: Installing and lifting the load supports", Chapter 10.4.7)



Technical considerations on synchronous operation:

In synchronous operation, the active cylinder units are readjusted as they are lifted or lowered in order to ensure equal movement. Unequal rates of movement resulting from different load distributions on the cylinder units are therefore corrected. The tolerance between the positions of the cylinder units is specified through pre-defined limits. The controller monitors the difference in height between the individual cylinder units, and switches into a fault state if the maximum tolerance value is exceeded (if the equipment moves out of the limits).

If synchronous operation is deactivated while the load is raised, further lifting or lowering must only be carried out with particular care.



13 / 50

Synchronous control is activated by pressing button [13] (switching cabinet) or button [50] (suspended switch). (Only active cylinder units are synchronized.)

It is still possible to deactivate synchronous control by pressing button [13] (switching cabinet) or button [50] (suspended switch) again.

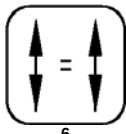


Synchronous operation is indicated on the display [17] by the plus sign (+).

Example of activated and synchronized cylinder units: 1,2,3,4

1+2+3+4

The underlining of the activated cylinder units indicates that the sliding pieces have been put in place.



6

Display at the switching cabinet:

Indicator lamp [6] (green) lights up: synchronous operation is active.

Indicator lamp [6] (green) does not light up: synchronous operation is not active.



63

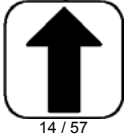
Display at the suspended switch:

Indicator lamp [63] (green) lights up: synchronous operation is active.

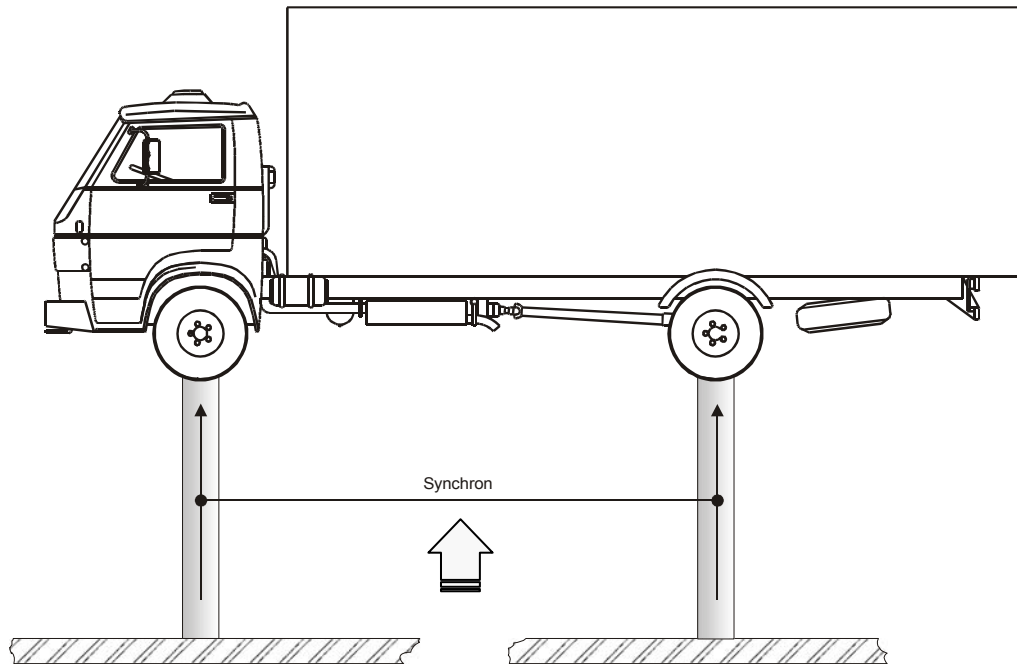
Indicator lamp [63] (green) does not light up: synchronous operation is not active.

Lifting in synchronous operation will electronically lock the synchronization circuit. It is no longer possible to deactivate synchronous control by pressing button [13] (switching cabinet) or button [50] (suspended switch) again.

Special case: Lowering a cylinder unit while the load is raised (see "Special features", Section 10.4.11).



When synchronous operation is active, hold down button [14] (switching cabinet) or button [57] (suspended switch) until the desired lifting height has been reached.



