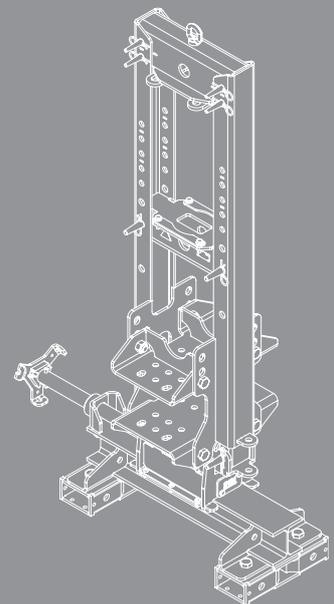
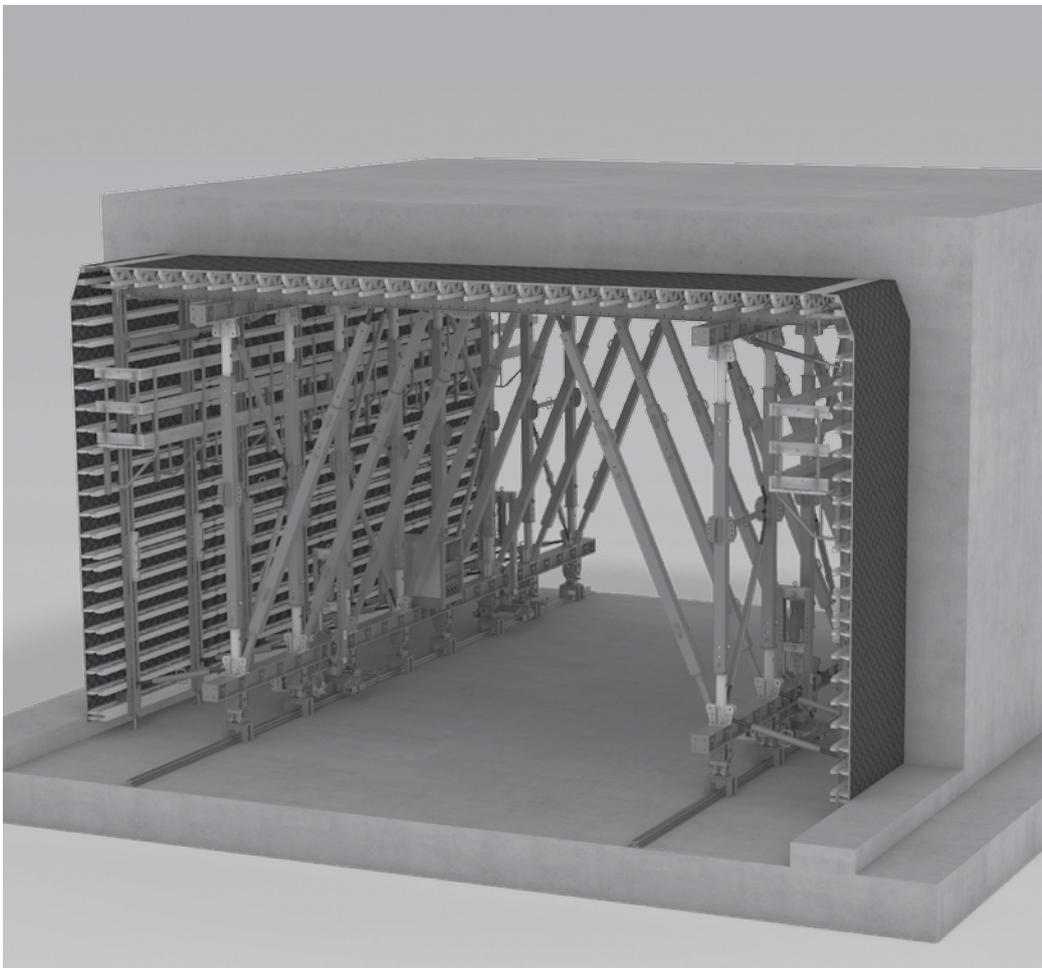


# VTC

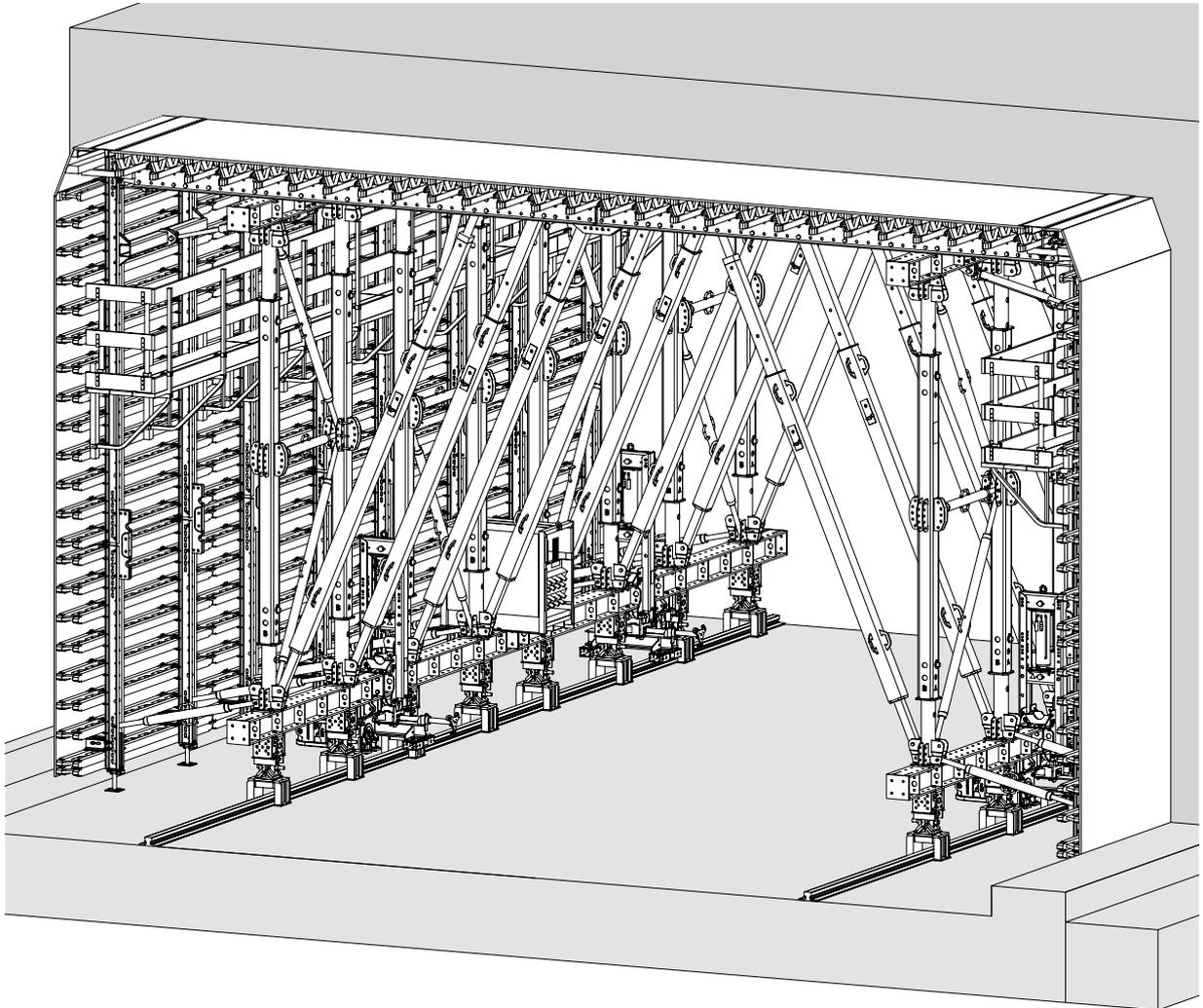
## System Components for the Tunnel Formwork Carriage

Assembly Instructions – Issue 04/2019





## Main Components



- A1 Hydraulic Pump VARIOKIT 8-cycles
- A2 Hydraulic Components
- A3 Lifting and Lowering Unit LALD
- A4 Hydraulic Drive
  
- B1 Assembly - General
- B2 Base Beam VARIOKIT
- B3 Base Beam RCS
- B4 Base Beam HDT
- B5 Installation of the Hydraulic Components
- B6 Connection and Modification of the Hydraulic Pump

## Overview

Main Components	3
Key	4

## Introduction

Target Groups	5
Additional Technical Documentation	5
Intended Use	6
Instructions on Use	6
Cleaning and Maintenance Instructions	7

## Safety Instructions

Cross-System	8
System-Specific	9

## Component Overview and Tool List

Parts List	12
Tool List	13
Tightening Torque	13

## System Overview

A1	Hydraulic Pump VARIOKIT 8-cycles	14
	Overview of the Hydraulic Pump	14
	Operating the Hydraulic Pump	16
A2	Hydraulic Components	18
	Lifting and Lowering Cylinder	18
	Hydraulic Cylinder	19
	Hydraulic Quick-Coupler	20
	Hydraulic Hose	21
	Hydraulic Twin Hose	21
A3	Lifting and Lowering Unit LALD	22
	Overview	22
	Lift Frame LALD VARIOKIT	22
	Hinge Slide LALD VARIOKIT	22
	Lifting Tool LALD VARIOKIT	24
A4	Hydraulic Drive	25
	Valve Block Hydraulic Drive	25
	Hydraulic Drive VARIOKIT	26
	Wheel Block VARIOKIT 300kN	27
	Charts	28
A5	System-Specific Components	29
	Telescopic Prop VARIOKIT	29
	Vertical Connector RCS	31
	Cross Connector RCS VARIOKIT	32
	Slab Shoe VARIOKIT	33
	Hinge Connector RCS	34

## Assembly

B1	Assembly - General	36
	Standard Assembly	36
	Safety instructions	36
	Preparation	36
B2	Base Beam VARIOKIT	37
	Installing the Hydraulic Pump	37
	Installing the Lift Frame	38
	Mounting the Hinge Slide	39
	Mounting the Wheel Block VARIOKIT 300 kN	41
	Mounting the Hydraulic Drive VARIOKIT	43

	Mounting the Heavy-Duty Wheel VARIOKIT	44
	Mounting the Flange Cage SLR VARIOKIT	46
	Mounting the Valve Block Hydraulic Drive	47
	Mounting the Support Wedge Box VARIOKIT	48
	Mounting the Heavy-Duty Roller 200 kN	49
B3	Base Beam RCS	50
	Multi-Adapter RCS VARIOKIT	50
	Installing the Hydraulic Pump	51
	Modifying the Lift Frame	52
	Installing the Lift Frame	52
	Mounting the Hinge Slide	54
	Mounting the Wheel Block VARIOKIT 300 kN	56
	Mounting the Hydraulic Drive VARIOKIT	58
	Mounting the Heavy-Duty Wheel VARIOKIT	59
	Mounting the Flange Cage SLR VARIOKIT	61
	Mounting the Valve Block Hydraulic Drive	62
	Mounting the Support Wedge Box VARIOKIT	64
	Mounting the Heavy-Duty Roller 200 kN	65
B4	Base Beam HDT	66
	Installing the Hydraulic Pump	66
	Modifying the Lift Frame	67
	Installing the Lift Frame	68
	Mounting the Hinge Slide	69
	Mounting the Wheel Block VARIOKIT 300 kN	71
	Mounting the Hydraulic Drive VARIOKIT	73
	Mounting the Heavy-Duty Wheel VARIOKIT	74
	Mounting the Flange Cage SLR VARIOKIT	76
	Mounting the Valve Block Hydraulic Drive	77
	Mounting the Support Wedge Box VARIOKIT	78
B5	Installing the Hydraulic Components	79
	Installing the Lifting and Lowering Unit	79
	Installing the Hydraulic Jack 250 kN	80
	Installing the Hydraulic Cylinder	82
B6	Connection and Modifications	
	Hydraulic Pump	84
	Hydraulic Pump RCS 4 x 190 bar for the Hydraulic Drive	84
	Hydraulic Pump VARIOKIT 8-cycles with Hydraulic Drive	86

Hydraulic Pump VARIOKIT 8-cycles without Hydraulic Drive	88	G2 Dismantling the Lifting and Lowering Unit	120
Electrical supply	89	Dismantling the Hinge Slide	120
<b>Commissioning</b>		Dismantling the Lift Frame	121
C1 Initial Commissioning	90	G3 Disposal	122
General information	90	<b>Transportation and Storage</b>	
Preparation	90	H1 General Transport Instructions	124
Switching on the Hydraulic Pump	92	General Safety Instructions	124
Bleeding the hydraulic system	93	Packaging	124
C2 Commissioning during low temperatures	96	Transport from and to the construction site	125
C3 C2 Commissioning after a long downtime period	97	Transportation and intermediate storage on the construction site	125
<b>Application</b>		Longer storage periods	125
D1 First Concreting Section	98	H2 Dimensions	126
Safety instructions	98	<b>Appendix</b>	
Extending or retracting the wall formwork	98	I1 Maintenance Chart	128
Raising or lowering the Tunnel Formwork Carriage	98	I2 Participation Protocol and Handover Certificate	129
Moving the Tunnel Formwork Carriage	99	I3 Matrix: Telescopic Prop Example	130
Concreting	99	I4 Components	132
Prerequisites	99	I5 Installation Declaration	194
Preparation	100		
First concreting cycle	101		
D2 Additional concreting sections	102		
Striking the concreting section	102		
Moving the Tunnel Formwork Carriage	103		
Shuttering the concreting section	105		
Moving the Tunnel Formwork Carriage with Jack	106		
<b>Remedial Measures for Malfunctions</b>			
E1 Malfunctions Table for the Hydraulic System	112		
E2 Malfunctions Table for the Hydraulic Drive	113		
<b>Maintenance and Repairs</b>			
F1 Inspection of the Hydraulic System	114		
Hydraulic Pump	114		
Hydraulic Hoses	114		
Hydraulic Cylinder	115		
Hydraulic Drive	115		
F2 Inspection of the Tunnel Formwork Carriage	116		
<b>Removal and Dismantling</b>			
G1 Dismantling the Hydraulic System	118		
General information	118		
Dismantling the Hydraulic Hoses	118		
Dismantling the Hydraulic Cylinder	118		
Dismantling the Hydraulic Pump	119		
Dismantling the Hydraulic Drive	119		

## Key

### Pictogram | Definition

Danger / Warning / Caution

Information

To be complied with

Load-bearing point

Visual check

Tip

Misapplication

Safety helmet

Safety shoes

Safety gloves

Safety glasses

Personal protective equipment to prevent falling from a height (PPE)

### Arrows

Arrow representing an action

Arrow representing a reaction of an action\*

Forces

\* if not identical to the action arrow.

### Safety instruction categories

The safety instructions alert site personnel to the risks involved and provide information on how to avoid these risks. Safety instructions are featured at the beginning of the section or ahead of the instructions, and are highlighted as follows:

#### **Danger**

This sign indicates an extremely hazardous situation which, if not avoided, will result in death or serious injury.

#### **Warning**

This sign indicates a hazardous situation which, if not avoided, could result in death or serious injury.

#### **Caution**

This sign indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

#### **Information**

This sign indicates situations in which failure to observe the information can result in material damage.

### Set-up of the safety instructions

#### **Signal word**

Type and source of the danger!  
Consequences of non-compliance.  
⇒ Avoidance measures.

### Dimension specifications

Dimensions are usually given in cm. Other measurement units, e.g. m, are shown in the illustrations. Load details are usually given in kg. Other measurement units, e.g. t, are shown in the illustrations.

### Conventions

- Instructions are numbered with: 1. ...., 2. ...., 3. ....
- The result of an instruction is shown by: →
- Position numbers are clearly provided for the individual components and are given in the drawing, e.g. **1**, in the text in brackets, for example (1).
- Multiple position numbers, i.e. alternative components, are represented with a slash: e.g. **1 / 2**.

### Terminology

- For better readability and comprehensibility, the term "extra-long example term" is referred to as "shortened term" in the instructions.

### Presentational reference

The illustration on the front cover of these instructions is understood to be a system representation only. The assembly steps presented in these Assembly Instructions are shown in the form of examples with only one component size. They are valid accordingly for all component sizes contained in the standard configuration.

For a better understanding, detailed illustrations are partly incomplete. Some safety installations which have possibly not been shown in these detailed descriptions must nevertheless still be available.

## Target Groups

### Contractors

These Assembly Instructions are intended for contractors who use PERI products for

- assembling, modifying and dismantling operations, or
- use them, e.g. for concreting, or
- who have them used, e.g. for forming operations.

### Competent person

(Construction Site Coordinator)

The Safety and Health Protection Coordinator\*

- is appointed by the client,
- must identify potential hazards during the planning phase,
- determines measures that provide protection against risks,
- creates a safety and health plan,
- coordinates the protective measures for the contractor and site personnel so that they do not endanger each other,
- monitors compliance with the protective measures.

### Competent person

Due to the specialist knowledge gained from professional training, work experience, and recent professional activity, the competent person has a reliable understanding of safety-related issues and can correctly carry out inspections. Depending on the complexity of the test to be undertaken, e.g. scope of testing, type of testing or the use of certain measuring devices, a range of specialist knowledge is necessary.

PERI is responsible for training the operating personnel. With his signature on the handover certificate, the operator confirms that he is able to correctly operate the hydraulic system and drive. See "Participation Protocol and Handover Certificate" on Page 129.

### Qualified personnel

PERI products may only be assembled, modified or dismantled by personnel who are suitably qualified to do so. For the work to be carried out, the qualified personnel must have received instructions\*\* covering at least the following points:

- The plan for the assembly, modification or dismantling of the PERI product in an understandable form and language.

- The measures necessary to safely assemble, modify or dismantle the PERI product.
- Naming of the preventive measures to be taken to avoid the risk of persons and objects falling.
- The safety precautions to be taken in the event of changing weather conditions that could adversely affect the safety of the PERI product concerned, as well as the personnel.
- Details regarding permissible loads.
- Description of all other risks and dangers associated with assembly, modification or dismantling operations.



- **In other countries, ensure that the relevant national guidelines and regulations in the respective current version are complied with!**
- **If no country-specific regulations are available, it is recommended to proceed according to German guidelines and regulations.**
- **A competent person must be present on site during formwork operations.**

\* Valid in Germany: Regulations for Occupational Health and Safety on Construction Sites 30 (RAB 30).

\*\* Instructions are given by the contractor himself or a competent person selected by him.

## Additional Technical Documentation

- Instructions for Use:
  - Hydraulic Pump
  - Hydraulic Drive
  - Hydraulic Jack
  - Filter Pump CE
- Assembly Instructions:
  - RCS Climbing Device and Hydraulics
- Instructions for Assembly and Use:
  - Concrete Pump Connector BPA-2
- Design information for proving the Climbing Anchor
- Project-specific Instructions for Assembly and Use and related general arrangement drawings.
- Safety Data Sheet:
  - Hydraulic Oil
- PI Sheets:
  - separate product information, e.g. for permissible anchor loads

## Intended Use

### Product description

PERI products have been designed for exclusive use in the industrial and commercial sectors by suitably trained personnel only.

The hydraulic Lifting and Lowering Unit, as well as the Wall Hydraulic Cylinder, serve only to position the VTC Tunnel Formwork Carriage and Internal Wall Formwork vertically and horizontally. The Hydraulic Cylinders are relieved of any load before concreting begins. Forces occurring during concreting operations must be transferred via the formwork system and supporting structure. Any other use is considered contrary to the designated use.

These Assembly Instructions serve as a basis for the project-related risk assessment as well as instructions for the provision and use of the system by the contractor (user). However, they do not replace these in any way.

The components are to be inspected before each use to ensure that they are in perfect condition and function correctly.

Deviations from the standard configuration are not permitted. Special applications must be described in the form of detailed planning and operating instructions based on a separate risk assessment. These special applications must be approved by PERI.

For all damage arising from non-intended use

- the operator bears sole responsibility.
- the manufacturer assumes no liability.

The VTC Tunnel Formwork Carriage may only be used

- within the permissible load-bearing capacity.
- within the permissible temperature limits of -20 °C to +60 °C (with special measures up to -30 °C).
- in good working condition and if correctly mounted.

### Features

Depending on the tunnel construction method, the VTC Tunnel Formwork Carriage only requires one load-bearing system for the walls and slab, which means the overall workload is greatly reduced. The outer wall formwork is also the stopend for the slab edge. The system is self-propelled by means of the hydraulic drive.

The same hydraulic components are always used. The construction of the VTC Tunnel Formwork Carriage and formwork elements is always adapted to accommodate the structure and is thus planned on a project-related basis.

---

## Instructions on Use

Use in a way not intended according to the Assembly Instructions or deviating from the standard configuration or intended use represents a misapplication with a potential safety risk.

Only PERI original components may be used. The use of other products and spare parts is not allowed and represents a misapplication with associated safety risks.

Changes to PERI components are not permitted and represent a misapplication with associated safety risks.

Operations with damaged or incomplete lifting equipment are not permissible.

The system described in these Assembly Instructions may contain patent-protected components.



- The description of the assembly and operation of the assemblies and components in these Assembly Instructions is intended as an example.
- For use on the construction site, a project-specific assembly plan is required.
- The project-related assembly plan from PERI is binding for assembly operations.

## Cleaning and Maintenance Instructions

In order to ensure cost-effective, technical and safe use over a long period, it is important to take a value-preserving approach.

In order to maintain the value and operational readiness of the formwork materials over the long term, clean the panels after each use.

Some repair work may also be inevitable due to the tough working conditions.

Repairs which require welding or deformation of components must be carried out by PERI.

The following points should help to keep cleaning and maintenance costs as low as possible.

Spray the formwork on both sides with concrete release agent before each use; this facilitates easier and faster cleaning of the formwork. Spray the concrete release agent very thinly and evenly!

Spray the rear side of the formwork with water immediately after concreting; this avoids any time-consuming and costly cleaning operations.

When used continuously, spray the panel formlining with concrete release agent immediately after striking; then clean by means of a scraper, brush or rubber lip scraper. Important: do not clean formlining made of plywood with high-pressure equipment. This could result in the formlining being damaged.

Fix box-outs and mounting parts with double-headed nails; as a result, the nails can easily be removed later, and damage to the formlining is largely avoided.

Close all unused anchor holes with plugs; this eliminates any subsequent cleaning or repair work. Anchor holes accidentally blocked with concrete are freed by means of a steel pin from the formlining side.

When placing bundles of reinforcement bars or other heavy objects on horizontally stored formwork elements, suitable support, e.g. square timbers, is to be used: this largely avoids impressions and damage to the formlining.

Internal concrete vibrators should be fitted with rubber caps if possible; as a result, any damage to the formlining is reduced if the vibrator is accidentally inserted between the reinforcement and formlining.

Never clean powder-coated components, e.g. elements and accessories, with a steel brush or hard metal scraper: this ensures that the powder coating remains intact.

Use spacers for reinforcement with large-sized supports or extensive areas of support; this largely avoids impressions being formed in the formlining when under load.

Mechanical components, e.g. spindles or gear mechanisms, must be cleaned of dirt or concrete residue before and after use, and then greased with a suitable lubricant.

Provide suitable support for the components during cleaning so that no unintentional change in their position is possible.

Do not clean components suspended on crane lifting gear.

## Cross-System



**The safety instructions apply to all phases of the system.**

### General

The contractor must ensure that the Instructions for Assembly and Use supplied by PERI are available at all times and understood by the site personnel.

These Assembly Instructions can be used as the basis for creating a risk assessment. The risk assessment is compiled by the contractor. The Assembly Instructions do not replace the risk assessment!

Always take into consideration and comply with the safety instructions and permissible loads.

For the application and inspection of PERI products, the current safety regulations and guidelines valid in the respective countries must be observed.

Materials and working areas are to be inspected on a regular basis, especially before each use and assembly, for:

- signs of damage,
- stability and
- function.

Damaged components must be exchanged immediately on site and may no longer be used.

Safety components are to be removed only when they are no longer required.

Components provided by the contractor must conform to the characteristics required in these Instructions for Assembly and Use, as well as all valid construction guidelines and standards. Unless otherwise indicated, this applies in particular to:

- timber components: Strength Class C24 for Solid Wood according to EN 338.
- scaffold tubes: galvanised steel tubes with minimum dimensions of  $\varnothing 48.3 \times 3.2$  mm according to EN 12811-1:2003 4.2.1.2.
- scaffold tube couplings according to EN 74.

Deviations from the standard configuration are only permitted after a further risk assessment has been carried out by the contractor.

Appropriate measures for working and operational safety, as well as stability, are defined on the basis of this risk assessment.

Corresponding proof of stability can be provided by PERI on request if the risk assessment and resulting measures to be implemented are made available.

Before and after exceptional occurrences that may have an adverse effect on the safety of the formwork system, the contractor must immediately

- create another risk assessment, with appropriate measures being carried out based on the results to ensure the stability of the formwork system,
- arrange for an extraordinary inspection to be carried out by a competent person qualified to do so. The aim of this inspection is to identify and rectify any damage in good time, in order to guarantee the safe use of the formwork system.

Exceptional occurrences can include:

- accidents,
- longer periods of non-use,
- natural events, e.g. heavy rainfall, icing, heavy snowfall, storms or earthquakes.

In the case of unfavourable weather conditions, suitable precautions and measures are to be implemented, in order to guarantee working safety and stability.

### Assembly, modification and dismantling work

Assembly, modification or dismantling of formwork systems may only be carried out by qualified persons under the supervision of a competent person. The qualified personnel must have received appropriate training for the work to be carried out with regard to specific risks and dangers.

On the basis of the risk assessment and the Assembly Instructions, the contractor must create installation instructions in order to ensure safe assembly, modification and dismantling of the formwork system.

The contractor must ensure that the personal protective equipment required for the assembly, modification or dismantling of the formwork system, e.g.

- safety helmet,
  - safety shoes,
  - safety gloves,
  - safety glasses,
- is available and used as intended.

If personal protective equipment against falling from a height (PPE) is required or specified in local regulations, the contractor must determine appropriate attachment points on the basis of the risk assessment. The contractor stipulates the PPE to be used to prevent falling.

The contractor must

- provide safe working areas for site personnel which are to be reached through the provision of safe access ways. Areas of risk must be cordoned off and clearly marked.
- ensure the stability during all stages of construction, in particular during assembly, modification and dismantling operations.
- ensure and prove that all loads can be safely transferred.

Secure intermediate states correctly by means of temporary supports in order to prevent any tipping over. Keep the component attached to the crane lifting gear until assembly has been completed.

Only use tested and approved lifting gear.

Only use the specified attachment points for components during the transportation procedure.

## Utilisation

Every contractor who uses or allows formwork systems or sections of the formwork to be used, is responsible for ensuring that the equipment is in good condition.

If the formwork system is used successively or at the same time by several contractors, the health and safety coordinator must point out any possible mutual hazards and all work must be then coordinated.

## System-specific



**The safety instructions apply to all phases of the system.**

### Operations

The contractor must ensure that the assembly, modification, dismantling, moving, use and handling of the product is managed and supervised by qualified personnel and authorised personnel.

**All persons working with the system must be familiar with the operating instructions and the safety information.**

The contractor has to ensure that the official Assembly Instructions, Instructions for Assembly and Use, other instructions required for operations or assembly, relevant planning documents, parts lists and other data are available to the users.

### Access ways and working areas

- Safe access to all working areas must be guaranteed at all times.
- Working areas must remain free of any tripping hazards.
- Do not walk on components and assembly units, always ensure that they are in a secure position.
- Always keep components and assembly units free of dirt, ice and snow.
- Working platforms are to be kept clean and tidy. Especially after hydraulic oil leakage and wet weather conditions, there is an increased risk of slipping.
- Do not remain in an area of risk created by moving parts.
- Avoid installing working areas and access points in areas of risk.
- Make sure the Hydraulic Pump is positioned on a level and sufficiently load-bearing surface.

## Assembly



Use suitable personal protective equipment (PPE):

- safety helmet
- safety shoes
- protective gloves

There is always the possibility that unforeseen risks arise during assembly work. Assess the degree of risk in each individual case and, if necessary, take measures to prevent or at least minimise the risk.

If guardrails cannot be used due to technical reasons or have to be removed, then site personnel are to be secured by other means (e.g. through PPE).

Site personnel are forbidden to remain in areas below where assembly work is being carried out unless the area of risk has been provided with sufficient protection against falling, overturning, sliding or rolling objects and masses. Cordon off and clearly mark all areas of risk.

Only those persons who are required to carry out the individual work steps may remain on the VTC Tunnel Formwork Carriage.

Ensure that the hydraulic lines and power cable are always positioned so that

- they do not create any tripping hazard,
- they can be securely clamped,
- they cannot be sheared off.

## Protection against falling objects

Secure tools and materials to prevent them from falling to the ground. Remove concrete residue and other dirt.

Avoid positioning working areas and access points in areas of risk. If this is not possible due to work procedures, suitable equipment (e.g. protective roofs) must be available to provide protection against falling objects. This also applies to work requiring only a short period of time.

Operational working areas at great heights are to be secured against falling objects by means of appropriate constructional measures. Safety nets (mesh size  $\leq 2$  cm) are considered to be suitable here.

Do not remain under any suspended loads.

## Hydraulic components

Visual checks are to be carried out by authorised personnel at regular intervals.

Qualified personnel are to carry out a functionality check before every working cycle or assembly takes place. If any defects are discovered, repairs are only allowed to be carried out by qualified personnel.

The hydraulic hoses have an expiry date. Observe the manufacturer-specific information.

Do not suspend any objects from the hydraulic hoses.

Observe the manufacturer-specific information regarding the inspection and maintenance of the hydraulic pump.

For correct use and disposal of the hydraulic oil, follow the manufacturer's instructions.

Thicken any hydraulic oil leakage immediately with oil binder and then wipe away.



Wear safety glasses and suitable protective gloves when working on the hydraulic system.



Always switch off the power to the hydraulic pump and secure it against being switched on again once the moving procedure of the Tunnel Formwork Carriage has been completed. On the hydraulic pump disconnect the Adapter Cable RCS from the power supply and secure against unauthorised use.

This safety measure also applies to the following:

- Assembly.
- Maintenance.
- Repairs.
- Inspections.
- Dismantling.

Approval for the use is the responsibility of the operating personnel.

## Maintenance and repairs

- Only use materials which are in perfect condition.
- System components are to be checked for signs of damage by qualified personnel and authorised persons on a regular basis. See Section "F1 Inspecting the Hydraulics" on Page 114 and Section "F2 Inspecting the Tunnel Formwork Carriage" on Page 116.
- Dirt which affects the functionality is to be removed immediately.
- Damaged components are to be inspected, removed and replaced.
- Determine the cause of any damage that occurs on a recurring basis and rectify.

Do not use if the type plate on the hydraulic pump is missing, incomplete or illegible.

## Electric components



### Danger

High voltage on the hydraulic pump! Death or serious injury can result from an electric shock.

- ⇒ Connection only by authorised qualified personnel.
- ⇒ Only qualified personnel can carry out work and repairs on the electrical components of the system.
- ⇒ Only use approved, undamaged and tested connecting cables.

Compare required type of current and voltage with that specified on the type plate.

Visual checks of the electrical connections are to be carried out by authorised personnel at regular intervals.

Do not suspend any objects from the electrical lines.

# Component Overview and Tool List



Pos.no.	Component name	Item no.
1	Hydraulic Pump VARIOKIT 8-cycles	126852
2	Lifting and Lowering Cylinder	127480
3	Hydraulic Cylinder	127481
4	Hydraulic Pump RCS 4 x 190 bar	109766
7	Rail	
7.1	Crane Rail A75	818555
7.2	Crane Rail S49	834862
7.3	U-Profile U140	806336
9	Cable Connection CEE 16A	
10	Base Beam	
10.1	Longitudinal Beam VARIOKIT	
10.2	Climbing Rail RCS	
10.3	Main Beam HDT	
11	Multi-Adapter RCS VARIOKIT	130848
12	Adapter RCS SLR VARIOKIT	130842
13	Connector RCS LALD VARIOKIT	130972
14	Vertical Connector RCS	129800
15	Cross Connector RCS VARIOKIT	131040
16	Slab Shoe VARIOKIT	130820
17	Hinge Connector RCS	130825
18	Cross Connector VARIOKIT	111279
19	Angle Connector RCS/SRU	111283
20	Heavy-Duty Wheel VARIOKIT	131001
21	Flange Cage SLR VARIOKIT	130981
22	Pressure Frame LALD SLR VARIOKIT	130843
23	Pressure Frame Assembly Kit	133911
24	Hinge Slide LALD VARIOKIT	130902
25	Lift Frame LALD VARIOKIT	130955
26	Support Wedge Box VARIOKIT	130970
27	Hydraulic Jack 250 kN	130965
28	Lifting Tool LALD VARIOKIT	131072
31	Wheel Block VARIOKIT 300 kN	133664
32	Hydraulic Drive VARIOKIT	133953
33	Valve Block Hydraulic Drive	134002
34	Telescopic Prop VARIOKIT	131060
35	Distribution Waler	
36	Connection Bracket	
37	Steel Waler SRU 147 U120	103877
40	Brace Support 250	113770
41	Wedge Lowering Device 420 kN	024590
44	Heavy-Duty Roller Swivel Plate	131811
46	Heavy-Duty Roller 200 kN Type A-II	022041

Pos.no.	Component name	Item no.
	<b>Hydraulic item</b>	
50	Hydraulic Hose DN08	
51	Hydraulic Hose DN12	
52	Hydraulic Twin Hose RCS	
53	Plug DN10 R3/8IG	128992
54	Socket DN10 R3/8IG	128993
55	Double Nipple G3/8	128994
56	Sealing Washer G3/8	128995
57	Hydraulic Accumulate Piece RCS	112421
58	Conversion Set Hydr. Pump RCS-VTC	133676
59	Hydraulic T-Piece DN08	129423
60	Hydraulic Quick-Coupler	
61	Male Stud Coupler	051750
	<b>Small components</b>	
100	Bolt ISO4017-M12x055-8.8-VZ	710710
101	Hex. Nut ISO7040-M12-8-VZ	710381
102	Washer ISO 7089-12-200HV-VZ	780702
103	Bolt ISO4017-M16x025-8.8-VZ	113990
104	Bolt ISO4014-M16x150-8.8-VZ	710049
105	Hex. Nut ISO7040-M16-8-VZ	070890
106	Washer ISO 7094-16-100HV-VZ	113349
107	Bolt ISO4017-M20x040-8.8-VZ	706458
108	Bolt ISO4017-M20x055-8.8-VZ	111137
109	Bolt ISO4017-M20x060-8.8-VZ	057139
110	Bolt ISO4017-M20x070-8.8-VZ	721912
111	Bolt ISO4014-M20x120-8.8-VZ	104477
112	Hex. Nut ISO4032-M20-8-VZ	710334
113	Hex. Nut ISO7040-M20-8-VZ	781053
114	Washer ISO 7089-20-200HV-VZ	706454
115	Bolt ISO4017-M24x050-8.8-VZ	109199
116	Bolt ISO4017-M24x060-8.8-VZ	125462
117	Bolt ISO4017-M24x070-8.8-VZ	132382
118	Bolt ISO4014-M24x080-8.8-VZ	105416
119	Bolt ISO4014-M24x130-8.8-VZ	109612
120	Hex. Nut ISO4032-M24-8-VZ	022250
121	Hex. Nut ISO7040-M24-8-VZ	105032
122	Washer ISO 7089-24-200HV-VZ	722663
123	Fitting Pin D=21x120	104031
124	Cotter Pin 4/1, galv.	018060
125	Fitting Pin D=26x120	111567
126	Cotter Pin 5/1, galv.	022230
127	Bolt 40x160	127400
128	Bolt 50x175	127397
129	Hinged Pin DIN 11023-10x65	126417

# Component Overview and Tool List

Pos.no.	Component name	Item no.	Pos.no.	Component name	Item no.
130	Wingnut Pivot Plate DW 15, galv.	030370	138	Climbing Cone-2 M24/DW 15 VZ	031220
131	Tie Rod 0.50 MTR DW 15	030005	150	Cable Tie NT-240H	051760
132	Hex. Nut SW 30 / 50, galv. DW 15	030070			
133	Hydr. Oil Filter Pump CE	131313			
134	Bolt ISO4017-M20x130-8.8-VZ	711078			
135	Washer ISO 7093-1-16-200HV-VZ	710886			
136	Bolts for Hinge Connector RCS	130831			
137	Tie Yoke SRU	110755			

Tool name
Ratchet Wrench 1/2"
Extension for the Ratchet Wrench
Socket Set 1/2" up to SW 36
Spirit Level
Cordless Screwdriver
Ring Spanner/Open-End Spanner Set
4-Sling Lifting Gear
Torque Wrench
Hammer
Round Slings

## Tightening torque

For non-defined lubricated screw connections, PERI recommends the following guide values as "hand-tightened" tightening torque MA. These guide values are based on EN 15048 with Safety Factor 3 against breakage of a bolt with Strength Class 4.6.

Bolt M8	8 Nm
Bolt M10	16 Nm
Bolt M12	30 Nm
Bolt M16	65 Nm
Bolt M20	100 Nm
Bolt M24	150 Nm
Bolt M30	260 Nm
Bolt M36	350 Nm

Tightening torque has been determined for the following hydraulic components:

Union Nut DKOS12	42-50Nm
Union Nut DKOS16	60-70Nm
Screw-In Thread G3/8	80 Nm

## Overview of the Hydraulic Pump

### Identification markings

For clear identification of the hydraulic pump and electric motor, pay attention to the type plates.

When consulting the manufacturer, have the information on the type plates to hand.  
(Fig. A1.01)



Fig. A1.01

- |            |                                       |             |                                   |
|------------|---------------------------------------|-------------|-----------------------------------|
| <b>1</b>   | Hydraulic Pump                        | <b>1.10</b> | Oil Drain Bolt                    |
| <b>1.1</b> | Hand Lever                            | <b>1.11</b> | Return Flow Filter                |
| <b>1.2</b> | CEE Motor Protection Plug             | <b>1.12</b> | Bypass Connection                 |
| <b>1.3</b> | Adapter Cable RCS                     | <b>1.13</b> | Motor for the Hydraulic Pump      |
| <b>1.4</b> | Hydraulic Connection Feed             | <b>1.14</b> | Attachment Point                  |
| <b>1.5</b> | Hydraulic Connection Return Flow      | <b>1.15</b> | Type Plate for the Hydraulic Pump |
| <b>1.6</b> | Manometer                             | <b>1.16</b> | Type Plate for the Electric Motor |
| <b>1.7</b> | Oil Tank                              | <b>1.17</b> | Leakage Oil Connection            |
| <b>1.8</b> | Oil Level Indicator with Thermometer  | <b>1.18</b> | RFID Chip                         |
| <b>1.9</b> | Filling Opening for the Hydraulic Oil | <b>1.19</b> | Split Pin                         |
|            |                                       | <b>1.20</b> | Oil Sump                          |
|            |                                       | <b>1.21</b> | Funnel                            |

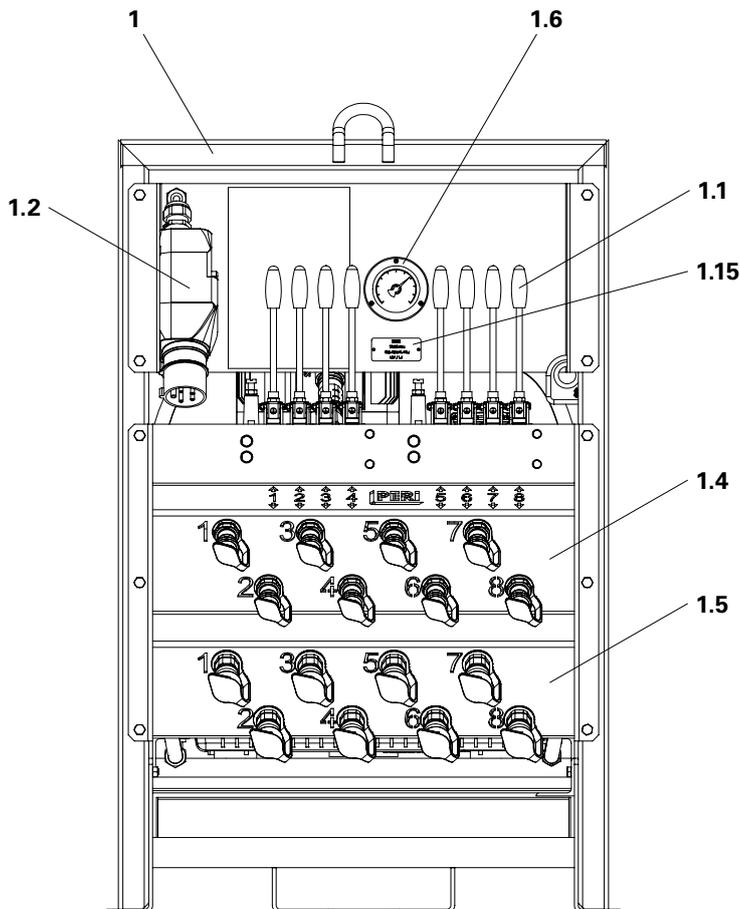


Fig. A1.02

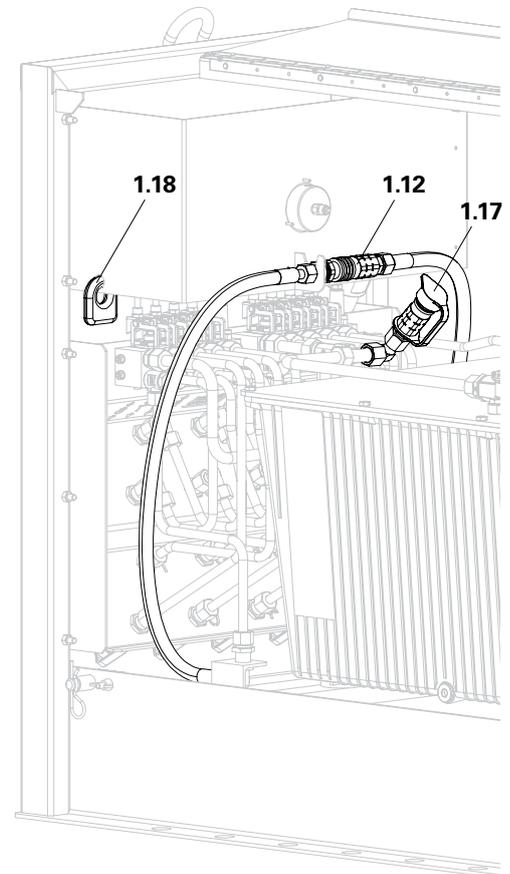


Fig. A1.03

# A1 Hydraulic Pump VARIOKIT 8-cycles

Technical data	Europe	USA
Operating pressure	180 bar	180 bar
Voltage	400 V	460 V
Fuse	16 A slow	16 A slow
Frequency	50 Hz	60 Hz
Oil volume	87 l	87 l
Weight	241 kg	241 kg

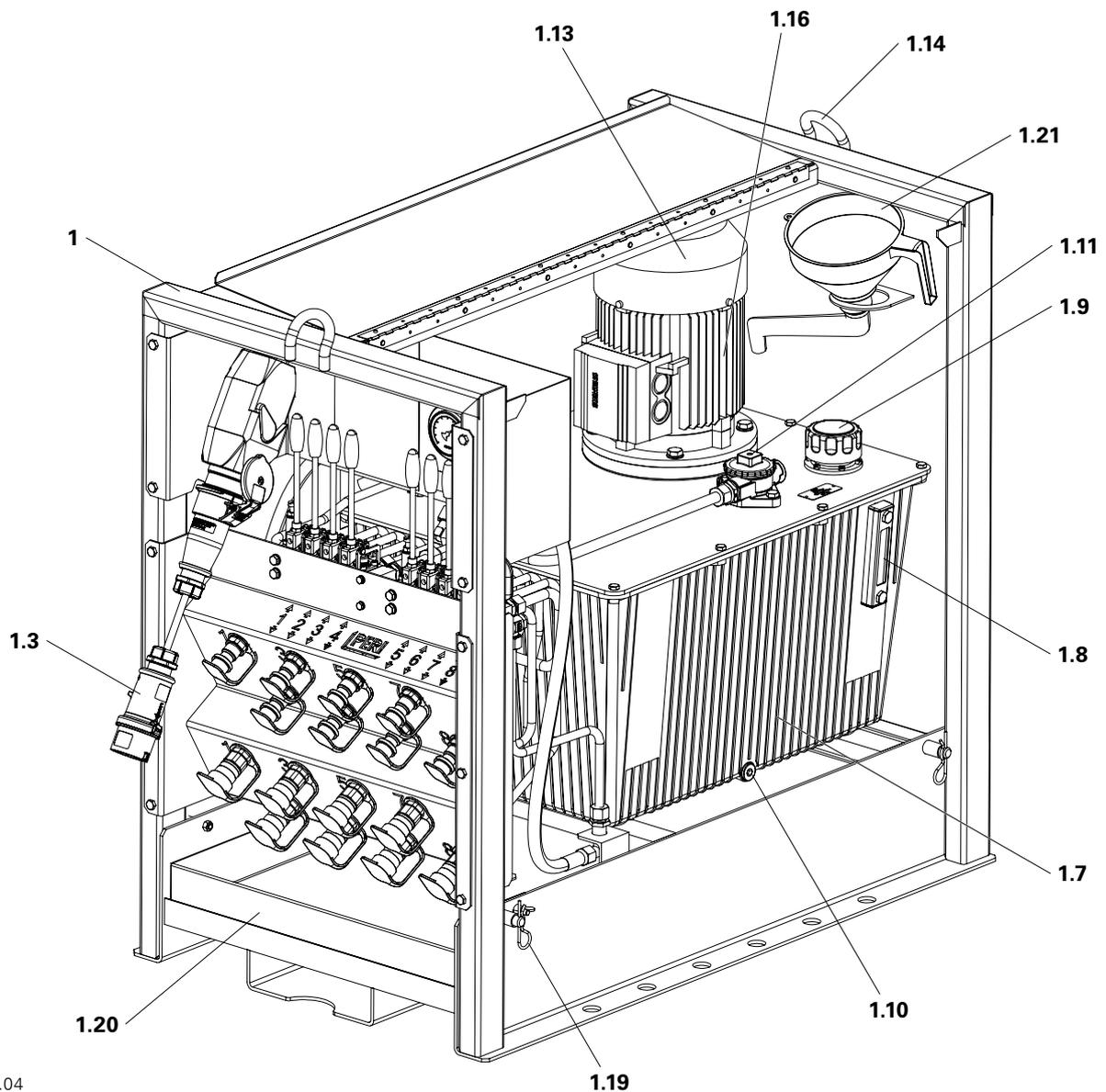


Fig. A1.04

## Operating the Hydraulic Pump



### Danger

Uncontrolled movement of the hydraulic cylinder!

Risk of crushing body, arms and legs.

⇒ Check whether all hand levers are in the centre position.

⇒ Leave the area of risk.

### Switching on

Turn switch (1.24) on the CEE Motor Protection Plug to I.

→ The hydraulic pump is switched on.

→ The hydraulic pump is ready to operate and circulates freely.

(Fig. A1.05)

### Extend the hydraulic cylinder.

Press the hand lever (1.1).

→ the hydraulic cylinder extends.

(Fig. A1.06)

### Retract the hydraulic cylinder.

Pull the hand lever (1.1).

→ The hydraulic cylinder retracts.

(Fig. A1.07)

### Switching off

Turn switch (1.24) on the CEE Motor Protection Plug to 0.

→ The hydraulic pump switches off.

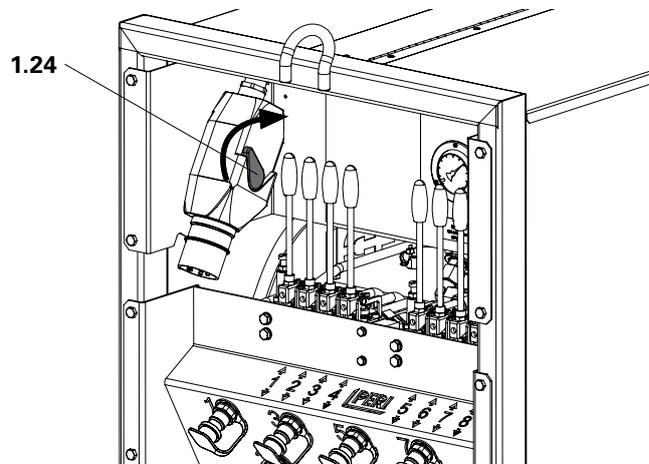


Fig. A1.05

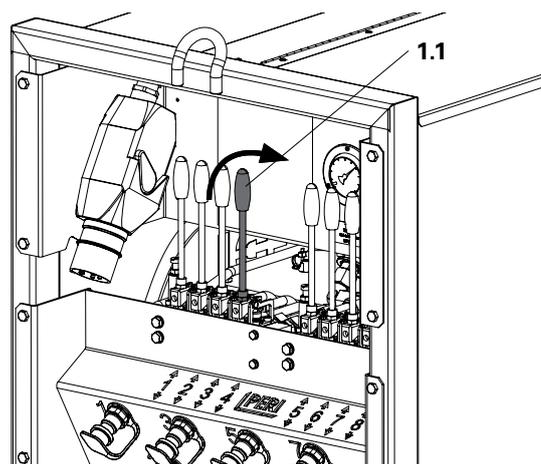


Fig. A1.06

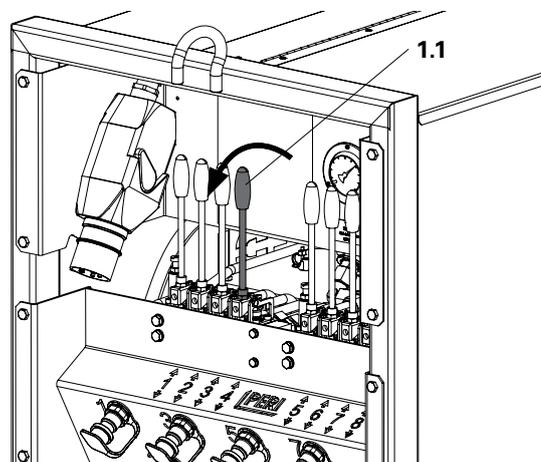


Fig. A1.07

## Taking a reading of the hydraulic pressure

The manometer shows the operating pressure of the hydraulic system. Pressure is applied only when operating the hand lever. If none of the hand levers are actuated, the pressure in the system is 0 bar, the hydraulic pump circulates freely. (Fig. A1.08)

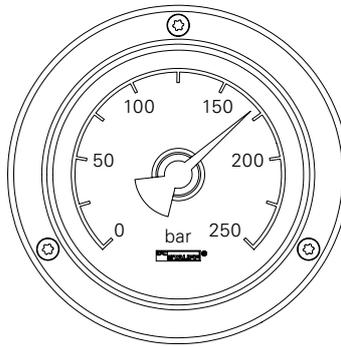


Fig. A1.08

## Opening the hydraulic pump

1. Fold up cover (1.22).
  2. Remove split pin (1.19).
  3. Push side wall (1.23) upwards and remove.
- (Fig. A1.09)

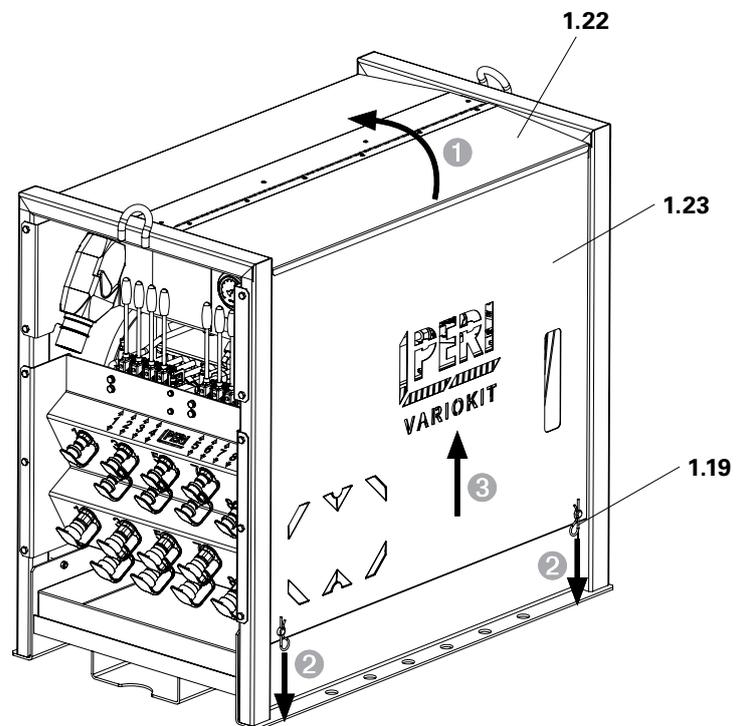


Fig. A1.09

## Taking a reading of the oil temperature and oil level

The oil level indicator with thermometer (1.8) is an instrument cluster and shows the oil level and oil temperature. (Fig. A1.10)

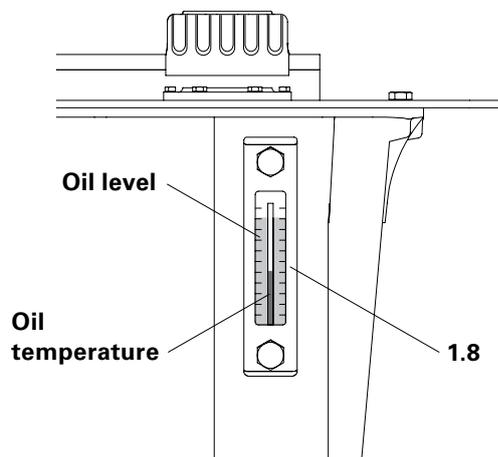


Fig. A1.10

## Lifting and Lowering Cylinder

The Tunnel Formwork Carriage is raised and lowered by means of the Lifting and Lowering Cylinder.

- In the concreting position, the Tunnel Formwork Carriage is raised.
- In the moving position, the Tunnel Formwork Carriage is lowered.

The tunnel slab is shuttered and struck in one working operation. When concreting the tunnel slab, the load is transferred via Brace Frames and Wedge Lowering Devices into a sufficiently load-bearing surface.

Technical data	D120/70 Stroke 300
Lifting power $F_{\text{pressure}}$	200 kN
Lifting power $F_{\text{traction}}$	135 kN
Piston stroke	300 mm
External length (retracted)	832 mm
External length (extended)	1132 mm
Ø Eye	51 mm
Operating pressure	180 bar
Weight	55 kg

- 2** Lifting and Lowering Cylinder
  - 2.1** Quick Coupler Feed
  - 2.2** Quick Coupler Return Flow
  - 2.3** Piston Rod Side
  - 2.4** Piston Side
  - 2.5** RFID Chip
- (Fig. A2.01)

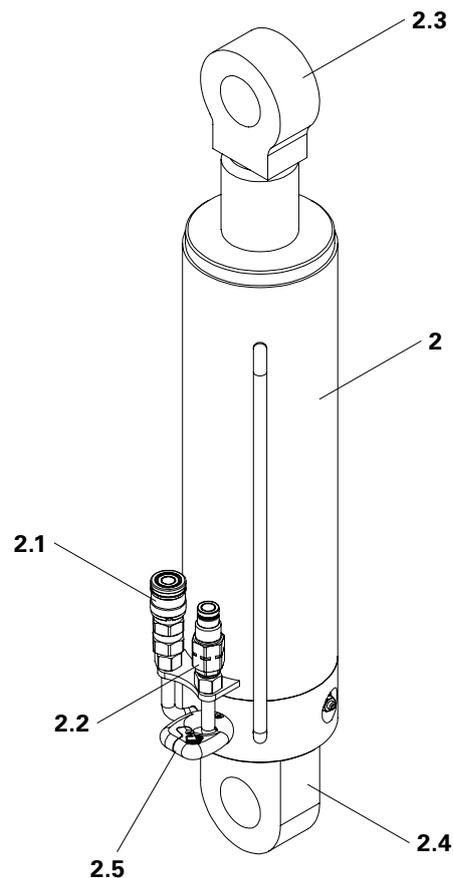


Fig. A2.01

## Hydraulic Cylinder

The wall formwork is retracted and extended with the hydraulic cylinders:

- In the concreting position, the wall formwork is extended.
- In the moving position, the wall formwork is retracted.

The hydraulic cylinders are mounted underneath the slab formwork and facilitate fast shuttering and striking operations. Adjustable limit stops ensure repeatable exact positioning of the wall formwork without requiring any re-adjustment.

Technical data	D60/40 Stroke 650
Lifting power $F_{\text{pressure}}$	50 kN
Lifting power $F_{\text{traction}}$	30 kN
Piston stroke	650 mm
External length (retracted)	1040 mm
External length (extended)	1690 mm
Ø Eye	41 mm
Operating pressure	180 bar
Weight	22 kg

- 3** Hydraulic Cylinder
  - 3.1** Quick Coupler Feed
  - 3.2** Quick Coupler Return Flow
  - 3.3** Piston Rod Side
  - 3.4** Piston Side
  - 3.5** RFID Chip
- (Fig. A2.02)

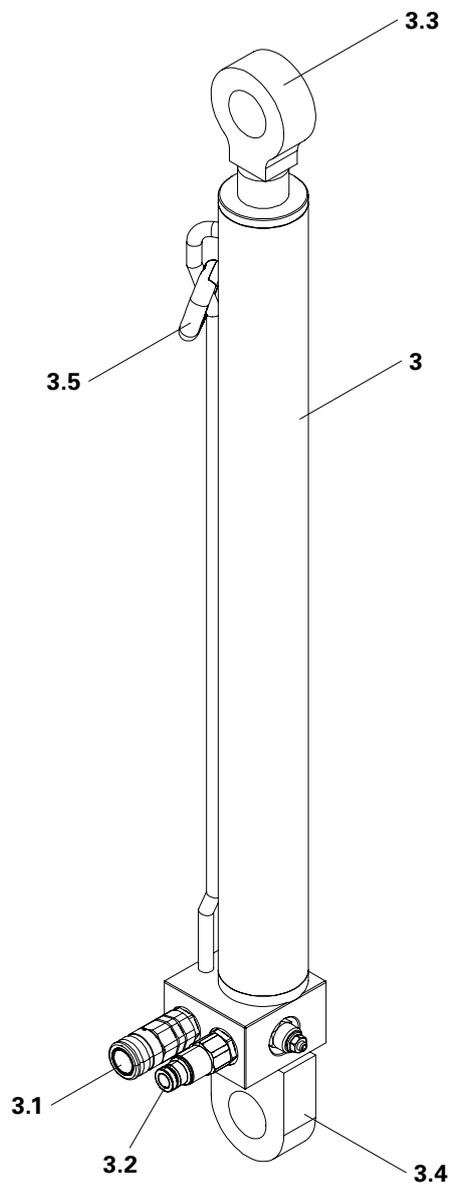


Fig. A2.02

## Hydraulic Quick Coupler

- 60.1** Quick Coupler Connector
- 60.2** Quick Coupler Bushing
- 60.3** Retaining Ring
- 60.4** Notch
- 60.5** Sphere

The Hydraulic Quick Coupler allows connecting the hydraulic components without any tools. The hydraulic system must be free of pressure. After uncoupling, the Hydraulic Quick Coupler seals the hydraulic connection which means the hydraulic oil cannot escape.

(Fig. A2.03)

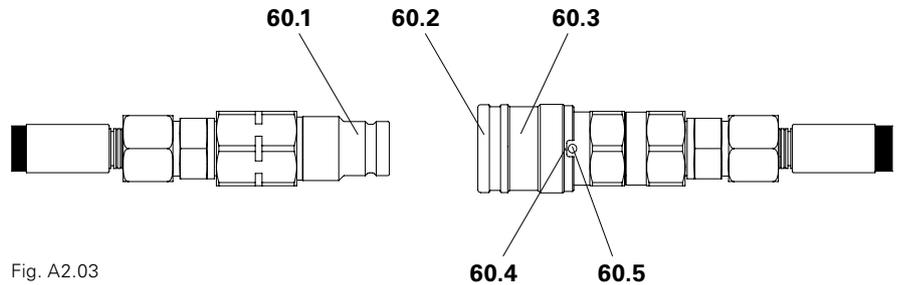


Fig. A2.03

### Connecting the Quick Coupler

**!** Depressurise the hydraulic system.

1. Protection caps may have to be removed.
2. Clean the bushing and connector, and check for any signs of damage.
3. Align notch (60.4) in the retaining ring of the bushing with the sphere (60.5).
4. Push the connector (60.1) as far as possible into the bushing (60.2) until the retaining ring engages.  
→ The quick coupler is now connected.
5. Turn the retaining ring (60.3) by 90°.  
→ The quick coupler is secured against any unintentional release.

(Fig. A2.04 + A2.05)

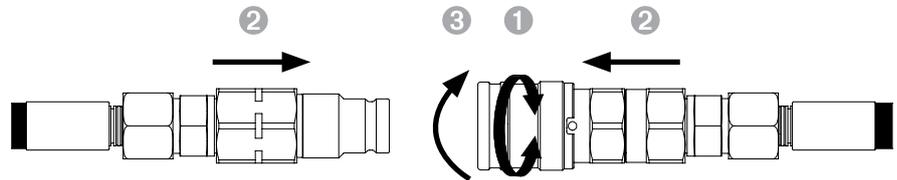


Fig. A2.04

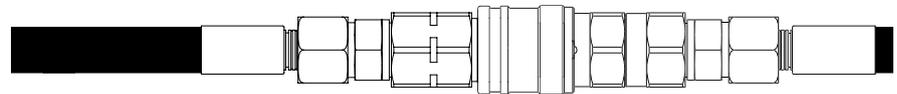


Fig. A2.05

### Disconnecting the Quick Coupler

**!** Depressurise the hydraulic system.

1. Align notch (60.4) in the retaining ring of the bushing with the sphere (60.5).
2. Press the quick coupler together, push back the retaining ring (60.3) and hold.
3. Pull the quick coupler apart.

(Fig. A2.06)

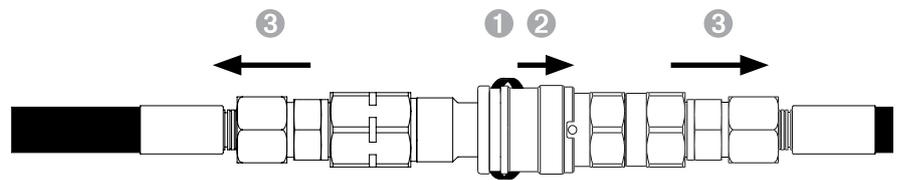


Fig. A2.06

## Hydraulic Hose

### Hydraulic Twin Hose

- 50** Hydraulic Hose DN08
- 51** Hydraulic Hose DN12
- 52** Hydraulic Twin Hose RCS
- 60.1** Quick Coupler Plug
- 60.2** Quick Coupler Bushing

#### Hydraulic hose

The hydraulic hose connects the hydraulic pump to the consumer. A quick coupler bushing is mounted at one end of the hydraulic hose while a quick coupler connector is fitted at the other end. (Fig. A2.07)

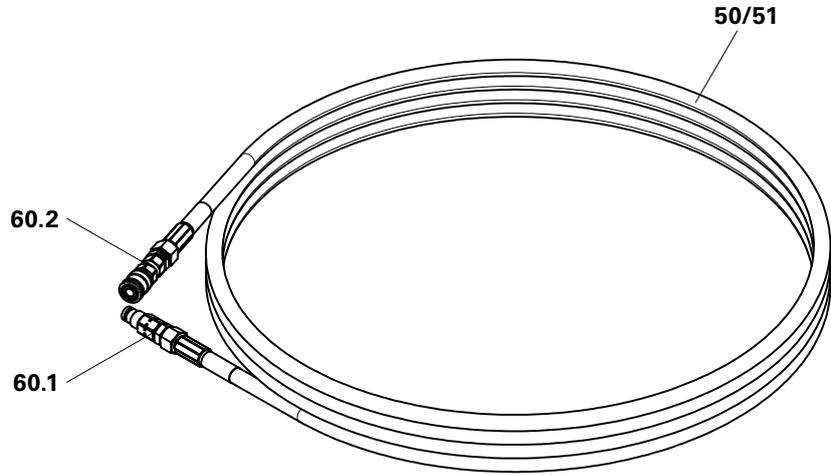


Fig. A2.07

#### Hydraulic twin hose

The hydraulic twin hose is comprised of two individual hoses. At each end of the hydraulic twin hose, there is a quick coupler bushing and a quick coupler connector. (Fig. A2.08)

The arrangement of the connector and bushing on the hydraulic pump and consumers means that the feed and return flow lines cannot be mixed up.

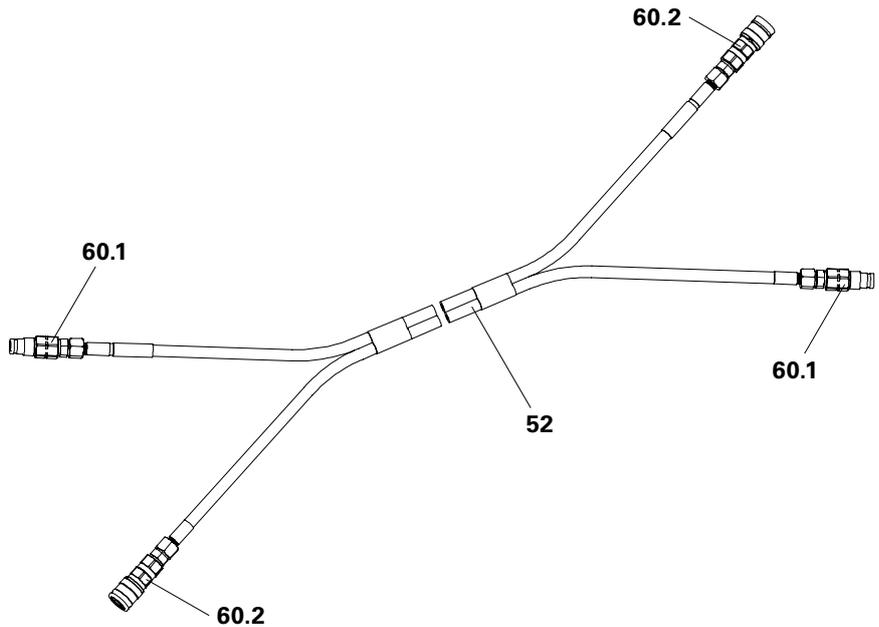


Fig. A2.08



#### General information about hydraulic hoses

Hydraulic hoses

- are to be positioned to allow oil to flow smoothly.
- must have no kinks or twists.
- are not placed over sharp edges.
- are to be secured at regular intervals with cable ties.
- are not fixed to any moving parts.
- are arranged so they do not create any tripping hazards.

Do not place any objects on the hydraulic hoses.



The length of the hydraulic hoses is

- as short as possible.
- as long as required.

If the hydraulic hoses are too long, this creates unnecessary pressure losses.

## Overview

The Lift Frame LALD VARIOKIT and the Hinge Slide LALD VARIOKIT form the lifting and lowering equipment for the Tunnel Formwork Carriage. With the lifting and lowering equipment, the Tunnel Formwork Carriage

- is lifted and moved into the concreting position.
- is lowered and brought into the moving position.

(Fig. A3.04)

Technical data	
Load-bearing capacity	91 – 200 kN <sup>1) 2)</sup>
Maximum stroke	300 mm
Lateral adjustment	±220 mm
Maximum compensation in a longitudinal direction	±5°
Maximum compensation in a lateral direction	±5°
Operated with	<ul style="list-style-type: none"> <li>■ Lifting and Lowering Cylinder</li> <li>or</li> <li>■ hydraulic jack</li> </ul>

<sup>1)</sup> Longitudinal inclination ≤1°

<sup>2)</sup> Bearing shell ± 10 cm from the centre of the bearing block (Fig. 3.03)

### Lift Frame LALD VARIOKIT

The Lift Frame is mounted on the Base Beam of the support structure. With the Lift Frame, the entire construction of the Tunnel Formwork Carriage is guided during the lifting and lowering operations.

The Lifting and Lowering Cylinder is mounted in the Lift Frame. As an alternative to the Lifting and Lowering Cylinder, a hydraulic jack can be used. In this case, the Lift Frame must be modified.

(Fig. A3.01)

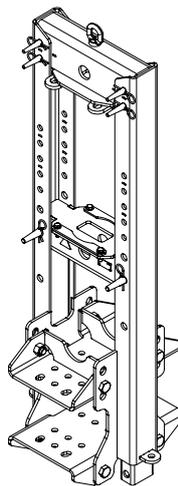


Fig. A3.01

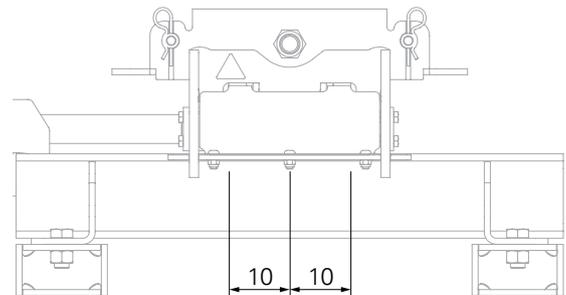


Fig. A3.03

### Hinge Slide LALD VARIOKIT

The Hinge Slide LALD VARIOKIT is mounted on the Lift Frame LALD VARIOKIT. The Hinge Slide is an articulated bearing position and compensates the unevenness of the ground.

The Hinge Slide facilitates exact positioning of the Tunnel Formwork Carriage in a transverse direction.

(Fig. A3.02)

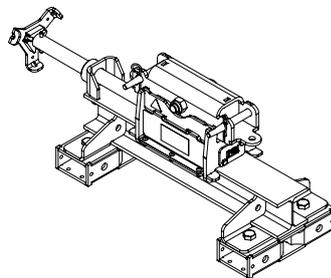


Fig. A3.02

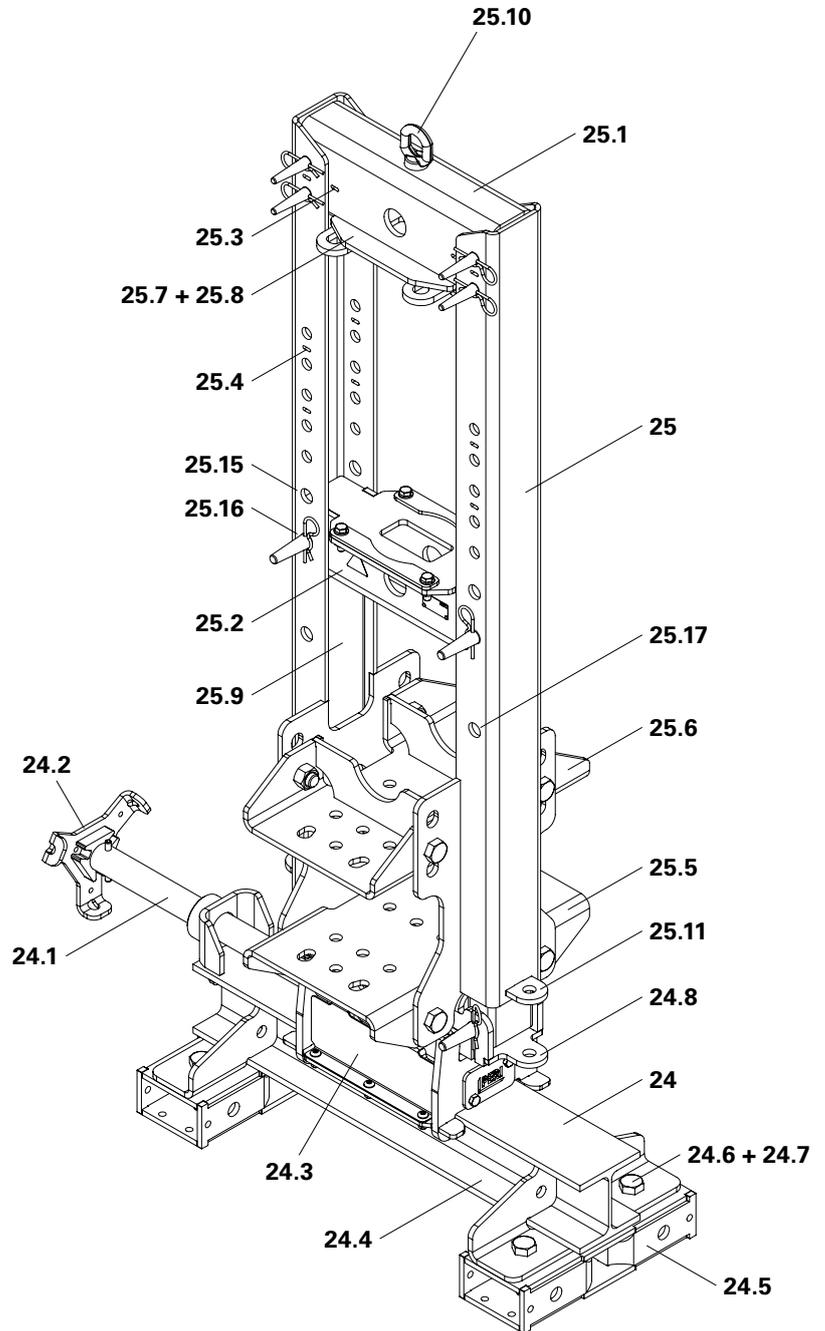
#### Aligning the Hinge Slide in a transverse direction

1. Turn on the spindle head (24.2) and thereby move the bearing shell (24.3) into the required direction.

(Fig. A3.04)

# A3 Lifting and Lowering Unit LALD

- 25** Lift Frame LALD VARIOKIT
- 25.1** Main Beam
- 25.2** Cross Beam
- 25.3** Marking for Main Beam
- 25.4** Marking for Gallows
- 25.5** Bottom Girder Connection
- 25.6** Top Girder Connection
- 25.7** Slide Plate
- 25.8** Threaded Bolt
- 25.9** Sliding Part
- 25.10** Attachment Point
- 25.11** Eyelet for Lift Frame
- 25.15** Parking position
- 25.16** Transport position
- 25.17** Moving position



- 24** Hinge Slide LALD VARIOKIT
- 24.1** Spindle
- 24.2** Spindle Head
- 24.3** Bearing shell
- 24.4** Bearing block
- 24.5** Bottom Profile
- 24.6** Bolt M24x50
- 24.7** Nut M24
- 24.8** Eyelet for Hinge Slide

Fig. A3.04

## Lifting Tool LALD VARIOKIT

If the lifting and lowering equipment is operated with a hydraulic jack, the Hinge Slide must be lifted manually with the Lifting Tool. (Fig. A3.05)

If the Lifting Tool is not required, hang the Lifting Tool in the Lift Frame at the top. (Fig. A3.06)

- 28.1** Tube
- 28.2** Retaining Head
- 28.3** Adjusting Unit
- 28.4** Hook
- 28.5** Closure
- 28.6** Linch Pin 5x32

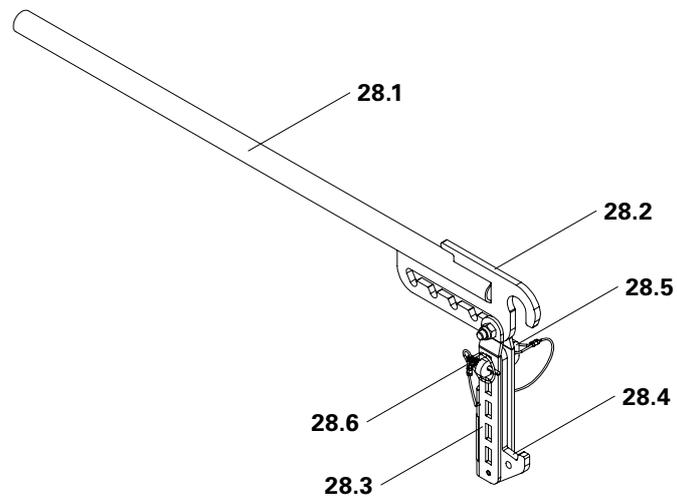


Fig. A3.05

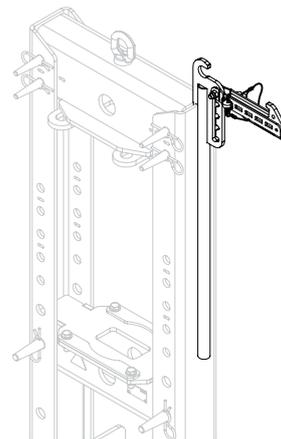


Fig. A3.06

### Application

1. Suspend Lifting Tool with retaining head (28.2) from the eyelet of the Lift Frame (25.11).
2. Pull the lever (28.1) upwards. Ensure that the hook (28.4) engages in the eye of the Hinge Slide (24.8).
3. Continue to pull the lever upwards until the Hinge Slide (24) is completely raised. (Fig. A3.07)

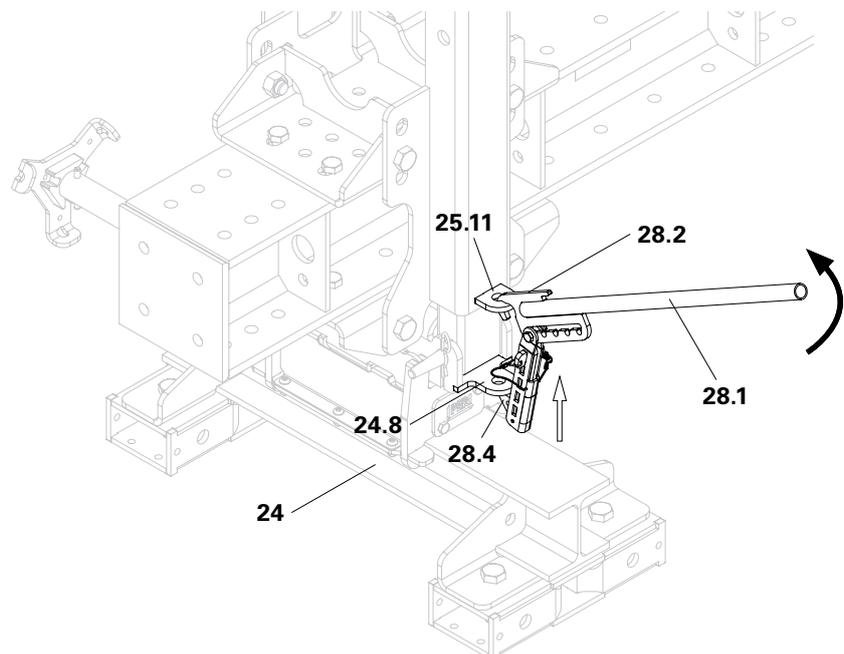


Fig. A3.07

## Valve Block Hydraulic Drive

The valve block is the control system for the hydraulic drive.

The two hydraulic motors are individually controlled using the valve block.

The valve block is used in combination with the Hydraulic Pump VARIOKIT 8-cycles.

Alternatively, the Hydraulic Pump RCS can be used. The Hydraulic Pump RCS must be modified for this particular use. The direction of movement is indicated by means of symbols on the housing.

- Large triangle: DIRECTION OF MOVEMENT FORWARDS
- Small triangle: DIRECTION OF MOVEMENT BACKWARDS

### Moving forward

Push hand lever (33.1 + 33.2) forwards (large triangle).

→ the Tunnel Formwork Carriage moves forward.

### Moving backwards

Pull hand lever (33.1 + 33.2) backwards (small triangle).

→ the Tunnel Formwork Carriage moves backwards.

Hydraulic line	Hose type
Hydraulic Pump – Valve Block ≤5 m	EN853-2SN-DN08-FF
Hydraulic Pump – Valve Block >5 m	EN853-2SN-DN12-FF
Valve Block – Motor	EN853-2SN-DN12-FF
Overflow oil line	EN853-2SN-DN08-FF

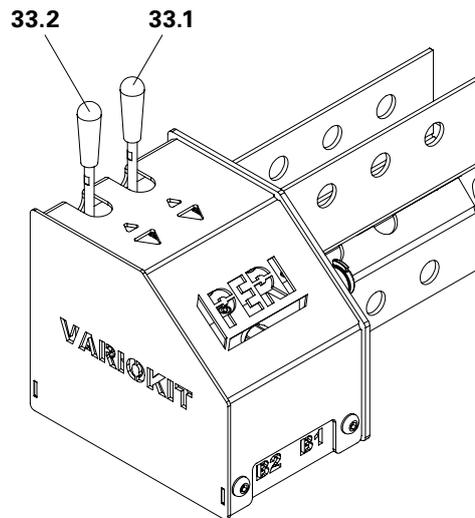


Fig. A4.01

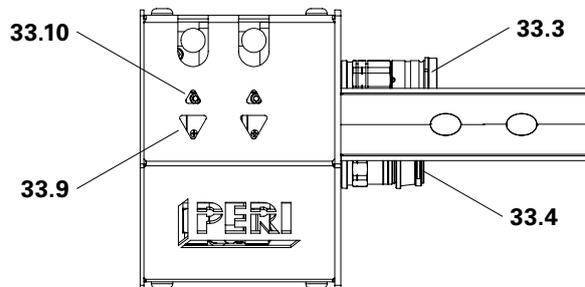


Fig. A4.02

- 33.1** Hand lever 1 (left)
  - 33.2** Hand lever 2 (right)
  - 33.3** Connection P (Feed Unit)
  - 33.4** Connection T (Return Flow Unit)
  - 33.5** Connection A1 (Feed Motor 1)
  - 33.6** Connection B1 (Return Flow Motor 1)
  - 33.7** Connection A2 (Feed Motor 2)
  - 33.8** Connection B2 (Return Flow Motor 2)
  - 33.9** Direction of movement forwards (large arrow)
  - 33.10** Direction of movement backwards (small arrow)
- (Fig. A4.01 + A4.02 + A4.03)

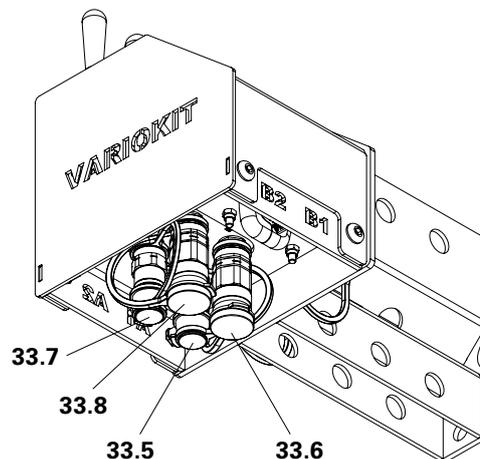


Fig. A4.03

## Hydraulic Drive VARIOKIT

The Hydraulic Drive VARIOKIT together with the Wheel Block VARIOKIT 300 kN forms the hydraulic drive system.

The VTC Tunnel Formwork Carriage is moved to the next concreting section by means of the hydraulic drive system. Propulsion takes place with two hydraulic motors which are individually controlled. The VTC Tunnel Formwork Carriage is mounted on heavy-duty wheels running on longitudinal rails.

- The Hydraulic Drive VARIOKIT is comprised of one hydraulic motor complete with an integrated holding brake.
- The Hydraulic Drive VARIOKIT is bolted to the Wheel Block VARIOKIT 300 kN and connected to the wheel.

**32.1** Connection A (Feed)

**32.2** Connection B (Return Flow)

**32.3** Connection Y (Overflow Oil Line)

**32.4** Attachment Point

**32.8** Holes for Coupling Bolts

(Fig. A4.04 + A4.05)

Technical data		
Wheel block	Load-bearing capacity	300 kN
	Max. speed	3 m/min
	Max. transmittable torque	7000 Nm
Hydraulic drive	Recommended operating pressure	170 bar
	Specific drive torque	35 Nm/bar
	Displacement per revolution	2,2 l/U
Wheel block including hydraulic drive <sup>1)</sup>	Max. gradient/inclination under full load	4,5%

<sup>1)</sup> For detailed information, see "Hydraulic Drive VARIOKIT: 2-wheel drive with Hydraulic Pump VARIOKIT" characteristic curves on Page 28 or "Hydraulic Drive VARIOKIT: 2-wheel drive with Hydraulic Pump RCS" on Page 28.

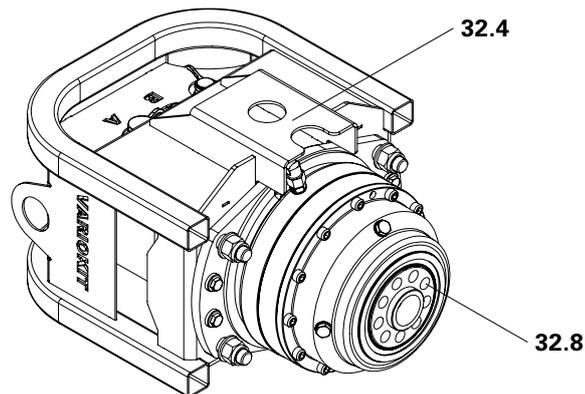


Fig. A4.04

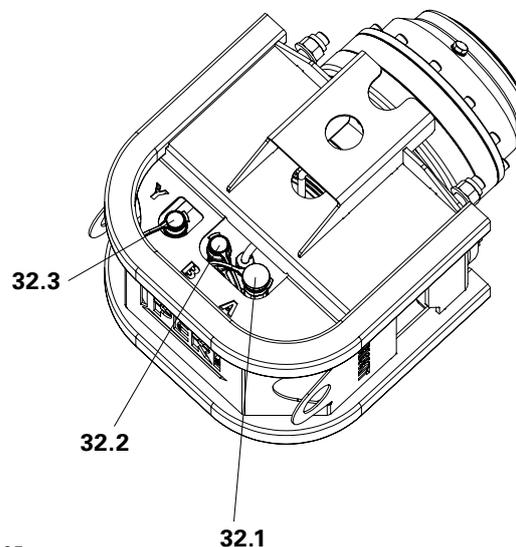


Fig. A4.05

## Wheel Block VARIOKIT 300 kN

The Wheel Block VARIOKIT 300 kN as housing for the Hydraulic Drive VARIOKIT. The wheel is integrated in the wheel block. The guide rollers provide lateral guidance on the longitudinal rails.

The coupling bolts (31.3) connect the drive shaft of the motor to the wheel. Loosening the coupling bolts creates a freewheeling mode and the Tunnel Formwork Carriage can then be moved without requiring the hydraulic drive. (Fig. A4.06 + A4.07)

Fig. A4.08 shows the hydraulic drive with the wheel block

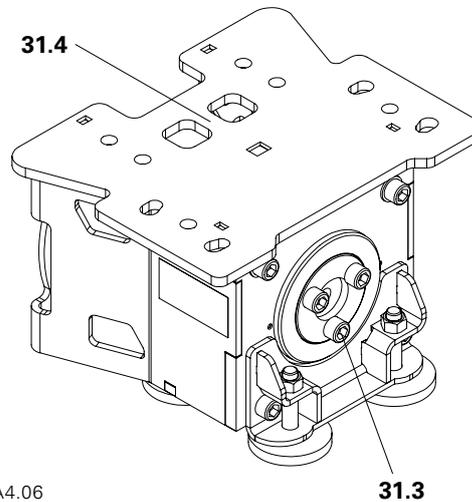


Fig. A4.06



- The coupling bolts have Strength Class 10.9.
- The coupling bolts may only be replaced by bolts of the same strength class if they are lost.

- 31.1** Wheel
- 31.2** Guide Roller
- 31.3** Coupling Bolt M20x200
- 31.4** Attachment Point
- 31.5** Fitting Pin M20x120

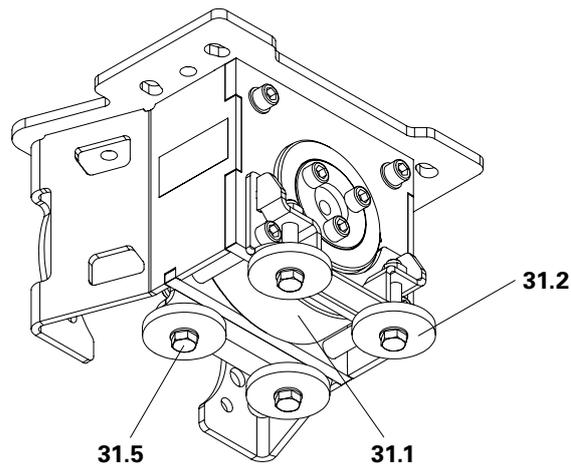


Fig. A4.07

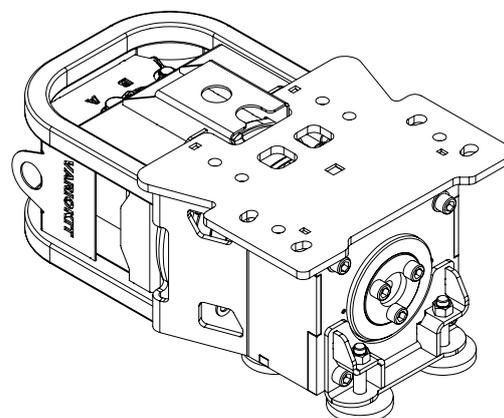


Fig. A4.08

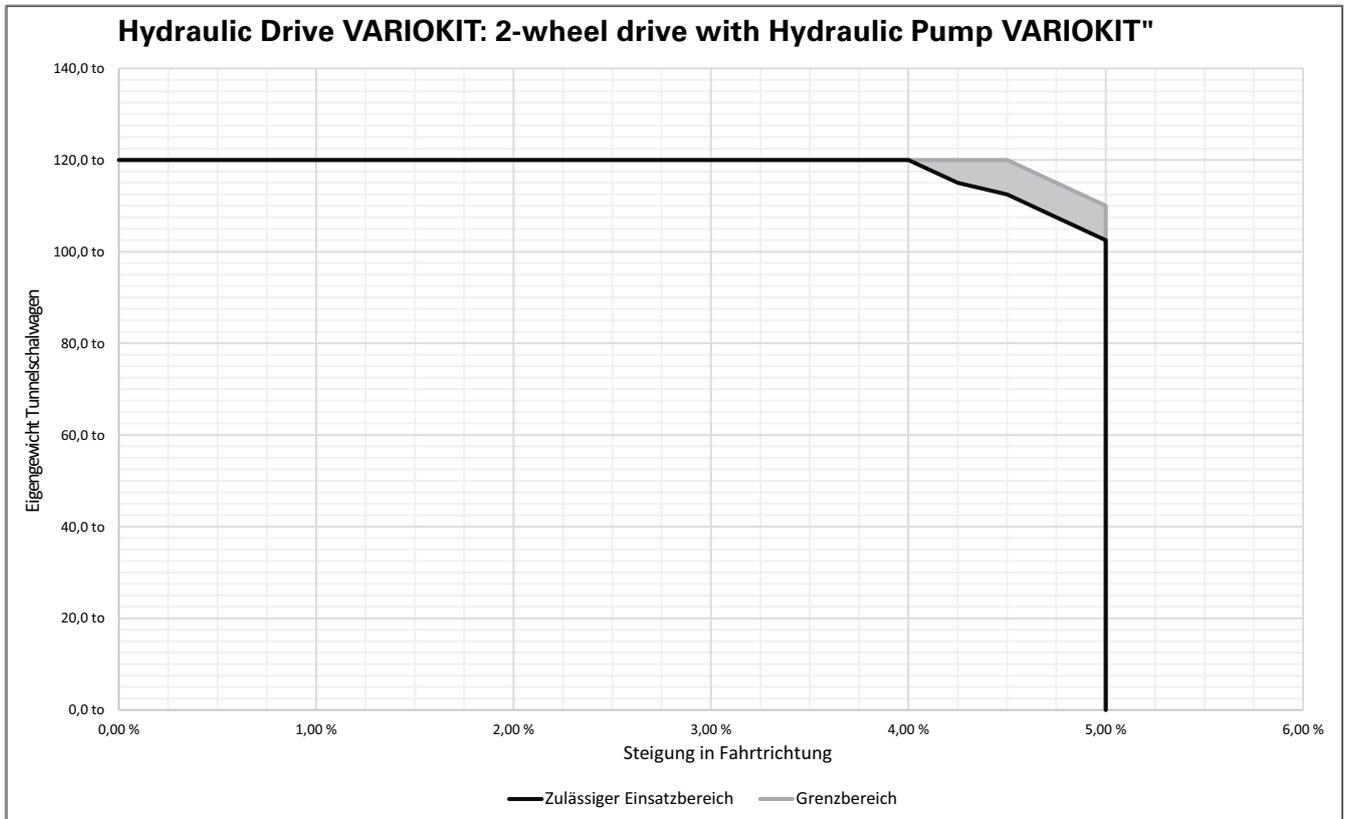


Fig. A4.09

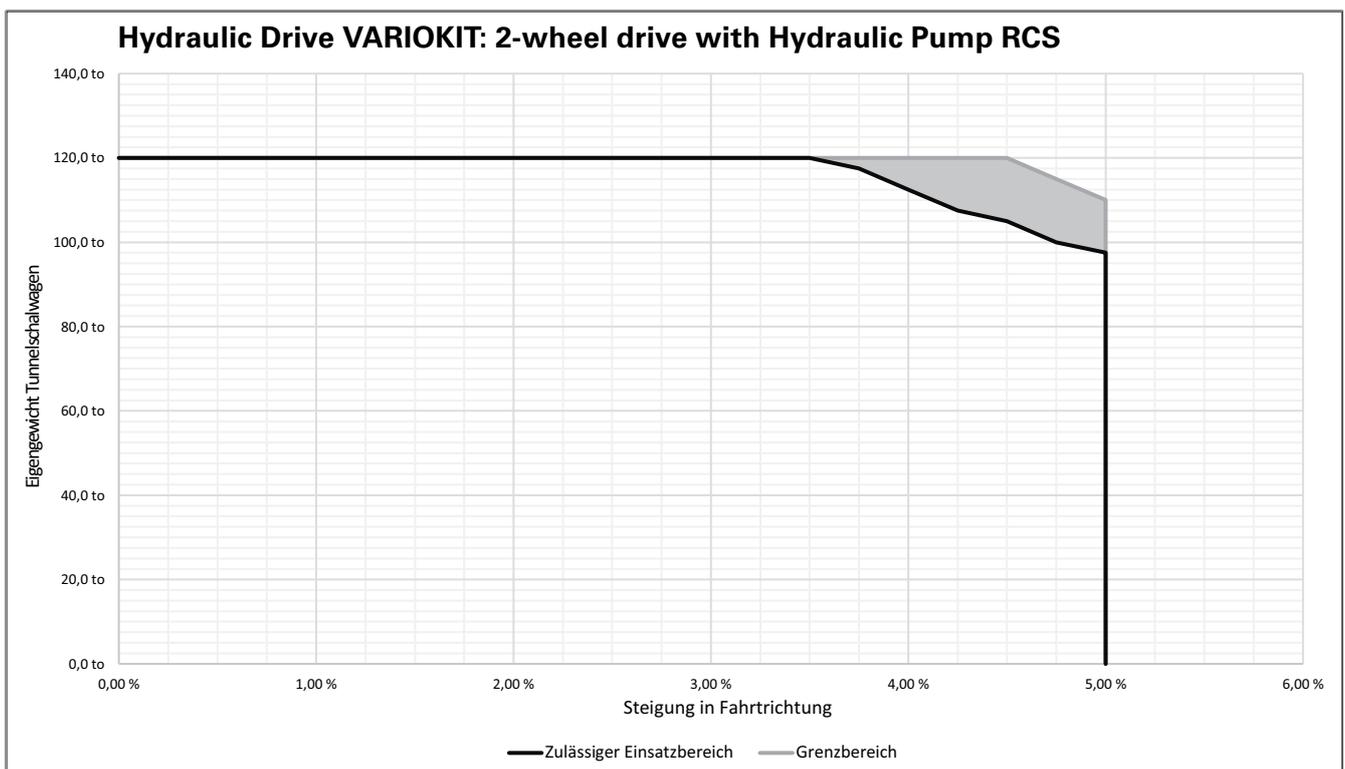


Fig. A4.10

## Telescopic Prop VARIOKIT

The Telescopic Prop VARIOKIT is a height-adjustable heavy-duty prop for transferring vertical loads.

- The Telescopic Prop VARIOKIT is compatible with:
  - Longitudinal Beam VARIOKIT.
  - Climbing Rail RCS.
- The centre lugs offer connection possibilities for:
  - Heavy-Duty Spindles SLS.
  - DW 15 Cross Bracing.
  - Corner Connector SRU VARIOKIT.
- The top and bottom lugs provide connection possibilities for:
  - Heavy-Duty Spindles SLS.
  - DW 15 Cross Bracing.
  - Struts VARIOKIT.