10.6.3 Vertical traversing: Synchronous lowering

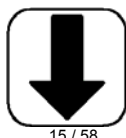
Before lowering, check that all the load-bearing cylinder units have been selected, and that they are indicated on the display with a plus sign (+), or that the indicator lamp [63] (green) on the suspended switch is lit.

Example:

Activated and synchronized cylinder units 1, 2, 3, 4



The underlining of the activated cylinder units indicates that the sliding pieces have been put in place.



15 / 58

Press button [15] (switching cabinet) or button [58] (suspended switch) in order to start the lowering procedure. Lowering is not completed until the vehicle that has been raised has been fully put down once again. No load must remain on the load supports.

Special case:

If the vehicle load bearing point is too close to the ground, it is possible that not all load supports will be completely released. In that case, synchronous operation must be deactivated manually through user intervention.

See "Lifting/lowering individual cylinder units under load", chapter 10.5.14.1, for information regarding user intervention.

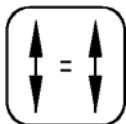


The following applies to means of fitting with the narrow roll cover or with a narrow roll cover and a shaft for retractable load supports:

The load supports will stop automatically with a safety clearance from the ground.

Load supports in the different versions:

If the equipment is mounted with a narrow roll cover and shaft for retractable load supports, it must be positioned horizontally above the parking position after this first stop. Only after this parking position has been reached can the load supports be fully retracted. (See also "Programmed parking position", Chapter 10.4.12.2)



13 / 50

When all load has been taken off the load supports, the synchronous circuit is electronically released, and can be deactivated by pressing button [13] (switching cabinet) or button [50] (suspended switch).

Ensure that the load supports have been fully retracted before driving the vehicle off the lifting system. Depending on the construction of the sliding pieces that are used, they may need to be folded in, or possibly dismantled, to avoid collision with the vehicle.

10.6.4 Parking

Requirement for parking: (only applies to the narrow roll cover with retractable load supports.)

Retractable load supports must be moved to their parking position through horizontal traversing. This requires the cylinder units to be individually activated and moved.



28 / 60



29 / 59

Press button [28] or [29] (switching cabinet) or button [60] or [59] (suspended switch) to move the activated cylinder unit above the parking position.



23

Option: Approaching the parking position

All the activated cylinder units move to their pre-programmed parking position by pressing button [23] (switching cabinet). Exact positioning of the load supports before lowering is carried out by the controller.

Completely lowering the load supports:



15 / 58

Press the button [15] (on the switching cabinet), or button [58] (on the suspended switch) in order to begin the lowering process. The lowering is completed when the load supports have come down to floor level.

10.6.5 Special Features

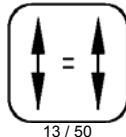
10.6.5.1 Lifting/lowering individual cylinder units under load

In order to remove various assemblies, or to improve the accessibility of the vehicle's assemblies, it is possible to move vertically individual cylinder units while under load. Particular care is required when working in this operating mode, since it is possible for changes in load distribution to cause the raised vehicle to tilt. Suitable safety precautions must be taken, appropriate to the particular case.



Serious personal injury if improperly or carelessly used!
Load may need to be secured against slipping or tilting.

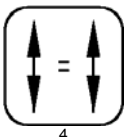
In order to be able to lower one cylinder unit while the load is raised, synchronous operation must be deactivated:



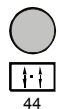
Press button [16] (switching cabinet) or button [61] (suspended switch), "Activate user intervention", and hold it down. Synchronous operation is then switched off by additionally pressing the button [13] (switching cabinet) or button [50] (suspended switch).



The fact that synchronous operation has been cancelled is indicated by "User intervention" being shown on the display [17], and by the disappearance of the plus sign (+).
 Example: Cylinder units 1, 2 and 4 are active.



Display at the switching cabinet:
 Indicator lamp [6] (green) does not light up: synchronous operation is not active.



Display at the suspended switch:
 Indicator lamp [63] (green) does not light up: synchronous operation is not active.

Deactivate all those cylinder units that are not to be moved vertically using buttons [8, 9, 10, 11] at the switching cabinet or the selection switches [51, 52, 53, 55] and [54, 56] at the suspended switch. Only the cylinder unit that is to be moved may remain active. The active cylinder unit is shown on the display.



14 / 57



15 / 58

Cautiously (using inching mode) proceed with lifting or lowering using button [14] or [15] (switching cabinet), or button [57] or [58] (suspended switch). The vehicle must be watched closely for any changes in its position while the traversing procedure is carried out.

In order to associate a cylinder unit again with synchronous operation, the load supports must be set up again (see "Vertical traversing: Installing and lifting the load supports", see Section 10.5.10)



Only when the pressure switch senses a reaction and provides a release signal to the control unit can this cylinder unit be included in synchronous operation again.

Synchronous operation can, however, also be activated again at any time through "Activate user intervention".

All those cylinder units that have been extended are activated again using buttons [8, 9, 10, 11] at the switching cabinet or the selection switches [51, 52, 53, 55] and [54, 56] at the suspended switch. Activate synchronous operation again by pressing button [13] (switching cabinet) or button [50] (suspended switch). The load can now be lifted or lowered synchronously.

10.6.5.2 2+2 Operation

If the lifting system is fitted with four cylinder units, they can be divided into two sets of lifting system that can be operated independently.

Cylinder units 1 and 2 are referred to as lifting system 1, while cylinder units 3 and 4 are referred to as lifting system 2.

Operation of the multiple-piston lifting platform that has been divided in this way is not in principle different from the operations already described. The cylinder units are activated and traversed (vertically/horizontally) as described above.



Changing the operating unit by turning the keyswitch [2] to position 2.

Any time the operating unit is changed, cylinder units that were previously active are deactivated. It is necessary to reactivate the desired cylinder units at the newly chosen operating unit.

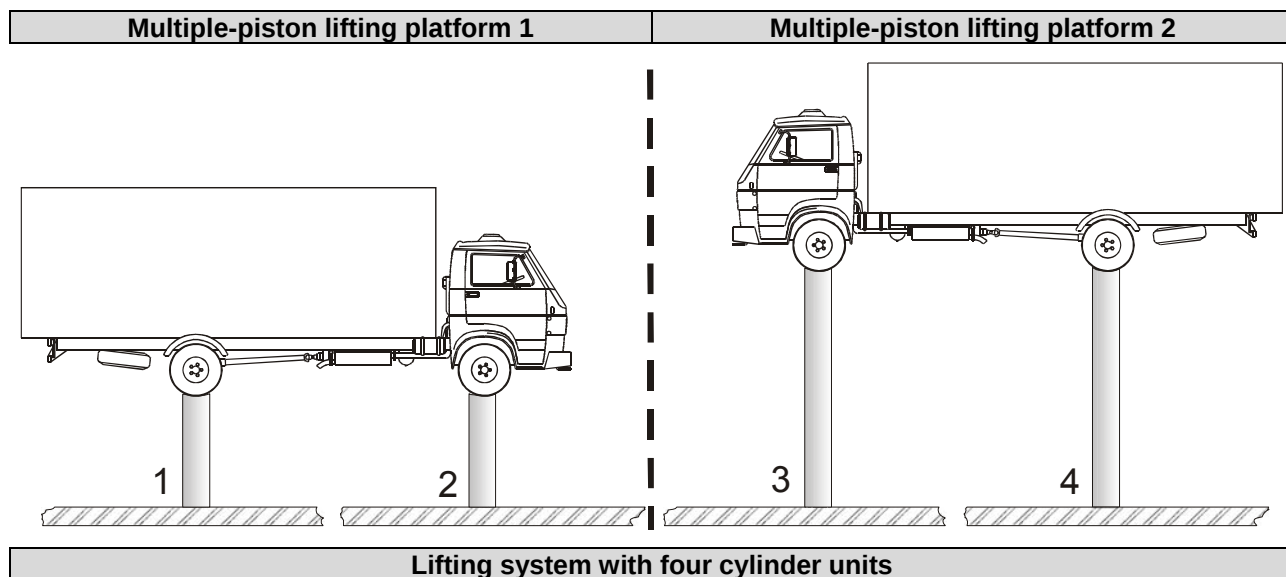
Note that:

in 2+2 operation lifting system 1 is operated by suspended switch 1, and lifting system 2 by suspended switch 2.