- 34.1** Centre Tube
  - 34.2** Centre Lugs
  - 34.3** Positioning Hole
  - 34.4** Telescopic Tube top
  - 34.5** Head Plate
  - 34.6** Top Lugs
  - 34.7** Telescopic Tube bottom
  - 34.8** Base Plate
  - 34.9** Bottom Lugs
  - 34.10** Positioning Pins
  - 34.11** Hinged Pin
  - 34.12** Side markings
- (Fig. A5.01)

Technical data	
Extension length min.	4000 mm
Extension length max.	6500 mm
Grid spacing	31,25 mm
Extension length 400 – 600 cm	Load-bearing capacity 250 kN <sup>1) 2)</sup>
Extension length > 600 cm	Load-bearing capacity 185 kN <sup>1) 2)</sup>

<sup>1)</sup> Symmetrical extension of the telescopic tube

<sup>2)</sup> No additional load on the centre lugs

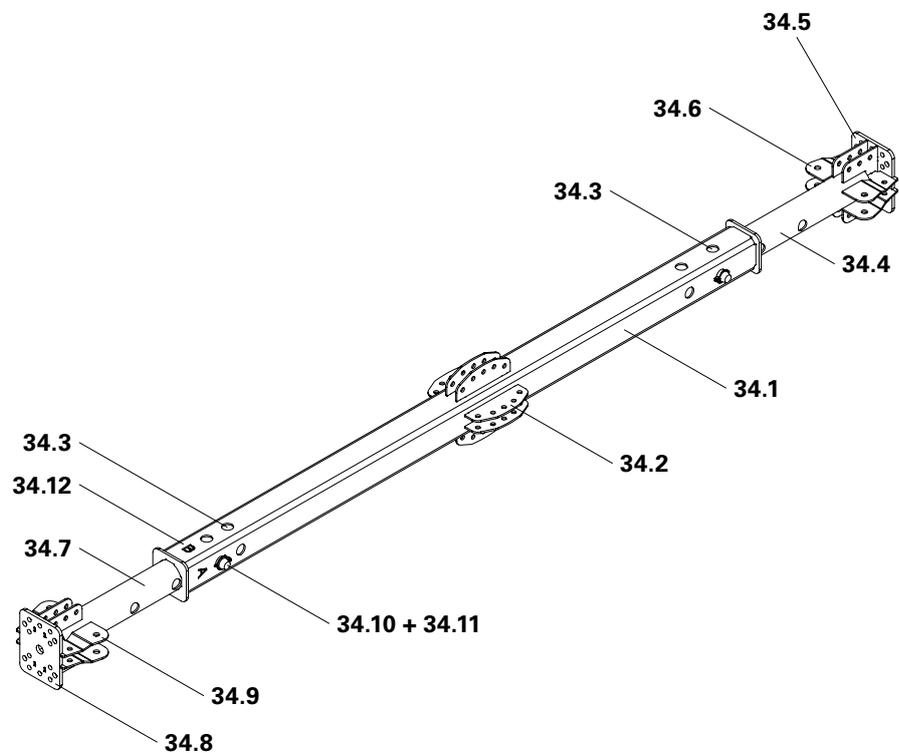


Fig. A5.01



## Warning

Telescopic tubes can change their position during crane transport. As a result, this changes the centre of gravity and position of the Telescopic Prop!

Risk of crushing and trapping of hands and other body parts.

- ⇒ Fix the telescopic tubes with positioning pins and secure with hinged pins.
- ⇒ Guide the telescopic tubes with ropes.
- ⇒ Keep clear of the slewing area.



- Uniformly extend the telescopic tube at the top and telescopic tube at the bottom.
- The extension above and below should be about the same.
- Always mount the Base Plate lengthwise to the Base Beam.
- Base Plate and Head Plate should have the same mounting direction. The centre tube may need to be turned by 90°. This depends on the required marking position.
- The alignment of the head piece is changed by re-bolting from A1 to B1 or A2 to B2. However, the extension length of the Telescopic Prop does not change.

- The following extension lengths cannot be realised:

- 6437.50 mm
- 6468.75 mm

These missing extension lengths can be compensated via the adjustment range of the Wedge Lowering Device 420kN or by turning the Support Wedge BoxVARIOKIT.

## Application

1. Support the middle part at the ends with timbers.
2. Remove the hinged pin (34.11) and pull out all positioning pins (34.10).
3. Extend the telescopic tube at the top and bottom respectively to the required length.
4. Fix both telescopic tubes with positioning pins (34.10) and secure with hinged pins (34.11).

A matrix for the Telescopic Prop together with an example is available in the appendix. See "I3 Matrix: Telescopic Prop Example" on Page 130.

## Vertical Connector RCS

The Vertical Connector RCS connects two Climbing Rails RCS. The second Climbing Rail RCS is vertically mounted with the front side on the first Climbing Rail RCS.

- One Climbing Rail RCS acts as a base beam and is installed horizontally.
- One Climbing Rail RCS is mounted vertically as a prop on the base beam.
- The vertically mounted Climbing Rail RCS serves as a heavy-duty prop for transferring vertical loads.



### Warning

Components can overturn and cause injuries!

⇒ Provide temporary support for the components.

### Components

- 10.2** Climbing Rail RCS
- 14** Vertical Connector RCS
- 123** Fitting Pin  $\varnothing$  21x120
- 124** Cotter Pin 4/1
- 125** Fitting Pin 26x120
- 126** Cotter Pin 5/1

### Assembly

1. Fix the Vertical Connector (14) to the Base Beam at the designated assembly position using two fitting pins 26x120 (125) and secure with cotter pins 5/1 (126).
2. Fix the Climbing rail RCS (10.2) to the Vertical Connector (14) using fitting pin 21x120 (123) and fitting pin 26x120 (125). Secure with cotter pin 4/1 (124) and cotter pin 5/1 (126). (Fig. A5.02)

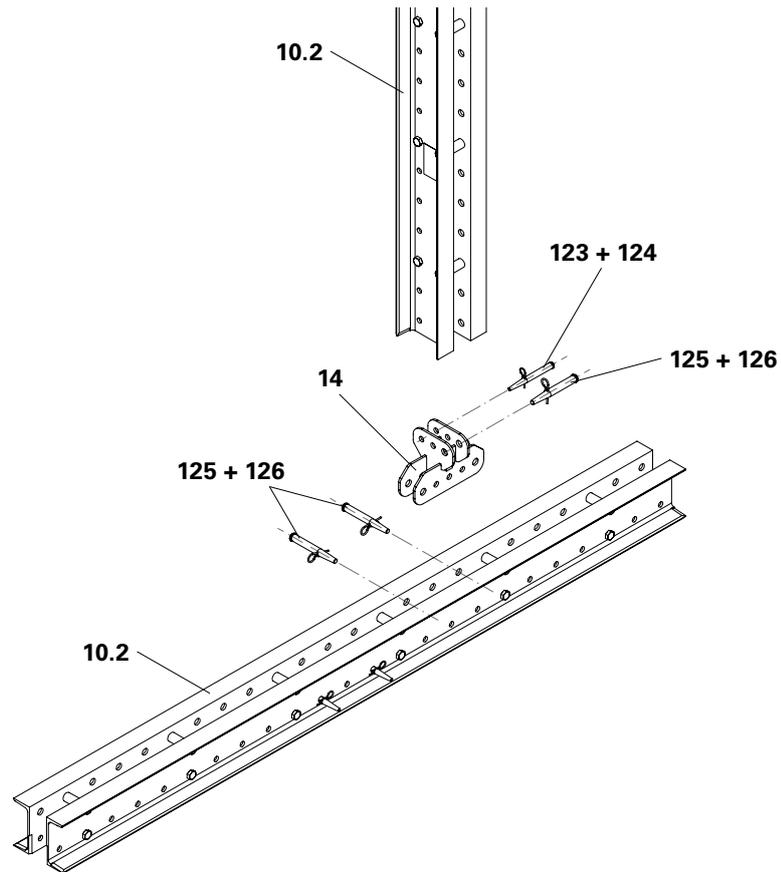


Fig. A5.02

## Cross Connector RCS VARIOKIT

The Cross Connector RCS VARIOKIT connects one Longitudinal Beam VARIOKIT with one Climbing Rail RCS.

- The Longitudinal Beam VARIOKIT is the base beam.
- The Climbing Rail RCS is mounted as a formwork girder transversely on the base beam.
- The construction serves to transfer vertical loads.

### Components

- 10.1** Longitudinal Beam VARIOKIT
- 10.2** Climbing Rail RCS
- 15** Cross Connector RCS VARIOKIT
- 109** Bolt M20x60
- 112** Nut M20
- 114** Washer M20
- 125** Fitting Pin 26x120
- 126** Cotter Pin 5/1

### Assembly

1. Fix the Cross Connector (15) to the Longitudinal Beam VARIOKIT (10.1) at the designated mounting position using bolts M20x60 (109), washers M20 (114) and nuts M20 (112).
2. Position the Climbing Rail RCS (10.2) above the Cross Connector. The Cross Connector lies between the profiles of the Climbing Rail RCS.
3. Fix the the Cross Connector (15) with fitting pins 26x120 (125) and secure with cotter pins 5/1 (126). (Fig. A5.03)

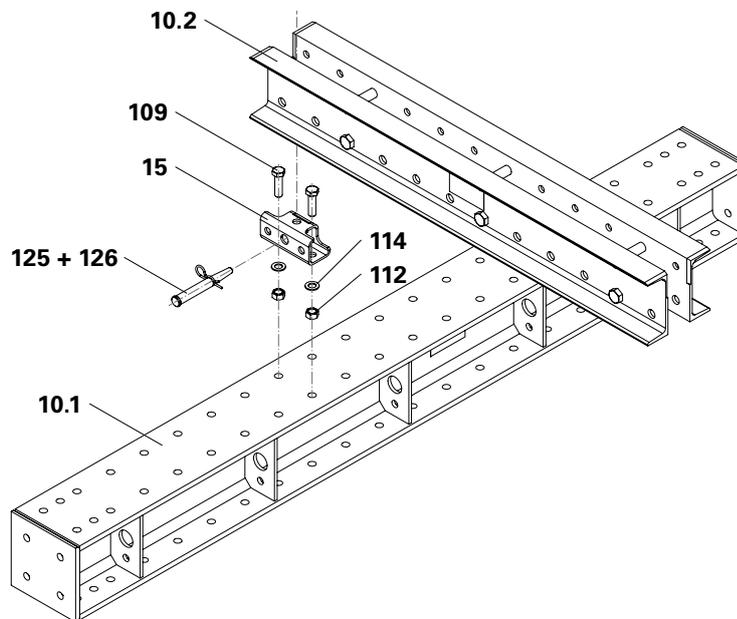


Fig. A5.03

## Slab Shoe VARIOKIT

With the Slab Shoe VARIOKIT, shoring and heavy-duty constructions are anchored to the slab in the previous concrete section. The Slab Shoe is fixed to one Climbing Cone-2.

The following anchoring is possible:

- with Tie Rod DW 15.
- with Heavy-Duty Spindles SLS.

### Components

- 
- 16** Slab Shoe VARIOKIT
  - 117** Bolt M24x70
  - 131** Tie Rod DW 15
  - 132** Hex. Nut DW 15
  - 137** Tie Yoke SRU
  - 138** Climbing Cone-2 M24/DW 15
- 

### Assembly

1. Mount Slab Shoe (16) to the Climbing Cone (138) with bolt M24x70 (117).
2. Insert Tie Rod (131) through the Tie Yoke (137) and screw on hex. nut (132).
3. Suspend assembly unit in the Slab Shoe (16) and secure against falling off.
4. Tension Tie Rod (131) with the hex. nut (132).

(Fig. A5.04)

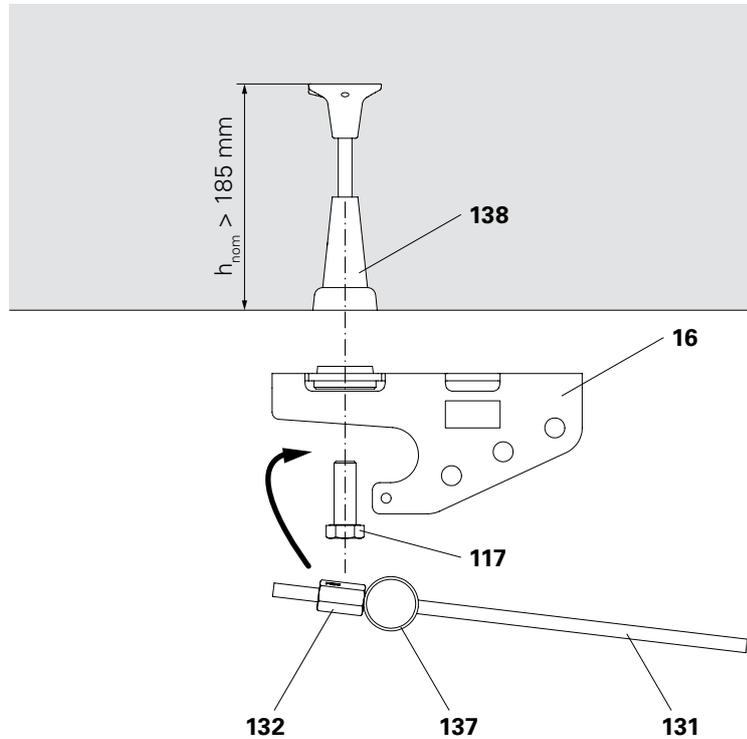


Fig. A5.04



Determine the required anchoring depth and concrete strength according to separate static calculations in accordance with Building Authority Approval Z-21.6-1767.

## Hinge Connector RCS

The Hinge Connector RCS is an articulated connection for two Climbing Rails RCS. With the Hinge Connector, simplified radii can easily be realised during construction in the tunnel cross-section.

- The Hinge Connector allows continuous angle formation of up to 60°.
- The through bore serves to accommodate the Tie Yoke SRU.
- Depending on the project, the installation position and bolting of the Hinge Connector may differ.

(Fig. A5.05)

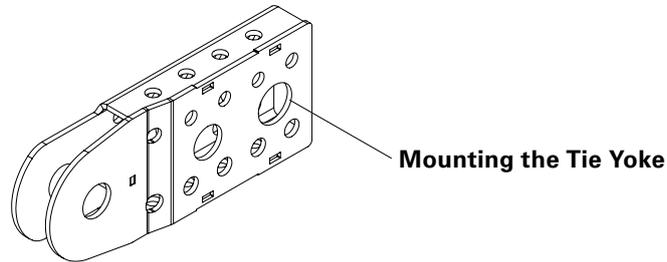


Fig. A5.05



- The Hinge Connector is used in pairs.
- During installation, ensure that an offset side corresponds with a straight side.
- Fix each Hinge Connector with two fitting pins 21x120 and two fitting pins 26x120.

Fig. A5.06 shows two Hinge Connectors from above, before assembly and in the final position.



Fig. A5.06a



Fig. A5.06b

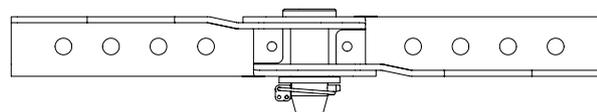


Fig. A5.06c



## Warning

Components can overturn and cause injuries!

⇒ Provide temporary support for the components.

## Components

- 10.2** Climbing Rail RCS
- 17** Hinge Connector RCS
- 123** Fitting Pin  $\varnothing$  21x120
- 124** Cotter Pin 4/1
- 125** Fitting Pin 26x120
- 126** Cotter Pin 5/1
- 136** Bolts for Hinge Connector RCS

## Modifying the Climbing Rail RCS

Modify the Climbing Rail when installing the Hinge Connector.

1. Remove bolts M20 and M24 of the outermost spacers.
2. Move the spacers 1 or 2 holes inwards.
3. Fix the spacer sleeves with bolts and nuts M20 and M24.

(Fig. A5.07)

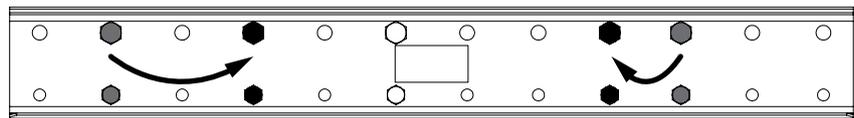


Fig. A5.07

## Assembly

1. Fix the Hinge Connector RCS (17) to the ends of the Climbing Rails RCS (10.2) with fitting pin 21x120 (123) and fitting pin 26x120 (125). Secure with cotter pin 4/1 (124) and cotter pin 5/1 (126).
2. Connect the two Hinge Connectors RCS (17) with Bolts for Hinge Connector RCS (136).
3. Position washer (136.1).
4. Secure with hinged pin (136.2).

(Fig. A5.08)

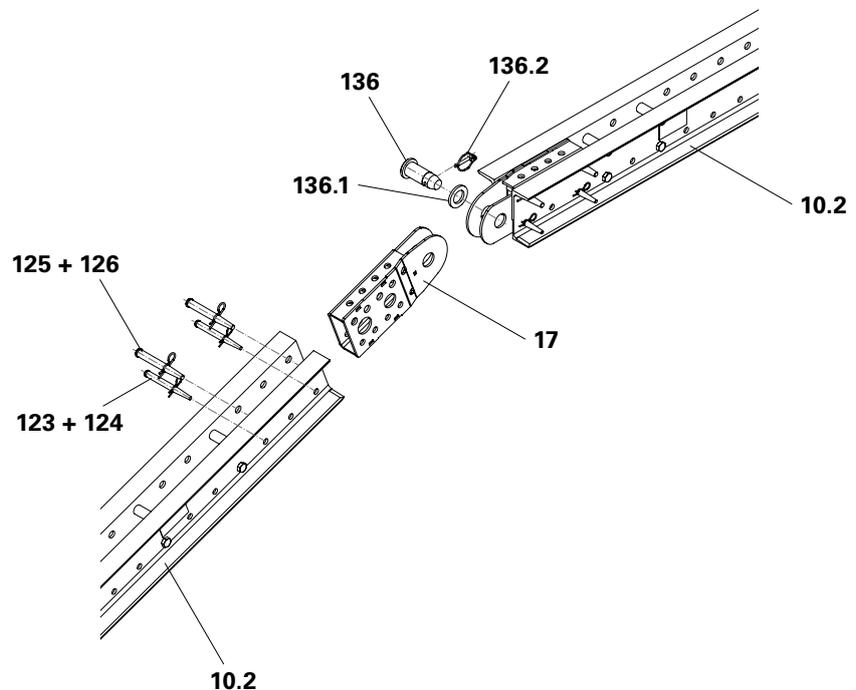


Fig. A5.08

## Presented standard assembly



### Warning

Heavy moving parts!

During assembly, there is a risk of hands and other body parts being crushed.

- ⇒ Wear personal protective equipment.
- ⇒ Guide components so that no bodily parts can become trapped.
- ⇒ Do not stand between moving elements.
- ⇒ Maintain an appropriate safety distance.
- ⇒ Ensure a safe and secure position.

### General

The Assembly Instructions describe the assembly of a Tunnel Formwork Carriage for the construction of a tunnel using cut-and-cover and semi-monolithic methods. External formwork and stopend formwork are additionally required for these construction methods. Both assembly groups are not part of these Assembly Instructions.

The structures shown in these Assembly Instructions are examples and feature only one component size. They are valid accordingly for all component sizes contained in the standard configuration.



- Setting up and assembly of the individual components is explained by way of examples. The exact assembly position is provided in the assembly plan of the project.
- Both assembly and dismantling must be planned on a project-specific basis while taking into account all intermediate status and individual boundary conditions.
- Depending on the Base Beam, there are differences in the assembly which will be described separately in the following sections:
  - B2 Base Beam VARIOKIT.
  - B3 Base Beam RCS.
  - B4 Base Beam HDT.

### Function

The Tunnel Formwork Carriage is comprised of one supporting structure. The formwork construction is mounted on this supporting structure. The formwork construction is comprised of slab formwork and wall formwork. The slab formwork as well as the wall formwork can consist of several segments. A hydraulic system is integrated in the Tunnel Formwork Carriage. This facilitates hydraulic shuttering and striking of the slab and walls. Moving the Tunnel Formwork Carriage to the next concreting section is carried out by

- suitable construction site equipment provided by the contractor.
- the Hydraulic Drive.

## Preparation

### Measures before assembling

- Check the completeness of the technical documentation:
  - assembly plans
  - pre-assembly drawings
  - general arrangement drawings
  - hydraulic plan
  - electrical circuit diagram
  - parts list
- Site personnel to familiarise themselves with the equipment using the available documentation.

### Prerequisites

- Tunnel bottom plate and starters are concreted, allowed to harden and released for the assembly of the Tunnel Formwork Carriage.
- The Tunnel Formwork Carriage is assembled in the first concreting section.
- The supporting structure is completely assembled on the Base Beam (10).
- The supporting structure is positioned on support blocks (40), Wedge Lowering Devices (41) and Support Wedge Boxes (26).
- The rails (7) are placed in position and adjusted to suit the concreting position.
- Assembly takes place approx. 5 cm above the concreting height. This facilitates the installation of the components and allows accurate positioning on the concreting height after assembly.

(Fig. B1.01)

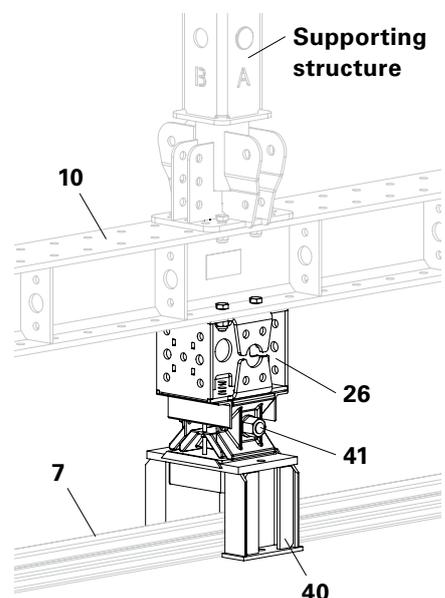


Fig. B1.01

## Installing the Hydraulic Pump

- The standard position for installing the hydraulic pump is on the Base Beam.
- When moving the hydraulic pump, use suitable lifting straps or available crane eyes.
- Use attachment points on the hydraulic pump.

### Components

- 
- 1** Hydraulic Pump VARIOKIT 8-cycles
  - 10.1** Longitudinal Beam VARIOKIT
  - 109** Bolt M20x60
  - 113** Nut M20 self-securing
  - 114** Washer M20
- 

### Assembly

1. Attach the hydraulic pump (1) to the crane lifting gear and fly in.
  2. Position the hydraulic pump over the assembly position and lower onto the Base Beam (10.1).
  3. Fix the hydraulic pump on the Base Beam with bolts M20x60 (109), self-securing nuts M20 (113) and washers M20 (114).
  4. Remove crane lifting gear.
- (Fig. B2.01)

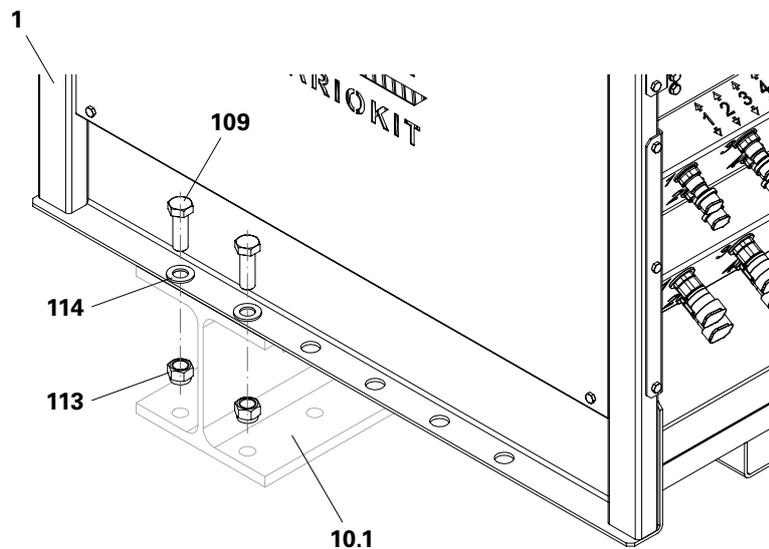


Fig. B2.01



Fix the hydraulic pump to the Base Beam so that the oil tank is centred on the Base Beam.

## Installing the Lift Frame



When moving the Lift Frame, use the available crane eyes.

### Components

- 10.1** Longitudinal Beam VARIOKIT
- 25** Lift Frame LALD VARIOKIT
- 109** Bolt M20x60
- 113** Nut M20 self-securing
- 114** Washer M20
- 120** Nut M24

7. Fix the Lift Frame (25) to the Base Beam with bolts M20x60 (109), washers M20 (114) and self-securing nuts M20 (113).
8. Tighten bolts M24x50 (115a) on the Girder Connection above (25.6).
9. Remove crane lifting gear. (Fig. B2.03)

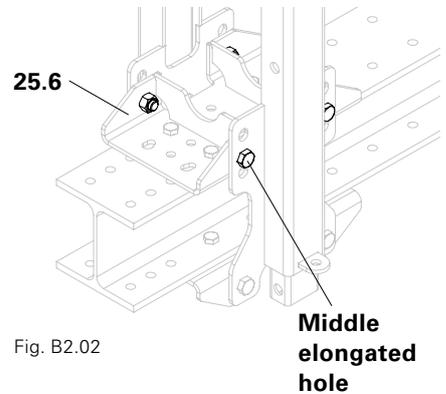


Fig. B2.02

**Middle elongated hole**



Ensure that the fixing board (25.6) is fixed in the middle elongated holes. (Fig. B2.02)

### Assembly

1. Loosen bolts M24x50 (115a).
2. Remove bolts M24x50 (115b) and dismantle bottom Girder Connection (25.5).
3. Attach the Lift Frame (25) to the crane lifting gear and fly in.
4. Lower the Lift Frame onto the assembly position on the Base Beam (10.1).
5. Fix the bottom Girder Connection (25.5) in its original position with bolts M24x50 (115b) and nuts M24 (120).
6. Raise the Lift Frame so that it rests tightly against the Base Beam (10.1).

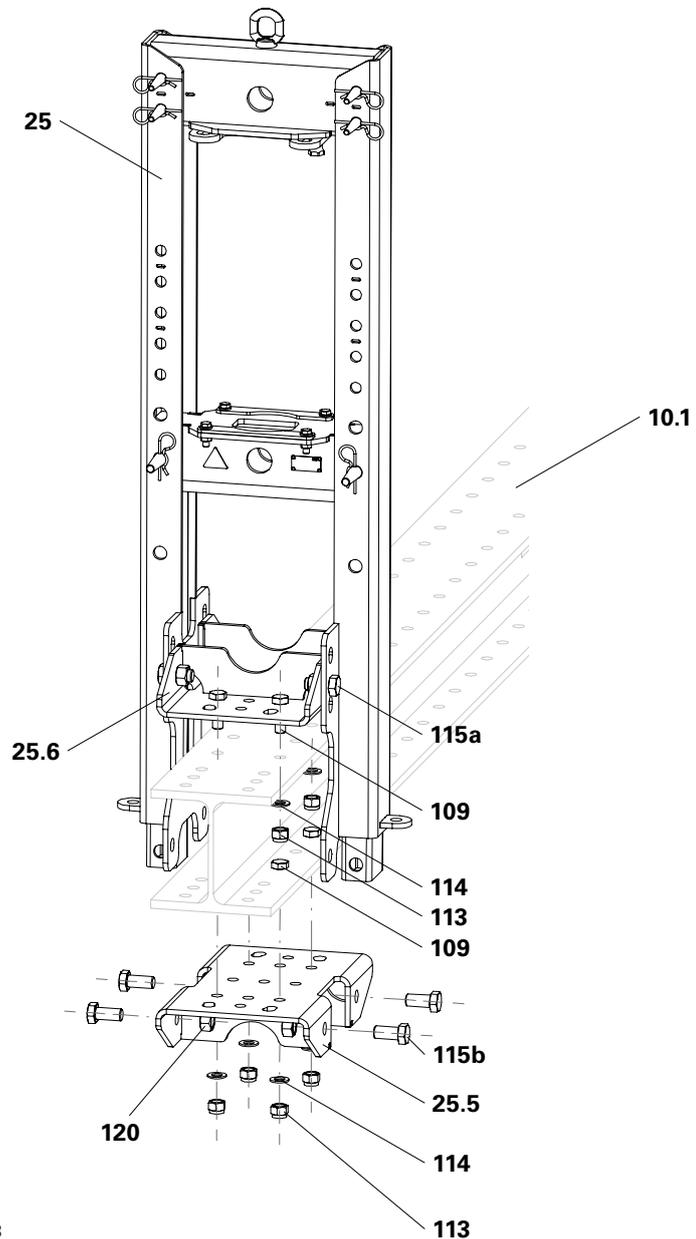


Fig. B2.03

## Mounting the Hinge Slide



### Warning

Heavy moving parts!  
 During assembly, there is a risk of hands being crushed.  
 ⇒ Wear protective gloves.  
 ⇒ Ensure a safe and secure position.

### Components

- |           |                           |
|-----------|---------------------------|
| <b>24</b> | Hinge Slide LALD VARIOKIT |
| <b>25</b> | Lift Frame LALD VARIOKIT  |

### Mounting with Crane Rail A75

1. Position the Hinge Slide (24) under the Lift Frame (25).
2. Pull the cotter pin (126b) and fitting pin 26x120 (125b).
3. Hold the sliding part (25.9) in its position.
4. Pull the cotter pin (126a) and fitting pin 26x120 (125a).
5. Lower the sliding part (25.9) and insert into the retainer of the Hinge Slide.
6. Insert fitting pin 26x120 (125b) and secure with cotter pin (126b).
7. Insert the fitting pin 26x120 (125a) in one hole higher in the parking position and secure with cotter pin (126a).

(Fig. B2.04 + B2.05)

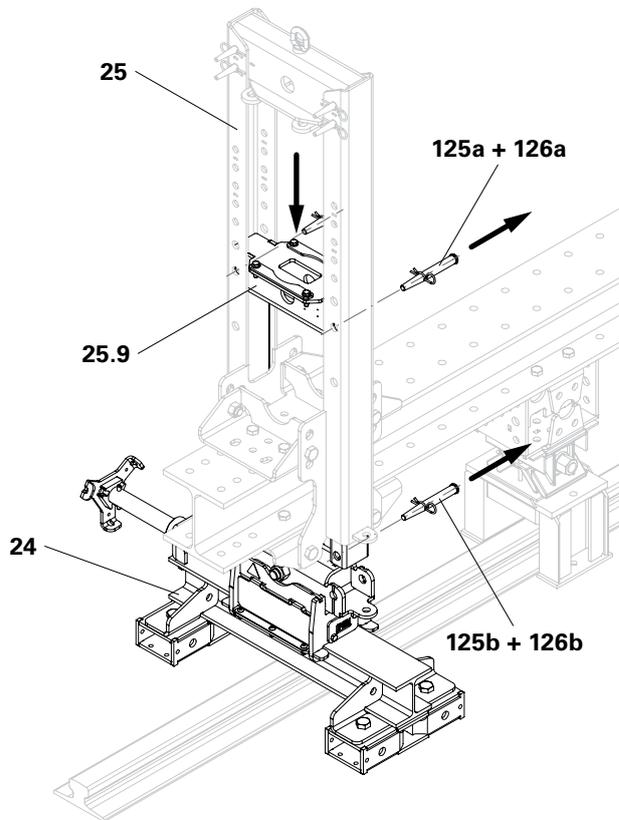


Fig. B2.04

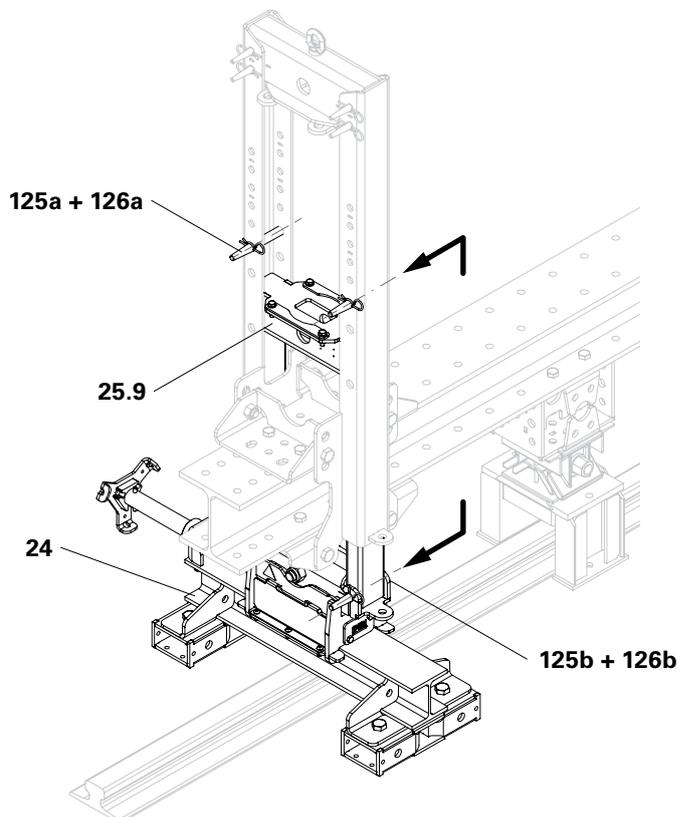


Fig. B2.05

## Mounting with Crane Rail S49

1. Remove bolts M24x50 (24.6).
2. Turn bottom profile (24.5) by 90°.
3. Fix bottom profile with bolts M24x50 (24.6) and nuts M24 (24.7).
4. For the rest of the assembly of the Hinge Slide, see Mounting with Crane Rail A75.

(Fig. B2.06)

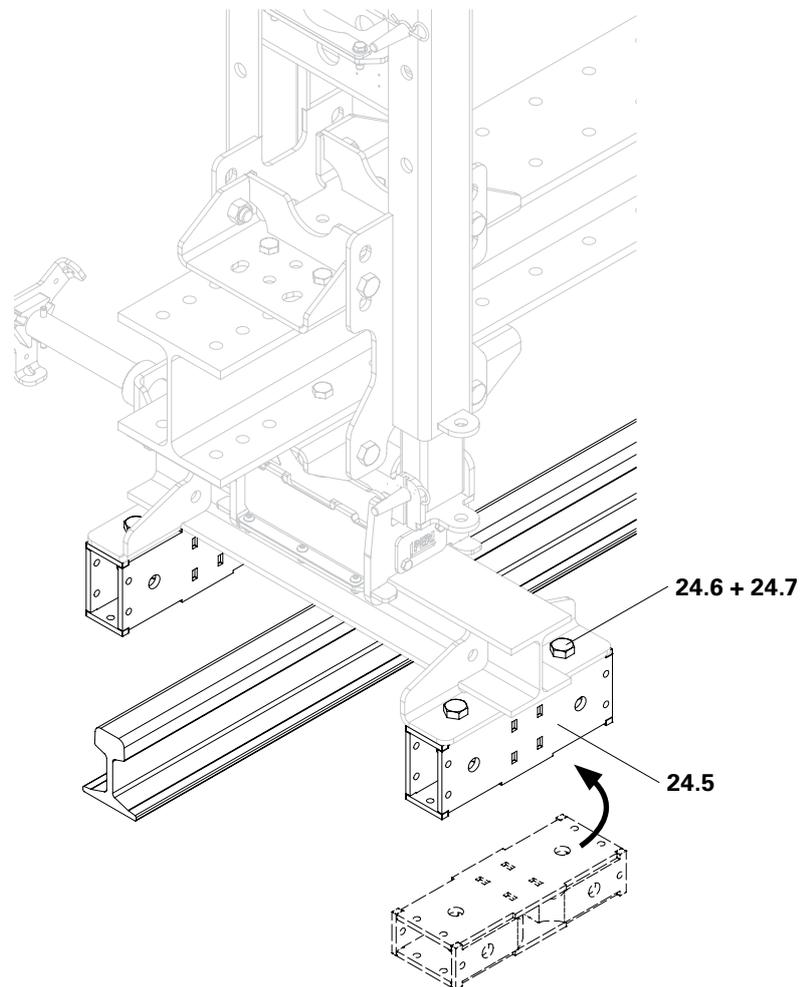


Fig. B2.06

## Mounting the Wheel Block VARIOKIT 300 kN



The Wheel Block VARIOKIT is mounted on both Base Beams of the Tunnel Formwork Carriage in the same installation position. The Hydraulic Drive protrudes in the direction of travel to the left of the Base Beam.

### Components

- 10.1** Longitudinal Beam VARIOKIT
- 31** Wheel Block VARIOKIT 300 kN
- 110** Bolt M20x70
- 113** Nut M20 self-securing
- 114** Washer M20

### Mounting without using the Lifting and Lowering Unit

1. Attach the wheel block (31) to the crane lifting gear and fly in.
  2. Position the wheel block on the assembly position.
  3. Fix the wheel block to the Base Beam with bolts M20x70 (110), washers M20 (114) and self-securing nuts M20 (113).
  4. Remove crane lifting gear.
- (Fig. B2.07)

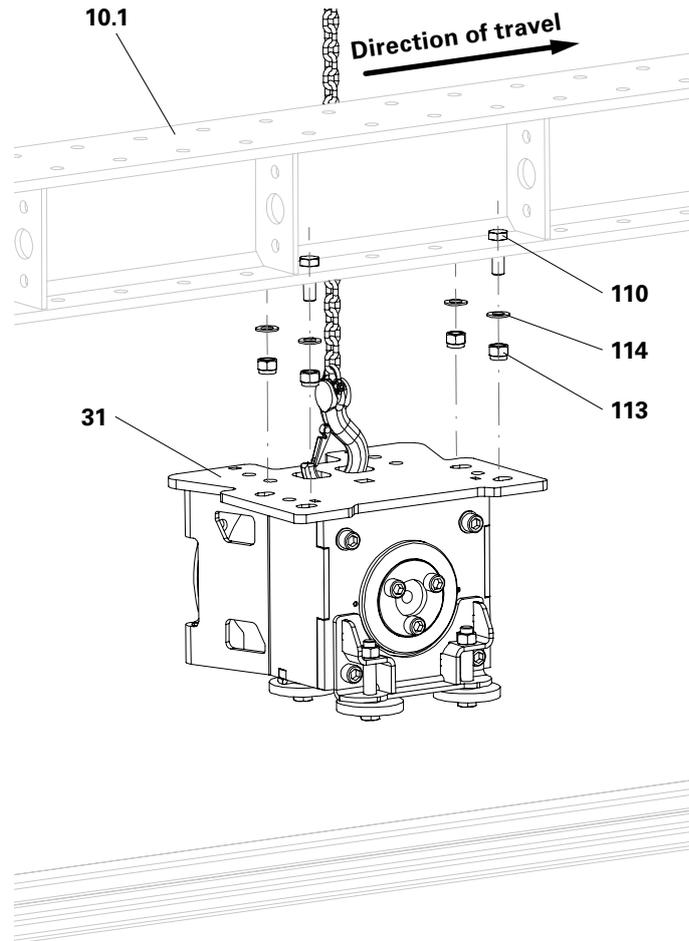


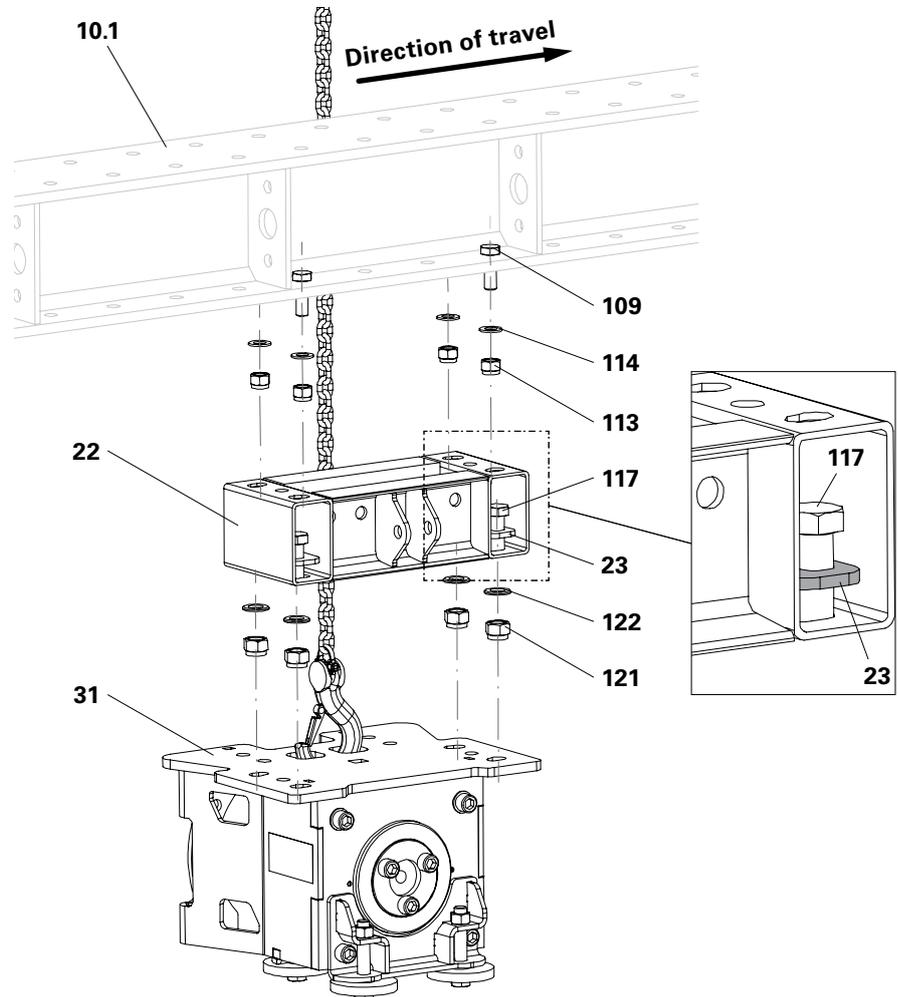
Fig. B2.07

## Components

<b>10.1</b>	Longitudinal Beam VARIOKIT
<b>22</b>	Pressure Frame LALD SLR VARIOKIT
<b>23</b>	Pressure Frame Assembly Kit
<b>31</b>	Wheel Block VARIOKIT 300 kN
<b>109</b>	Bolt M20x60
<b>113</b>	Nut M20 self-securing
<b>114</b>	Washer M20
<b>117</b>	Bolt M24x70
<b>121</b>	Nut M24 self-securing
<b>122</b>	Washer M24

## Assembly when using the Lifting and Lowering Unit

1. Fix the Pressure Frame (22) to the Longitudinal Beam (10.1) at the designated mounting position using bolts M20x60 (109), washers M20 (114) and nuts M20 (113).
2. Attach the wheel block (31) to the crane lifting gear and fly in.
3. Position the wheel block on the assembly position.
4. Fix the wheel block to the Pressure Frame (22) with bolts M24x70 (117), Pressure Frame Assembly Kit (23), washers M24 (122) and self-securing nuts M24 (121).
5. Remove crane lifting gear. (Fig. B2.08)



The hydraulic drive turns in a clockwise direction when looking at the wheel hub.

Fig. B2.08

## Mounting the Hydraulic Drive VARIOKIT

### Components

- |           |                             |
|-----------|-----------------------------|
| <b>31</b> | Wheel Block VARIOKIT 300 kN |
| <b>32</b> | Hydraulic Drive VARIOKIT    |

### Assembly

1. Remove the coupling bolts M20x200 (31.3) and place to one side. The nuts will no longer be required.
2. Remove bolts M20x70 (32.5), nuts M20 (32.6) and washers M20 (32.7).
3. Attach the hydraulic drive (32) to the crane lifting gear and fly in.
4. Position the hydraulic drive in front of the wheel block (31) and then carefully push into the wheel block.
5. Fix the hydraulic drive to the wheel block with bolts M20x70 (32.5), washers M20 (32.7) and nuts M20 (32.6). (Fig. B2.09a + B2.09b)
6. Remove crane lifting gear.
7. Attach one coupling bolt M20x200 (31.3) in the wheel (31.1).
8. Turn the wheel until the coupling bolt engages the hydraulic drive.
9. Attach all coupling bolts and screw in as far as possible to the limit stop.

(Fig. B2.09b)

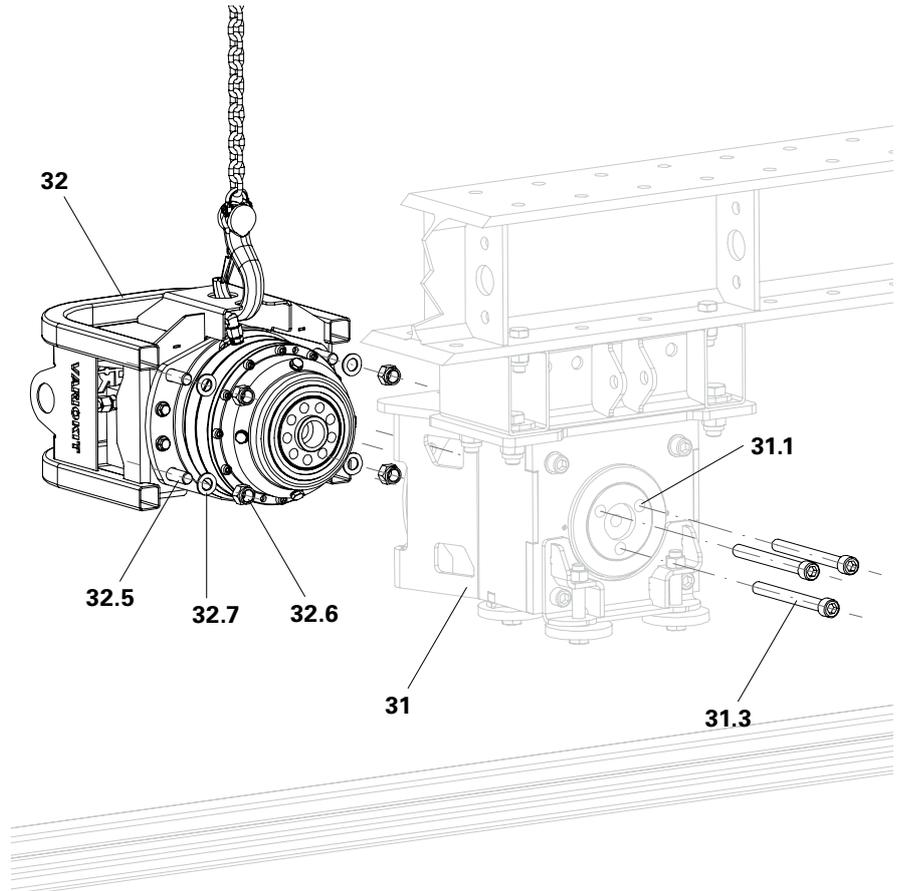


Fig. B2.09a



The coupling bolts leave a small gap after they are fully tightened. This gap is important so that the bearings in the wheel block are not damaged. Never close this gap with higher tightening torque or shorter bolts!

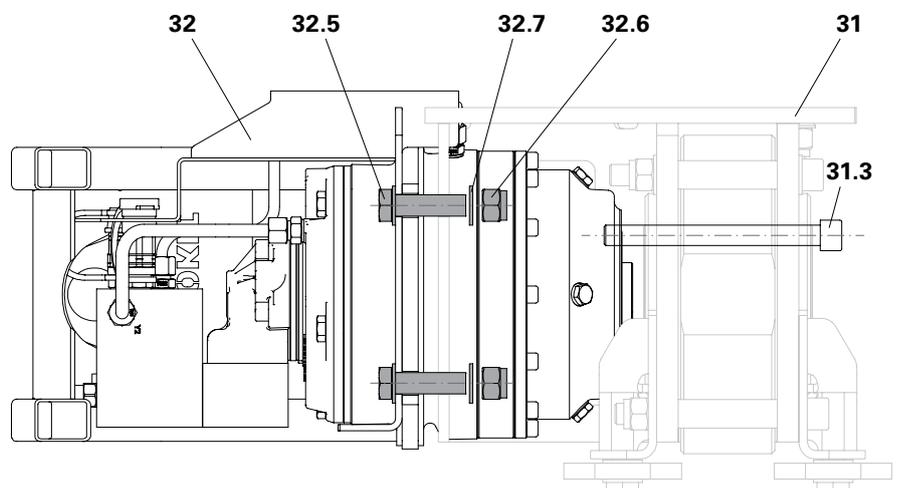


Fig. B2.09b

## Mounting the Heavy-Duty Wheel VARIOKIT

The Heavy-Duty Wheel is only used to move the Tunnel Formwork carriage. The Heavy-Duty Wheel runs on crane rails; alternatively, in a U-rail.

### Components

- 10.1 Longitudinal Beam VARIOKIT
- 20 Heavy-Duty Wheel VARIOKIT
- 110 Bolt M20x70
- 113 Nut M20 self-securing
- 114 Washer M20

### Mounting without using the Lifting and Lowering Unit

1. Position the Heavy-Duty Wheel (20) on the assembly position.
  2. Fix the Heavy Duty Wheel to the Base Beam with bolts M20x70 (110), washers M20 (114) and self-securing nuts M20 (113).
- (Fig. B2.10)



For easier and safer assembly, insert two Tie Rods DW15 through the Heavy-Duty Wheel and secure with Cam Nuts DW15.