It is not possible to operate the lifting system via the control box in this operating mode.

If lifting system 1 and lifting system 2 are in synchronous operation at the same time, the display [17] shows the following:

1+2 3+4



The lifting system is operated using the suspended switch(es) as described in these sections:

"Selection/activation of the cylinder units", see Section 10.4.2

"Park out", see Section 10.4.3

"Horizontal traversing and positioning of load supports", see Section 10.4.6

"Vertical traversing: Installing and lifting the load supports", see Chapter 10.4.7

"Vertical traversing: Synchronous lifting", see Section 10.4.8

"Vertical traversing: Synchronous lowering", see Section 10.4.9

"Parking", see Section 10.4.10 or 10.5.13



Regardless of the operating mode, the EMERGENCY OFF switch(es) [43] on the suspended switch(es) are always operable.



Original Operating Instructions

ES DUAL 8.0 / 14.0

11. Help with faults – determination of defects

When eliminating lifting system faults the following risks must be taken into account:



- Electronic modules can be damaged by electrostatic processes.
- Allergies can be provoked by contact with escaping fluids.

To avoid damage to machinery or life-threatening injuries when eliminating lifting system faults, the following points must be obeyed without fail:



- Unintentional switching on of power sources can cause serious injuries to persons and damage to machinery.
- With unsecured manual operation there is an increased risk of injury from crushing, shearing, or being caught in the machinery.

- Only attempt to eliminate faults on your own if you have the appropriate qualifications to do so.
- Secure the lifting system against any inadvertent restart or operation by unauthorised persons. Switch the main switch [1] on the switching cabinet to position “0” and secure against any attempt at switching it on again (with a padlock).
- When checking functions a second person must ensure that the lifting system is safely switched off at all times.
- Secure the area in which moving parts of the lifting system are active.

All tasks on the electrical equipment of the lifting system may as a matter of principle only be performed by trained electrical specialists.

Only MAHA GmbH & Co KG are authorized to make any modifications to the lifting system's control program. Updating or installing a new software version may only be carried out by specialists authorized by MAHA GmbH & Co KG.

A large number of electrical and mechanical fault messages can be output on the display [29] of the switching cabinet. Because of the large number of possible sources of faults, it is not possible to name all the possible trigger events in detail.

Error messages

Error messages are output on the display [31]. If one or more cylinder units are affected by this error, the number of the affected cylinder unit(s) flashes on the display [17].

This error message remains displayed until acknowledged with button [30].

Error code	Cause / message	Description / fault conditions / possible causes	Remedy
20	Low voltage	Supply voltage too low (voltage variations), overload due to short-circuit	Recommendation: Switch the lifting system off and then back on again. If this is not successful, repair should only be carried out by MAHA GmbH & Co KG customer service
25	False software version number of a module or an operating terminal	Software not mutually compatible	Repair only by MAHA GmbH & Co KG customer service
30	Ultrasonic sensor defective	Cable broken, incorrect height measurement	
31	Temperature sensor / ultrasonic sensor defective	As for error code 30, faulty sensor	
40	Difference too great for synchronous operation	At least one of the activated cylinder units has left the pre-defined limits (50 mm)	Check whether the lift has met an obstacle while lowering, displacement measuring system faulty
50	CAN communication operating unit	Communication lost between a module and the lifting system. (The modules continuously and automatically check each other for existence and function.)	Repair only by MAHA GmbH & Co KG customer service
51	CAN module 1		
52	CAN module 2		
90	CAN communication operating unit		
91	CAN module 3		
92	CAN module 4		
93	CAN module 5		
94	CAN module 6		
60	Pulse generator on travel unit defective or rotational speed too low or no rotational speed	Broken cable, pulse generator (Hall sensor) incorrectly adjusted, travel against an obstacle	Repair only by MAHA GmbH & Co KG customer service
100	Module with the same ID	Incorrect ID assignment at first installation,	
101	Module mit ungültiger ID	Module addressing occupied twice, incorrect software installed on module	

Warning messages

Warning messages are shown on the display [31], and are cleared automatically after about three seconds.

Error code	Cause / message	Description / fault conditions / possible causes	Remedy
150	Synchronous operation cannot be activated since the pressure switch not sending signal	Weight on at least one cylinder unit too low to trigger the pressure switch	Activate synchronous operation through user intervention
161	Travel only possible in reverse direction due to rotational speed being too low	Travel against the mechanical stop, travel against an obstacle, roll cover not functional (jammed)	If necessary, remove the obstacle, and "move free" about 50 mm in the opposite direction
170	First park out	Load supports not parked out	Move the load supports vertically to the parking out height
180	Pressure switch or synchronous operation activated	Signifies that pressure switches are activated, or synchronous operation has been turned on by user intervention	This message is not an error! It indicates that horizontal traversing is blocked.

If no error message is shown on the display [31] of the switching cabinet, but a fault is nevertheless present, the faults and their causes can be limited to those described below.

It should be borne in mind that some kinds of work should only be carried out by specially trained and qualified personnel.

Fault	Possible cause	Remedy
Cylinder unit cannot be traversed horizontally	Electrical supply to drive motor interrupted	Repair only by MAHA GmbH & Co KG customer service
	Drive motor faulty	
	Clutch faulty	
	Lining oily/soiled	
	Traversing chain jammed or broken	
Cylinder unit cannot be traversed vertically	Electrical supply to drive motor interrupted	Repair only by MAHA GmbH & Co KG customer service
	Drive motor faulty	
	Dirt in valve	
	Suction filter blocked	
	Solenoid valve faulty	
Oil leakage at piston rod	Gasket faulty Scored piston rod	
Hydraulic piston moves jerkily	Air in the system	Vent cylinder unit, see Technical Manual
Hydraulic piston does not move out to its end position	Oil level too low	Refill oil



Original Operating Instructions

ES DUAL 8.0 / 14.0

12. Emergency lowering

Should it not be possible to lower the lifting system a vehicle that is on the lifting platform can be lowered to the ground position (or lowest end position) using the emergency lowering procedure.

This emergency lowering is only made available for exceptional situations (fault in the control / displacement measuring system / hydraulic unit).

In such cases, emergency lowering can be carried out via the switching cabinet or the suspended switch(es); see Section 12.1. In the event of total failure of the lifting system (electrical, or due to a fault in the lowering valve), the emergency lowering can be carried out using compressed air (pneumatically); see Section 12.2.

If necessary contact MAHA immediately.

Important service numbers can be found under "Warranty, claims" in Section 15.

The following steps must be performed with extreme care!

If they are not observed the risk of an accident is increased.



- **Additional personnel are necessary for safety reasons.**
 - **Emergency lowering may only be carried out by a qualified expert.**
 - **The vehicle must be watched closely during the emergency lowering.**
 - **The safety representative must be informed and if necessary should be called in.**
 - **If necessary, the lifting system should be switched off after emergency lowering, secured against further operation (with a padlock at main switch "1"), and MAHA's customer service department should be informed.**
-

If "Error code 40" is generated, check whether a technical fault is present in components of the lifting system.

In the case of a technical fault, such as the failure of one of the cylinder unit's displacement measuring systems, or as a result of lowering onto an obstacle, the lifting system stops because it has exceeded the pre-defined limits. The display [31] shows the error message "Error code 40" (Difference in synchronous operation too great).

Acknowledge the error message with button [30]. If, after a further attempt to travel (lifting or lowering), the lifting system switches again into the fault state, it must be assumed that a technical fault is present.

The vehicle on the equipment must be lowered without automatic control (not synchronously). Particular care must be exercised when working in this operating mode.

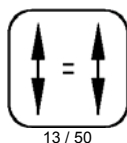
12.1 Emergency lowering using the switching cabinet or suspended switch



Serious personal injury if improperly or carelessly used!
Load may need to be secured against slipping or tilting.

Attach a temporary length measuring system (such as a measuring tape or rule) to the appropriate cylinder unit(s) so that the distance between the load support and the ground can be measured.

In order to be able to lower one cylinder unit while the load is raised, synchronous operation must be deactivated:

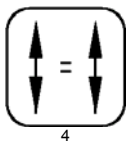


Press button [16] (switching cabinet) or button [61] (suspended switch), "Activate user intervention", and hold it down. Synchronous operation is then switched off by additionally pressing the button [13] (switching cabinet) or button [50] (suspended switch).