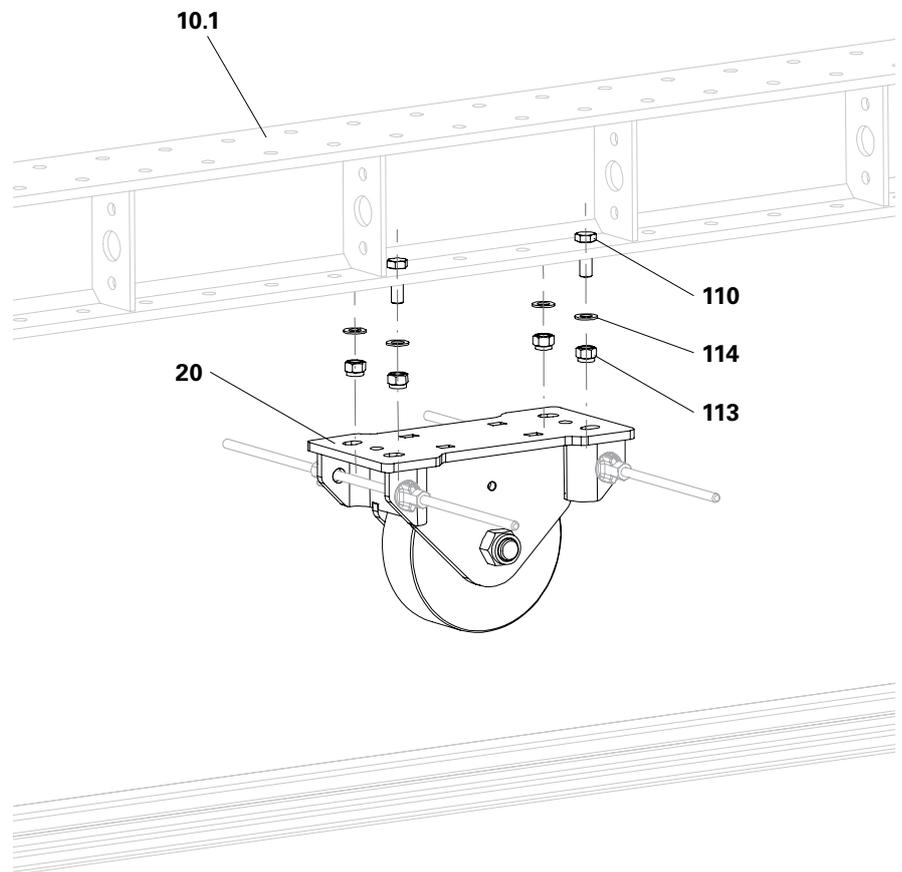


Fig. B2.10

## Components

- 10.1** Longitudinal Beam VARIOKIT
- 20** Heavy-Duty Wheel VARIOKIT
- 22** Pressure Frame LALD SLR VARIOKIT
- 23** Pressure Frame Assembly Kit
- 109** Bolt M20x60
- 113** Nut M20 self-securing
- 114** Washer M20
- 117** Bolt M24x70
- 121** Nut M24 self-securing
- 122** Washer M24

## Assembly when using the Lifting and Lowering Unit

1. Fix the Pressure Frame (22) to the Base Beam (10.1) at the designated mounting position using bolts M20x60 (109), washers M20 (114) and self-securing nuts M20 (113).
2. Position the Heavy-Duty Wheel (20) on the assembly position.
3. Fix the Heavy-Duty Wheel to the Pressure Frame with bolts M24x70 (117), Pressure Frame Assembly Kit (23), washers M24 (122) and self-securing nuts M24 (121).

(Fig. B2.11)



For easier and safer assembly, insert two Tie Rods DW15 through the Heavy-Duty Wheel and secure with Cam Nuts DW15.

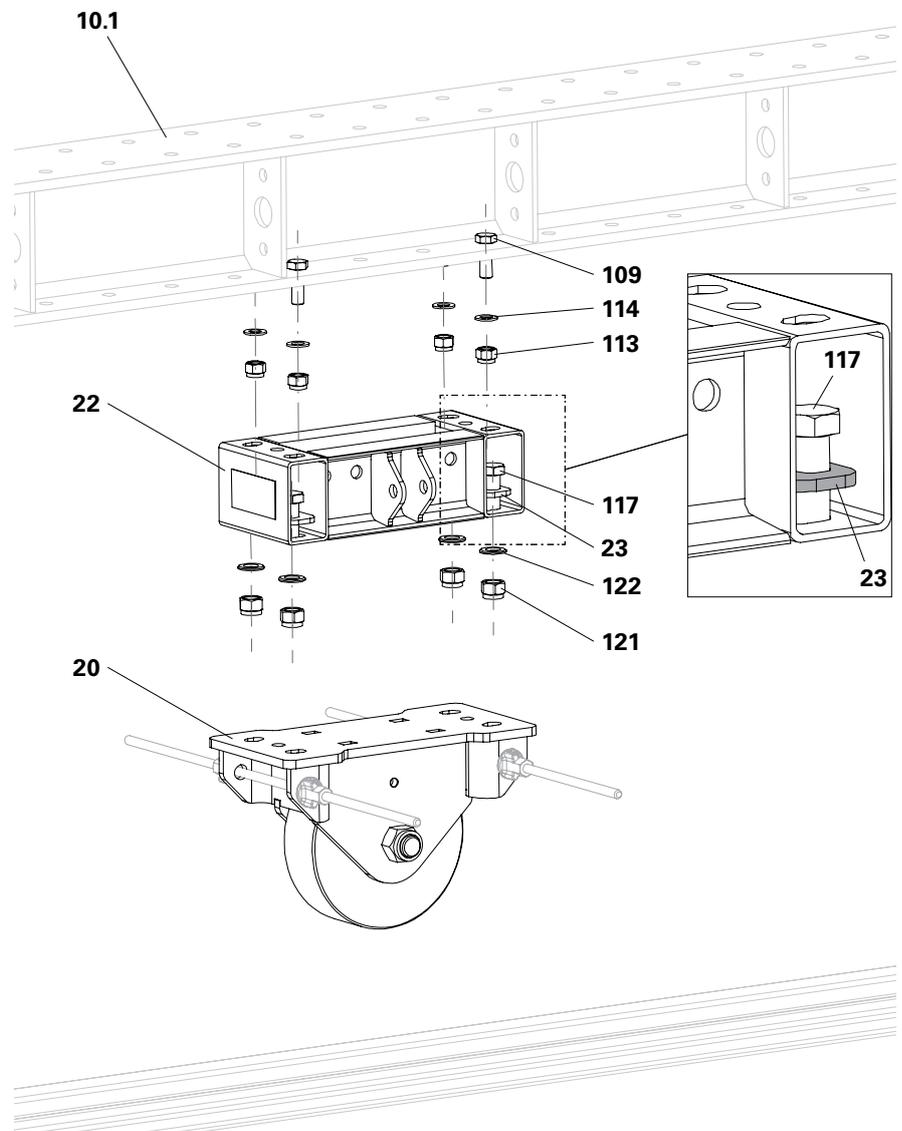


Fig. B2.11

## Mounting the Flange Cage SLR VARIOKIT

When using the A75 or S49 Crane Rails, the Flange Cage must be installed. The Flange Cage serves to provide lateral guidance for the Heavy-Duty Wheels on the Rails. The Flange Cage is used in pairs.



When using U-profiles as Rails, the Flange Cage must not be mounted.

### Components

- 20** Heavy-Duty Wheel VARIOKIT
- 21** Flange Cage SLR VARIOKIT
- 103** Bolt M16x25
- 104** Bolt M16x150
- 105** Nut M16 self-securing
- 106** Washer M16

### Assembly

1. Slide the Flange Cage (21) over the wheel bolt (20.1) and push it upwards.
  2. Fix the Flange Cage (21) to the Heavy-Duty Wheel (20) on both sides using Bolts M16x25 (103) and Washers M16 (106).
  3. Connect the two Flange Cages to each other with Bolts M16x150 (104) and self-securing Nuts M16 (105).
- (Fig. B2.12)

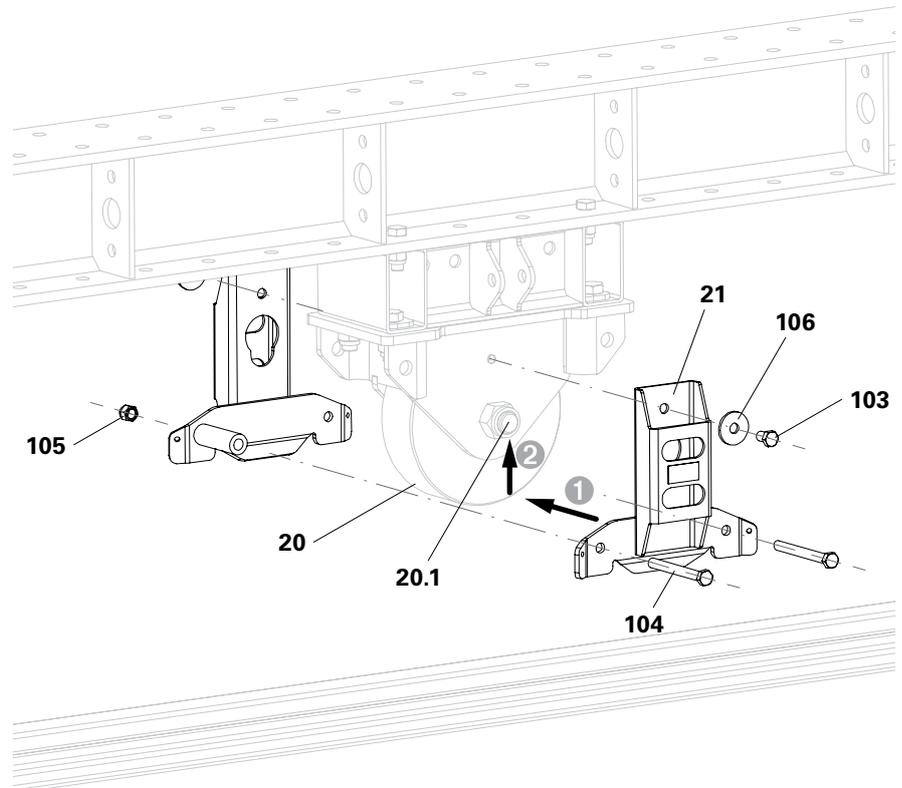


Fig. B2.12

## Mounting the Valve Block Hydraulic Drive

### Components

<b>33</b> Valve Block Hydraulic Drive	
<b>37</b> Steel Waler SRU 147	1x
<b>123</b> Fitting Pin Ø 21x120	2x
<b>124</b> Cotter Pin 4/1	2x
<b>130</b> Wingnut Pivot Plate	2x
<b>131</b> Tie Rod DW 15	2x
<b>132</b> Hex. Nut DW 15	4x

### Assembly

1. Mount one Hex. Nut DW15 (132a) on both Tie Rods (131).
2. Insert the Tie Rods through the drilled holes in the Base Beam (10.1) and tighten with Hex. Nut DW15 (132b).
3. Position the Steel Waler SRU 147 (37) on the Base Beam and secure it with Wingnut Pivot Plates (130).

(Fig. B2.13)

4. Fix the Valve Block Hydraulic Drive (33) at the end of the Steel Waler SRU 147 (37) using two Fitting Pins 21x120 (123) and secure with Cotter Pins 4/1 (124).

(Fig. B2.14)

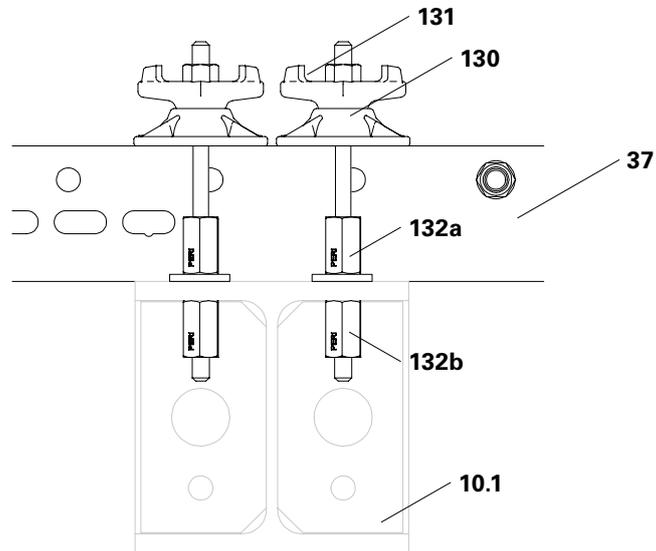


Fig. B2.13

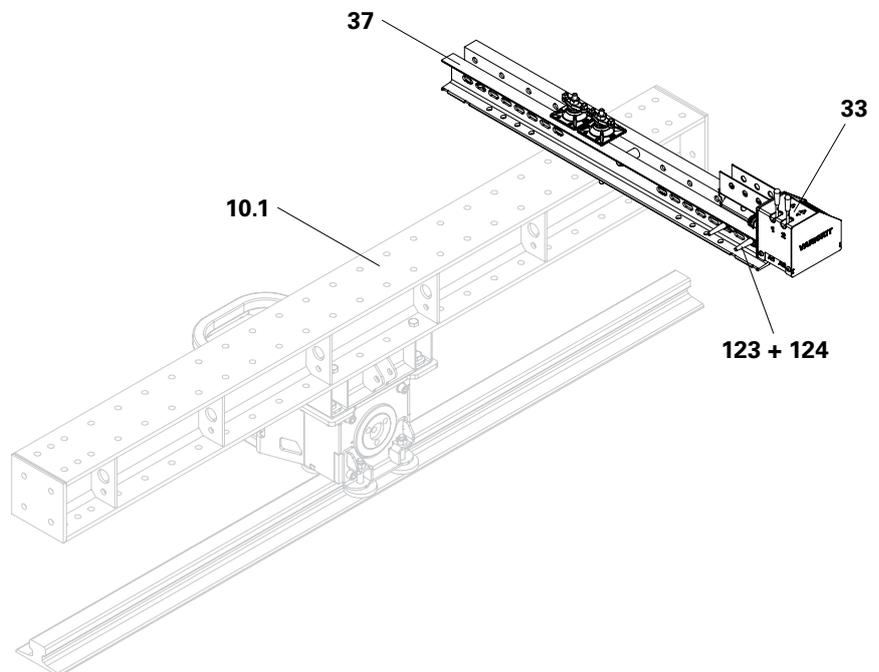


Fig. B2.14

## Mounting the Support Wedge Box VARIOKIT

- The Support Wedge Box acts as a spacer and compensates for height differences between the Base Beam and the Wedge Lowering Device and support frame.
- The Support Wedge Box transfers vertical loads that occur during concreting. The Lifting and Lowering Cylinders are thereby completely relieved.

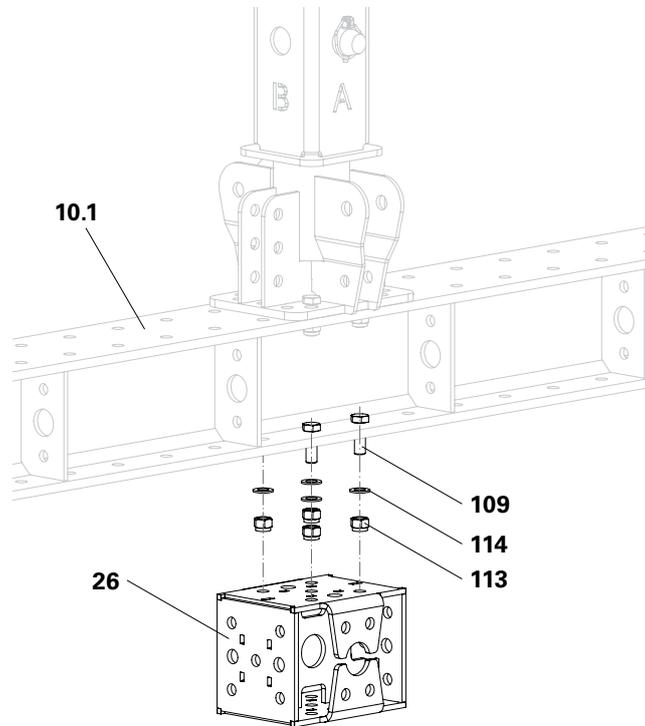
### Components

- 10.1** Longitudinal Beam VARIOKIT
- 26** Support Wedge Box VARIOKIT
- 109** Bolt M20x60
- 113** Nut M20 self-securing
- 114** Washer M20



- With the Crane Rail A75, the Support Wedge Box is mounted horizontally. (Fig. B2.15)
- With the Crane Rail S49, the Support Wedge Box is mounted vertically. (Fig. B2.16)

Fig. B2.15



### Assembly

1. Position the Support Wedge Box (26) on the assembly position.
2. Fix the Support Wedge Box to the Base Beam with bolts M20x60 (109), washers M20 (114) and self-securing nuts M20 (113).

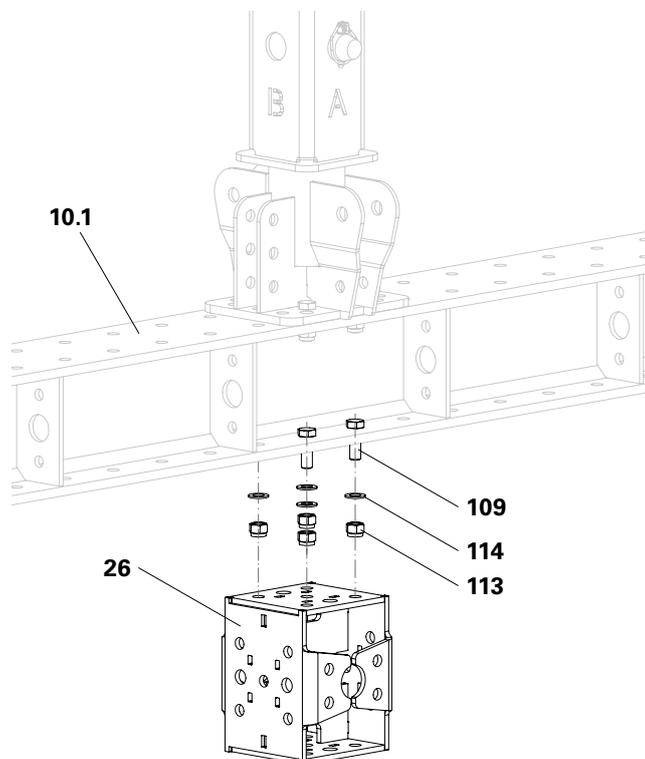


Fig. B2.16

## Mounting the Heavy-Duty Roller 200 kN

With the Heavy-Duty Roller 200kN trolley, the Base Beam including the assemblies can be moved. Depending on the assembly direction on the Base Beam, this is possible in the longitudinal or transverse direction.

The Heavy-Duty Roller Swivel Plate is a connection component for mounting the Heavy-Duty Roller 200kN to the Base Beam.

### Components

<b>10.1</b>	Longitudinal Beam VARIOKIT
<b>44</b>	Heavy-Duty Roller Swivel Plate
<b>46</b>	Heavy-Duty Roller 200 kN Type A-II
<b>100</b>	Bolt M12x55
<b>101</b>	Nut M12 self-securing
<b>102</b>	Washer M12
<b>109</b>	Bolt M20x60
<b>113</b>	Nut M20 self-securing
<b>114</b>	Washer M20

### Assembly

1. Insert bolts M12x55 (100) into the holes of the Heavy-Duty Roller Swivel Plate (44). The bolt head must be flush with the Heavy-Duty Roller Swivel Plate.
  2. Align the Heavy-Duty Roller Swivel Plate on the assembly position so that the holes in the Heavy-Duty Roller Swivel Plate and the Base Beam are flush.
  3. Insert bolts M20x60 (109) through the holes. The bolt head must be flush with the Heavy-Duty Roller Swivel Plate.
  4. Fix the Heavy-Duty Roller Swivel Plate using washers M20 (114) and self-securing nuts M20 (113).
  5. Secure the Heavy-Duty Roller 200kN (46) with washers M12 (102) and self-securing nuts M12 (101).
- (Fig. B2.17)



The longer side of the Heavy-Duty Roller Swivel Plate is parallel to the direction of travel.

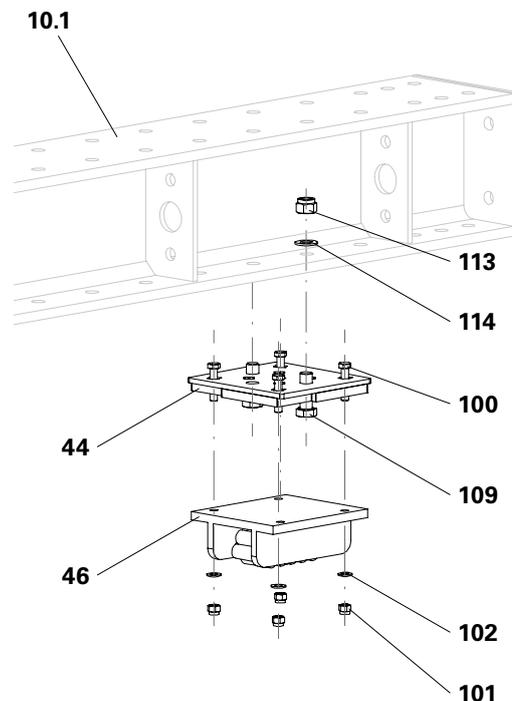


Fig. B2.17

## Multi-Adapter RCS VARIOKIT

The Multi-Adapter RCS VARIOKIT is used to connect components to the Climbing Rail RCS. (Fig. B3.01)  
 The Multi-Adapter RCS VARIOKIT is used individually or as a unit. Thereby, two Multi-Adapters RCS are positively connected to each other.

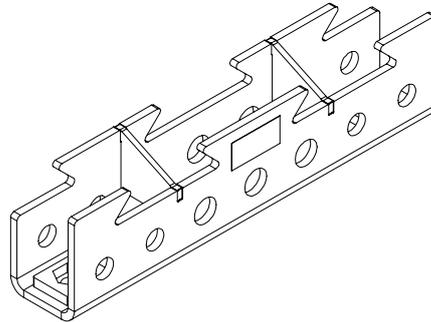


Fig. B3.01

### Caution

The two Multi-Adapters of the assembly unit can come loose!  
 Risk of crushing and abrasions caused by falling components.  
 ⇒ Only support the complete assembly unit on the top Multi-Adapter (11a).  
 ⇒ Do not tip the assembly unit.

### Components

<b>11</b>	Multi-Adapter RCS VARIOKIT	2x
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### Connecting two Multi-Adapters RCS

1. Position two Multi-Adapters next to each other, both Multi-Adapters have the same mounting position.
  2. Turn one Multi-Adapter (11a) by 180° and hold slightly offset above the other Multi-Adapter (11b).
  3. Place Multi-Adapter (11a) on Multi-Adapter (11b).
  4. Slide the Multi-Adapter (11a) upwards along the inclination until both components snap into place.
- (Fig. B3.02)

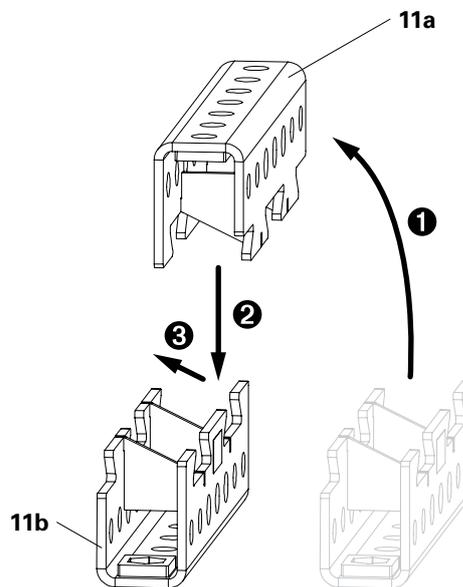


Fig. B3.02

Fig. B3.03 shows the Multi-Adapter assembly unit. The assembly unit is fixed in the Climbing Rail RCS with fitting pins.

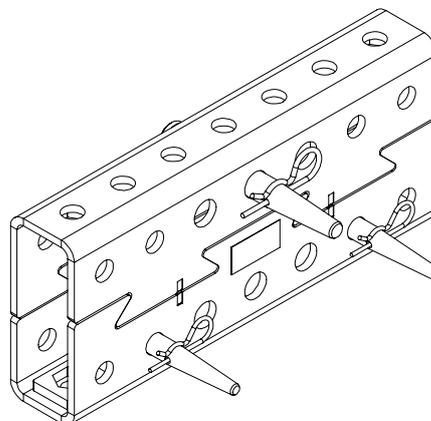


Fig. B3.03

## Installing the Hydraulic Pump

- The standard position for installing the hydraulic pump is on the Base Beam.
- When moving the hydraulic pump, use suitable lifting straps or available crane eyes.
- Use attachment points on the hydraulic pump.

3. Attach the hydraulic pump (1) to the crane lifting gear and fly in.
4. Position the hydraulic pump over the assembly position and lower onto the Base Beam (10.2).
5. Fix the hydraulic pump to both Multi-Adapters with bolts M20x60 (109), self-securing nuts M20 (113) and washers M20 (114).
6. Remove crane lifting gear. (Fig. B3.04)



Fix the hydraulic pump to the Base Beam so that the oil tank is centered on the Base Beam.

### Components

- 1** Hydraulic Pump VARIOKIT 8-cycles
- 10.2** Climbing Rail RCS
- 11** Multi-Adapter RCS VARIOKIT
- 109** Bolt M20x60
- 113** Nut M20 self-securing
- 114** Washer M20
- 123** Fitting Pin  $\varnothing$  21x120
- 124** Cotter Pin 4/1
- 125** Fitting Pin 26x120
- 126** Cotter Pin 5/1

### Assembly

1. Fix 2x Multi-Adapter RCS (11) in the top row of holes of the Climbing Rail RCS (10.2) at the designated assembly position with fitting pins 26x120 (125) and secure with cotter pins 5/1 (126).
2. Secure both Multi-Adapters RCS (11) with fitting pins 21x120 (123) against twisting. Secure fitting pins 21x120 with cotter pins 4/1 (124).

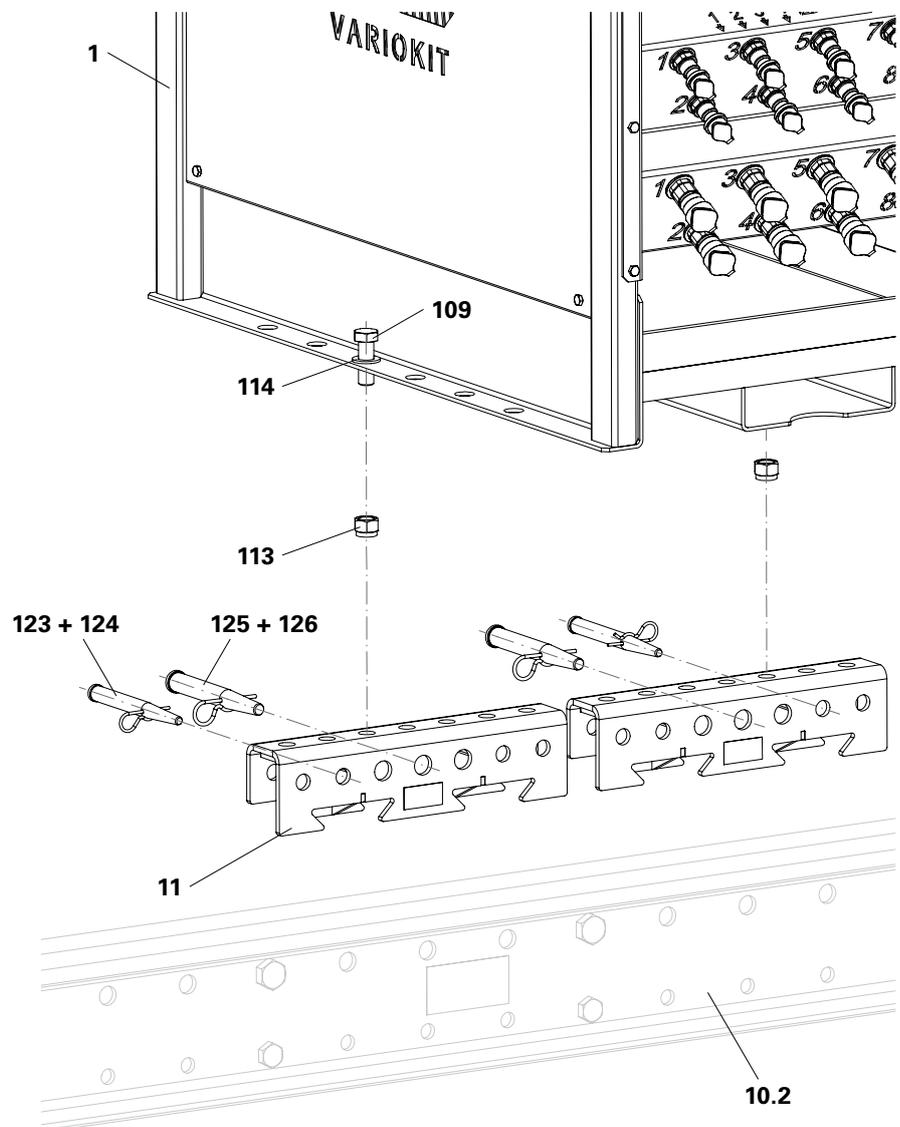


Fig. B3.04

## Modifying the Lift Frame



- Before assembly takes place, the Lift Frame must be modified on the Base Beam RCS.
- When moving the Lift Frame, use the available crane eyes.

### Components

**25** Lift Frame LALD VARIOKIT

### Modification

1. Remove bolts M24x50 (115a) and move the Girder Connection at the top (25.6) into the bottom elongated hole.
  2. Fix the Girder Connection at the top (25.6) with bolts M24x50 (115a), do not tighten the bolts.
- (Fig. B3.05)

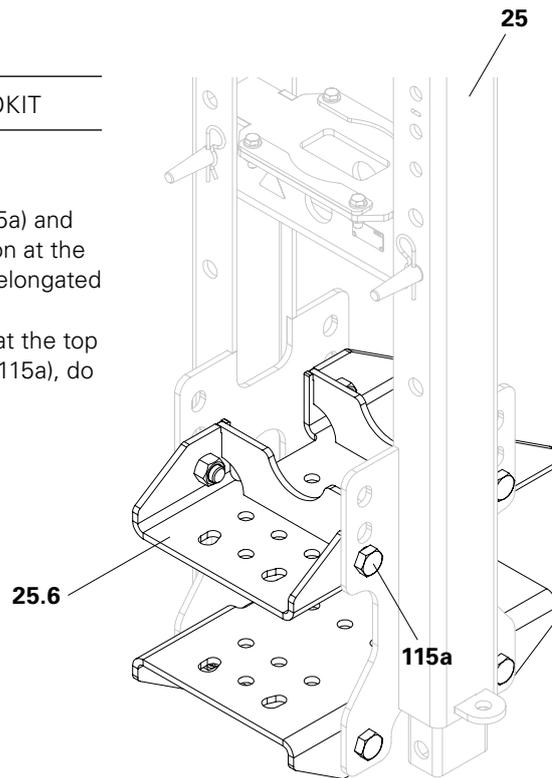


Fig. B3.05

## Installing the Lift Frame



When moving the Lift Frame, use the available crane eyes.

### Components

**10.2** Climbing Rail RCS  
**11** Multi-Adapter RCS VARIOKIT 2x  
**25** Lift Frame LALD VARIOKIT  
**109** Bolt M20x60  
**113** Nut M20 self-securing  
**114** Washer M20  
**123** Fitting Pin  $\varnothing$  21x120  
**124** Cotter Pin 4/1  
**125** Fitting Pin 26x120  
**126** Cotter Pin 5/1



Ensure that the fixing board at the top (25.6) is fixed in the bottom elongated holes.

(Fig. B3.06)

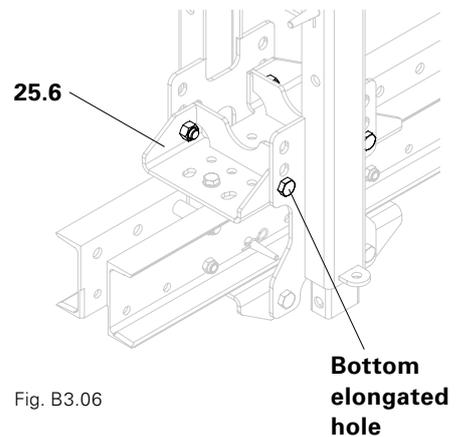


Fig. B3.06

**Bottom elongated hole**

## Assembly

1. Connect two Multi-Adapters RCS (11) together to form one assembly unit.
2. Fix the assembly unit in the top row of holes at the designated assembly position with fitting pin 26x120 (125) and secure with cotter pin 5/1 (126).
3. Fix the assembly unit in the bottom row of holes with two fitting pins 21x120 (123) and secure with cotter pins 4/1 (124).
4. Remove bolts M24x50 (115b) and dismantle bottom Girder Connection (25.5).
5. Attach the Lift Frame (25) to the crane lifting gear and fly in.
6. Lower the Lift Frame onto the assembly position on the Base Beam (10.2).
7. Fix the bottom Girder Connection (25.5) in its original position with bolts M24x50 (115b) and nuts M24 (120).
8. Raise the Lift Frame so that it rests tightly against the Base Beam (10.2).
9. Fix the Lift Frame (25) to the Multi-Adapter RCS assembly unit with bolts M20x60 (109), washers M20 (114) and self-securing nuts M20 (113).
10. Tighten bolts M24x50 (115a) on the Girder Connection above (25.6).
11. Remove crane lifting gear. (Fig. B3.07)

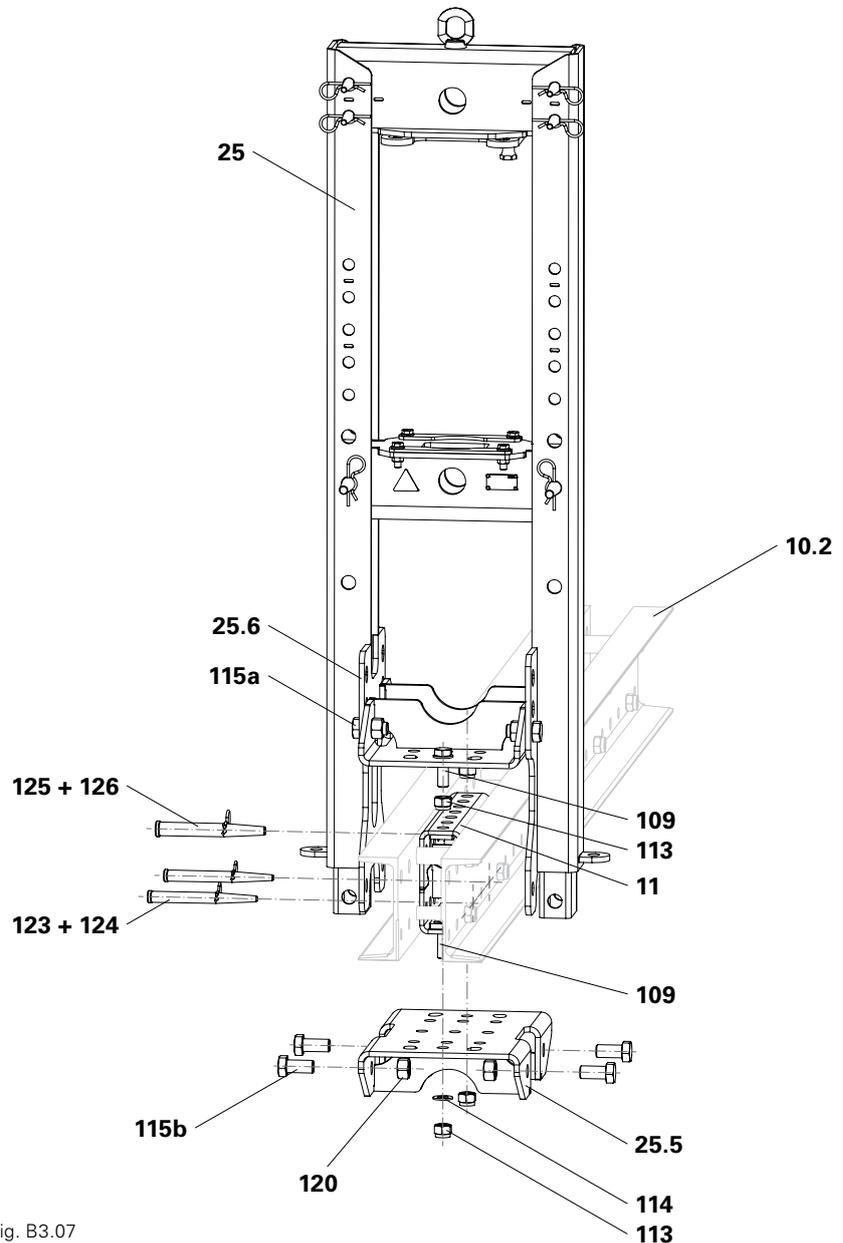


Fig. B3.07

## Mounting the Hinge Slide



### Warning

Heavy moving parts!  
 During assembly, there is a risk of hands being crushed.  
 ⇒ Wear protective gloves.  
 ⇒ Ensure a safe and secure position.

### Components

- |           |                           |
|-----------|---------------------------|
| <b>24</b> | Hinge Slide LALD VARIOKIT |
| <b>25</b> | Lift Frame LALD VARIOKIT  |

### Mounting with Crane Rail A75

1. Position the Hinge Slide (24) under the Lift Frame (25).
2. Pull the cotter pin (126b) and fitting pin 26x120 (125b).
3. Hold the sliding part (25.9) in its position.
4. Pull the cotter pin (126a) and fitting pin 26x120 (125a).
5. Lower the sliding part (25.9) and insert into the retainer of the Hinge Slide.
6. Insert fitting pin 26x120 (125b) and secure with cotter pin (126b).
7. Insert the fitting pin 26x120 (125a) in one hole higher in the parking position and secure with cotter pin (126a).

(Fig. B3.08 + B3.09)

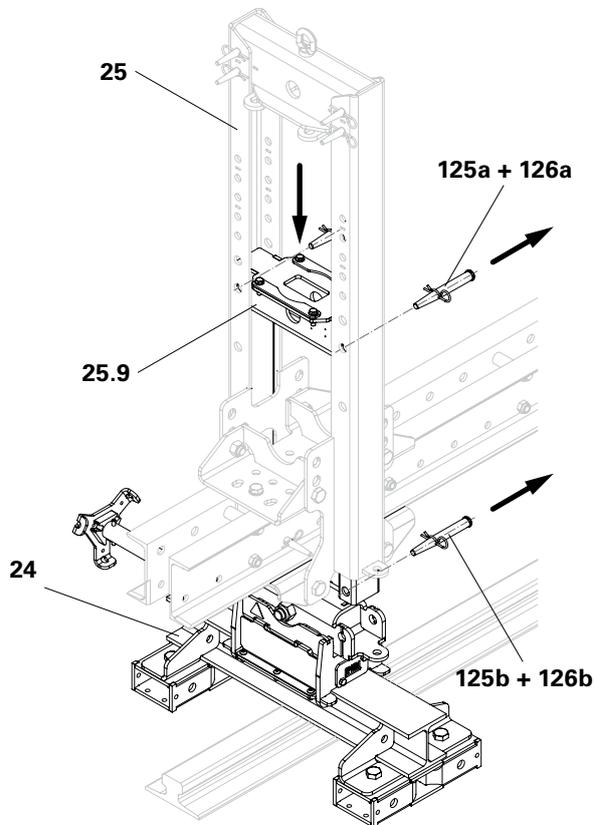


Fig. B3.08

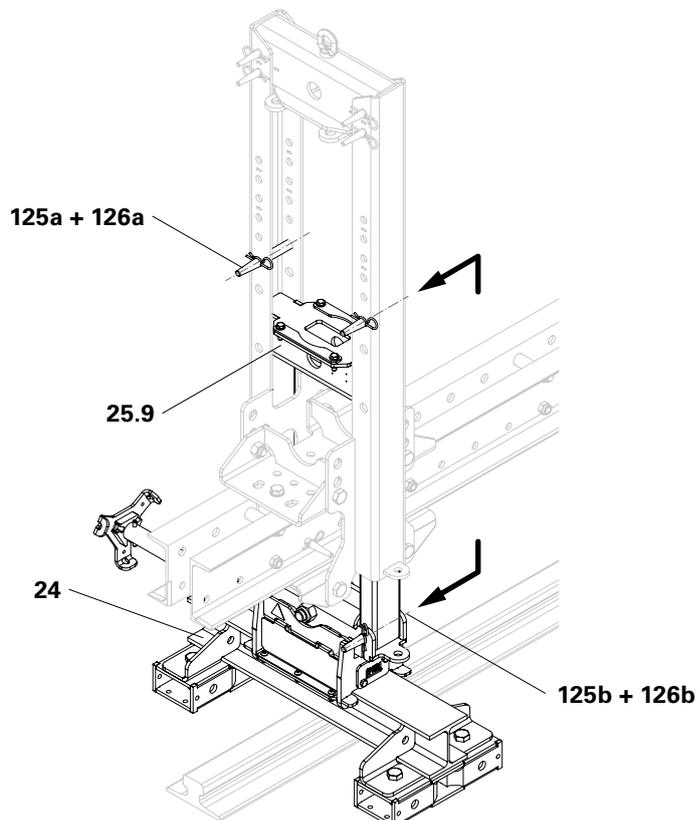


Fig. B3.09

### Mounting with Crane Rail S49

1. Remove bolts M24x50 (24.6).
2. Turn bottom profile (24.5) by 90°.
3. Fix bottom profile with bolts M24x50 (24.6) and nuts M24 (24.7).
4. For the rest of the assembly of the Hinge Slide, see Mounting with Crane Rail A75.

(Fig. B3.10)

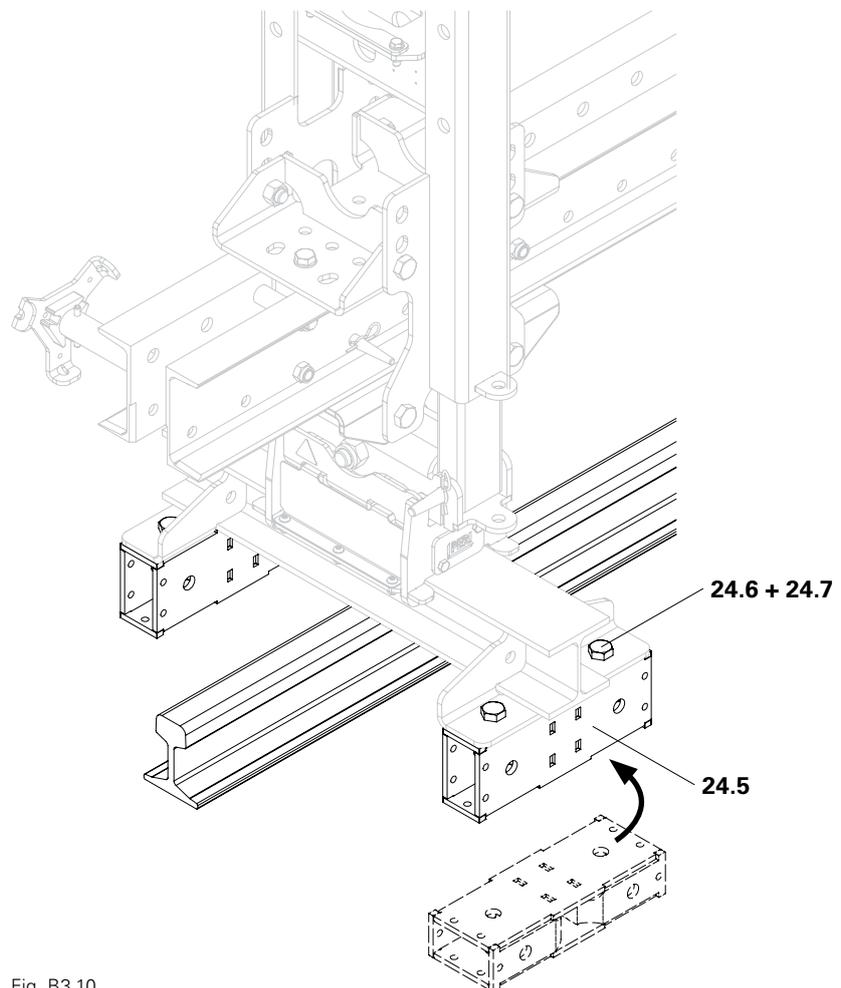


Fig. B3.10

## Mounting the Wheel Block VARIOKIT 300 kN



The Wheel Block VARIOKIT is mounted on both Base Beams of the Tunnel Formwork Carriage in the same installation position. The hydraulic drive protrudes in the direction of travel to the left of the Base Beam.

### Components

- 10.2 Climbing Rail RCS
- 12 Adapter RCS SLR VARIOKIT
- 31 Wheel Block VARIOKIT 300 kN
- 109 Bolt M20x60
- 113 Nut M20 self-securing
- 114 Washer M20
- 123 Fitting Pin  $\varnothing$  21x120
- 124 Cotter Pin 4/1

### Mounting without using the Lifting and Lowering Unit

1. Fix the Adapter RCS SLR (12) to the wheel block (31) with bolts M20x60 (109), washers M20 (114) and self-securing nuts M20 (113).
2. Attach the assembly unit to the crane and fly in.
3. Fix the assembly unit on the assembly position with fitting pins 21x120 (123) and secure with cotter pins 4/1 (124).
4. Remove crane lifting gear.  
(Fig. B3.11)

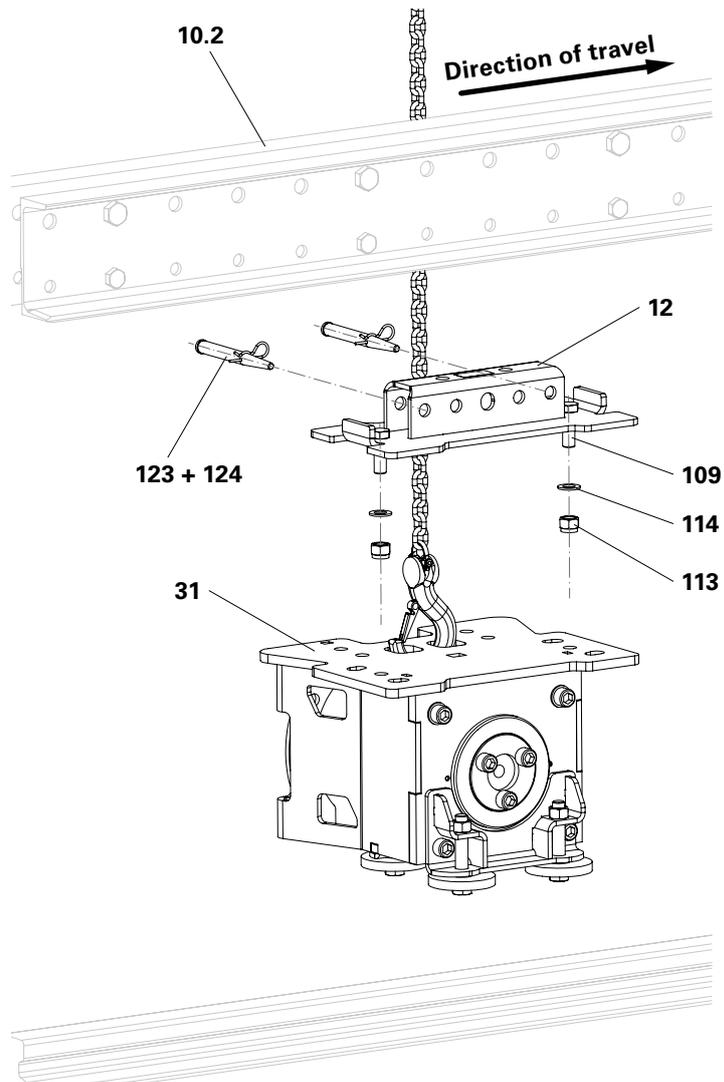


Fig. B3.11

## Components

- 10.2** Climbing Rail RCS
- 12** Adapter RCS SLR VARIOKIT
- 22** Pressure Frame LALD SLR VARIOKIT
- 23** Pressure Frame Assembly Kit
- 31** Wheel Block VARIOKIT 300 kN
- 109** Bolt M20x60
- 113** Nut M20 self-securing
- 114** Washer M20
- 117** Bolt M24x70
- 121** Nut M24 self-securing
- 122** Washer M24
- 123** Fitting Pin  $\varnothing$  21x120
- 124** Cotter Pin 4/1

## Assembly when using the Lifting and Lowering Unit

1. Fix the Adapter RCS SLR (12) to the Pressure Frame (22) with bolts M20x60 (109), washers M20 (114) and self-securing nuts M20 (113).
2. Fix the assembly unit to the wheel block (31) with bolts M24x70 (117), Pressure Frame Assembly Kit (23), washers M24 (122) and self-securing nuts M24 (121).
3. Attach the assembly unit to the crane and fly in.
4. Fix the assembly unit at the designated assembly position with fitting pins 21x120 (123) and secure with cotter pins 4/1 (124).
5. Remove crane lifting gear. (Fig. B3.12)



The hydraulic drive turns in a clockwise direction when looking at the wheel hub.