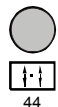


The fact that synchronous operation has been cancelled is indicated by "User intervention" being shown on the display [15], and by the disappearance of the plus sign (+).
Example: Cylinder units 1, 2 and 4 are active.

1 2 4
User intervention

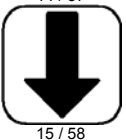


Display at the switching cabinet:
Indicator lamp [4] (green) does not light up: synchronous operation is not active.



Display at the suspended switch:
Indicator lamp [44] (green) does not light up: synchronous operation is not active.

Deactivate all those cylinder units that are not to be moved vertically using buttons [8, 9, 10, 11] at the switching cabinet or the selection switches [51, 52, 53, 55] and [54, 56] at the suspended switch. Only the cylinder unit that is to be moved may remain active. The active cylinder unit is shown on the display.



Cautiously (using inching mode) proceed with lifting or lowering using button [14] or [15] (switching cabinet), or button [57] or [58] (suspended switch). The vehicle must be watched closely for any changes in its position while the traversing procedure is carried out.

12.2 Emergency lowering using compressed air (pneumatic release)



Serious personal injury if improperly or carelessly used!
Load may need to be secured against slipping or tilting.

Attach a temporary length measuring system (such as a measuring tape or rule) to the appropriate cylinder unit(s) so that the distance between the load support and the ground can be measured.

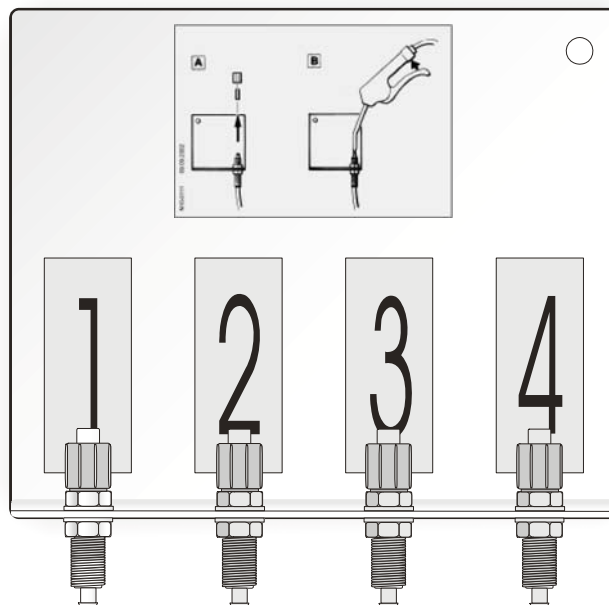
The pneumatic lines for the emergency lowering are attached to the bracket at the switching cabinet. Each line number corresponds to the number of the associated cylinder unit.

Diagram A:

To lower one or more cylinder units this way, screw down the cap nut and remove the dust cover from the air connection.

Diagram B:

Push a compressed air gun up to the opening (not with excessive force) and cautiously supply compressed air (brief pulses) to initiate lowering.



Numbering according to the cylinder units (number)

Only lower each cylinder unit in small steps (we recommend about 50 mm) so that the load does not get into a tilted, unstable position.



Original Operating Instructions

ES DUAL 8.0 / 14.0

13. Maintenance, care and servicing

Minimal but regular care will pay for itself in terms of a long, trouble-free working life.

To prevent damage to the facility or life-threatening injuries when maintaining the lifting platform the following points must be observed without fail:



- Serious damage to the machinery can arise from the installation of incorrect spare parts or consumables.
- Electrical leads that have been laid incorrectly (with too small a bending radius, for example) can cause cable melting, scorching and fires.
- Electronic components can be damaged by electrostatic processes.
- Incorrectly wired up electrical connections can destroy the electrical / electronic components.
- Interchanged electrical connections cause an incorrect direction of motor rotation – this can lead to serious damage to the facility.



- **Inadvertent switching on of power sources can lead to serious physical injuries and damage to machinery. The main switch must therefore always be secured with a padlock.**
- There is a risk of injury from sharp-edged parts of the facility that are accessible.
- Allergies can be provoked by contact with escaping fluids.
- **Using the incorrect bolt tightening torques can lead to serious damage to persons and machinery.**
Using a torque wrench, check that all fixing bolts have been fitted with the correct tightening torque (see following values):
 - Fixing bolts for the load supports
(Load supports – cylinder unit): M20-10.9, tightening torque 500 Nm
 - Fixing bolts for the cylinder unit in the fitting pit liner / frame
(Cylinder unit – fitting pit liner / fitting frame): M20-10.9,
Tightening torque 500 Nm

Before starting maintenance tasks secure an extensive working area.

The following items must be checked at least once per week:

- Power supply connections (where visible - the roll cover does not have to be removed)
- Supply-disposal lines
- Display instruments
- Suspended switch
- Foreign objects in the roll cover

Regular checks must be performed at intervals of one year at the most after the initial commissioning by a specialist (e.g. MAHA Customer Service).

(VBG 14 §39) The checks essentially comprise visual and functional checks. In addition they include checks on the condition of components, as well as checks on the effectiveness and integrity of the safety devices and the completeness of the test book.

- All tasks on the electrical equipment of the lifting platform may as a matter of principle only be performed by trained electrical specialists.
- Only MAHA GmbH & Co KG are authorized to make any modifications to the machine's control program.
- All operating materials, lubricants and auxiliary material that are not to be reused must be disposed of in an environmentally correct manner.
- Repairs may only be performed by the Customer Service department of the company MAHA GmbH & Co KG.

13.1 Care

Care instruction:

Care instructions

- Whether dirty or not, the platform must be cleaned and examined at regular intervals.
- If the lifting platform has been wetted by harmful liquids, such as

- salt water
- coldsolvent cleaner
- floor cleaning agent
- brake fluid



the liquid must be cleaned off the affected parts immediately. The platform must then be treated with a protective agent (e.g. oil or wax spray).

- No liability can be accepted for damage arising from the weather or the location if a platform that has not explicitly been provided for operation in the open air is nevertheless erected and used in the open.
- Damage to the surface protection must be repaired.
- Please take further details from the test book that is supplied with the equipment.

N09-9955

Cleaning and lubricating:



Cleaning of the lifting platform should take place monthly, or more frequently if there is a high level of dirt contamination.

Cleaning of the piston rods:

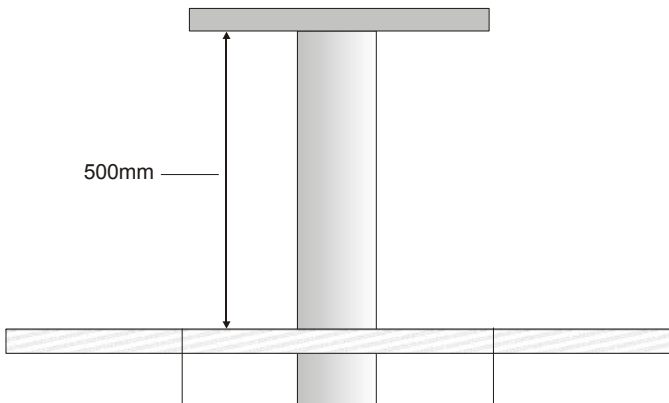
Acid-forming cleaning agents must not be used, since these can damage the chrome surface layers of the piston rods.



Underseal residues and other contaminants have the potential to destroy the seals. The result: Cleaning agents and salt water can then penetrate without hindrance and cause a large amount of damage. Guarantee claims cannot be made in cases of rust. Pistons must always be protected with a thin film of oil.

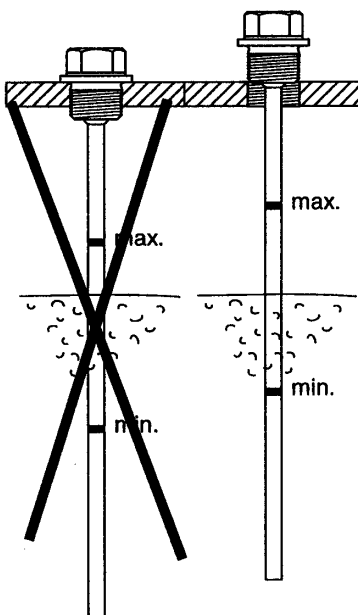
To ensure that the roll cover can move freely, heavy soiling should be removed from the covering elements at regular intervals.