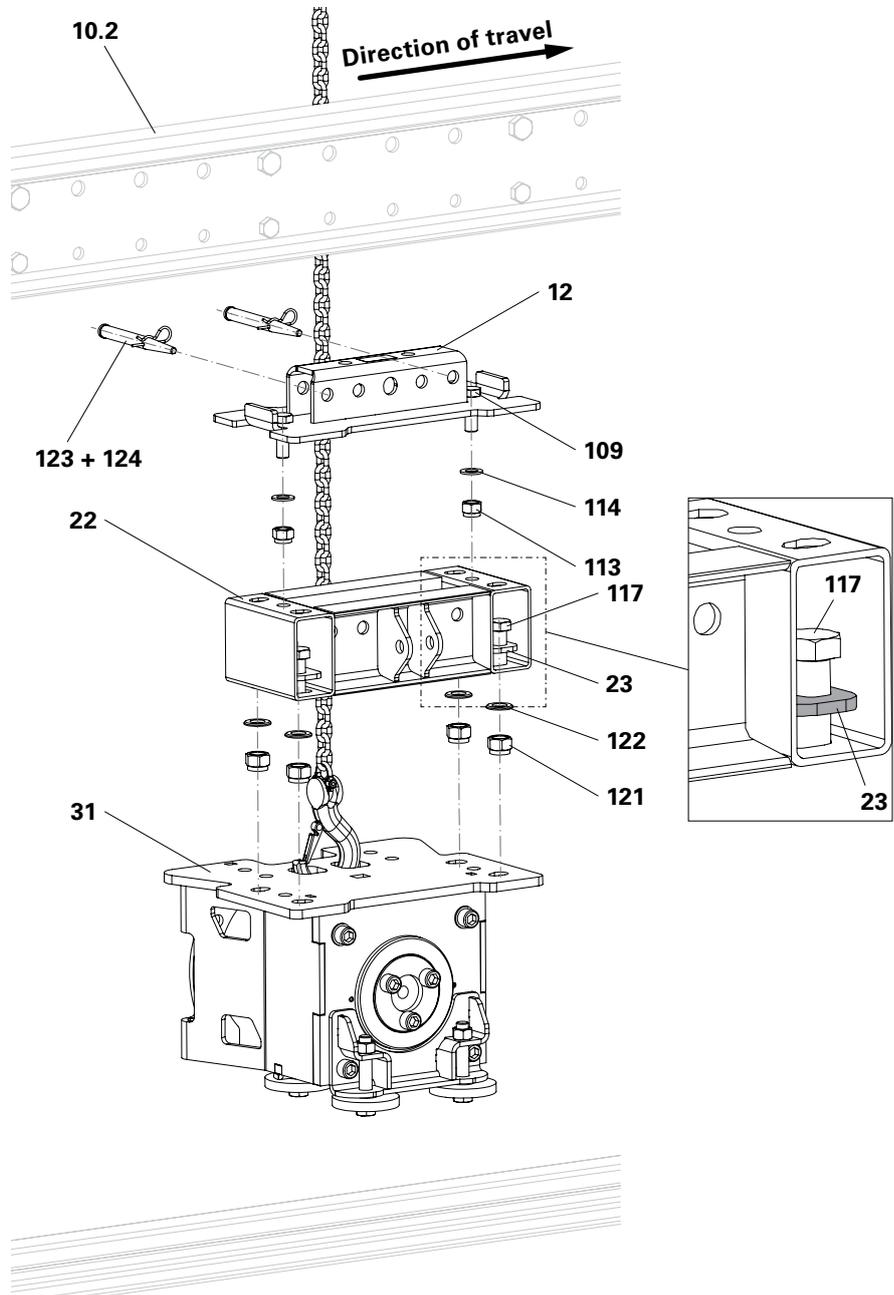


Fig. B3.12

## Mounting the Hydraulic Drive VARIOKIT

### Components

- 31** Wheel Block VARIOKIT 300 kN
- 32** Hydraulic Drive VARIOKIT

### Assembly

1. Remove the coupling bolts M20x200 (31.3) and place to one side. The nuts will no longer be required.
2. Remove bolts M20x70 (32.5), nuts M20 (32.6) and washers M20 (32.7).
3. Attach the hydraulic drive (32) to the crane lifting gear and fly in.
4. Position the hydraulic drive in front of the wheel block (31) and then carefully push into the wheel block.
5. Fix the hydraulic drive to the wheel block with bolts M20x70 (32.5), washers M20 (32.7) and nuts M20 (32.6). (Fig. B3.13a + B3.13b)
6. Remove crane lifting gear.
7. Attach one coupling bolt M20x200 (31.3) in the wheel (31.1).
8. Turn the wheel until the coupling bolt engages the hydraulic drive. Attach all coupling bolts and screw in as far as possible to the limit stop.

(Fig. B3.13b)

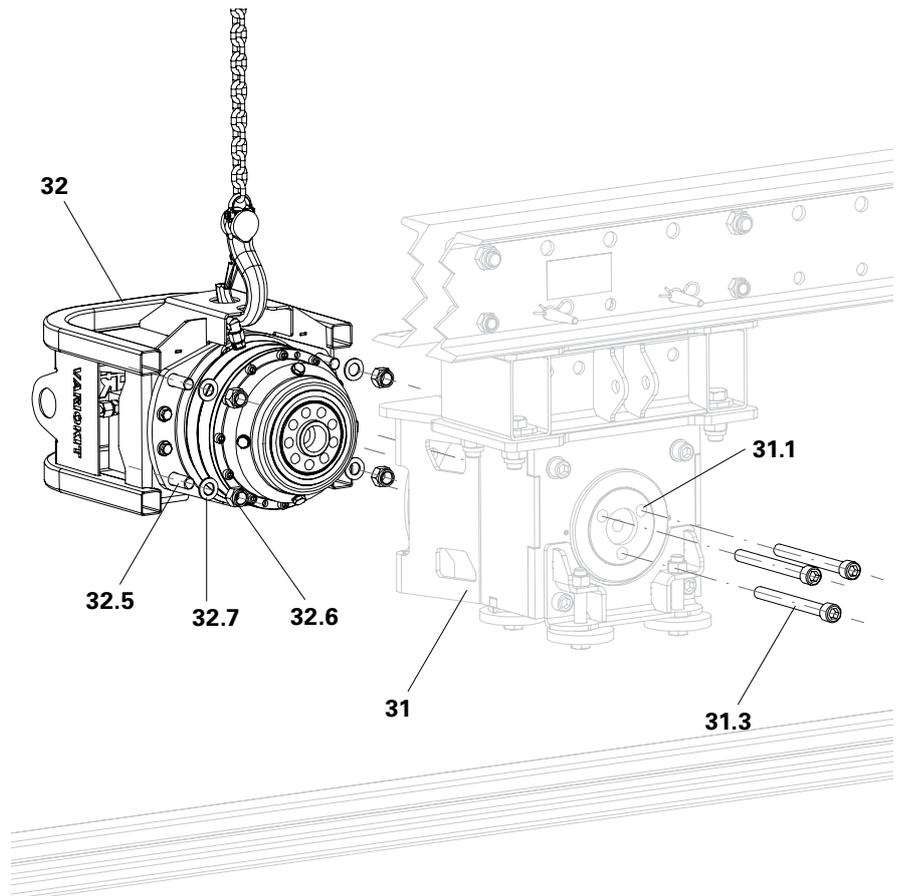


Fig. B3.13a



The coupling bolts leave a small gap after they are fully tightened. This gap is important so that the bearings in the wheel block are not damaged. Never close this gap with higher tightening torque or shorter bolts!

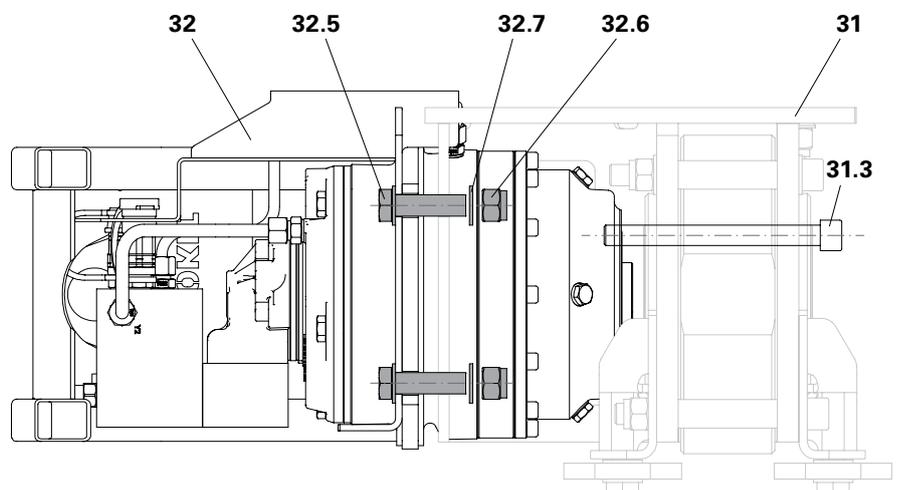


Fig. B3.13b

## Mounting the Heavy-Duty Wheel VARIOKIT

The Heavy-Duty Wheel is only used to move the Tunnel Formwork carriage.  
The Heavy-Duty Wheel runs on crane rails; alternatively, in a U-rail.

### Components

- 10.2** Climbing Rail RCS
- 12** Adapter RCS SLR VARIOKIT
- 20** Heavy-Duty Wheel VARIOKIT
- 109** Bolt M20x60
- 113** Nut M20 self-securing
- 114** Washer M20
- 123** Fitting Pin  $\varnothing$  21x120
- 124** Cotter Pin 4/1

### Mounting without using the Lifting and Lowering Unit

1. Fix the Heavy-Duty Wheel to the Adapter RCS SLR (12) with bolts M20x60 (109), washers M20 (114) and self-securing nuts M20 (113).
2. Fix the assembly unit on the assembly position with fitting pins 21x120 (123) and secure with cotter pins 4/1 (124).

(Fig. B3.14)



For easier and safer assembly, insert two Tie Rods DW15 through the Heavy-Duty Wheel and secure with Cam Nuts DW15.

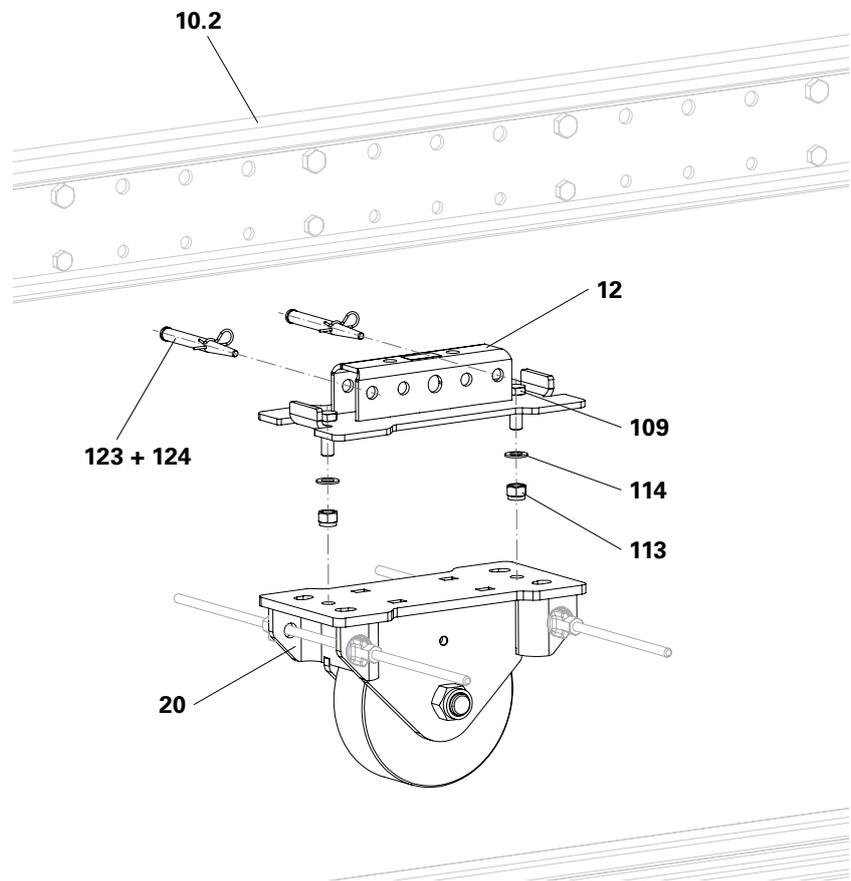


Fig. B3.14

## Components

- 10.2** Climbing Rail RCS
- 12** Adapter RCS SLR VARIOKIT
- 20** Heavy-Duty Wheel VARIOKIT
- 22** Pressure Frame LALD SLR VARIOKIT
- 23** Pressure Frame Assembly Kit
- 109** Bolt M20x60
- 113** Nut M20 self-securing
- 114** Washer M20
- 117** Bolt M24x70
- 121** Nut M24 self-securing
- 122** Washer M24
- 123** Fitting Pin  $\varnothing$  21x120
- 124** Cotter Pin 4/1

## Assembly when using the Lifting and Lowering Unit

1. Fix the Adapter RCS SLR (12) to the Pressure Frame (22) with bolts M20x60 (109), washers M20 (114) and self-securing nuts M20 (113).
2. Fix the assembly unit to the Heavy-Duty Wheel (20) with bolts M24x70 (117), Pressure Frame Assembly Kit (23), washers M24 (122) and self-securing nuts M24 (121).
3. Fix the assembly unit on the assembly position with fitting pins 21x120 (123) and secure with cotter pins 4/1 (124).

(Fig. B3.15)



For easier and safer assembly, insert two Tie Rods DW15 through the Heavy-Duty Wheel and secure with Cam Nuts DW15.

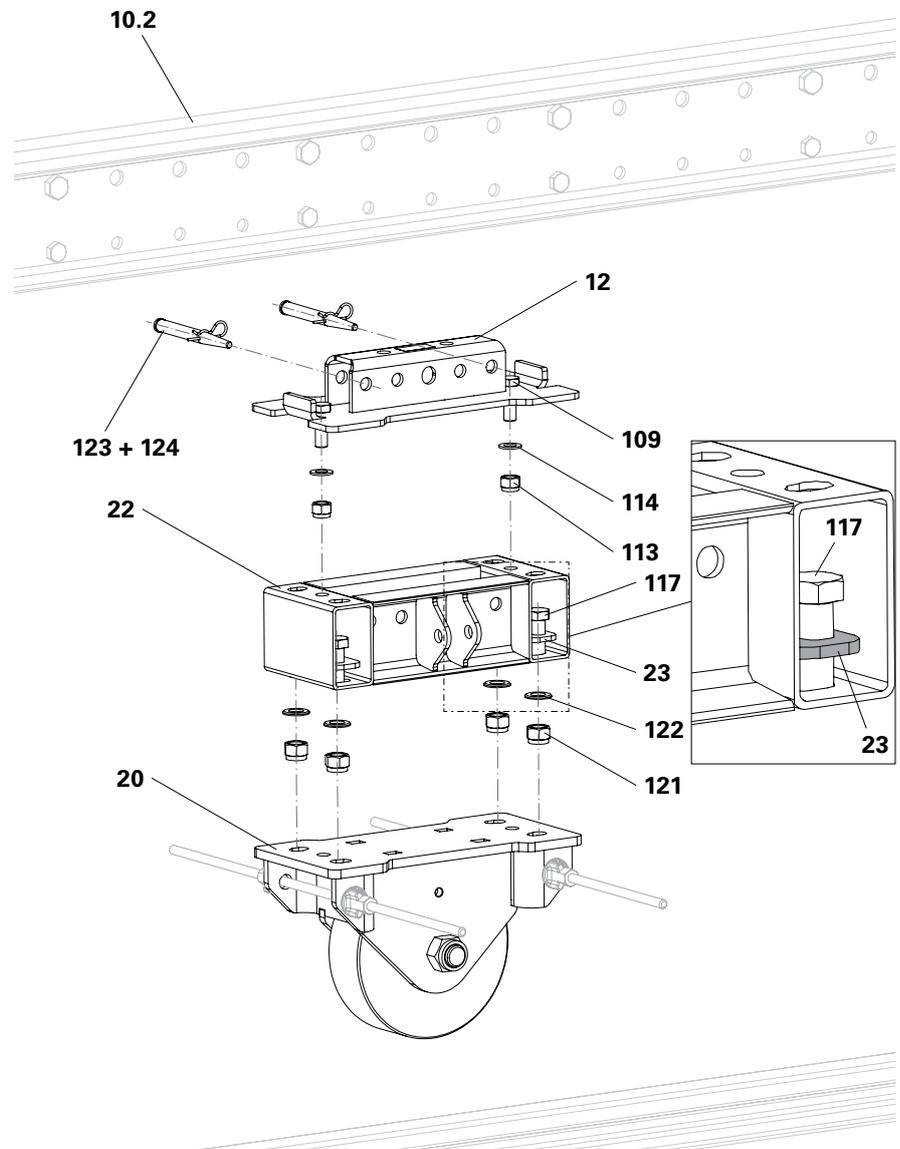


Fig. B3.15

## Mounting the Flange Cage SLR VARIOKIT

When using the A75 or S49 Crane Rails, the Flange Cage must be installed. The Flange Cage serves to provide lateral guidance for the Heavy-Duty Wheels on the Rails. The Flange Cage is used in pairs.



When using U-profiles as Rails, the Flange Cage must not be mounted.

### Components

- 20** Heavy-Duty Wheel VARIOKIT
- 21** Flange Cage SLR VARIOKIT
- 103** Bolt M16x25
- 104** Bolt M16x150
- 105** Nut M16 self-securing
- 106** Washer M16

### Assembly

1. Slide the Flange Cage (21) over the wheel bolt (20.1) and push it upwards.
  2. Fix the Flange Cage (21) to the Heavy-Duty Wheel (20) on both sides using bolts M16x25 (103) and washers M16 (106).
  3. Connect the two Flange Cages to each other with bolts M16x150 (104) and self-securing nuts M16 (105).
- (Fig. B3.16)

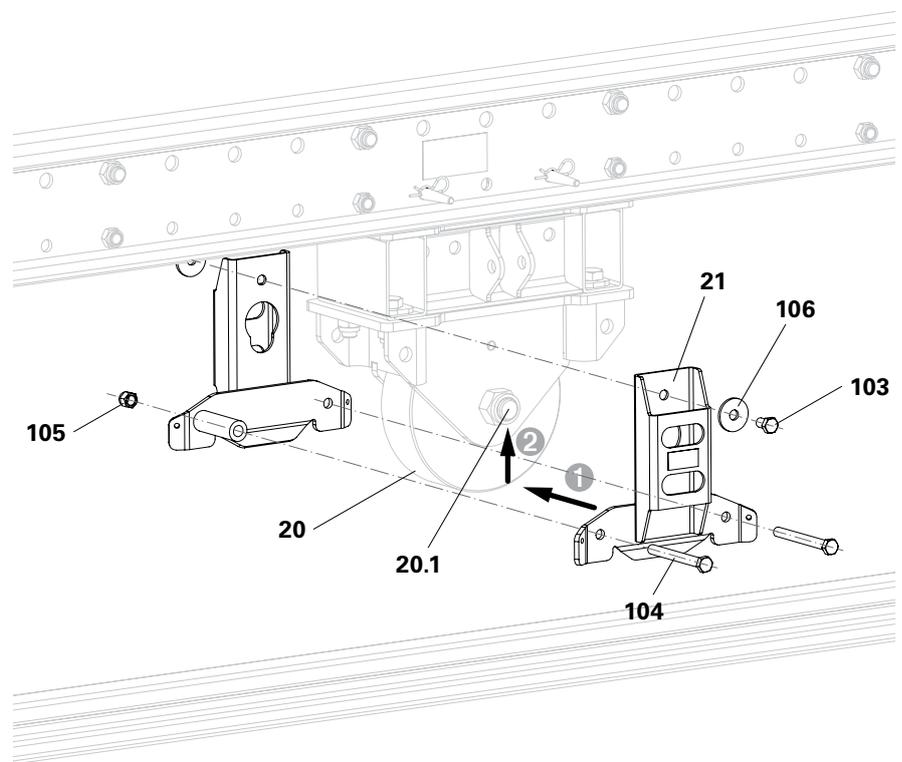


Fig. B3.16

## Mounting the Valve Block Hydraulic Drive Version 1

### Components

<b>10.2</b>	Climbing Rail RCS	1x
<b>14</b>	Vertical Connector RCS	1x
<b>19</b>	Angle Connector RCS/SRU	1x
<b>33</b>	Valve Block Hydraulic Drive	
<b>37</b>	Steel Waler SRU 147	1x
<b>123</b>	Fitting Pin Ø 21x120	5x
<b>124</b>	Cotter Pin 4/1	5x
<b>125</b>	Fitting Pin 26x120	5x
<b>126</b>	Cotter Pin 5/1	5x

### Assembly

1. Fix the Vertical Connector (14) to the Base Beam at the designated assembly position using two fitting pins 26x120 (125) and secure with cotter pins 5/1 (126).
2. Fix the Climbing rail RCS (10.2) to the Vertical Connector (14) using fitting pin 21x120 (123) and fitting pin 26x120 (125). Secure with cotter pin 4/1 (124) and cotter pin 5/1 (126).
3. Fix the Angle Connector (19) to the Climbing Rail RCS (10.2) with two fitting pins 26x120 (125) and secure with cotter pins 5/1 (126).
4. Fix the Steel waler SRU 147 (37) to the Angle Connector (19) with two fitting pins 21x120 (123) and secure with cotter pins 4/1 (124).
5. Fix the Valve Block Hydraulic Drive (33) at the end of the Steel Waler SRU 147 (37) using two fitting pins 21x120 (123) and secure with cotter pins 4/1 (124).

(Fig. B3.17)

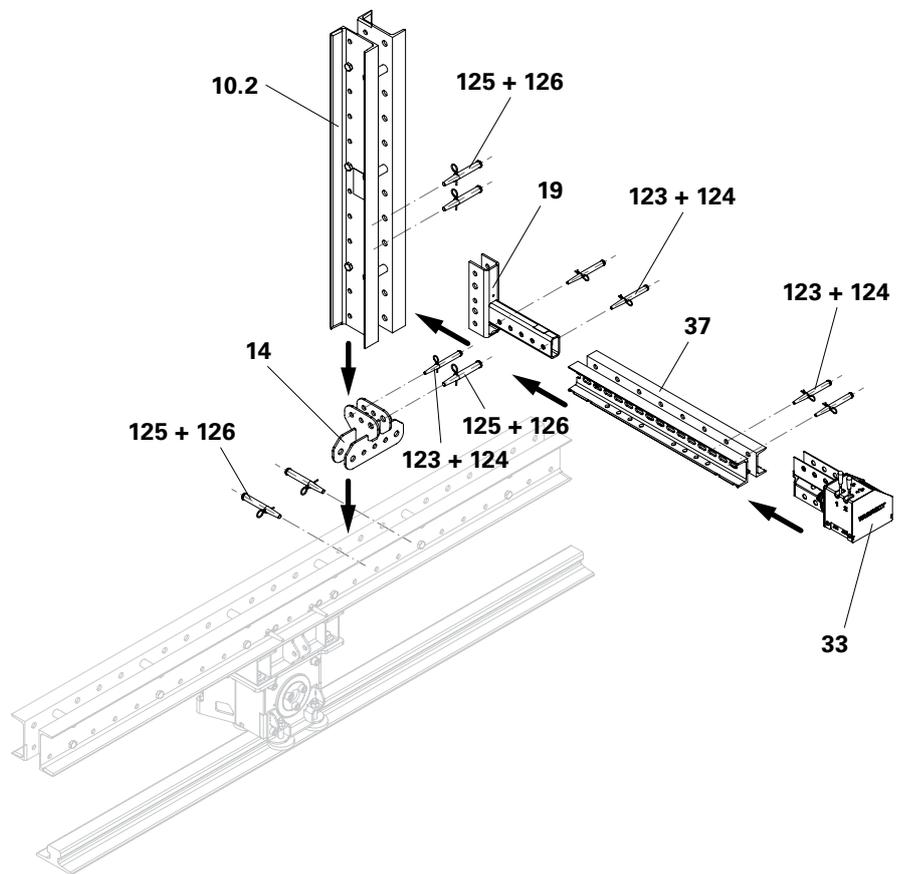


Fig. B3.17

## Mounting the Valve Block Hydraulic Drive Version 2

### Components

<b>18</b> Cross Connector VARIOKIT	1x
<b>33</b> Valve Block Hydraulic Drive	
<b>37</b> Steel Waler SRU 147	1x
<b>113</b> Nut M20 self-securing	1x
<b>114</b> Washer M20	2x
<b>123</b> Fitting Pin Ø 21x120	3x
<b>124</b> Cotter Pin 4/1	3x
<b>134</b> Bolt M20x130	1x

### Assembly

1. Fix the Cross Connector (18) to the Base Beam (10.2) at the designated assembly position with bolts M20x130 (134), washers M20 (114) and self-securing nuts M20 (113).
2. Position the Steel Waler SRU 147 (37) on the Base Beam (10.2), fix with fitting pins 21x120 (123) and secure with cotter pins 4/1 (124).

(Fig. B3.18)

3. Fix the Valve Block Hydraulic Drive (33) at the end of the Steel Waler SRU 147 (37) using two fitting pins 21x120 (123) and secure with cotter pins 4/1 (124).

(Fig. B3.19)

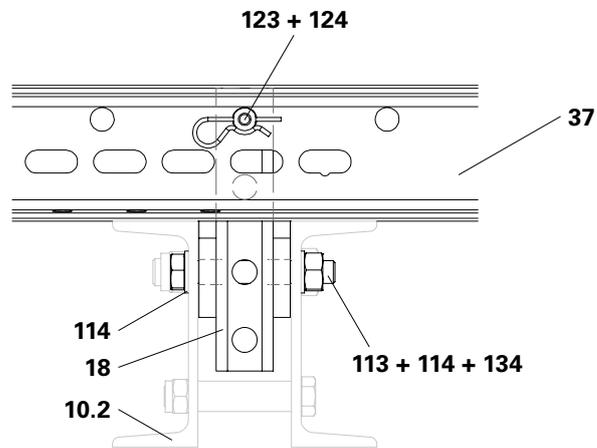


Fig. B3.18

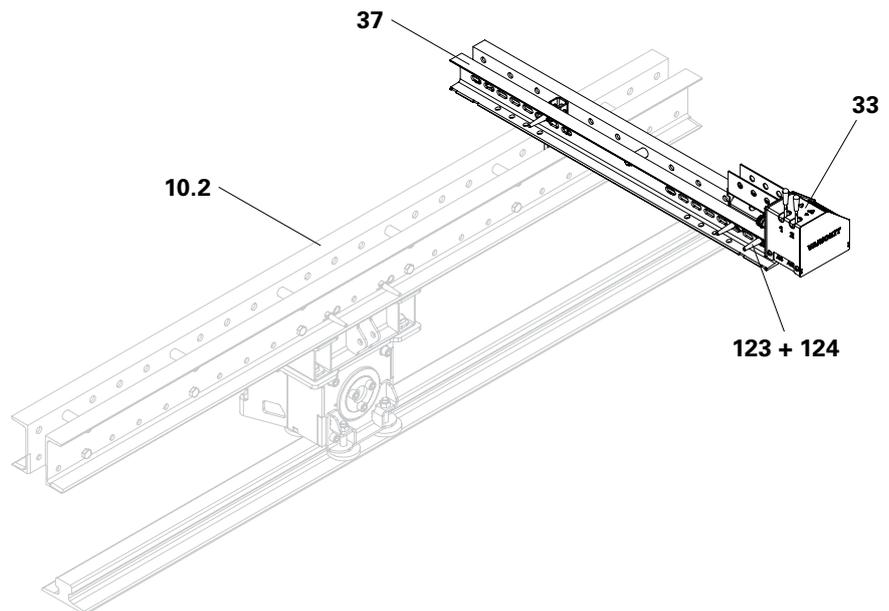


Fig. B3.19

## Mounting the Support Wedge Box VARIOKIT

- The Support Wedge Box acts as a spacer and compensates for height differences between the Base Beam and the Wedge Lowering Device and support frame.
- The Support Wedge Box transfers vertical loads that occur during concreting. The Lifting and Lowering Cylinders are thereby completely relieved.

### Components

- 10.2** Climbing Rail RCS
- 13** Connector RCS LALD VARIOKIT
- 26** Support Wedge Box VARIOKIT
- 108** Bolt M20x55
- 113** Nut M20 self-securing
- 114** Washer M20
- 123** Fitting Pin Ø 21x120
- 124** Cotter Pin 4/1



- With the Crane Rail A75, the Support Wedge Box is mounted horizontally. (Fig. B3.20)
- With the Crane Rail S49, the Support Wedge Box is mounted vertically. (Fig. B3.21)

### Assembly

1. Fix the Support Wedge Box to the Connector RCS LALD (13) with bolts M20x55 (108), washers M20 (114) and self-securing nuts M20 (113).
2. Fix the assembly unit on the assembly position with fitting pins 21x120 (123) and secure with cotter pins 4/1 (124).

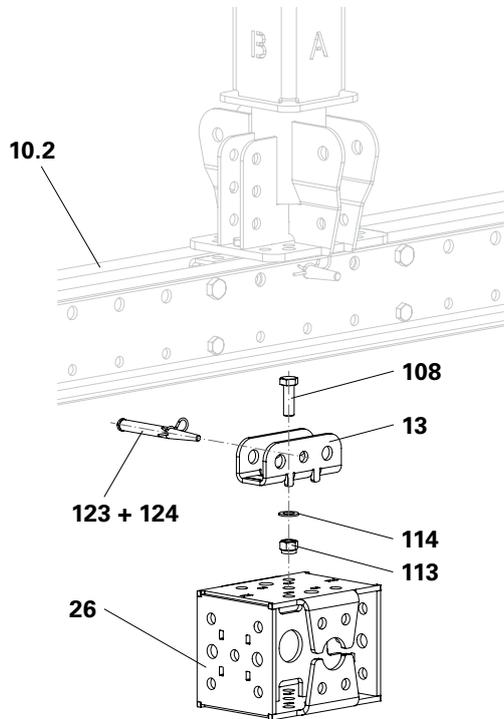


Fig. B3.20

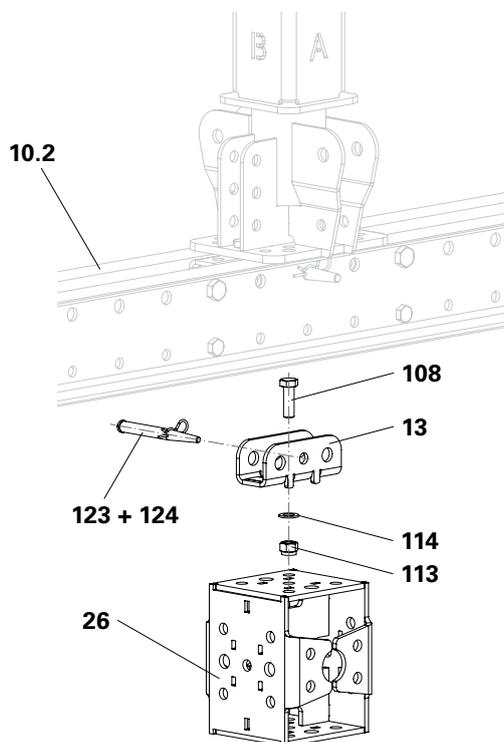


Fig. B3.21

## Mounting the Heavy-Duty Roller 200 kN

With the Heavy-Duty Roller 200kN trolley, the Base Beam including the assemblies can be moved.

Depending on the assembly direction on the Base Beam, this is possible in the longitudinal or transverse direction. The Heavy-Duty Roller Swivel Plate is a connection component for mounting the Heavy-Duty Roller 200kN to the Base Beam.

### Components

- 10.2** Climbing Rail RCS
- 13** Connector RCS LALD VARIOKIT
- 44** Heavy-Duty Roller Swivel Plate
- 46** Heavy-Duty Roller 200 kN Type A-II
- 100** Bolt M12x55
- 101** Nut M12 self-securing
- 102** Washer M12
- 107** Bolt M20x40
- 113** Nut M20 self-securing
- 114** Washer M20
- 123** Fitting Pin Ø 21x120
- 124** Cotter Pin 4/1



The longer side of the Heavy-Duty Roller Swivel Plate is parallel to the direction of travel.

### Assembly

1. Insert bolt M20x40 (107) through the centre hole of the Heavy-Duty Roller Swivel Plate (44). The bolt head must be flush with the Heavy-Duty Roller Swivel Plate.
2. Insert the Connector RCS LALD (13) in the Heavy-Duty Roller Swivel Plate (44) and secure with washers M20 (114) and self-securing nuts M20 (113).
  - ▶ Ensure that the snap tabs of the Connector RCS LALD (13) snap into the recesses of the Heavy-Duty Roller Swivel Plate (44).
3. Insert bolts M12x55 (100) into the holes (44.1) of the Heavy-Duty Roller Swivel Plate (44). The bolt heads must be flush with the Heavy-Duty Roller Swivel Plate.
4. Secure the Heavy-Duty Roller 200kN (46) with washers M12 (102) and self-securing nuts M12 (101).
5. Fix the assembly unit on the assembly position with fitting pins 21x120 (123) and secure with cotter pins 4/1 (124). (Fig. B3.22)

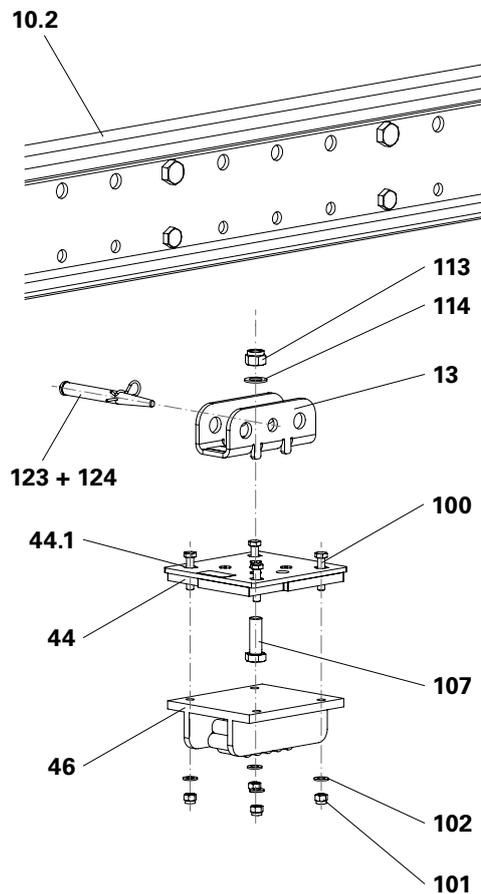


Fig. B3.22

## Installing the Hydraulic Pump

- The standard position for installing the hydraulic pump is on the Base Beam.
- When moving the hydraulic pump, use suitable lifting straps or available crane eyes.
- Use attachment points on the hydraulic pump.

### Components

- 1** Hydraulic Pump VARIOKIT 8-cycles
- 10.3** Main Beam HDT
- 117** Bolt M24x70
- 121** Nut M24 self-securing
- 122** Washer M24

### Assembly

1. Attach the hydraulic pump (1) to the crane lifting gear and fly in.
  2. Position the hydraulic pump over the assembly position and lower onto the Base Beam (10.3).
  3. Fix the hydraulic pump on the Base Beam with bolts M24x70 (117), self-securing nuts M20 (121) and washers M24 (122).
  4. Remove crane lifting gear.
- (Fig. B4.01)

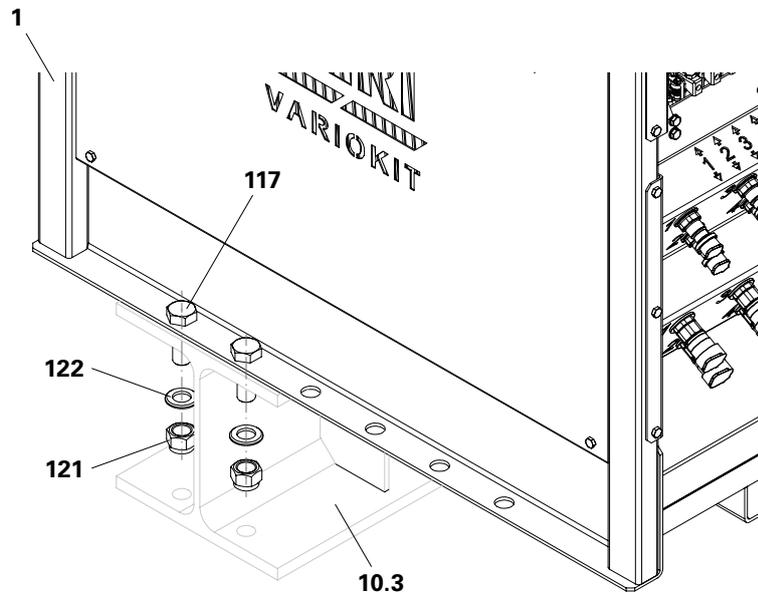


Fig. B4.01



Fix the hydraulic pump to the Base Beam so that the oil tank is centered on the Base Beam.

## Modifying the Lift Frame



- Before assembly takes place, the Lift Frame must be modified on the Base Beam HDT.
- When moving the Lift Frame, use the available crane eyes.

### Components

**25** Lift Frame LALD VARIOKIT

### Modification

1. Remove bolts M24x50 (115a) and move the Girder Connection at the top (25.6) into the top elongated hole.
2. Fix the Girder Connection at the top (25.6) with bolts M24x50 (115a), do not tighten the bolts.  
(Fig. B4.02)

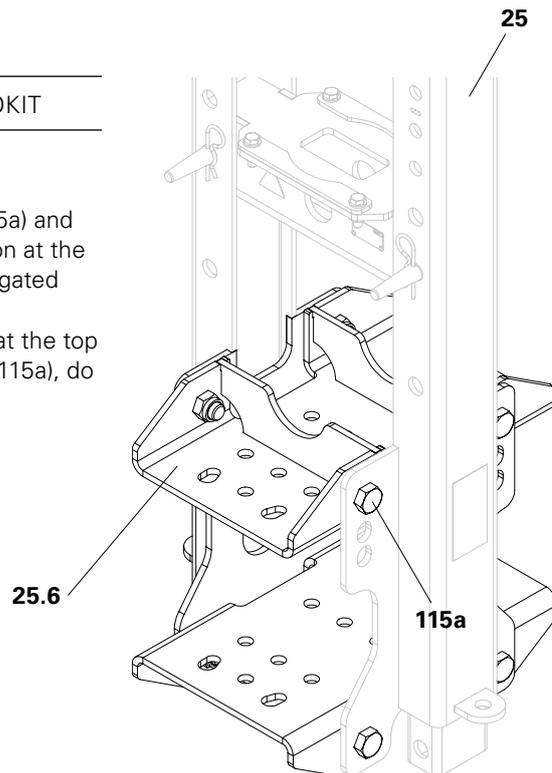


Fig. B4.02

## Installing the Lift Frame



- When moving the Lift Frame, use the available crane eyes.
- Ensure that the fixing board at the top (25.6) is fixed in the top elongated holes. (Fig. B4.03)

### Components

- 10.3** Main Beam HDT
- 25** Lift Frame LALD VARIOKIT
- 117** Bolt M24x70
- 121** Nut M24 self-securing
- 122** Washer M24

### Assembly

1. Loosen bolts M24x50 (115a).
2. Remove bolts M24x50 (115b) and dismantle bottom Girder Connection (25.5).
3. Attach the Lift Frame (25) to the crane lifting gear and fly in.
4. Lower the Lift Frame onto the assembly position on the Base Beam (10.3).
5. Fix the bottom Girder Connection (25.5) in its original position with bolts M24x50 (115b) and nuts M24 (120).
6. Raise the Lift Frame so that it rests tightly against the Base Beam (10.3).
7. Fix the Lift Frame (25) on the Base Beam with bolts M24x70 (117), washers M24 (122) and self-securing nuts M20 (121).
8. Tighten bolts M24x50 (115a) on the Girder Connection above (25.6).
9. Remove crane lifting gear. (Fig. B4.04)

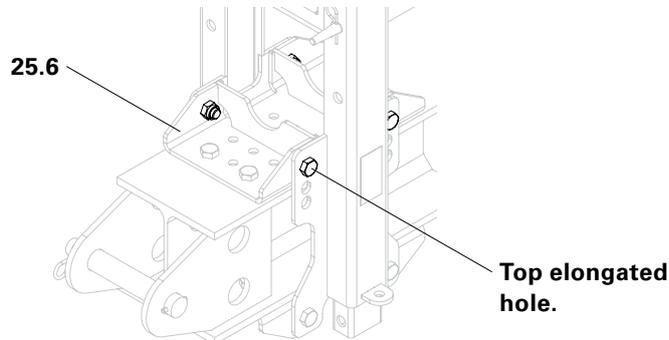


Fig. B4.03

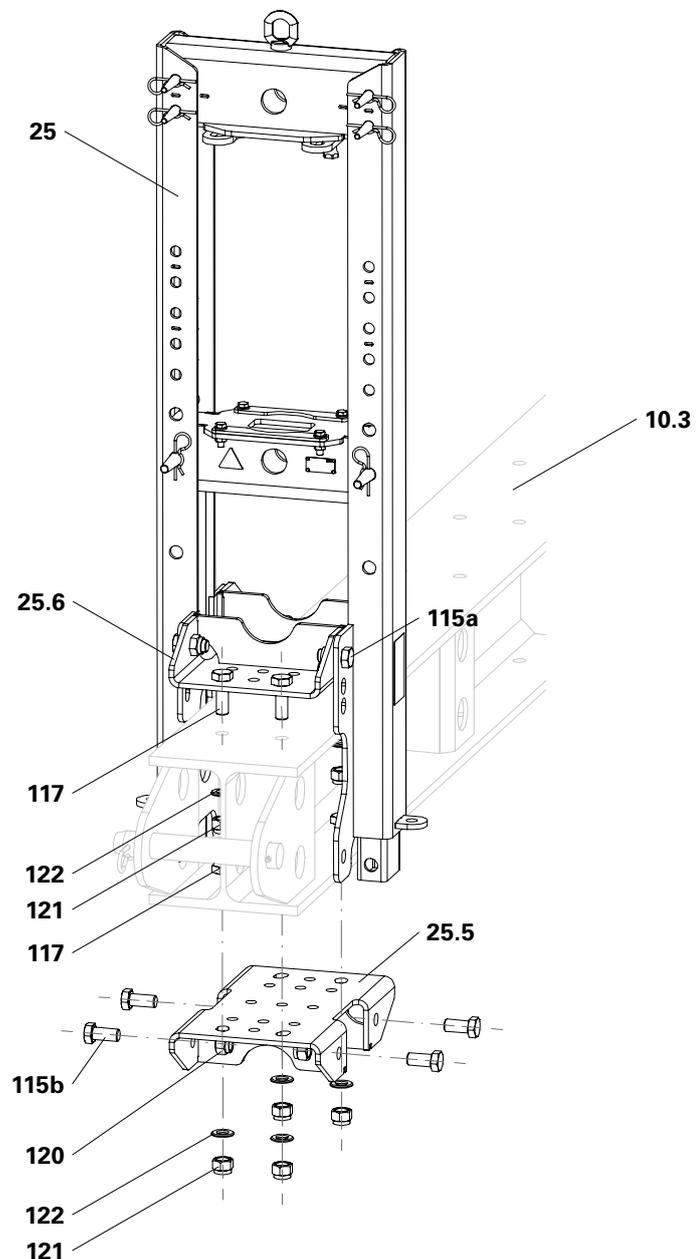


Fig. B4.04

## Mounting the Hinge Slide



### Warning

Heavy moving parts!  
 During assembly, there is a risk of hands being crushed.  
 ⇒ Wear protective gloves.  
 ⇒ Ensure a safe and secure position.

### Components

- |           |                           |
|-----------|---------------------------|
| <b>24</b> | Hinge Slide LALD VARIOKIT |
| <b>25</b> | Lift Frame LALD VARIOKIT  |

### Mounting with Crane Rail A75

1. Position the Hinge Slide (24) under the Lift Frame (25).
2. Pull the cotter pin (126b) and fitting pin 26x120 (125b).
3. Hold the sliding part (25.9) in its position.
4. Pull the cotter pin (126a) and fitting pin 26x120 (125a).
5. Lower the sliding part (25.9) and insert into the retainer of the Hinge Slide.
6. Insert fitting pin 26x120 (125b) and secure with cotter pin (126b).
7. Insert the fitting pin 26x120 (125a) in one hole higher in the parking position and secure with cotter pin (126a).

(Fig. B4.05 + B4.06)

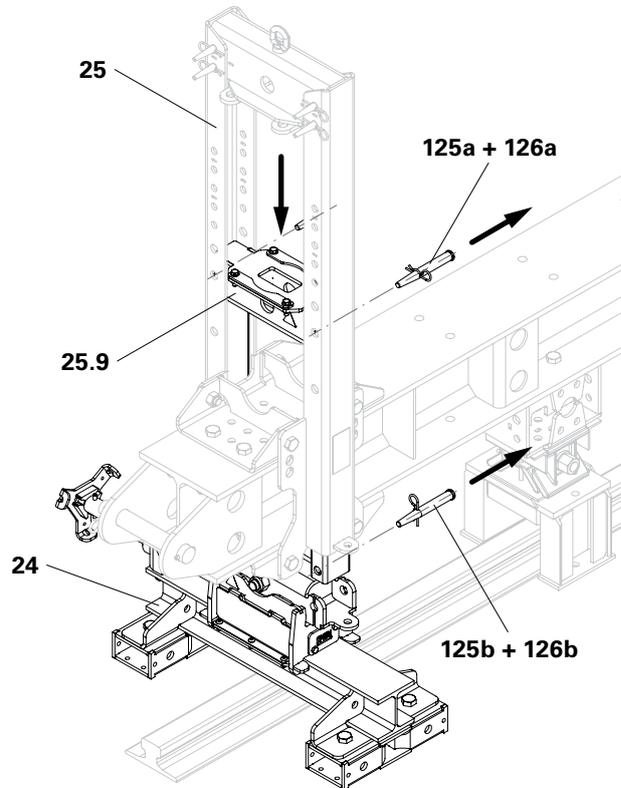


Fig. B4.05

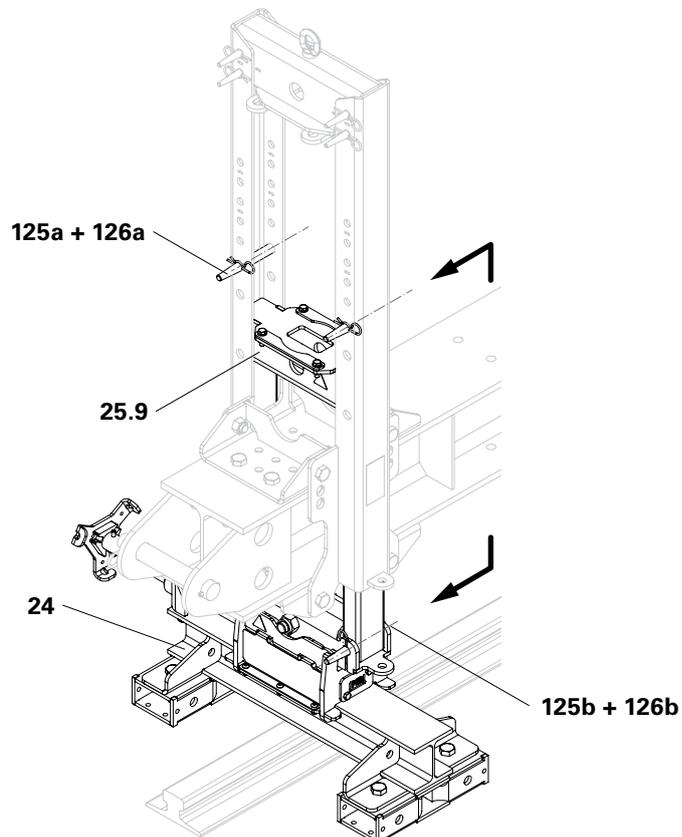


Fig. B4.06

## Mounting with Crane Rail S49

1. Remove bolts M24x50 (24.6).
2. Turn bottom profile (24.5) by 90°.
3. Fix bottom profile with bolts M24x50 (24.6) and nuts M24 (24.7).
4. For the rest of the assembly of the Hinge Slide, see Mounting with Crane Rail A75.