Measure the oil level:



Lift the load supports 500 mm to measure the oil level. Measure from the head plate down to the bottom edge of the load support. (See diagram to the left.)

Remove the covering plate after the load support has been lifted.



To measure correctly,

unscrew the oil dipstick, and measure as shown in the diagram to the left, with the thread to the top. To get a clear reading it is recommended that the dipstick is cleaned with a cloth before measuring.

Only hydraulic oils quoted by the manufacturer may be used. Information on the hydraulic oil is found in Section 2, "Technical data".



Original Operating Instructions

ES DUAL 8.0 / 14.0

14. Taking the lifting platform out of service

Taking the lifting system out of service may only be carried out by authorised specialists.

When taking the lifting platform out of service the following particular risks must be taken into account:

- First of all secure an extensive work area for the procedure of taking the lifting platform out of service.



- **Unsecured loads can fall with a risk to life! Never remain underneath unsecured loads.**
- **Parts that are incorrectly positioned can fall down or fall over.**
- **Platform loads must always be lowered. The lifting platform must not be taken out of service with a load in place.**
- **Accessible, sharp-edged facility parts constitute a risk of injury.**
- **Defective pressure lines and connections can lead to serious physical injuries.**
- **Lubricants, solvents or conservation agents can cause burns in the event of direct contact with the skin.**

When taking the lifting platform out of service for a short period only, there is no need for additional activities. Ensure that the lifting system is secured against unauthorised switching on (for example, by disconnecting the lifting system from the mains power supply, or by fitting a padlock to the main switch).

On lifting systems that are fitted with submergible pumps:

The operation of submersible pumps is not halted simply by separating the control from the mains or by pressing the EMERGENCY OFF switch.

Submergible pumps are connected directly to the mains inside the control box, in front of the main switch. To switch off the submergible pumps, open the switching cabinet and switch off the corresponding circuit breaker.

Final decommissioning / disposal is performed by MAHA GmbH & Co. KG.

You can agree the details with whichever branch of the Firma MAHA GmbH & Co. KG customer service department is responsible for you.

Environmentally correct disposal of the operating materials, lubricants and consumables must be observed. The disposal of operating materials or facility parts may only be undertaken by a company that is authorised to do so.



15. Warranty, claims

We offer warranty for 12 months from delivery with the usual conditions concerning inadequate work and materials.

Not included in any warranty are causes upon which we have no influence, such as:

- Rust caused by water or external effects (such as steam cleaners or salt water)
- Operator errors
- Storage under damp conditions
- Inappropriate use
- Unsuitable attempts at repair
- Damage in transit*

*When the facility is delivered check for completeness and integrity of parts and claim in accordance to the transport company's conditions of transportation.

Complaints at a later time cannot be considered to do lack of verifiability.

For a warranty complaint to be accepted it is necessary to describe the problem as accurately as possible. Vague statements such as "the lifting system does not work!" do not allow us to assess a fault from a distance.

When planning to send items back please ask for information over the telephone from MAHA, because many problems turn out to be trivial. We would ask that returned items should be well packed and carriage paid. After checking and accepting the complaint, we will reimburse any shipping costs.

Important service telephone numbers:

AutomoTec - Service

- Phone: +49 (0)180 -56242 -50
- Fax: +49 (0)180 -56242 -55
- Internet: <http://www.automo-tec.com>
- E-Mail: service@automo-tec.com

We will have to charge for service tasks and for unnecessary returns caused by failure to observe these instructions!

- Return by carriers or lorry:

MAHA Maschinenbau Haldenwang GmbH & Co. KG.
Hoyen 20
87490 Haldenwang
Germany



Original Operating Instructions

ES DUAL 8.0 / 14.0

16. Additional information



Do you have any other queries or requirements? Please contact us.

You can find us under:
<http://www.maha.de>

Our company address is:

MAHA Maschinenbau Haldenwang GmbH & Co. KG.
Hoyen 20
87490 Haldenwang
Germany

Phone: +49 (0) 8374 585 0
Fax: +49 (0) 8374 585 499
E-Mail: maha@maha.de