(Fig. B4.07)

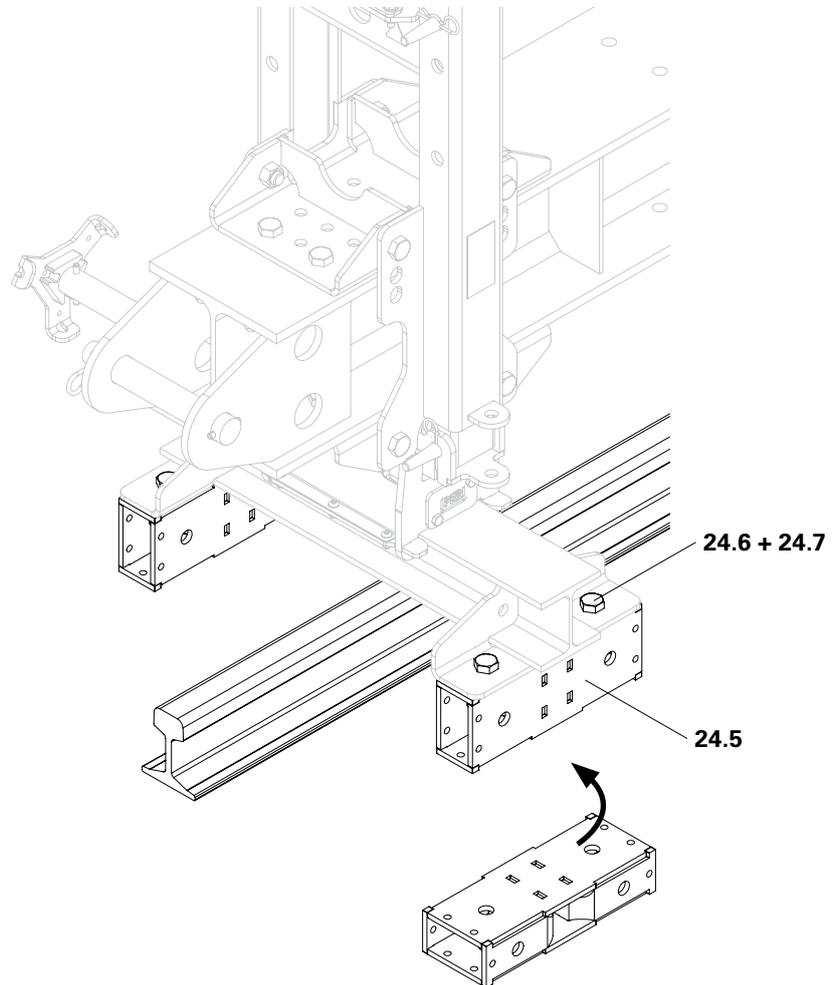


Fig. B4.07

## Mounting the Wheel Block VARIOKIT 300 kN



The Wheel Block VARIOKIT is mounted on both Base Beams of the Tunnel Formwork Carriage in the same installation position. The hydraulic drive protrudes in the direction of travel to the left of the Base Beam.

### Components

- 10.3** Main Beam HDT
- 31** Wheel Block VARIOKIT 300 kN
- 118** Bolt M24x80
- 121** Nut M24 self-securing
- 122** Washer M24

### Mounting without using the Lifting and Lowering Unit

1. Attach the wheel block (31) to the crane lifting gear and fly in.
  2. Position the wheel block on the assembly position.
  3. Fix the wheel block on the Base Beam with bolts M24x80 (118), washers M24 (122) and self-securing nuts M24 (121).
  4. Remove crane lifting gear.
- (Fig. B4.08)

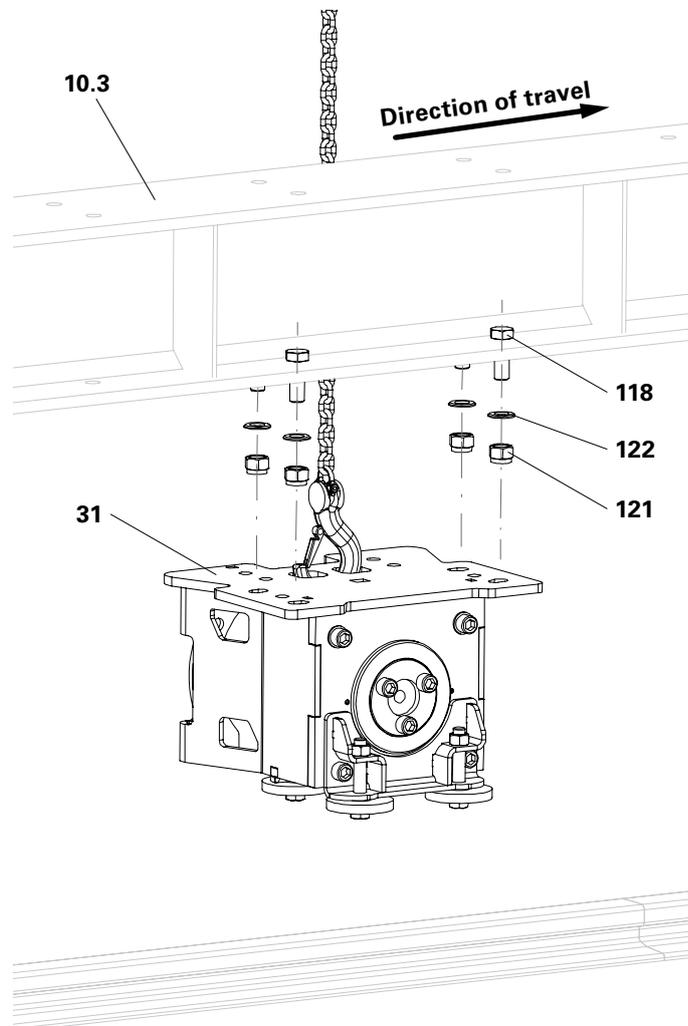


Fig. B4.08

## Components

- 10.3** Main Beam HDT
- 22** Pressure Frame LALD SLR VARIOKIT
- 23** Pressure Frame Assembly Kit
- 31** Wheel Block VARIOKIT 300 kN
- 117** Bolt M24x70
- 121** Nut M24 self-securing
- 122** Washer M24

## Assembly when using the Lifting and Lowering Unit

1. Fix the Pressure Frame (22) to the Base Beam with bolts M24x70 (117), washers M24 (122) and self-securing nuts M24 (121).
2. Attach the wheel block (31) to the crane lifting gear and fly in.
3. Position the wheel block on the assembly position.
4. Fix the wheel block to the Pressure Frame with bolts M24x70 (117), Pressure Frame Assembly Kit (23), washers M24 (122) and self-securing nuts M24 (121).
5. Remove crane lifting gear.  
(Fig. B4.09)



The hydraulic drive turns in a clockwise direction when looking at the wheel hub.

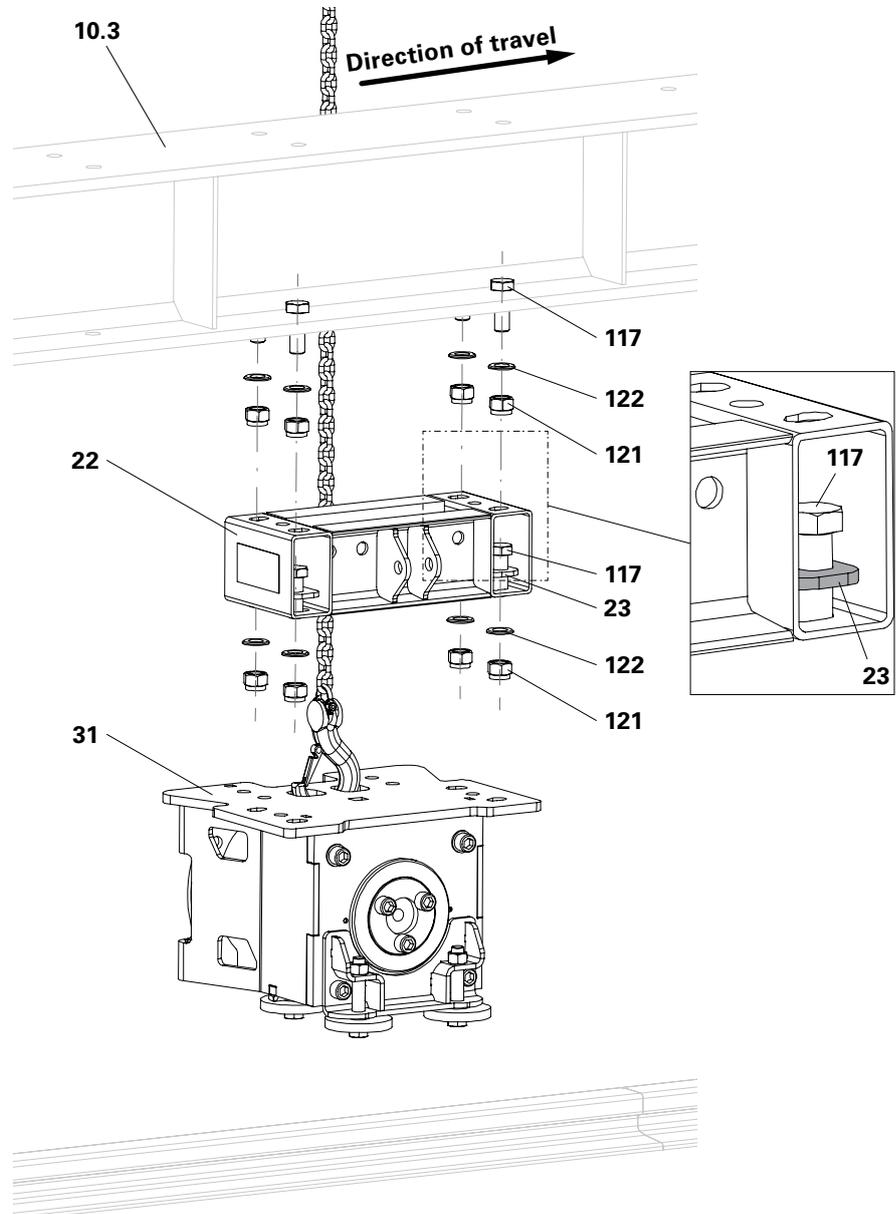


Fig. B4.09

## Mounting the Hydraulic Drive VARIOKIT

### Components

- 31** Wheel Block VARIOKIT 300 kN
- 32** Hydraulic Drive VARIOKIT

### Assembly

1. Remove the coupling bolts M20x200 (31.3) and place to one side. The nuts will no longer be required.
2. Remove bolts M20x70 (32.5), nuts M20 (32.6) and washers M20 (32.7).
3. Attach the hydraulic drive (32) to the crane lifting gear and fly in.
4. Position the hydraulic drive in front of the wheel block (31) and then carefully push into the wheel block.
5. Fix the hydraulic drive to the wheel block with bolts M20x70 (32.5), washers M20 (32.7) and nuts M20 (32.6). (Fig. B4.10a + B4.10b)
6. Remove crane lifting gear.
7. Attach one coupling bolt M20x200 (31.3) in the wheel (31.1).
8. Turn the wheel until the coupling bolt engages the hydraulic drive.
9. Attach all coupling bolts and screw in as far as possible to the limit stop.

(Fig. B4.10b)

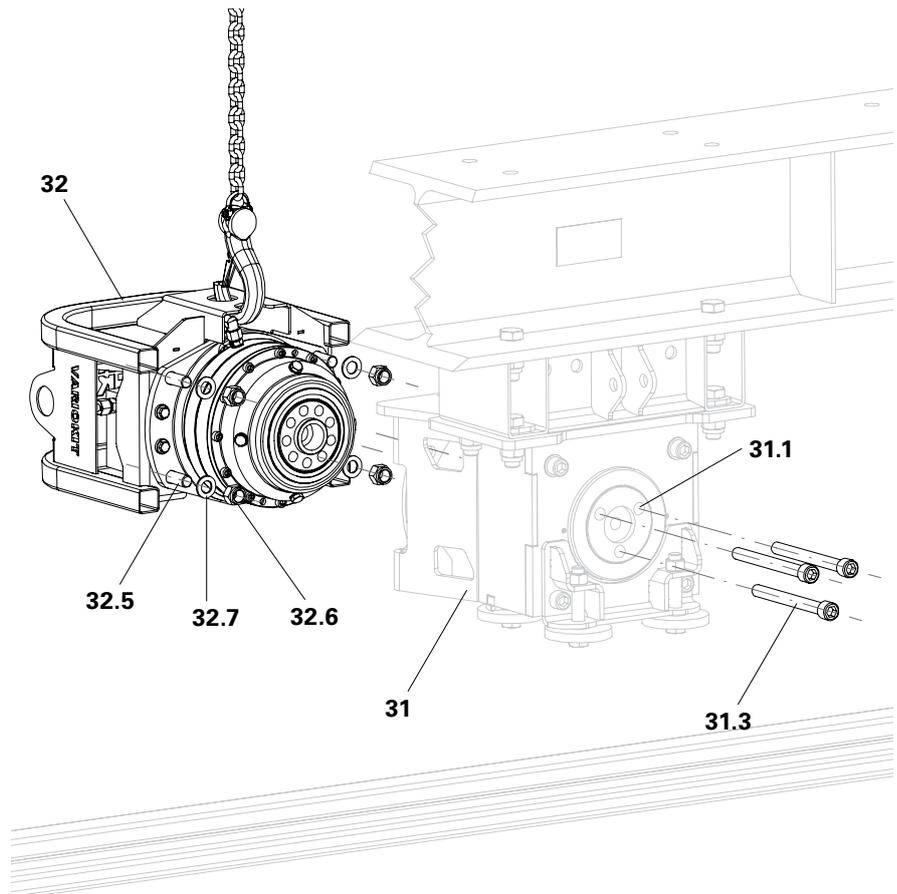


Fig. B4.10a



The coupling bolts leave a small gap after they are fully tightened. This gap is important so that the bearings in the wheel block are not damaged. Never close this gap with higher tightening torque or shorter bolts!

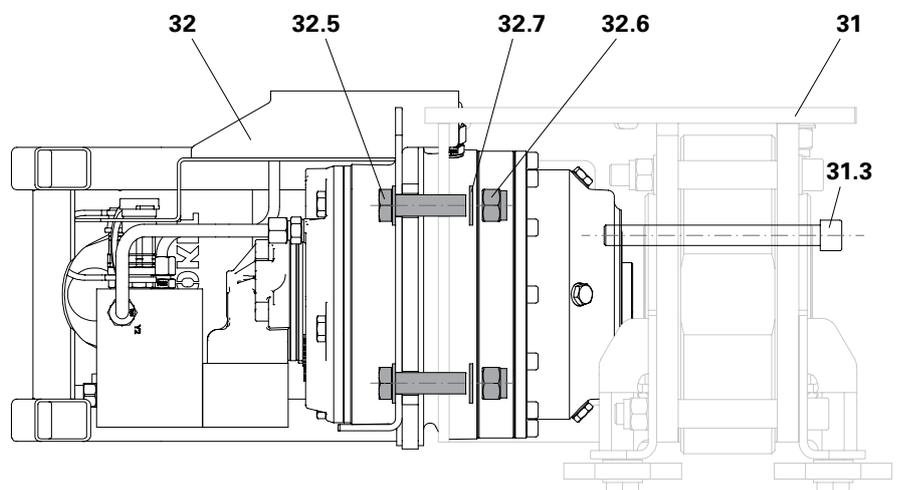


Fig. B4.10b

## Mounting the Heavy-Duty Wheel VARIOKIT

The Heavy-Duty Wheel is only used to move the Tunnel Formwork Carriage. The Heavy-Duty Wheel runs on crane rails; alternatively, in a U-rail.

### Components

- 10.3** Main Beam HDT
- 20** Heavy-Duty Wheel VARIOKIT
- 118** Bolt M24x80
- 121** Nut M24 self-securing  
Washer M24

### Mounting without using the Lifting and Lowering Unit

1. Position the Heavy-Duty Wheel (20) on the assembly position.
2. Fix the Heavy-Duty Wheel on the Base Beam with bolts M24x80 (118), washers M24 (122) and self-securing nuts M24 (121).

(Fig. B4.11)



For easier and safer assembly, insert two Tie Rods DW15 through the Heavy-Duty Wheel and secure with Cam Nuts DW15.

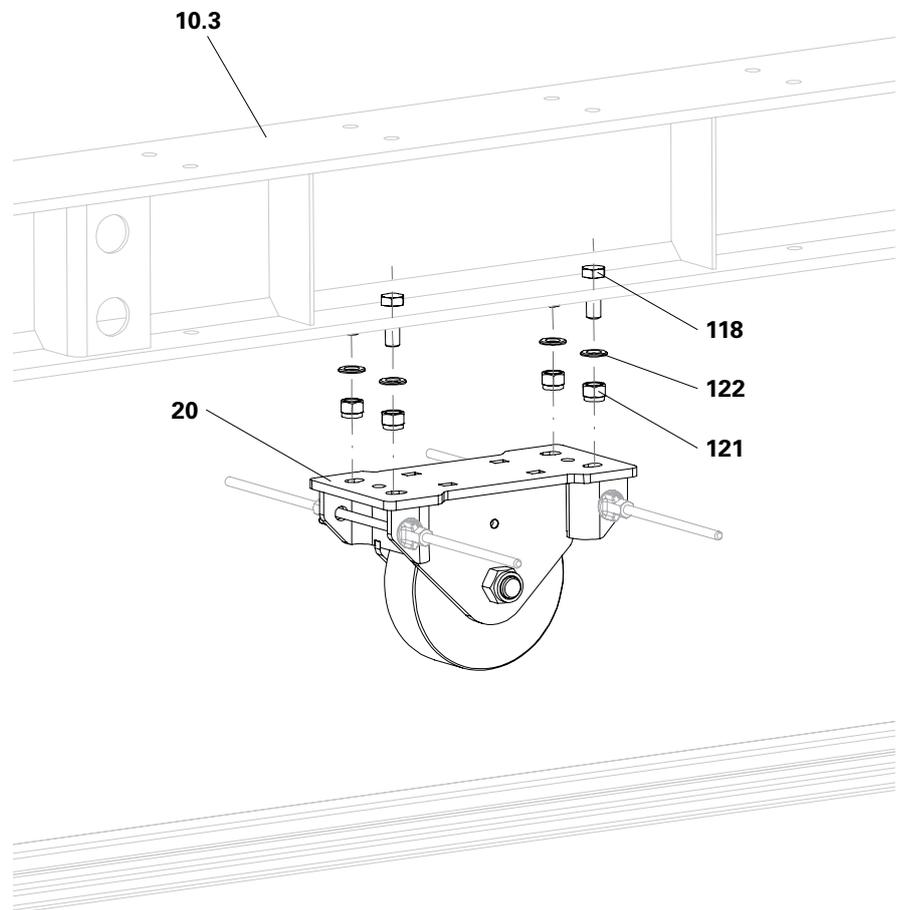


Fig. B4.11

## Components

- 10.3** Longitudinal Beam VARIOKIT
- 20** Heavy-Duty Wheel VARIOKIT
- 22** Pressure Frame LALD SLR VARIOKIT
- 23** Pressure Frame Assembly Kit
- 117** Bolt M24x70
- 121** Nut M24 self-securing
- 122** Washer M24

## Assembly when using the Lifting and Lowering Unit

1. Fix the Pressure Frame (22) to the Base Beam (10.3) at the designated assembly position with bolts M24x70 (117), washers M24 (122) and self-securing nuts M24 (121).
2. Position the Heavy-Duty Wheel (20) on the assembly position.
3. Fix the Heavy-Duty Wheel to the Pressure Frame with bolts M24x70 (117), Pressure Frame Assembly Kit (23), washers M24 (122) and self-securing nuts M24 (121).

(Fig. B4.12)



For easier and safer assembly, insert two Tie Rods DW15 through the Heavy-Duty Wheel and secure with Cam Nuts DW15.

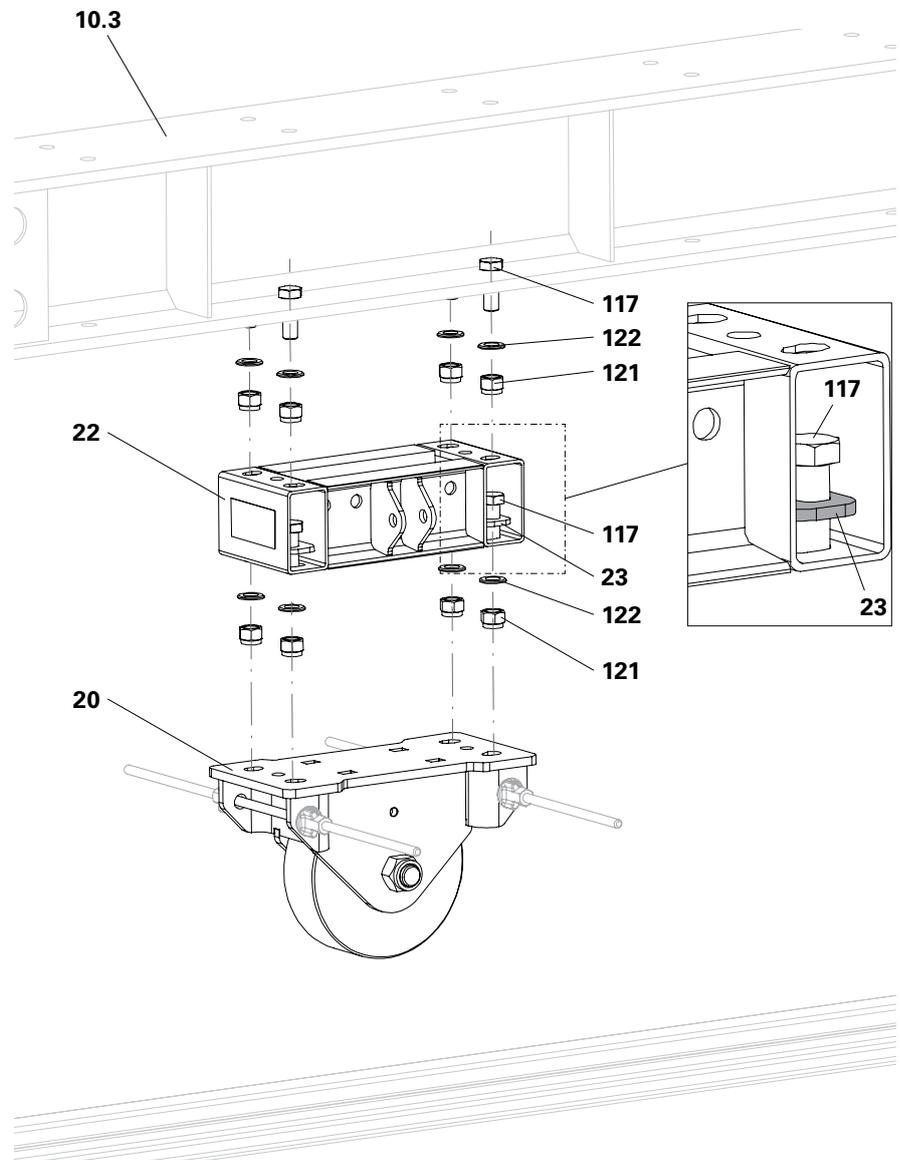


Fig. B4.12

## Mounting the Flange Cage SLR VARIOKIT

When using the A75 or S49 Crane Rails, the Flange Cage must be installed. The Flange Cage serves to provide lateral guidance for the Heavy-Duty Wheels on the Rails. The Flange Cage is used in pairs.



When using U-profiles as Rails, the Flange Cage must not be mounted.

### Components

- 20** Heavy-Duty Wheel VARIOKIT
- 21** Flange Cage SLR VARIOKIT
- 103** Bolt M16x25
- 104** Bolt M16x150
- 105** Nut M16 self-securing
- 106** Washer M16

### Assembly

1. Slide the Flange Cage (21) over the wheel bolt (20.1) and push it upwards.
  2. Fix the Flange Cage (21) to the Heavy-Duty Wheel (20) on both sides using bolts M16x25 (103) and washers M16 (106).
  3. Connect the two Flange Cages to each other with bolts M16x150 (104) and self-securing nuts M16 (105).
- (Fig. B4.13)

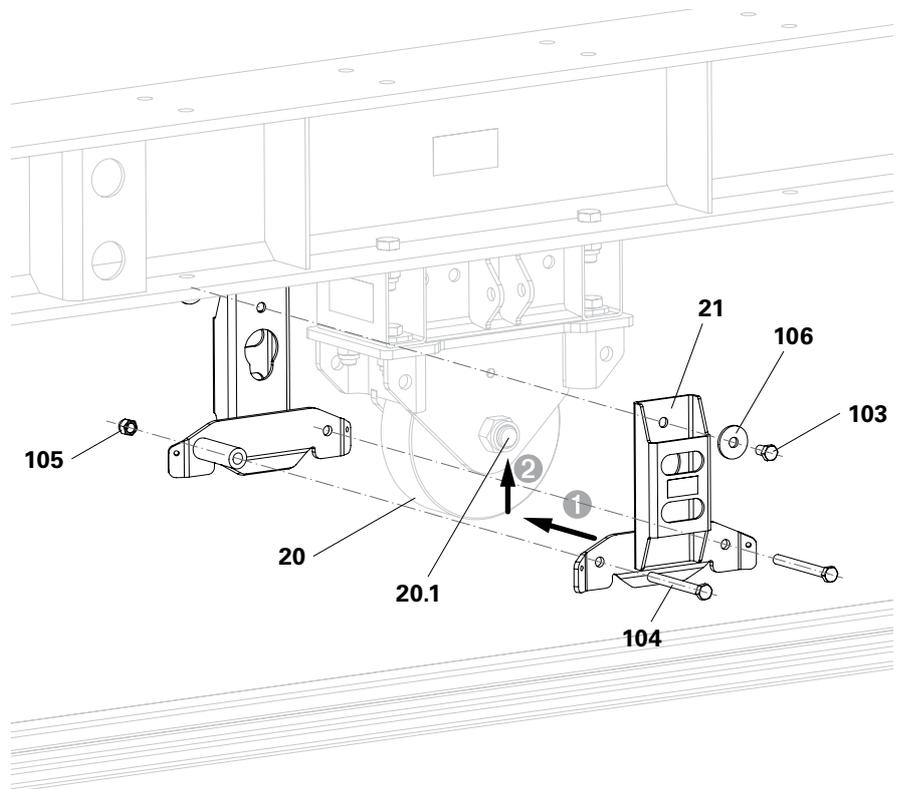


Fig. B4.13

## Mounting the Valve Block Hydraulic Drive

### Components

<b>33</b> Valve Block Hydraulic Drive	
<b>37</b> Steel Waler SRU 147	1x
<b>123</b> Fitting Pin Ø 21x120	2x
<b>124</b> Cotter Pin 4/1	2x
<b>130</b> Wingnut Pivot Plate	2x
<b>131</b> Tie Rod DW 15	2x
<b>132</b> Hex. Nut DW 15	4x

### Assembly

1. Mount one Hex. Nut DW15 (132a) on both Tie Rods (131).
2. Insert the Tie Rods through the drilled holes in the Base Beam (10.3) and tighten with Hex. Nut DW15 (132b).
3. Position the Steel Waler SRU 147 (37) on the Base Beam and secure it with Wingnut Pivot Plates (130).

(Fig. B4.14)

4. Fix the Valve Block Hydraulic Drive (33) at the end of the Steel Waler SRU 147 (37) using two fitting pins 21x120 (123) and secure with cotter pins 4/1 (124).

(Fig. B4.15)

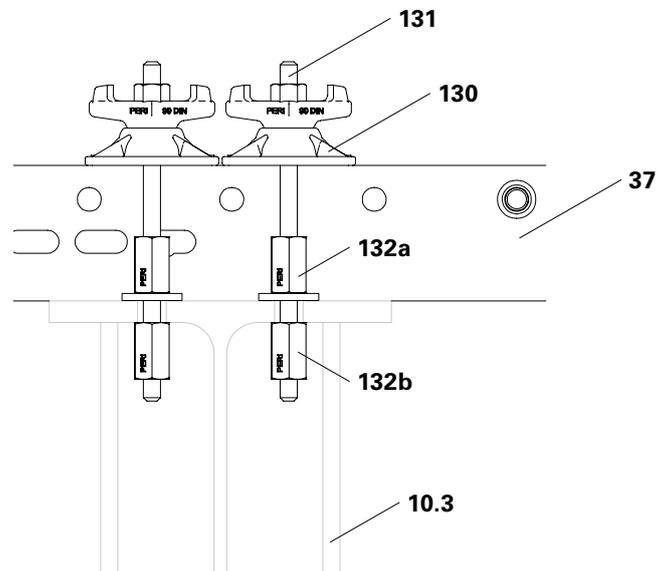


Fig. B4.14

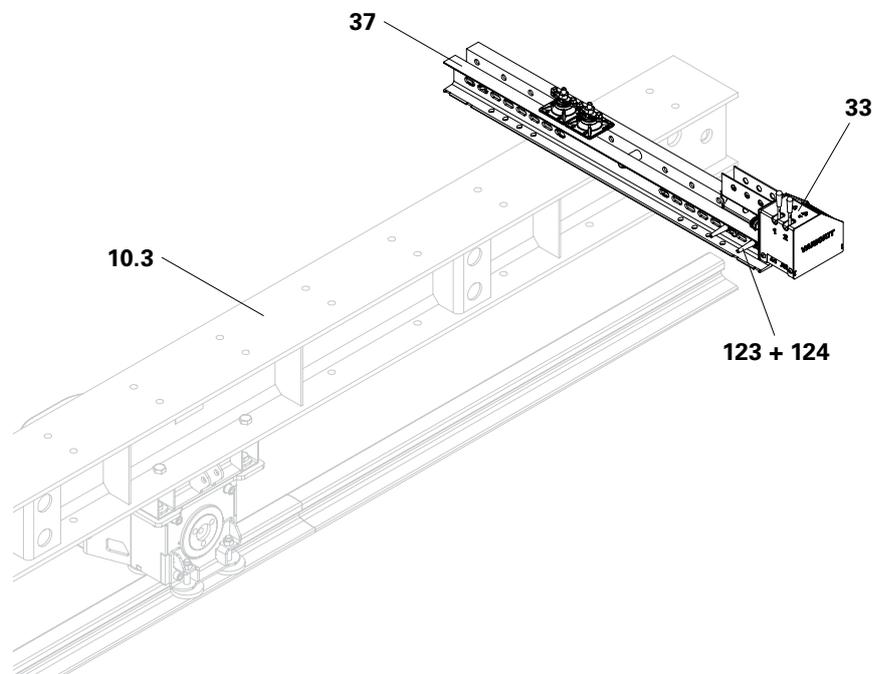


Fig. B4.15

## Mounting the Support Wedge Box VARIOKIT

- The Support Wedge Box acts as a spacer and compensates for height differences between the Base Beam and the Wedge Lowering Device and Brace Support
- The Support Wedge Box transfers vertical loads that occur during concreting. The Lifting and Lowering Cylinders are thereby completely relieved.

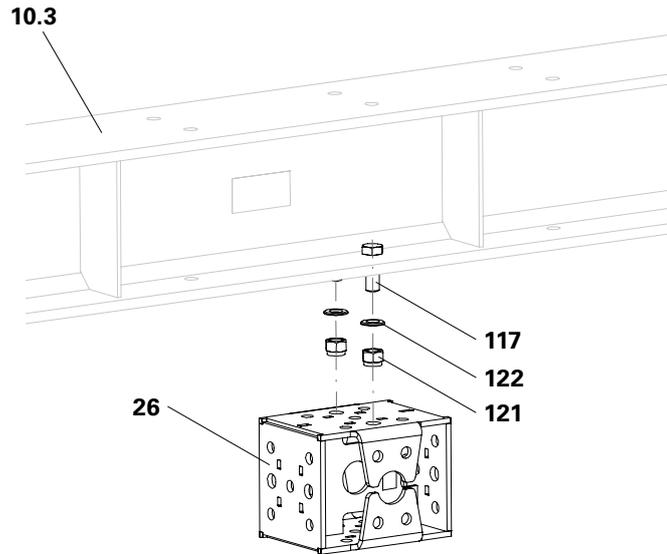
### Components

<b>10.3</b>	Main Beam HDT
<b>26</b>	Support Wedge Box VARIOKIT
<b>117</b>	Bolt M24x70
<b>121</b>	Nut M24 self-securing
<b>122</b>	Washer M24



- With the Crane Rail A75, the Support Wedge Box is mounted horizontally. (Fig. B4.16)
- With the Crane Rail S49, the Support Wedge Box is mounted vertically. (Fig. B4.17)

Fig. B4.16



### Assembly

1. Position the Support Wedge Box (26) on the assembly position.
2. Fix the Support Wedge Box on the Base Beam with bolts M24x70 (117), washers M24 (122) and self-securing nuts M20 (121).

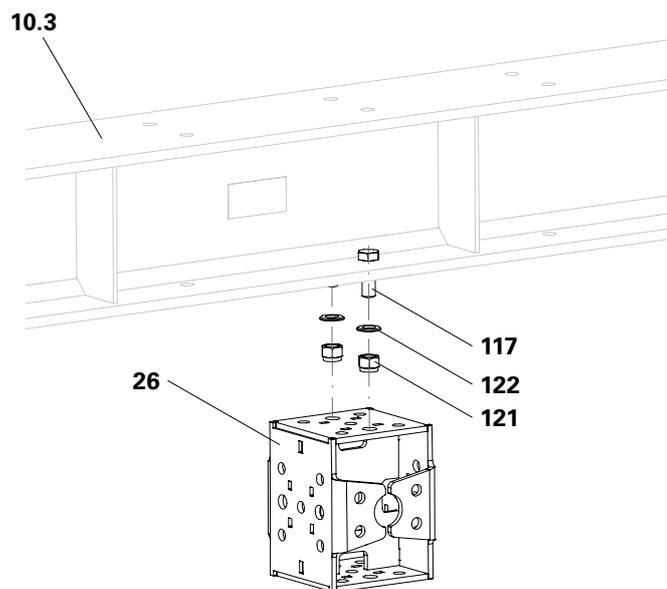


Fig. B4.17

## Installing the Lifting and Lowering Unit

### Assembly

1. Attach the Main Beam (25.1) to the attachment point on the crane.
2. Pull the cotter pin 4/1 (124) and fitting pin 21x120 (123).
3. Fly out the Main Beam and place next to the Lifting and Lowering Cylinder (2).
4. Pull the hinged pin 10x65 (129a) and bolt 50x175 (128a).
5. Loosen the threaded bolts (25.8), pull out the Slide Plate (25.7) and secure with threaded bolts (25.8). (Fig. B5.01)
  - The recess in the Main Beam is now visible.
6. Push the piston side into the Main Beam.
7. Insert bolt (128a) and secure with the hinged pin (129a).
8. Position Main Beam together with the Lifting and Lowering Cylinder above the Lift Frame.
9. Pull the hinged pin 10x65 (129b) and bolt 50x175 (128b).
10. Lower Main Beam together with the Lifting and Lowering Cylinder, insert into the Lift Frame and bottom Main Beam.
11. Insert bolt (128b) and secure with hinged pin (129b).
12. Insert fitting pin 21x120 (123) and secure with cotter pin 4/1 (124). (Fig. B5.02)

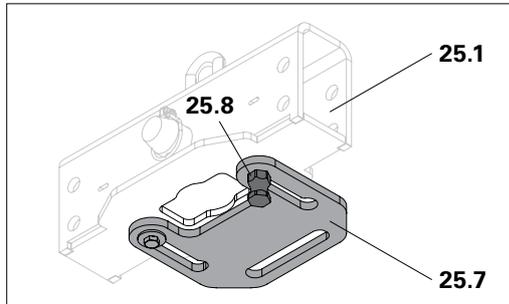


Fig. B5.01

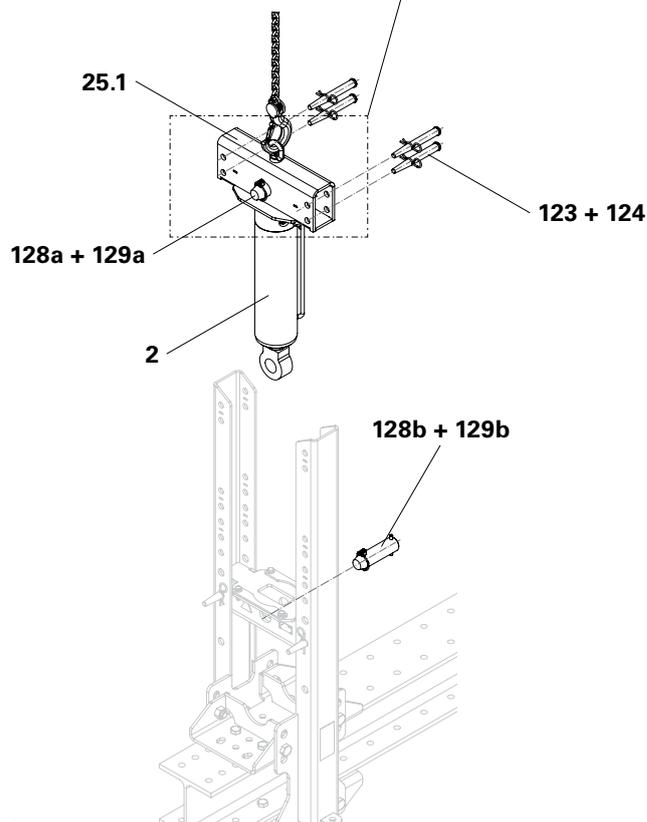


Fig. B5.02



Pay attention to the installation position of the Lifting and Lowering Cylinder. Through the shown installation position, the Slide Plate also provides protection for the hydraulic connections.

## Installing the Hydraulic Jack 250 kN

### Preparation

1. Extend the piston (27.3)  
approx. 5 mm.
2. Screw out the spindle (27.4)  
approx. 40 mm.  
(Fig. B5.03)

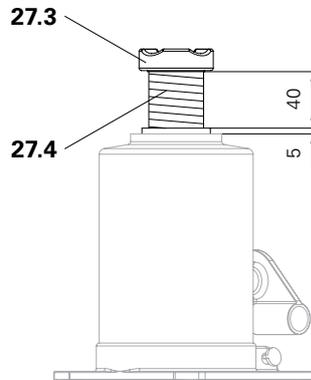


Fig. B5.03

### Assembly

1. Release clamping screws M12x40 (25.13).
2. Position the Hydraulic Jack (27) on the Cross Beam and turn until the Hydraulic Jack fits between the Clamping Plates (25.12).
3. Raise the Clamping Plates and turn the Hydraulic Jack by 90°.
4. Tighten the clamping screws.
5. Fix the Main Beam (25.1) in its position.
6. Pull the cotter pin 4/1 (124) and fitting pin 21x120 (123).  
(Fig. B5.04)

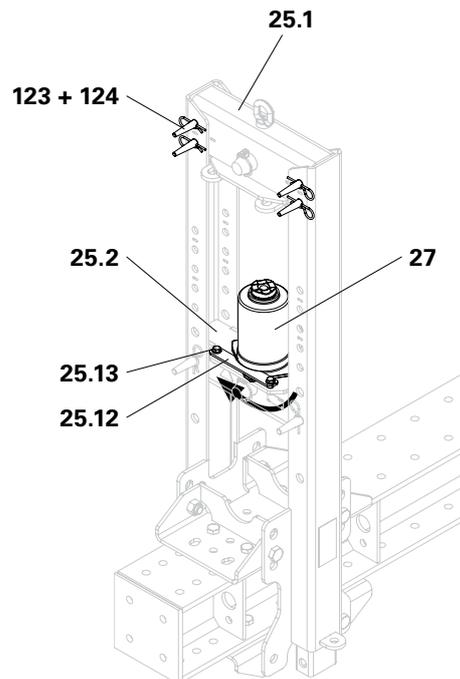


Fig. B5.04

# B5 Installation of the Hydraulic Components

7. Lower the Main Beam from Position 1 to Position 2; the markings on the Gallows and Main Beam are positioned opposite each other.
8. Insert fitting pin 21x120 (123) and secure with cotter pin 4/1 (124). (Fig. B5.06)
9. Insert the Slide Plate (25.7) and secure with the threaded bolt (25.8). (Fig. B5.05)



Only when the Slide Plate (25.7) is pushed in can the Hydraulic Jack transfer the lifting force to the Main Beam (25.1).

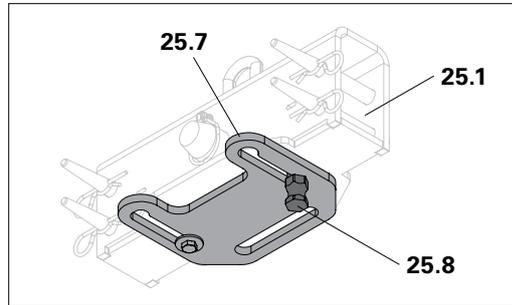


Fig. B5.05

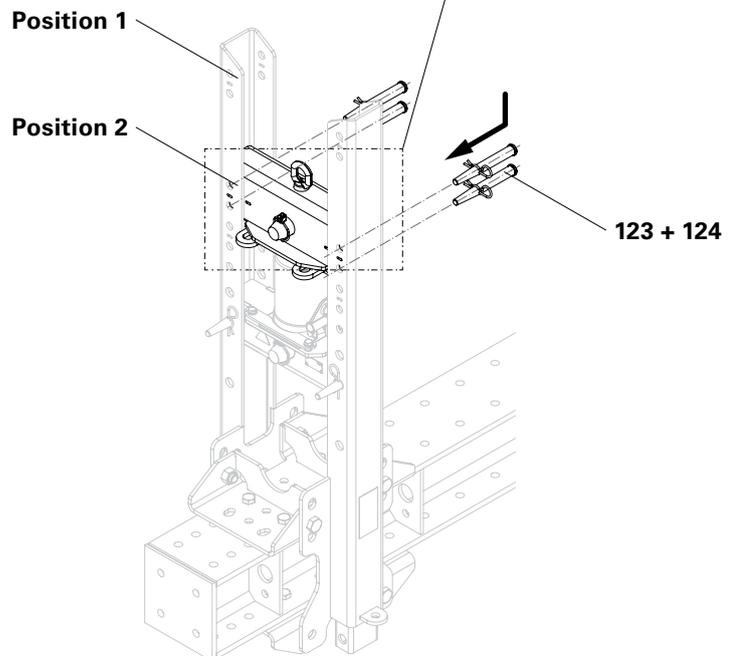


Fig. B5.06

## Installing the Hydraulic Cylinder

### Prerequisites

- The formwork construction is mounted.
- The working platforms are mounted.

### Components

- 3** Hydraulic Cylinder
- 126** Cotter Pin 5/1
- 127** Bolt 40x160

### Assembly

1. Position the hydraulic cylinder (3) with the piston side on the assembly position.
  2. Push piston side (3.4) into connection bracket (36).
  3. Insert bolts 40x160 (127a) and secure with cotter pins 5/1 (126a).
  4. Swivel the hydraulic cylinder in the distribution waler (35) and align.
  5. Insert bolts 40x160 (127b) and secure with cotter pins 5/1 (126b).
- (Fig. B5.07)

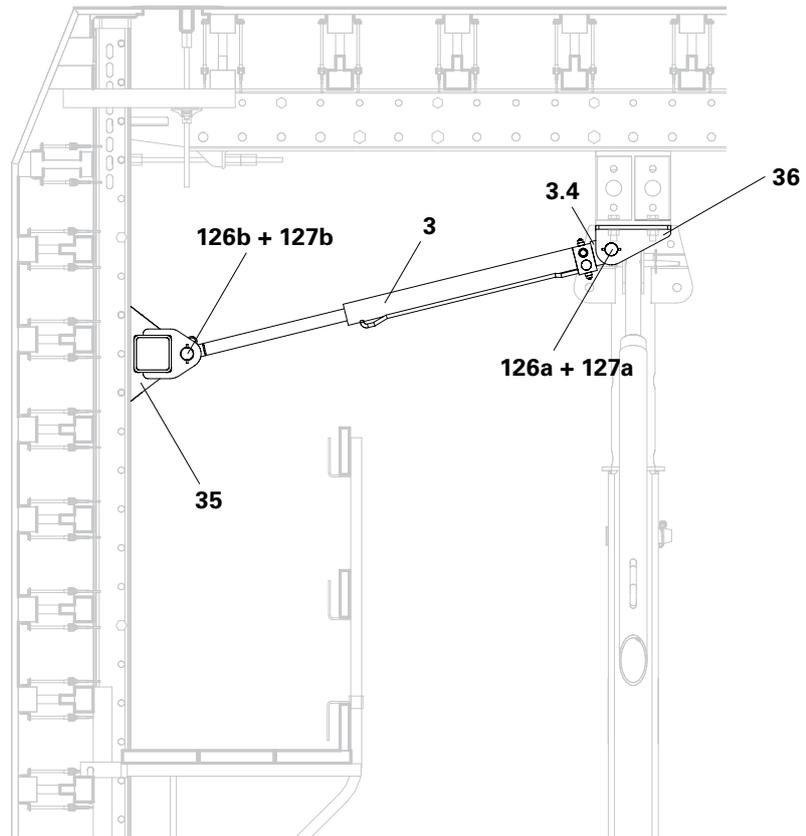


Fig. B5.07



# B6 Connection and Modification of the Hydraulic Pump

## Hydraulic Pump RCS 4 x 190 bar for the Hydraulic Drive

If only the hydraulic drive is installed, it can be operated with the hydraulic pump RCS 4 x 190 bar. The hydraulic drive is controlled using the hand levers on the hydraulic pump.



### Caution

Risk of tripping across the entire working area due to the hydraulic hoses!

⇒ Guide the hydraulic hoses along the support structure and secure with cable ties.

### Components

- 4 Hydraulic Pump RCS 4 x 190 bar
- 32 Hydraulic Drive VARIOKIT
- 50 Hydraulic Hose DN08
- 51 Hydraulic Hose DN12
- 57 Hydraulic Accumulate Piece RCS
- 58 Conversion Set Hydr. Pump RCS-VTC
- 59 Hydraulic T-Piece DN08



The length of the hydraulic hoses is

- as short as possible.
- as long as required.

If the hydraulic hoses are too long, this creates unnecessary pressure losses.

### Modifying the Hydraulic Pump RCS 4 x 190 bar

! Depressurise the hydraulic system.

1. Release the return flow line (4.1) from the return flow filter connection (4.2).
2. Attach the Conversion Set Hydr. Pump RCS-VTC (58) to the return flow filter connection (4.2).
3. Connect the return flow line (4.1) to the Conversion Set Hydr. Pump RCS-VTC (58).
4. Connect the Hydraulic T-Piece DN08 to the Conversion Set Hydr. Pump RCS-VTC (58) and guide the two hose ends to the rear out of the hydraulic pump.

(Fig. B6.01)

### Connecting the hydraulic drive

! Depressurise the hydraulic system.

1. Clean the hydraulic quick-couplers.
2. Connect the hydraulic drive in accordance with Fig. B6.02.

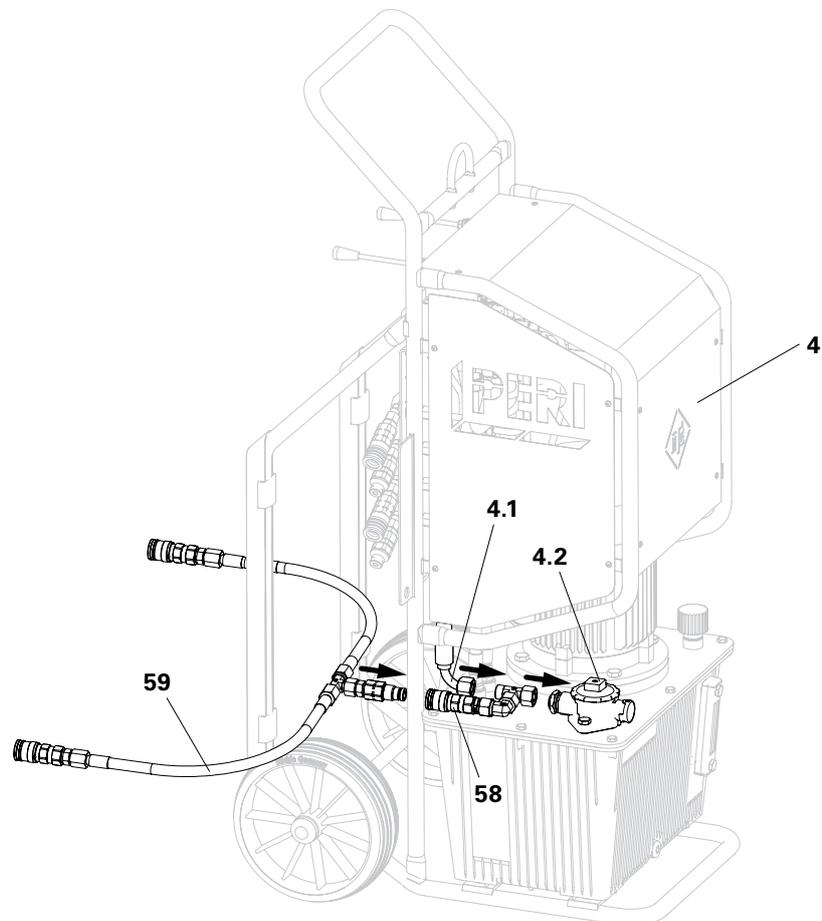
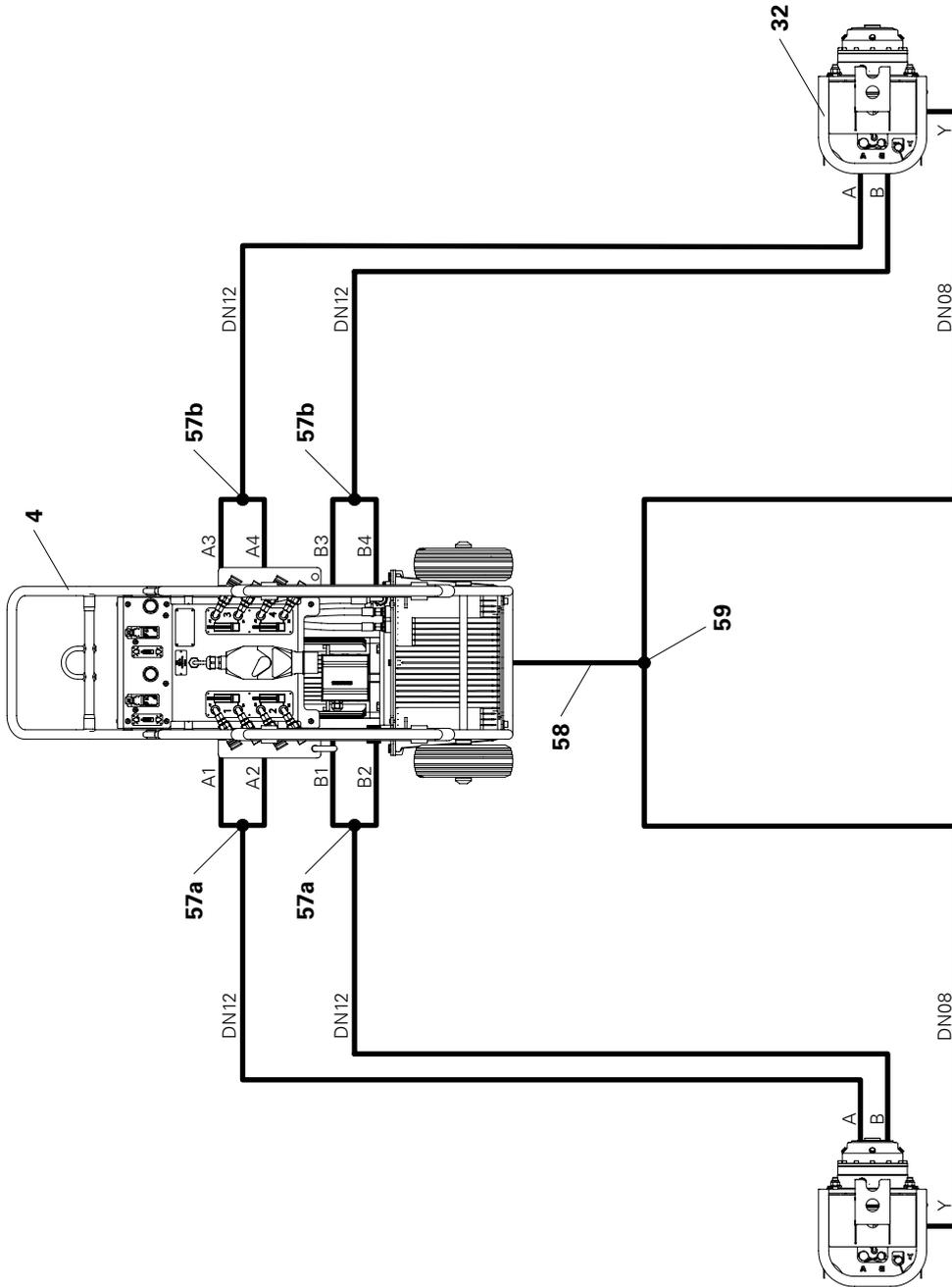


Fig. B6.01

# B6 Connection and Modification of the Hydraulic Pump



Single Hose (50/51)

Fig. B6.02

# B6 Connection and Modification of the Hydraulic Pump

## Hydraulic Pump VARIOKIT 8-cycles with Hydraulic Drive

If the hydraulic drive is installed in addition to the Lifting and Lowering Cylinders and the Hydraulic Cylinders, the hydraulic pump must be modified for this particular use.



### Caution

Risk of tripping across the entire working area due to the hydraulic hoses!

⇒ Guide the hydraulic hoses along the support structure and secure with cable ties.

### Components

- 1 Hydraulic Pump VARIOKIT 8-cycles
- 2 Lifting and Lowering Cylinder
- 3 Hydraulic Cylinder
- 32 Hydraulic Drive VARIOKIT
- 33 Valve Block Hydraulic Drive
- 50 Hydraulic Hose DN08
- 51 Hydraulic Hose DN12
- 52 Hydraulic Twin Hose RCS
- 59 Hydraulic T-Piece DN08



The length of the hydraulic hoses is

- as short as possible.
- as long as required.

If the hydraulic hoses are too long, this creates unnecessary pressure losses.

### Connecting the hydraulic drive

! Depressurise the hydraulic system.

1. Open the hydraulic pump (1). (Fig. B6.03)
2. Disconnect the bypass connection (1.12) on the hydraulic quick-coupler.
3. Guide the two hose ends forwards out of the hydraulic pump.
4. Remove the protective cover from the Leakage Oil Connection (1.17).
5. Clean the hydraulic quick-couplers.
6. Connect the hydraulic T-Piece DN08 (59) to the leakage oil connection and guide the two hose ends forwards out of the hydraulic pump.
7. Connect the hydraulic drive in accordance with Fig. B6.04.



For line lengths  $\leq 5$  m between the bypass connection (1.12) and the valve block of the hydraulic drive (33), hydraulic hoses with DN08 can be used.

### Connecting the hydraulic cylinder

! Depressurise the hydraulic system.

1. Clean the hydraulic quick-couplers.
2. Connect the hydraulic cylinders (2 + 3) in accordance with Fig. B6.04 to the hydraulic pump (1).

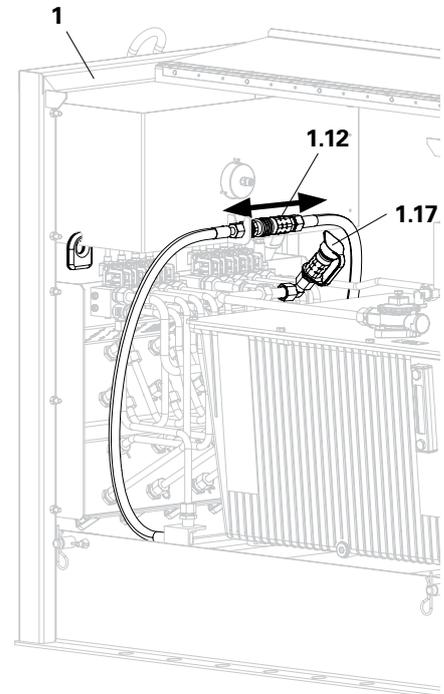


Fig. B6.03

# B6 Connection and Modification of the Hydraulic Pump

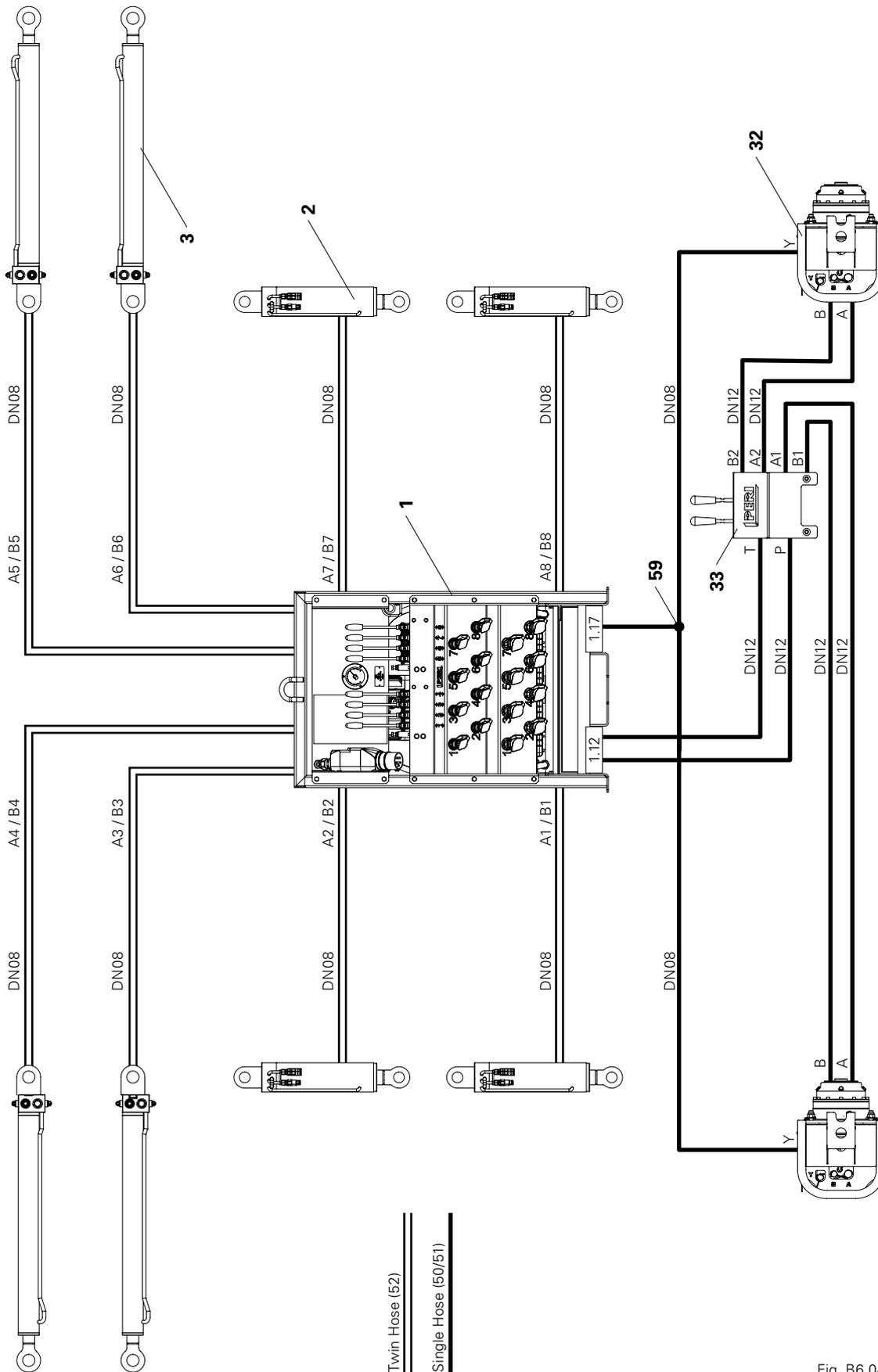


Fig. B6.04

# B6 Connection and Modification of the Hydraulic Pump

## Hydraulic Pump VARIOKIT 8-cycles without Hydraulic Drive



### Caution

Risk of tripping across the entire working area due to the hydraulic hoses!  
 ⇒ Guide the hydraulic hoses along the support structure and secure with cable ties.

### Components

- 1 Hydraulic Pump VARIOKIT 8-cycles
- 2 Lifting and Lowering Cylinder
- 3 Hydraulic Cylinder
- 52 Hydraulic Twin Hose RCS

### Connecting the Hydraulic Cylinder

- ! Depressurise the hydraulic system.
- 1. Clean the hydraulic Quick-Couplers.
- 2. Connect the hydraulic cylinder (2 + 3) in accordance with Fig. B6.05 to the hydraulic pump (1).



The length of the hydraulic hoses is

- as short as possible.
- as long as required.

If the hydraulic hoses are too long, this creates unnecessary pressure losses.

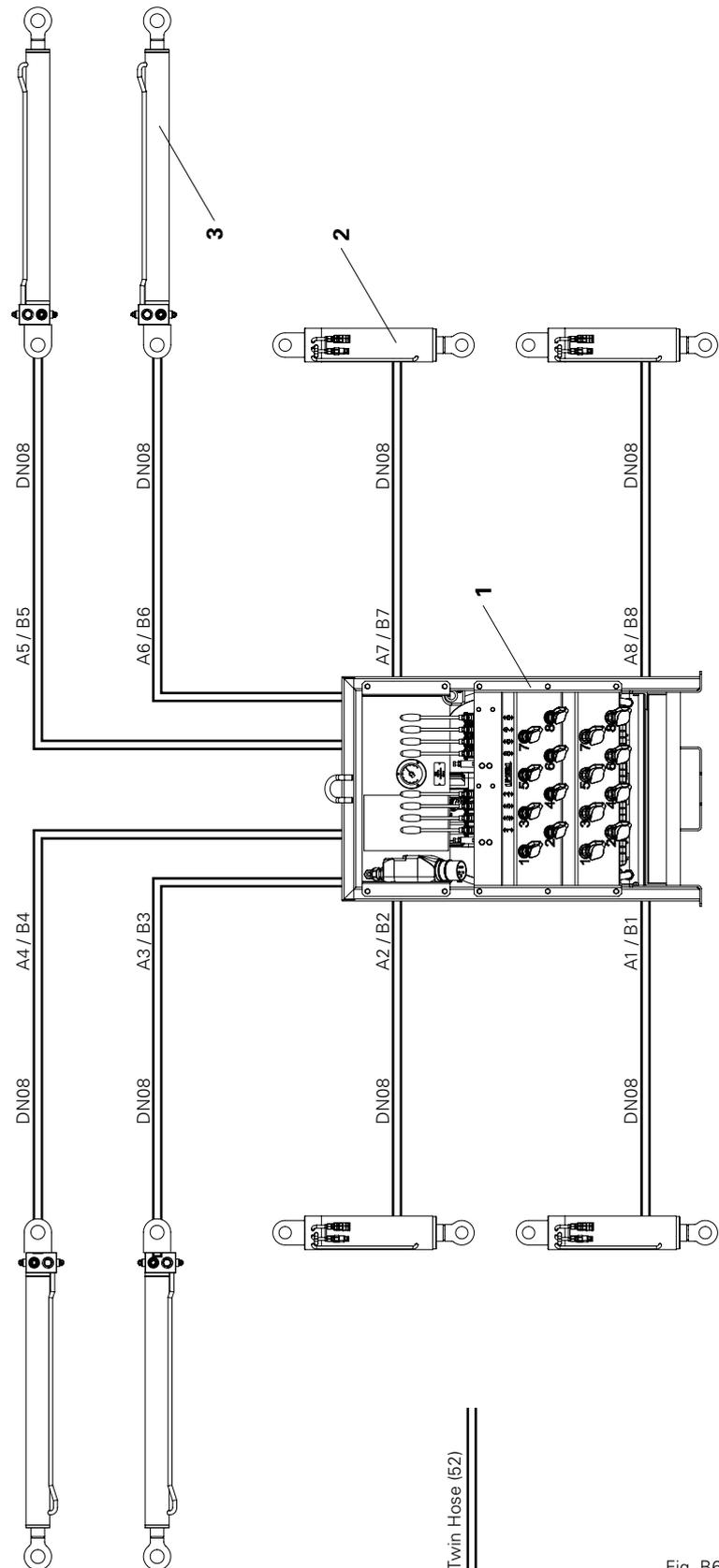


Fig. B6.05

# B6 Connection and Modification of the Hydraulic Pump

## Electrical supply



### Caution

Risk of tripping across the entire working area due to the connection cable!

- ⇒ Guide the connection cable along the support structure and, if necessary, secure with cable ties.
- ⇒ Arrange the connection cable so that it does not get caught up in the support structure or structure when the hydraulic cylinder is being extended and retracted as well as when moving the Tunnel Formwork Carriage.



### Danger

High voltage!

Serious injuries can result from an electric shock.

- ⇒ Ensure that the connection cable is not
  - **rolled over.**
  - **twisted.**
  - **kinked.**
  - **crushed.**
  - **tensioned.**

## Components

**1.3** Adapter Cable RCS

**9** Cable Connection CEE 16A

## Connecting the hydraulic pump

1. Insert Adapter Cable RCS (1.3) in the Motor Protection Plug (1.2).
2. Insert Cable Connection CEE 16A (9) in the Adapter Cable RCS (1.3).
3. Connect the Cable Connection CEE 16A (9) with a 16A CE connection.

(Fig. B6.06)

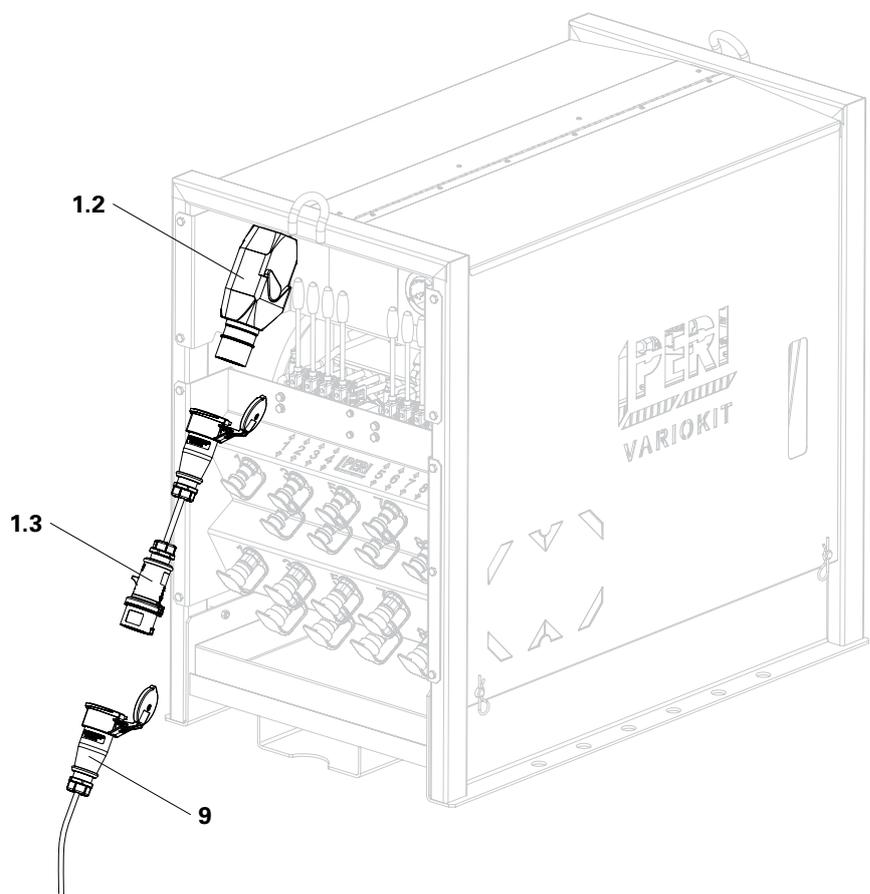


Fig. B6.06

## General information



Wear safety glasses and suitable protective gloves when working on the hydraulic system.



- For safe handling of the hydraulic oil, follow the instructions which are included in the safety data sheet of the oil selected for use.
- Avoid any body contact with the hydraulic oil.
- Ensure that the hydraulic oil does not come into contact with the structure.
- For information on cleaning and correct disposal, see the safety data sheet of the hydraulic oil selected for use.
- Do not mix hydraulic oils of different quality.



### Recommended hydraulic oil

- For operating temperatures 0 °C to 45 °C:  
PERI Hydraulic Oil HV LP46, 20 L,  
Item no. 057376.
- For temperatures of -20 °C to -30 °C:
  - Shell Tellus T32 or
  - AVIA Syntofluid PE-8 30



- The hydraulic oil used must be free of water and dirt.
- Avoid overfilling.
- The hydraulic cylinders must always be fully retracted when filling.
- The oil tank and filling filter must be free of water and dirt.
- The filling must be done using a filling filter (filling sieve, filling funnel with sieve insert or ultra-fine filter).
- All information applies to
  - the first filling,
  - when changing the hydraulic oil,
  - when topping up the hydraulic oil.

## Preparation

### Filling the hydraulic pump with hydraulic oil

1. Clean the oil tank in the area of the filling opening (1.9).
2. Unscrew the sealing cap of the filling opening and put to one side. Ensure that the sealing cap remains free of any dirt.
3. Fill the oil tank with the help of the funnel up to the top marking of the oil level indicator (1.8). Avoid overfilling.
4. Close the filling opening with the sealing cap.
5. Check the tightness of the oil tank.
6. Record type of oil used and amount in the maintenance chart.

(Fig. C1.01)



- Approx. 80 litres of hydraulic oil is required for the first filling.
- The hydraulic oil filter pump facilitates the first filling.
- Comply with the maintenance chart which can be found in the appendix of these assembly instructions.

## Checking the oil temperature and oil level



- The oil level can vary depending on the type, quantity and size of the consumer.
- The operating temperature increases with an increase in the outside temperature.
- Recommended operating temperature: 0 °C to 45 °C (average temperature of the hydraulic oil in the tank).
- With low temperatures, warm up hydraulic oil by flushing the system (at least 20 °C) in order to reach the required start viscosity.



Switch off the hydraulic pump if the oil temperature goes over 70 °C.

1. Read off the operating temperature and oil level on the oil level indicator with thermometer (1.08).

(Fig. C1.01)



If the oil level is too low

- the operating temperature increases,
- which leads to air inclusions,
- and results in the hydraulic cylinder being extended jerkily.



- Keep the oil level indicator (1.8) clean.
- Monitor the oil level at regular intervals.
- Immediately top up any missing hydraulic oil.
- Determine and eliminate the cause of excessive oil consumption.
- Regularly check the temperature of the electric motor and hydraulic oil during operations.

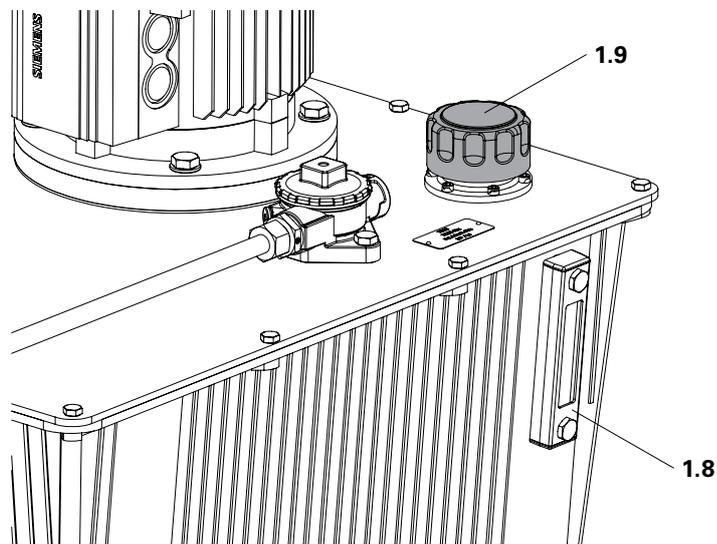


Fig. C1.01

## Switching on the hydraulic pump



### Danger

Risk of crushing through uncontrolled movement of the hydraulic cylinder!

- ⇒ Bring all hand levers to the centre position.
- ⇒ Leave the area of risk behind the wall formwork and on the Tunnel Formwork Carriage.

### Switching on

1. Check whether all hand levers are in the centre position.
  2. Switch on hydraulic pump with the motor switch (1.24).
  3. Listen out for any unusual pump noises. This is an indication of the incorrect direction of rotation of the motor.
  4. Check the rotation direction of the motor. If the control lamp is red, monitor the rotating field (1.25) (Fig. C1.02):
    - Switch off the hydraulic pump.
    - Unplug the Cable Connection CEE 16A.
    - Turn the phase inverter by 180° in the Adapter Cable RCS (1.3) (Fig. C1.03)
    - The rotary field is turned.
    - Plug in Cable Connection CEE 16A.
  5. Switch on the hydraulic pump.
- The hydraulic pump is ready to operate and circulates freely.

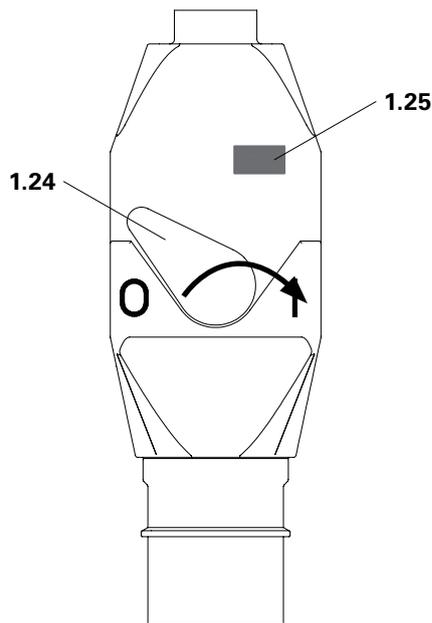


Fig. C1.02

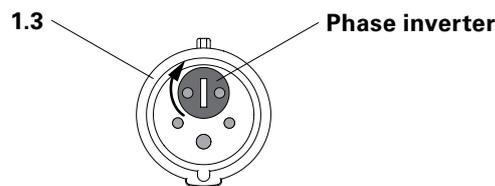


Fig. C1.03

## Bleeding the hydraulic system

The hydraulic system must be bled to ensure that the system functions correctly.

This is necessary:

- for every initial commissioning.
- after replacing hoses or hydraulic cylinders.
- after maintenance work.
- in the event of synchronisation problems.



### Warning

If the hydraulic cylinder is not completely bled, this can lead to uncontrolled and jerky movements!

As a result, persons can become trapped and seriously injured.

⇒ Keep clear of moving parts when operating the hydraulic system.

⇒ Regularly bleed the system as well as when required.



- When topping up the hydraulic oil, all hydraulic cylinders must be completely retracted otherwise the pump may overflow.
- The oil level in the hydraulic pump must be regularly checked and topped up as required.

### Prerequisites

- The hydraulic pump is filled with hydraulic oil.
- All hydraulic cylinders have been installed.
- The hydraulic drive has been installed.
- All hydraulic hoses have been correctly connected.

### Bleeding the hydraulic hoses

1. Disconnect all hydraulic hoses from the hydraulic cylinders and hydraulic drive.
2. Short-circuit the two hose ends. (Fig. C1.04a + C1.04b)
3. Switch on hydraulic pump.
4. Press the hand lever for the first hydraulic cylinder for approx. one minute.
5. Check the level in the oil tank and top up if necessary.

Repeat Steps 4 – 5 for all other hydraulic cylinders.

6. Connect all hydraulic hoses to the hydraulic cylinders.
7. Press the hand lever for the left hydraulic drive for approx. one minute.
8. Check the level in the oil tank and top up if necessary.

Repeat Steps 7 – 8 for the right hydraulic drive.

9. Connect all hydraulic hoses to the hydraulic drives.

→ The hydraulic hoses have now been bled.



Fig. C1.04a

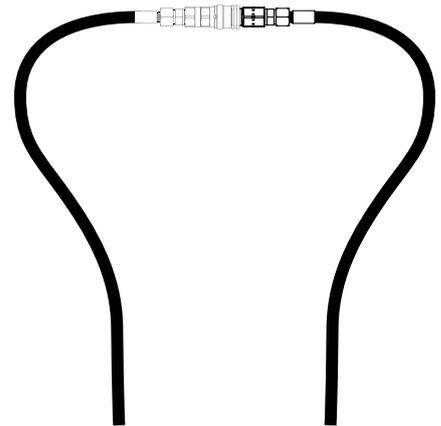


Fig. C1.04b

## Bleeding the Hydraulic Cylinder

1. Remove bolts from the hydraulic cylinders on the piston rod side.
2. Set down the hydraulic cylinders or let them hang so that the piston rod is free to move when extended.
3. Press the corresponding hand lever and hold for two minutes in order to displace the air pockets on the rod side.
  - The piston rods of the hydraulic cylinders extend.
  - The sound of blubbering in the oil tank indicates the bleeding procedure is taking place.
4. Check the level in the oil tank and top up if necessary.
5. Check the free circulation of the hydraulic oil with extended hydraulic cylinders.
6. Check components and connections for signs of external leakage.
7. Fix flapping lines and hoses.
8. Pull the corresponding hand lever and hold for two minutes in order to displace the air pockets on the piston side.
  - The piston rods of the hydraulic cylinders retract.
  - The sound of blubbering in the oil tank indicates the bleeding procedure is taking place.
9. Switch off the hydraulic pump and allow it to stand for at least one hour in order to allow the air bubbles to be released from the oil.
10. Completely extend and retract all hydraulic cylinders until any vibrations in the hydraulic cylinders have disappeared. When reaching the end position, hold the hand levers for approx. one minute.
11. Bolt on the hydraulic cylinders on the piston rod side.



Never tighten leaking fittings under high pressure. To relieve pressure, switch off the hydraulic pump.



- Check the oil level.
- Check synchronisation and end position of all hydraulic cylinders.

## Bleeding the Lifting and Lowering Cylinder

1. Disconnect the hydraulic hoses from the Lifting and Lowering Cylinders.
2. Dismantle the Lifting and Lowering Cylinder with the Main Beam and set down next to the Lifting and Lowering Unit. See Section "Installation of the Lifting and Lowering Cylinder" on Page 79.
3. Place the hydraulic cylinder so that the piston rod can freely move when extended.
4. Connect the hydraulic hoses to the Lifting and Lowering Cylinder.
5. Press the corresponding hand lever and hold for two minutes.
  - The piston rods of the hydraulic cylinders extend.
  - The sound of blubbering in the oil tank indicates the bleeding procedure is taking place.
6. Check the level in the oil tank and top up if necessary.
7. Check the free circulation of the hydraulic oil with extended hydraulic cylinders.
8. Check components and connections for signs of external leakage.
9. Fix flapping lines and hoses.
10. Pull the corresponding hand lever and hold for two minutes.
  - The piston rods of the hydraulic cylinders retract.
  - The sound of blubbering in the oil tank indicates the bleeding procedure is taking place.



- Check the oil level.
- Check synchronisation and end position of all hydraulic cylinders.

11. Switch off the hydraulic pump and allow it to stand for at least one hour in order to allow the air bubbles to be released from the oil.
12. Completely extend and retract all hydraulic cylinders until any vibrations in the hydraulic cylinders have disappeared. When reaching the end position, hold the hand levers for approx. one minute.
13. Disconnect the hydraulic hoses from the Lifting and Lowering Cylinders.
14. Install the Lifting and Lowering Cylinder. See Section "Installation of the Lifting and Lowering Cylinder" on Page 79.
15. Connect the hydraulic hoses to the Lifting and Lowering Cylinder.



Never tighten leaking fittings under high pressure. To relieve pressure, switch off the hydraulic pump.

## Bleeding the Hydraulic Drive

-  The wheels in the wheel blocks must turn freely.
1. Press both hand levers on the valve block and hold for two minutes.
    - The wheels turn in a clockwise direction.
    - The sound of blubbering in the oil tank indicates the bleeding procedure is taking place.
  2. Check the level in the oil tank and top up if necessary.
  3. Check the free circulation of the hydraulic oil.
  4. Check components and connections for signs of external leakage.
  5. Fix flapping lines and hoses.
  6. Pull both hand levers on the valve block and hold for two minutes.
    - The wheels turn in an anti-clockwise direction.
    - The sound of blubbering in the oil tank indicates the bleeding procedure is taking place.

Repeat Steps 2 – 5.



- Check the oil level.

7. Switch off the hydraulic pump and allow it to stand for at least one hour in order to allow the air bubbles to be released from the oil.
8. Operate the hydraulic drive until any vibrations have disappeared. Hold the respective hand lever for approx. one minute.



Never tighten leaking fittings under high pressure. To relieve pressure, switch off the hydraulic pump.

### Commissioning during low temperatures

With temperatures under 0 °C, warm up the hydraulic oil by flushing the system. As a result, the hydraulic oil reaches the required viscosity.

#### Warming up the hydraulic oil

The Hydraulic Cylinders are retracted?

1. Pull all Hand Levers one after the other and hold until a temperature of 20 °C has been reached.
2. Check that all Hydraulic Cylinders run smoothly and uniformly.



- For temperatures below -20 °C, use hydraulic oil with a low pour point (e.g. Shell Tellus T32 or AVIA Syntofluid PE-B 30).
- Do not use the Hydraulic Pump with temperatures below -30 °C.

## Commissioning after a long downtime period

- Thoroughly clean and rinse preserved equipment before commissioning. Any remaining preservation agents can block the valves.
- Drain condensation water from the hydraulic tank. For this, drain the hydraulic oil.
- Check hydraulic oil after a long standstill period for usability and change if necessary.



The same measures apply for re-commissioning as for the initial commissioning.



With low temperatures, warm up hydraulic oil by flushing the system in order to reach the required start viscosity.

## Safety instructions

During shuttering and striking operations, as well as when moving the Tunnel Formwork carriage, there must be two-way communications in place between all fitters.

When lifting, lowering and moving the Tunnel Formwork Carriage, only the required personnel may remain in the working area.



### Danger

- Risk of crushing when extending or retracting the wall formwork!
  - ⇒ During modification work, keep clear of the swivel range of the wall formwork.
  - ⇒ During shuttering and striking operations, personnel must keep clear of the area behind the wall formwork.
- Risk of crushing when the Tunnel Formwork Carriage is being raised or lowered!
  - ⇒ Do not take hold of anything between moving components of the Tunnel Formwork Carriage.
- Risk of crushing when moving the Tunnel Formwork Carriage!
  - ⇒ Do not remain in an area of risk caused by moving parts of the Tunnel Formwork Carriage.



- Never climb up or down the rear guardrails of the working platforms and concreting platforms.
- Ensure that the hydraulic lines and electrical cables can not be sheared or pinched when moving the Tunnel Formwork Carriage.
- Avoid kinking, twisting and pulling of hoses and cables.

## Extending or retracting the wall formwork

- Only retract or extend the wall formwork when all bracing, anchors, etc. have been removed.
- Extend or retract the wall formwork first on one side and then the other.
- Simultaneously and smoothly retract or extend both hydraulic cylinders on one side.
- Avoid any jerky movement of the hydraulic cylinders when extending or retracting.
- In the case of increased resistance or if the wall formwork does not move, immediately stop the procedure and return to the starting position.
  - Remove any obstacles or anchoring and struts that have been forgotten.
  - Repeat the procedure.

## Raising or lowering the Tunnel Formwork Carriage

- Ensure that the hydraulic lines and electrical cables are not crushed during the lifting or lowering procedures.
- Only lower the Tunnel Formwork Carriage after all lowering wedges and support frames have been removed.
- Simultaneously and smoothly raise or lower the Tunnel Formwork Carriage with all lifting and lowering equipment.
- Avoid any jerky movement of the hydraulic cylinders when extending or retracting.
- In the case of increased resistance or if the Tunnel Formwork Carriage does not move, immediately stop the procedure and return to the starting position.
  - Remove any obstacles.
  - Repeat the procedure.

## Moving the Tunnel Formwork Carriage

### Moving with the Hydraulic Drive

- Simultaneous and smooth moving operations with both hydraulic motors.
- Avoid any jerky movements.
- In the case of increased resistance or if the Tunnel Formwork Carriage does not move, immediately stop the procedure.
  - Locate and eliminate the problem.
  - Repeat the procedure.

### Moving when using equipment supplied by the contractor

- Only use one pulling device.
- Avoid any jerky movements.
- Attach chains of equal length to the attachment point on both Base Beams.
- Attach both chains to the pulling equipment.
- Brace both Base Beams against each other.

(Fig. D1.01)

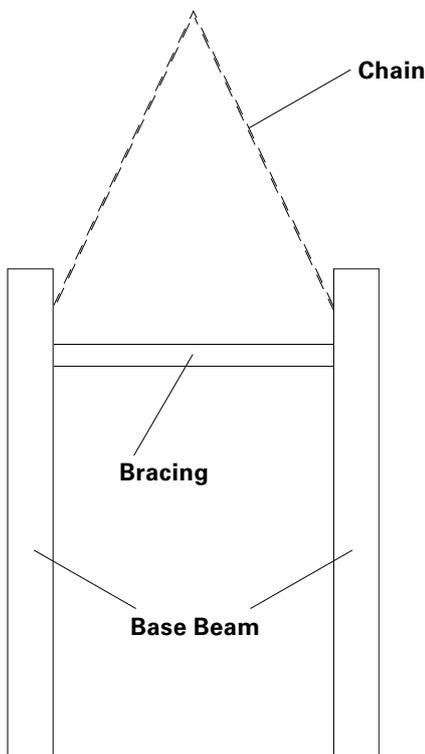


Fig. D1.01

## Prerequisites

- The Tunnel Formwork Carriage is assembled in the first concreting section.
- The Tunnel Formwork Carriage is raised 5 cm above the concreting height.
- The wall formwork is extended in the concreting position.
- The length of the rail is twice as long as the Tunnel Formwork Carriage:
  - one half projects into the current concreting section.
  - one half projects into the next concreting section.



- Relieve the hydraulic cylinders of the wall formwork by means of spindles or other measures.
- The rails are always laid out in the concreting position. As a result, aligning the Tunnel Formwork Carriage in a transverse direction is not required.
- The rails are simply placed in the required position and butt jointed.
- Connecting the rails or fixing in position is not necessary.
- When concreting tunnel radii, the tunnel wall has no curvature. The tunnel wall is comprised of numerous polygons.



PERI recommends connecting the rails and fixing in position.

## Preparation

1. Check whether the Tunnel Formwork Carriage is aligned in a transverse direction. If necessary, adjust with the Hinge Slide.
2. Check whether the longitudinal axis is correct.
3. Lower the Tunnel Formwork Carriage to the concreting height with the help of the Wedge Lowering Devices (41), and then align.
4. Support each Support Wedge Box (26) with a Wedge Lowering Device (41) and a Brace Support (40).
5. Extend the Wedge Lowering Devices (41) so that they can accommodate the weight of the Tunnel Formwork Carriage. (Fig. D1.02)
6. Completely retract the Lifting and Lowering Unit.  
→ The hydraulic system is now completely relieved.
7. Adjust the transverse stop of the wall formwork and secure with a lock nut. (Fig. D1.03)

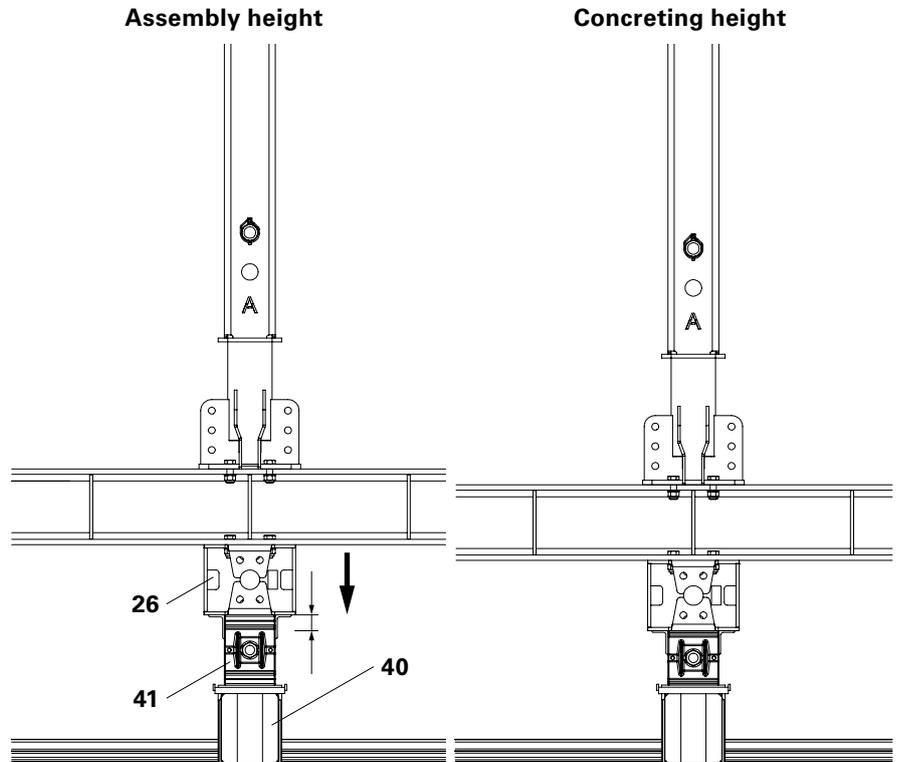


Fig. D1.02

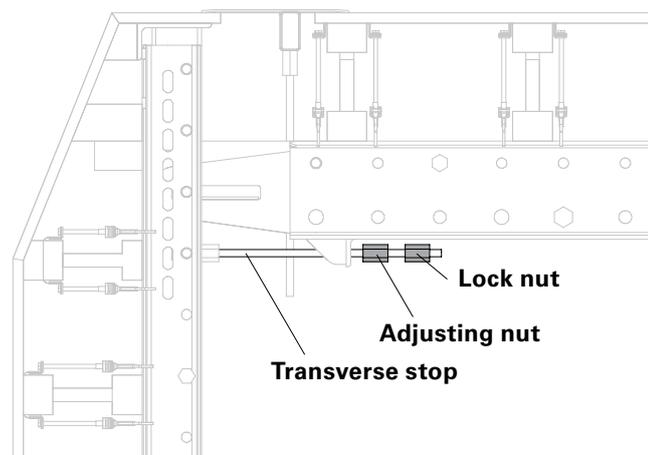


Fig. D1.03

## First concreting cycle

1. Mount the external formwork.
2. Mount the stopend formwork at both ends of the first concreting section.
3. Anchor the stopend formwork.
4. Relieve the Hydraulic Cylinders by means of spindles or other measures.
5. Anchor the Tunnel Formwork Carriage on the tunnel bottom plate.
6. Concrete the walls and slab of the first tunnel section.
7. Allow the concreting section to harden in accordance with the specified strength.

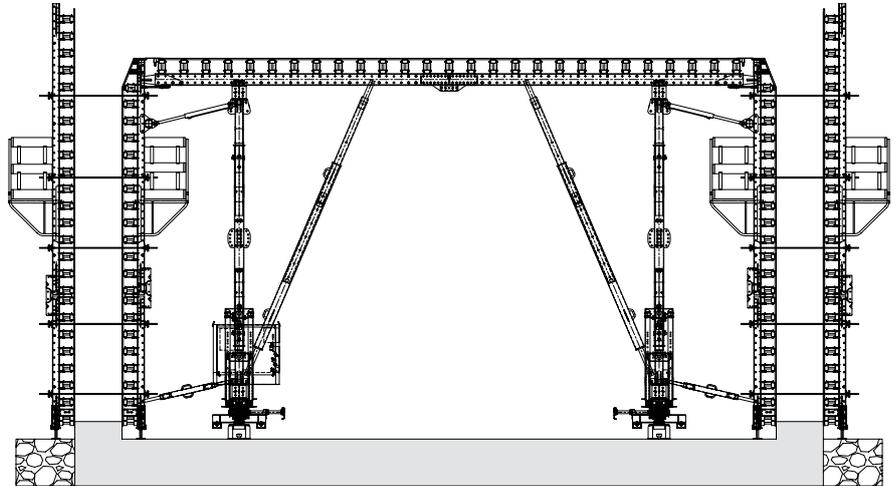


Fig. D1.04



Approval for further work is the responsibility of the operating personnel.

Fig. D1.04 shows the Tunnel Formwork Carriage with external formwork in the concreting position.



In order to ensure uniform load distribution on the Tunnel Formwork Carriage,

- evenly fill the wall formwork.
- simultaneously concrete both walls.
- evenly fill the slab formwork.
- evenly compact the concrete.

## Striking the concreting section

1. Moving the rails
  - one half projects into the current concreting section.
  - one half projects into the next concreting section.
2. Remove anchoring.
3. Remove stopend formwork.
4. Remove external formwork.
5. Retract wall formwork. (Fig. D2.01)
6. Lower the Wedge Lowering Device approx. 5 cm.
  - The entire Tunnel Formwork Carriage is lowered. (Fig. D2.02)
7. Extend the Lifting and Lowering Unit and raise the Tunnel Formwork Carriage until the Wedge Lowering Devices are free. (Fig. D2.03)
  - The entire load of the Tunnel Formwork Carriage is carried by the hydraulic system.
8. Remove Wedge Lowering Devices and place on the Base Beam.
9. Remove the Brace Support and place on the Base Beam.

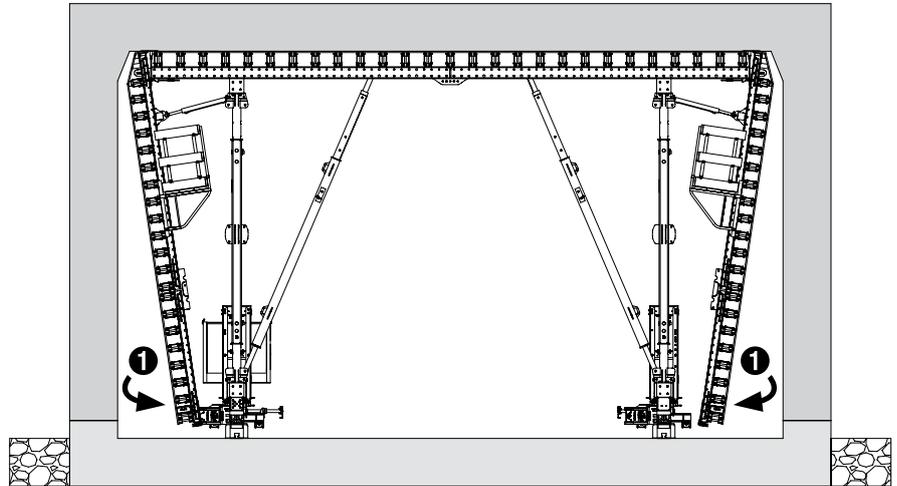


Fig. D2.01

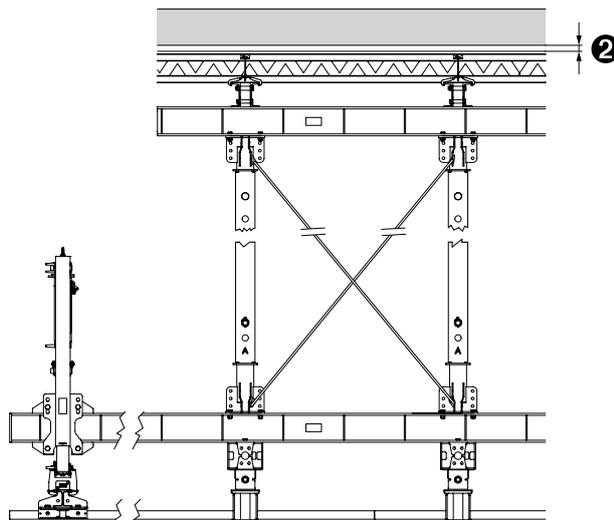


Fig. D2.02

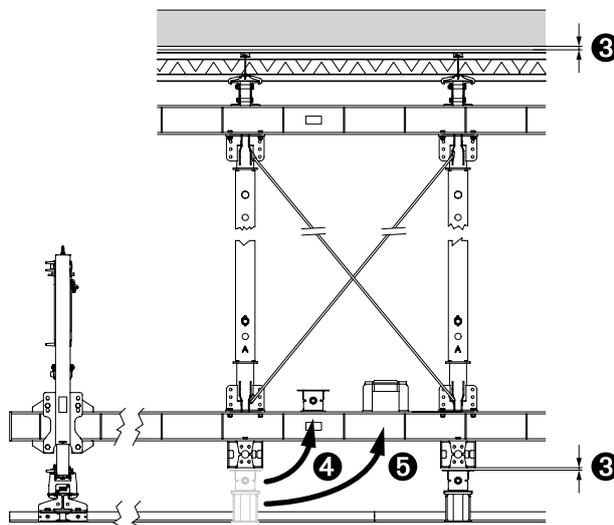


Fig. D2.03

## Moving the Tunnel Formwork Carriage



### Danger

Risk of crushing when moving the Tunnel Formwork Carriage!

⇒ Keep clear of the moving area of the Tunnel Formwork Carriage.

1. Align the Rails to suit the concreting position.
2. Lower the Tunnel Formwork Carriage onto the Rails. (Fig. D2.04)  
→ The Lifting and Lowering Unit is completely retracted.
3. Move the Tunnel Formwork Carriage to the next concreting section.

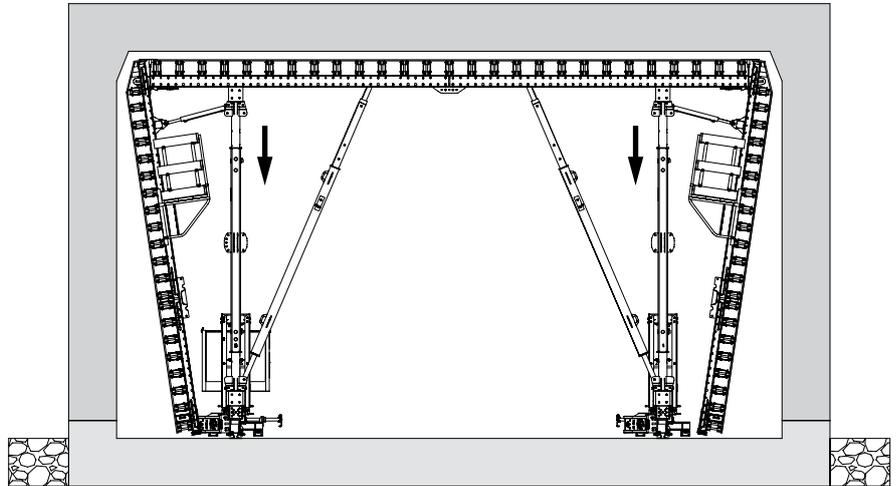


Fig. D2.04



- Ensure that the formwork has an overlap of 10 – 20 cm in the previous concreting section.



- Pay attention to the sequence when raising the Tunnel Formwork Carriage (Steps 4 + 5).
- Do not lower the Tunnel Formwork Carriage at the front once it has been raised and supported at the rear. Otherwise, this results in damage to the formwork and formwork girders.

4. Raise the Tunnel Formwork Carriage to the concreting height at the front.
  5. Raise the Tunnel Formwork Carriage at the rear to the limit stop of the previous concreting section. (Fig. D2.05 + D2.06)
  6. Support all Support Wedge Boxes (26) with a Wedge Lowering Device (41) and a Brace Support (40).
  7. Extend the Wedge Lowering Devices (41) so that they can accommodate the weight of the Tunnel Formwork Carriage.
  8. Completely retract the Lifting and Lowering Unit.
    - The hydraulic system is now completely relieved.
- Moving the Tunnel Formwork Carriage with the Hydraulic Jack: see Section "Moving the Lift Frame LALD with the Hydraulic Jack" on Page 106.

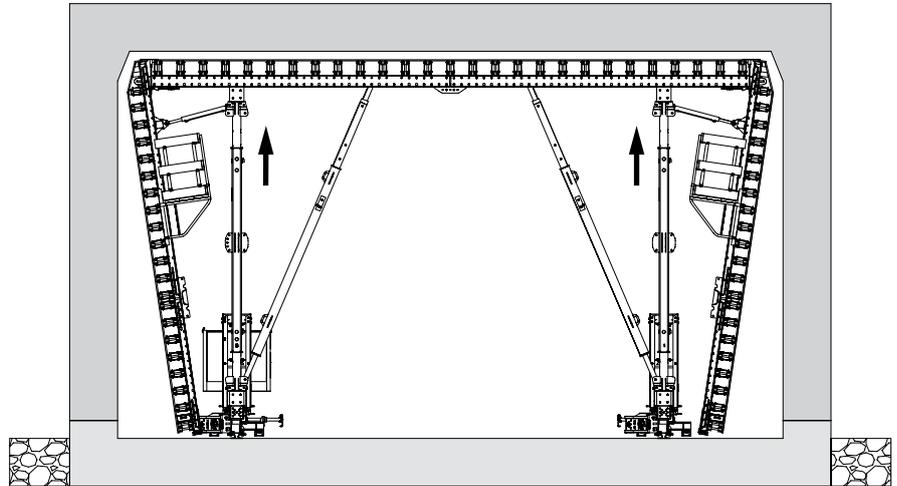


Fig. D2.05

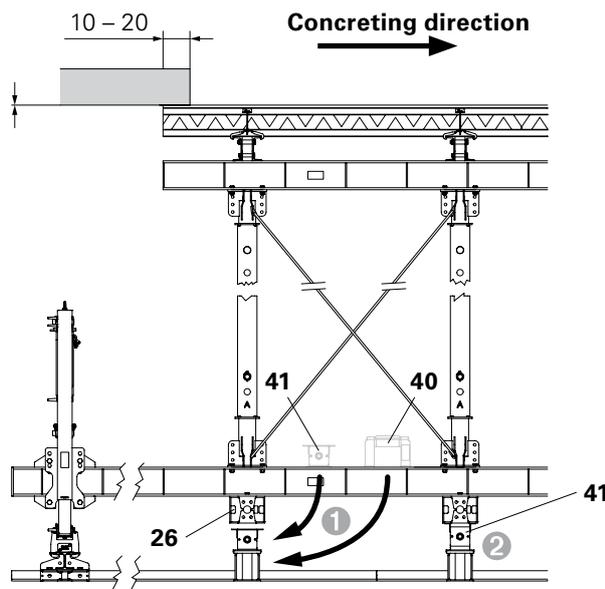


Fig. D2.06

## Shuttering the concreting section

1. Move the wall formwork into the concreting position:
  - below up to the limit against the starter.
  - above up to the limit against the transverse stop.

(Fig. D2.07)

2. Mount the external formwork.
3. Mount the stopend formwork.
4. Anchor the stopend formwork.
5. Relieve the wall formwork by means of spindles or other measures.
6. Anchor the Tunnel Formwork Carriage on the tunnel bottom plate.

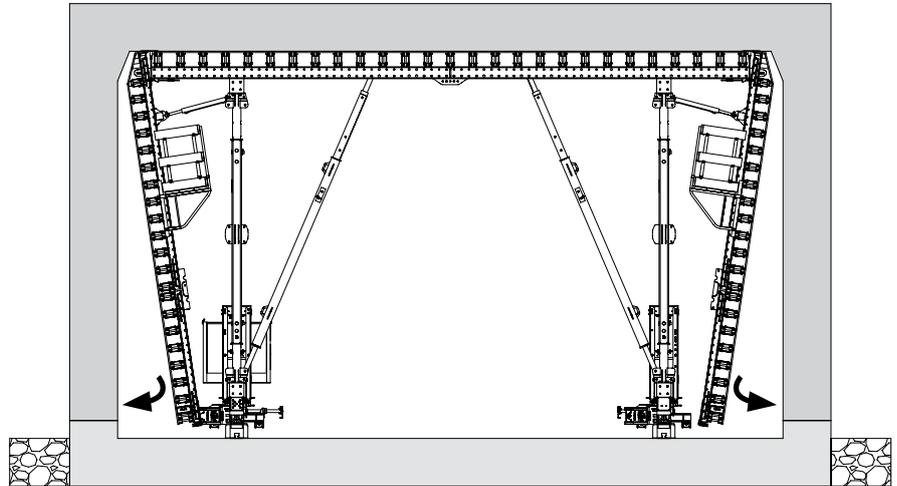


Fig. D2.07

Fig. D2.08 shows the Tunnel Formwork Carriage in the concreting position.

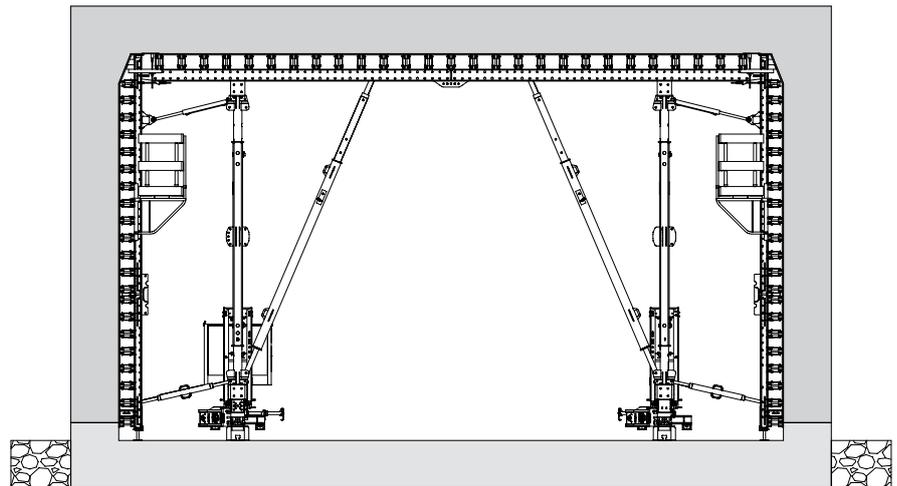


Fig. D2.08

## Moving the Tunnel Formwork Carriage with the Hydraulic Jack

### Prerequisites

The Lift Frame and Tunnel Formwork carriage are in the moving position.

### Components

- 24** Hinge Slide LALD VARIOKIT
- 26** Support Wedge Box VARIOKIT
- 27** Hydraulic Jack 250 kN
- 28** Lifting Tool LALD VARIOKIT
- 40** Brace Support 250
- 41** Wedge Lowering Device 420 kN
- 123** Fitting Pin D=21x120
- 124** Cotter Pin 4/1
- 125** Fitting Pin D=26x120
- 126** Cotter Pin 5/1, galv.



### Warning

Incorrect operation or hydraulic damage can cause unforeseen movements of the components. As a result, body parts could become trapped and crushed.

- ⇒ While the Lift Frame is being moved, no other work is to be carried out on the Tunnel Formwork Carriage or formwork.
- ⇒ Keep all body parts away from any raised components.
- ⇒ Otherwise support raised components, e.g. with timbers.

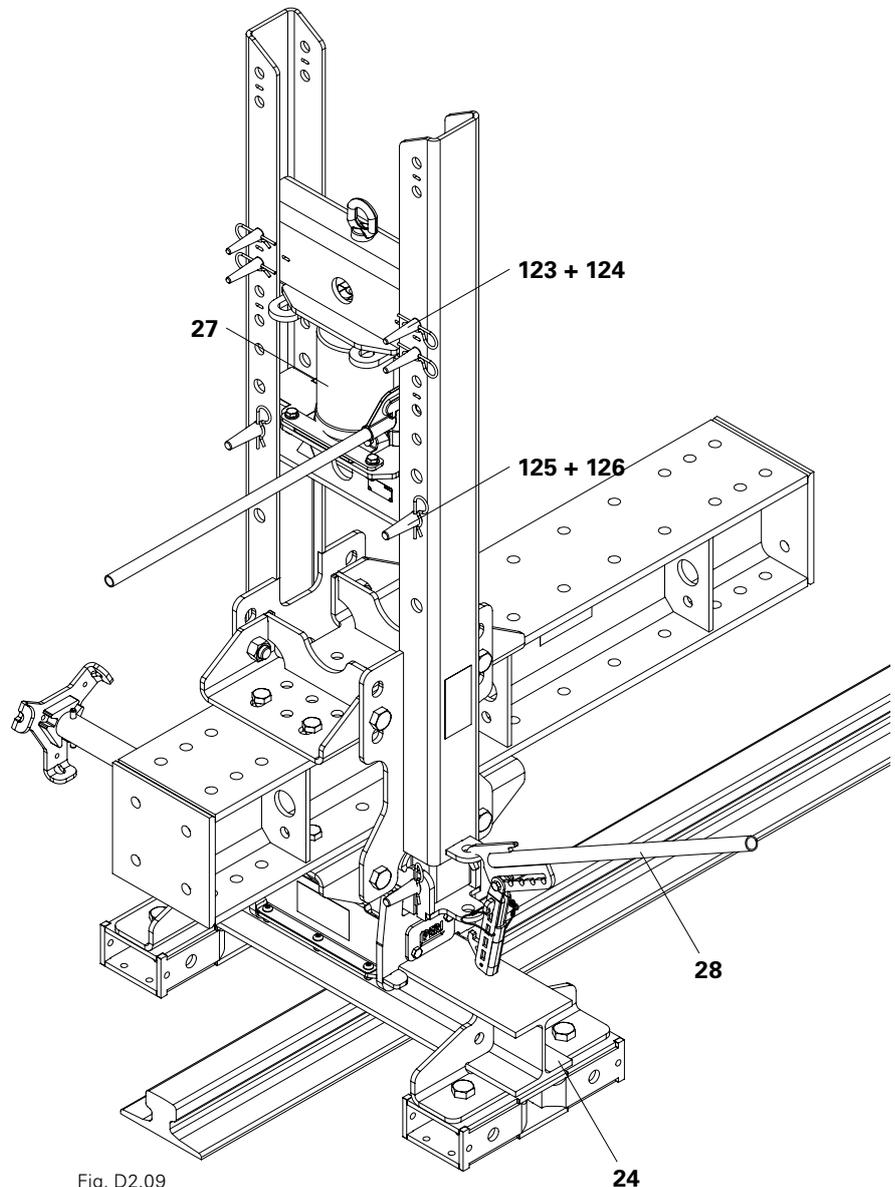


Fig. D2.09

## Lowering the Hinge Slide

1. Raise the Hinge Slide (24) slightly with the Lifting Tool (28) and thereby relieve the fitting pins (125) of the Cross Beam (25.2). See Section "Lifting Tool LALD VARIOKIT" on Page 24.
2. Remove fitting pins  $\varnothing$  26 mm (125) and cotter pins 5/1 (126) and insert in the parking position (25.15).
3. Release the Lifting Tool and thereby lower the Hinge Slides (24) to the ground.
4. Hang the Lifting Tool in the Lift Frame for parking. (Fig. D2.10)

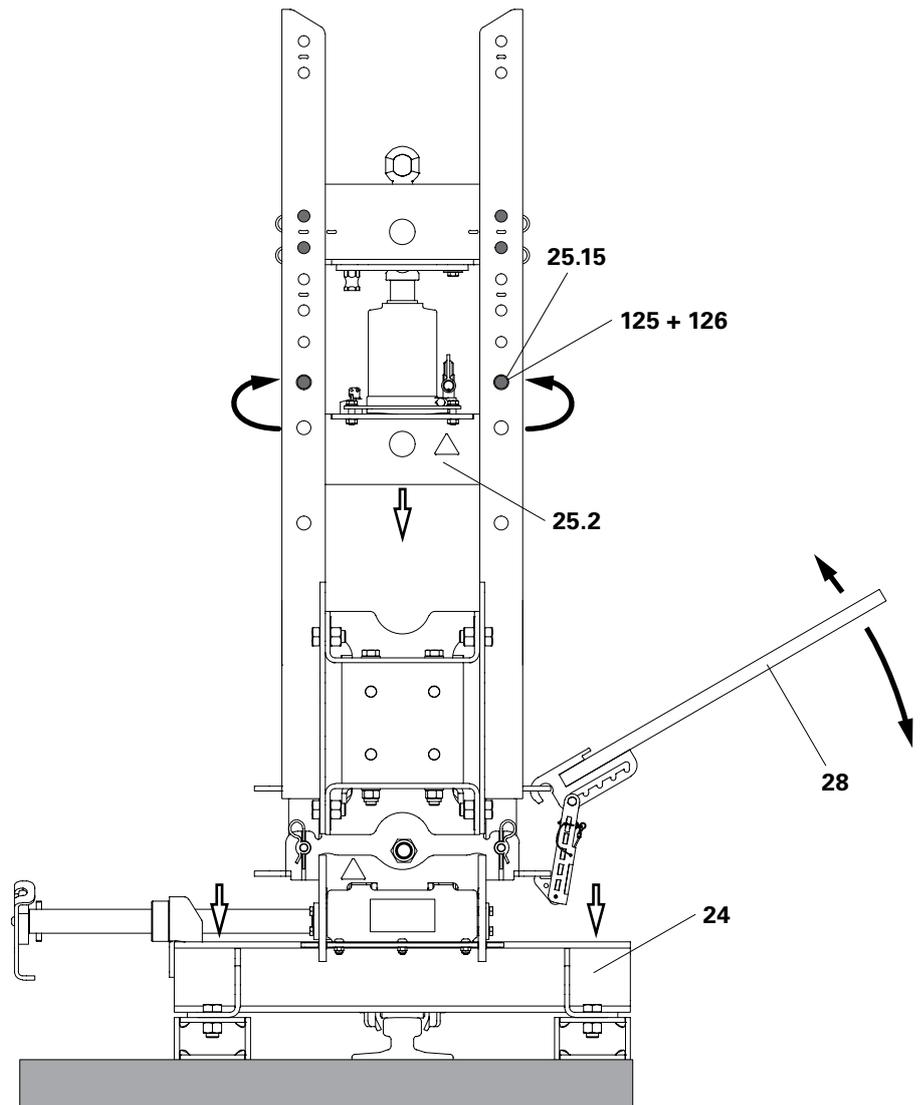


Fig. D2.10

## Preparing the lift

1. Insert the Slide Plate (25.7) and secure with the threaded bolt (25.8), see Section "Installation of the Hydraulic Jack 250 kN" on Page 80.
2. Set the Hydraulic Jack to lifting status according to the manufacturer's instructions.

## Carrying out the lifting procedure

1. Extend the Hydraulic Jack. The piston of the Hydraulic Jack lies against the Slide Plate (25.7) and raises the Main Beam (25.1) together with the Lift Frame LALD and thus the complete lattice framework.
2. Continue the lifting procedure until the shuttering position has been reached.

(Fig. D2.11)80

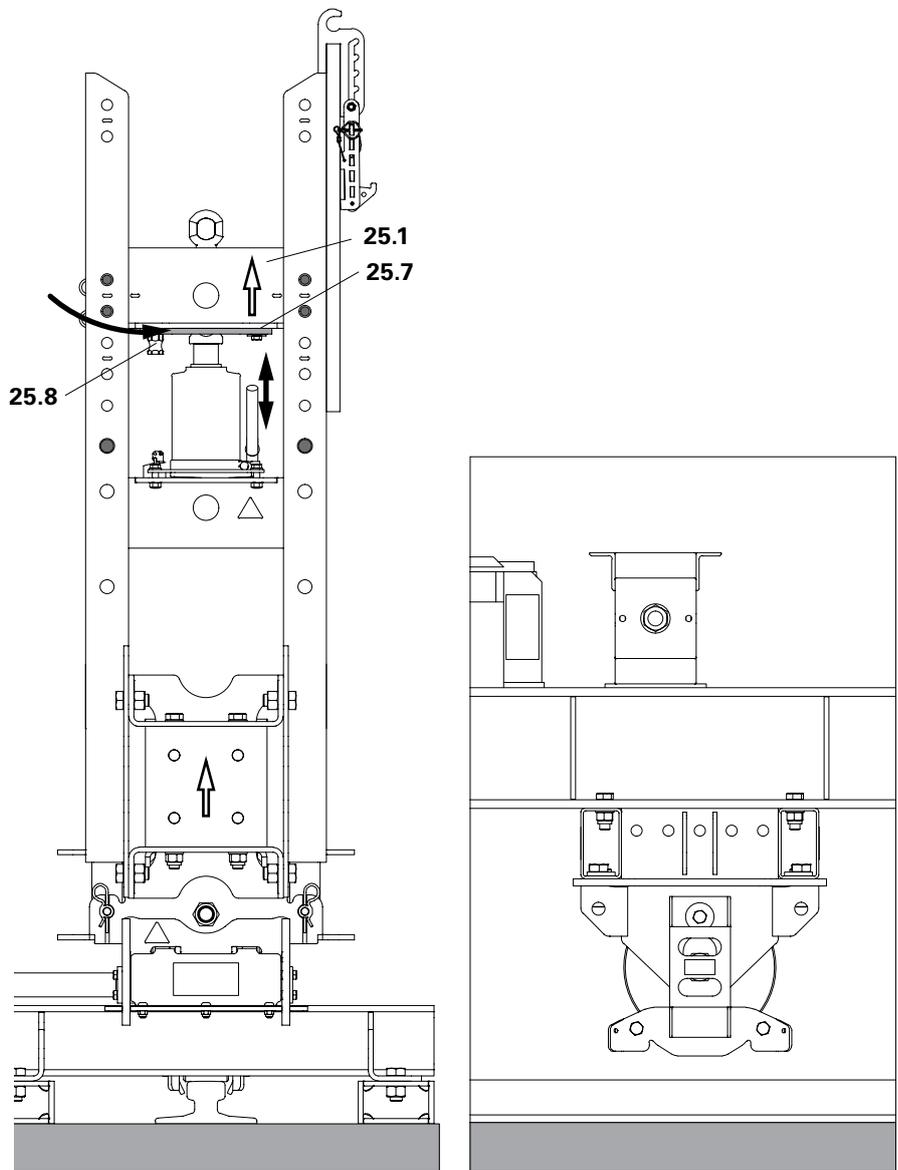


Fig. D2.11

## Relieving the hydraulics

1. Position the Brace Frame (40) and Wedge Lowering Device (41) under the Support Wedge Box.
2. Spindle out the Wedge Lowering Device (41) until it rests firmly against the Support Wedge Box (26).
3. Completely lower the Hydraulic jack (27) in accordance with the manufacturer's instructions.
4. Remove the threaded bolts (25.8) from the Slide Plate (25.7), and then remove the Slide Plate (25.7).
5. Raise the Hinge Slide (24) with the Lifting Tool (28) until the holes in the Cross Beam (25.2) correspond to the holes in the Lift Frame (25.16). See Section "Lifting Tool LALD VARIOKIT" on Page 24.
6. Remove fitting pins  $\varnothing$  26 mm (125) and cotter pins 5/1 (126) from the parking position (25.15) and insert the Cross Beam (25.2) in the transport position (25.16).

(Fig. D2.12)

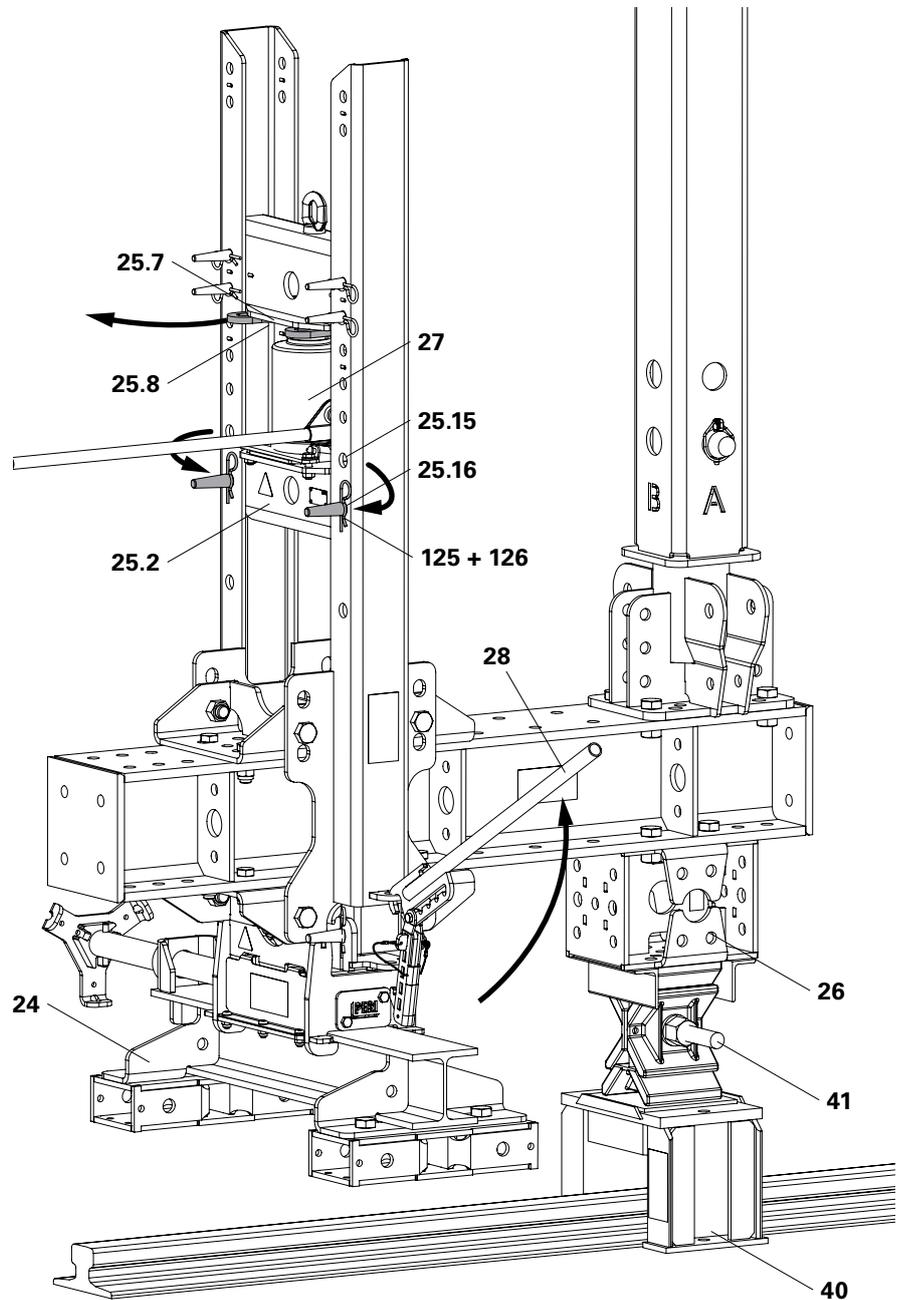


Fig. D2.12

## When the lifting range is insufficient

1. Adjust the lifting range of the Hydraulic Jack so that the holes in the Cross Beam (25.2) correspond to the holes for moving position (25.17) in the Lift Frame.
2. Insert Cross Beam (25.2) at the moving position (25.17) in the Lift Frame using fitting pins  $\varnothing$  26 mm (125) and cotter pins 5/1 (126).
3. Completely lower the Hydraulic Jack.
4. Remove Main Beam (25.1) from the top position (A) of the Lift Frame and install in the bottom position (B) or intermediate position.
5. Carefully raise the Hydraulic Jack until the fitting pins (125) are free of load in the Cross Beam (25.2).
6. Remove fitting pins  $\varnothing$  26 mm (125) from the Cross Beam and insert in the parking position (25.15) with cotter pins 5/1 (126).
7. Continue the lifting procedure. (Fig. D2.13)

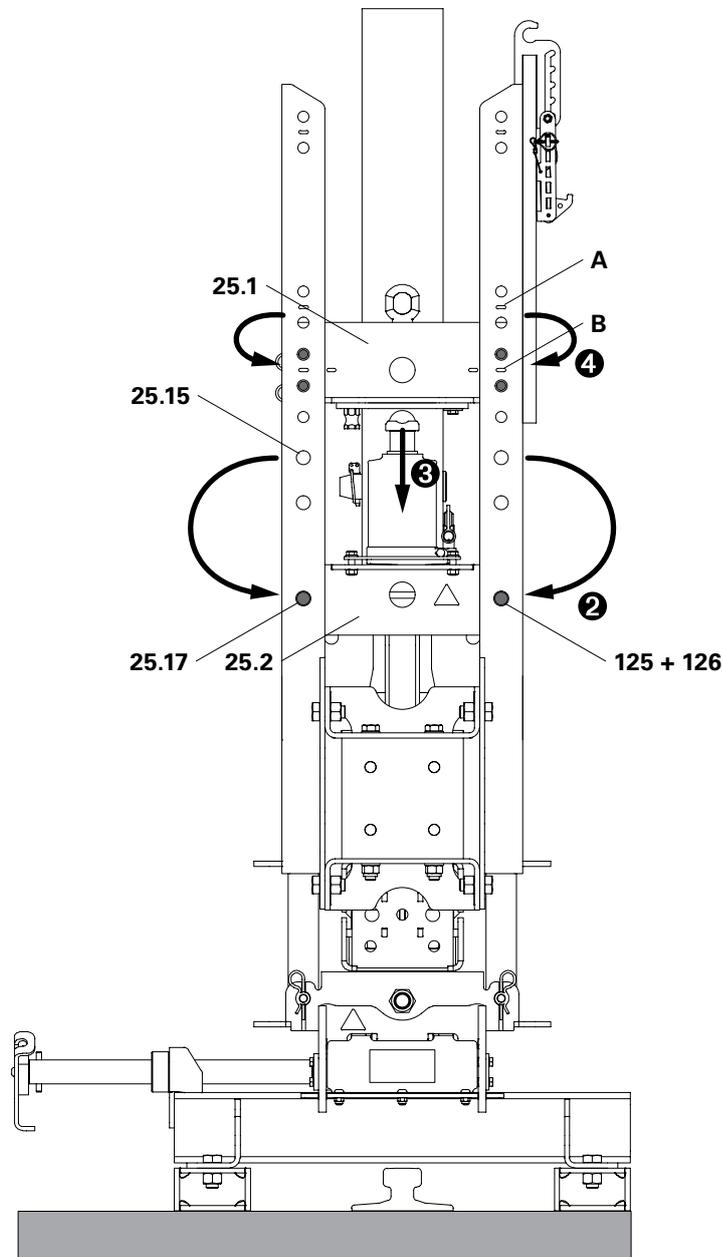


Fig. D2.13



# E1 Malfunctions Table for the Hydraulic System



Malfunction	Cause	Remedial measure
Unusual motor noise in the hydraulic pump	Incorrect rotation direction of the motor	If the warning light for monitoring the rotating field is activated, turn the phase inverter in the CEE Motor Protection Plug by 180°.
	Insufficient hydraulic oil	Top up hydraulic oil.
	Dirt in the hydraulic system	Replace hydraulic oil and, if necessary, clean the hydraulic tank and filter.
Hydraulic cylinder sinks	Air in the hydraulic system	Bleed the system.
	Load safety valve is defect	Replace the hydraulic cylinder and have an inspection carried out by PERI.
	Defective sealing	Replace the hydraulic cylinder and have an inspection carried out by PERI.
Hydraulic cylinders move unevenly	Air in the hydraulic system	Bleed the system.
	Dirt in the hydraulic system	Replace hydraulic oil and, if necessary, clean the hydraulic tank and filter.
	Leakage between the hydraulic pump and hydraulic cylinder	Retract all hydraulic cylinders, identify the leakage point and seal; replace with new component if necessary.
	Hydraulic hose is broken or leaks	Stop work and replace the defective hydraulic twin hose. Check all hydraulic twin hoses.
Temperature of the hydraulic oil is too high	Dirt in the hydraulic system	Replace hydraulic oil and, if necessary, clean the hydraulic tank and filter.
	Defective valve	Replace the hydraulic pump and have an inspection carried out by PERI.
	Hand lever operated too long	Switch off the hydraulic pump and allow it to cool down.
	Environmental temperature is too high	Adjust work procedures in hot climates and work with the hydraulic pump at night or in the mornings.
Hydraulic system is leaking hydraulic oil	Hydraulic hose is broken or leaks	Stop work and replace the defective hydraulic hose. Check all hydraulic hoses.
	Leaking connection	Switch off hydraulic pump for pressure relief, tighten or replace hose connection.
Unintentional extending or retracting of a hydraulic cylinder	Hand lever is dirty and not in centre position	Remove dirt deposits.
	Hand lever is dirty or defective	Replace the hand lever valve and have an inspection carried out by PERI.
<ul style="list-style-type: none"> <li>■ Hydraulic cylinder cannot handle the load</li> <li>■ Hydraulic cylinder does not extend</li> </ul>	Insufficient hydraulic oil in the tank	Determine the cause of the hydraulic oil loss and eliminate. Top up the hydraulic oil.
	Incorrect rotation direction of the motor	If the warning light for monitoring the rotating field is activated, turn the phase inverter in the CEE Motor Protection Plug by 180°.
	Leakage in the hydraulic system	Identify the leakage point and seal; if necessary, replace with new parts.
	Load safety valve is defect	Replace the hydraulic cylinder and have an inspection carried out by PERI.

## E2 Malfunctions Table for the Hydraulic Drive

Malfunction	Cause	Remedial measure
Brake does not release	Dirt in the hydraulic system	Replace hydraulic oil and, if necessary, clean the hydraulic tank and filter.
	Hydraulic lines not connected correctly	Correctly connect the hydraulic lines.
	Brake pressure valve is defective	Inspection by PERI.
Jerky movements when moving downwards	Lowering brake valve is defective	Inspection by PERI.
<ul style="list-style-type: none"> <li>■ Damage to motor casing</li> <li>■ Shaft sealing ring squeezed out</li> </ul>	Overflow oil line is not connected	Replace hydraulic motor and connect the overflow oil line.
Motor does not move despite brake being open	Pressure relief valve in the valve block is set too low	Inspection by PERI.
	Load exceeds specified limits	Do not exceed the permissible operating limits. See "Hydraulic Drive VARIOKIT: 2-wheel drive with Hydraulic Pump VARIOKIT" on Page 28 or "Hydraulic Drive VARIOKIT: 2-wheel drive with Hydraulic Pump RCS" on Page 28.
Valve block heats up	Operating error: hydraulic drive moves against obstacle and hand lever continues to be operated.	Switch off the hydraulic pump and allow the valve block to cool down.
Quick Coupler cannot be inserted	Quick-Coupler is dirty	Clean the Quick-Coupler.
	Quick-Coupler is damaged	Replace the Quick-Coupler.
	Hydraulic system is under pressure	Depressurise the hydraulic system.
<ul style="list-style-type: none"> <li>■ Uneven moving procedure</li> <li>■ Motors do not run synchronously</li> </ul>	Flow divider is defective	Inspection by PERI.
One-sided drive	Air in the hydraulic system	Bleed system.
	Dirt in the hydraulic system	Replace hydraulic oil and, if necessary, clean the hydraulic tank and filter.
	Hydraulic line is not correctly connected	Correctly connect the hydraulic lines.
	Operating error: only one hand lever operated	Operate the hand lever for both hydraulic drives.
Slight leakage	<ul style="list-style-type: none"> <li>■ Sealing rings</li> <li>■ Quick-Couplers</li> <li>■ Hose connections damaged</li> </ul>	Replace damaged components.
	<ul style="list-style-type: none"> <li>■ Quick-Couplers</li> <li>■ Hose connections incorrectly tightened</li> </ul>	<ul style="list-style-type: none"> <li>■ Switch off the hydraulic pump.</li> <li>■ Tighten with the specified tightening torque.</li> </ul>
Heavy leakage	<ul style="list-style-type: none"> <li>■ Hose connections</li> <li>■ Pipelines</li> <li>■ Hydraulic lines damaged</li> </ul>	<ul style="list-style-type: none"> <li>■ Switch off the hydraulic pump.</li> <li>■ Thicken any hydraulic oil leakage immediately with oil binder and then wipe away.</li> <li>■ Replace damaged components.</li> </ul>
Motor stops during operations	<ul style="list-style-type: none"> <li>■ Hydraulic lines unplugged</li> </ul>	Correctly connect the hydraulic lines.
	<ul style="list-style-type: none"> <li>■ Hydraulic lines torn off or driven over</li> </ul>	<ul style="list-style-type: none"> <li>■ Switch off the hydraulic pump.</li> <li>■ Thicken any hydraulic oil leakage immediately with oil binder and then wipe away.</li> <li>■ Replace defective hydraulic lines.</li> </ul>

# F1 Inspection of the Hydraulic System



Damage and downtime can be avoided by carrying out scheduled maintenance work.

PERI recommends shortened maintenance intervals:

- for equipment showing signs of heavy wear.
- with high thermal and mechanical loads.
- when subject to heavy soiling.

Hydraulic Pump	
Inspection / Maintenance / Repairs	Maintenance intervals
▪ Clean machine housing.	▪ daily
▪ Clean oil filter and replace if necessary. ▪ Replace hydraulic oil.	▪ before each use on the jobsite ▪ minimum 1x yearly
▪ Replace sealings.	▪ if leaking
▪ Check oil temperature and oil level. ▪ Check for signs of leakage. ▪ Check working and control pressures. ▪ Check whether any unusual noises or vibrations are present.	▪ daily to weekly
▪ Check equipment mountings. ▪ Check pipe and hose lines. (connections, chafe marks, kinks) ▪ Check protective covers. ▪ Check display devices. ▪ Check ventilation filter in the filling piece.	▪ weekly to monthly
▪ Check machine housing for signs of damage. ▪ Check performance.	▪ monthly to quarterly
Check the complete Hydraulic Pump for: ▪ deposits ▪ rust formation	▪ yearly

Hydraulic Hoses	
Inspection / Maintenance / Repairs	Maintenance intervals
▪ Replace fittings.	▪ if connection points are leaking
▪ Replace hoses.	▪ if the hose body is damaged ▪ deformation due to leaking hose fitting ▪ if more than six years old
▪ Check for signs of leakage.	▪ daily to weekly
▪ Check pipe and hose lines. (connections, chafe marks, kinks)	▪ weekly to monthly

<b>Hydraulic Cylinder</b> <b>Inspection / Maintenance / Repairs</b>	<b>Maintenance intervals</b>
<ul style="list-style-type: none"> <li>▪ Clean the Hydraulic Cylinder.</li> </ul>	<ul style="list-style-type: none"> <li>▪ as required</li> </ul>
<ul style="list-style-type: none"> <li>▪ Check for signs of leakage.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Visual check during use</li> <li>▪ Replace Hydraulic Cylinder in the event of leakage</li> </ul>

<b>Hydraulic Drive</b> <b>Inspection / Maintenance / Repairs</b>	<b>Maintenance intervals</b>
<ul style="list-style-type: none"> <li>▪ Clean the motor housing.</li> </ul>	<ul style="list-style-type: none"> <li>▪ daily</li> <li>▪ before every use</li> </ul>
<ul style="list-style-type: none"> <li>▪ Check for signs of leakage.</li> </ul>	<ul style="list-style-type: none"> <li>▪ daily</li> <li>▪ before every use</li> </ul>
<ul style="list-style-type: none"> <li>▪ Check whether any unusual noises or vibrations are present.</li> </ul>	<ul style="list-style-type: none"> <li>▪ daily</li> <li>▪ before every use</li> </ul>
<ul style="list-style-type: none"> <li>▪ Checking mounting elements are firmly in place.</li> </ul>	<ul style="list-style-type: none"> <li>▪ daily</li> <li>▪ before every use</li> </ul>
<ul style="list-style-type: none"> <li>▪ Replace hydraulic oil.</li> </ul>	<ul style="list-style-type: none"> <li>▪ before each use on the jobsite</li> <li>▪ minimum 1x yearly</li> <li>▪ every 2000 operating hours</li> </ul>

<b>Tunnel Formwork Carriage</b> <b>Inspection / Maintenance / Repairs</b>	<b>Maintenance intervals</b>
<ul style="list-style-type: none"> <li>▪ Check bolt/screw connections of the supporting structure and re-tighten if necessary.</li> <li>▪ Check the bolt/screw connections of the formwork construction and re-tighten if necessary.</li> <li>▪ Check the bolt/screw connections of the drive system and re-tighten if necessary.</li> <li>▪ Check all other bolt connections.</li> </ul>	<ul style="list-style-type: none"> <li>▪ before every use</li> </ul>
<ul style="list-style-type: none"> <li>▪ Clean and oil the formlining of the wall elements.</li> </ul>	<ul style="list-style-type: none"> <li>▪ after every use</li> </ul>
<ul style="list-style-type: none"> <li>▪ Clean and grease all sliding surfaces</li> <li>▪ spindles</li> <li>▪ Heavy-Duty Rollers</li> <li>▪ clean and grease.</li> </ul>	<ul style="list-style-type: none"> <li>▪ weekly</li> <li>▪ as required</li> </ul>
<ul style="list-style-type: none"> <li>▪ Grease the spindle thread and sliding surface of the Hinge Slide.</li> </ul>	<ul style="list-style-type: none"> <li>▪ weekly</li> <li>▪ as required</li> </ul>
<ul style="list-style-type: none"> <li>▪ Check all timber components for signs of damage and replace if necessary.</li> <li>▪ Check the steel construction for signs of deformation and replace if necessary.</li> <li>▪ Check the steel construction for signs of damage and replace if necessary.</li> </ul>	<ul style="list-style-type: none"> <li>▪ weekly to monthly</li> </ul>
<ul style="list-style-type: none"> <li>▪ Repair or replace the corrosion protection of steel components, e.g. with zinc spray.</li> </ul>	<ul style="list-style-type: none"> <li>▪ monthly</li> </ul>



## General information



Wear safety glasses and suitable protective gloves when working on the hydraulic system.



- For safe handling of the hydraulic oil, follow the instructions which are included in the safety data sheet of the oil selected for use.
- Avoid any body contact with the hydraulic oil.
- Ensure that the hydraulic oil does not come into contact with the structure.
- For information on cleaning and correct disposal, see the safety data sheet of the hydraulic oil selected for use.

## Dismantling the Hydraulic Hoses

### **Warning**

Hydraulic systems are under very high pressure!

When disconnecting the hydraulic lines, uncontrolled leaking of the hydraulic oil can occur.

- Risk of eye injury
  - ⇒ Before disconnecting the hydraulic lines, switch off and depressurise the hydraulic system.
  - ⇒ Wear safety glasses.
- Risk of soiling.
  - ⇒ Wear personal protective equipment.
  - ⇒ Thicken any hydraulic oil leakage immediately with oil binder and then wipe away.

1. Remove bolts from all hydraulic cylinders on the piston rod side, and then completely retract.
2. Switch off the hydraulic pump.
3. Disconnect the hydraulic pump from the mains.
4. Disconnect the hydraulic hoses from the hydraulic pump.
5. Disconnect the hydraulic hoses from the hydraulic cylinders.
6. Fit all Quick-Couplers with protection caps or couple them together.
7. Possibly couple together the bypass line in the hydraulic pump.
8. Roll up all hydraulic hoses, tie them together and sort by length.
9. Place the hydraulic hoses in the available transport container.

## Dismantling the Hydraulic Cylinder

### **Warning**

Heavy moving parts!

When dismantling, there is a risk of hands being crushed.

⇒ Wear protective gloves.

⇒ Ensure a safe and secure position.

### Dismantling the Hydraulic Cylinder

1. Remove bolts from the hydraulic cylinders.
2. Stack the hydraulic cylinders in the available transport crate and secure against sliding.

### Dismantling the Lifting and Lowering Cylinders

1. Attach the Lifting and Lowering Cylinder with the Main Beam to the crane lifting gear.
2. Dismantle the Lifting and Lowering Cylinder with the Main Beam and set down next to the transport crate.
3. Remove bolts from the Lifting and Lowering Cylinder on the piston side.
4. Stack the Lifting and Lowering Cylinders in the available transport crate and secure against slipping.
5. Mount the Main Beam in its original position on the Lift Frame.

## Dismantling the Hydraulic Pump

1. Disconnect the hydraulic pump from the mains.
2. Provide an empty hydraulic oil cannister.
3. Unscrew cover of the filling opening for the hydraulic oil.
4. With the Hydraulic Oil Filter Pump CE, suck up the hydraulic oil via the filling opening.
5. Attach the hydraulic pump to the crane lifting gear.
6. Detach hydraulic pump from the Base Beam and fly out.
7. Stack the hydraulic pumps in the available transport crate and secure against sliding.



- Store or dispose of the hydraulic oil in accordance with the applicable environmental regulations.
- Follow the Instructions for Use of the Hydraulic Oil Filter Pump CE.

## Dismantling the Hydraulic Drive



### Warning

Heavy moving parts!  
When dismantling, there is a risk of hands being crushed.  
⇒ Wear protective gloves.  
⇒ Ensure a safe and secure position.

### Dismantling the Hydraulic Drive

1. Remove the coupling bolts M20x200 (31.3) and place to one side.
2. Attach the hydraulic drive to the crane lifting gear.
3. Remove bolts M20x70.
4. Pull the hydraulic drive out of the wheel block.
5. Re-attach bolts M20x70, nuts M20 and washers M20 to the hydraulic drive.
6. Mount the coupling bolts M20x200 with nuts M20 on the wheel block again.
7. Fly out the hydraulic drive, stack in the available transport crate and secure against sliding.

### Dismantling the Wheel Block

1. Attach the wheel block to the crane lifting gear.
2. Remove bolts M20x70.
3. Fly out wheel block, place in the available transport crate and secure against sliding.

## Dismantling the Hinge Slide



### Warning

Heavy moving parts!  
 When dismantling, there is a risk of hands being crushed.  
 ⇒ Wear protective gloves.  
 ⇒ Ensure a safe and secure position.

### Dismantling

1. Pull fitting pins 26x120 (125a + 125b).
  2. Raise the sliding part (25.9) to the transport position.
  3. Insert fitting pin 26x120 (125a) and secure with cotter pin (126a).
  4. Insert fitting pin 26x120 (125b) and secure with cotter pin (126b).
- (Fig. G2.01 + G2.02)
5. Place the Hinge Slides (24) in the available transport container.

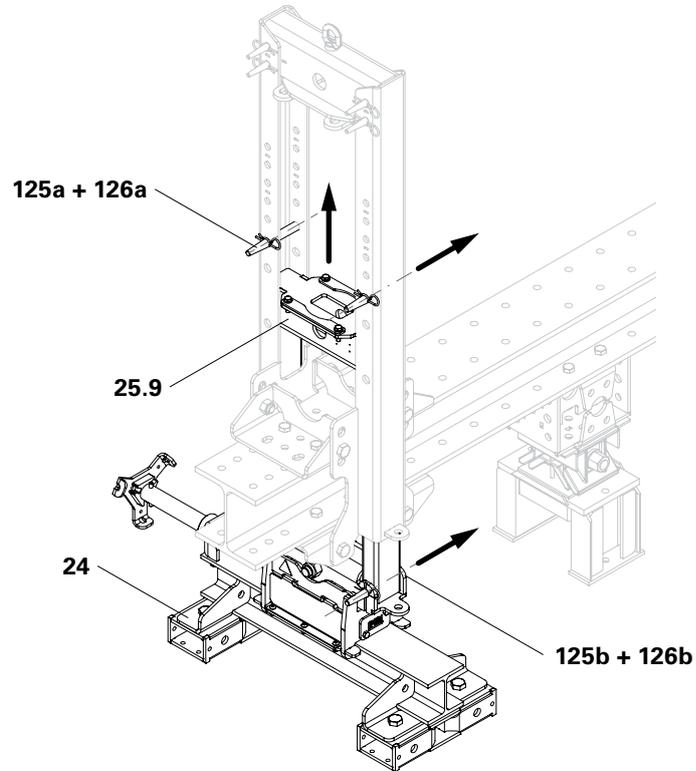


Fig. G2.01

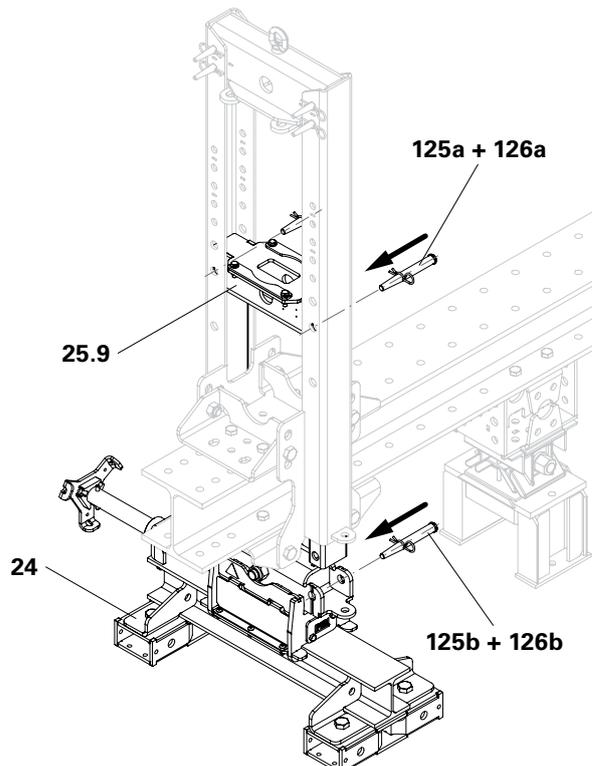


Fig. G2.02

## Dismantling the Lift Frame



When moving the Lift Frame, use the available crane eyes.

1. Attach Lift Frame to the crane lifting gear.
2. Remove bolts M20x60 (109).
3. Remove bolts M24x50 (115b) and dismantle bottom Girder Connection (25.5).
4. Fly out the Lift Frame and place next to the ring pallet.
5. Fix the bottom Girder Connection (25.5) in its original position with bolts M24x50 (115b) and nuts M24 (120).
6. Place the Lift Frame in the ring pallet and secure against sliding. (Fig. G2.03)

For safe transportation, see "Packaging" information on Page 124.

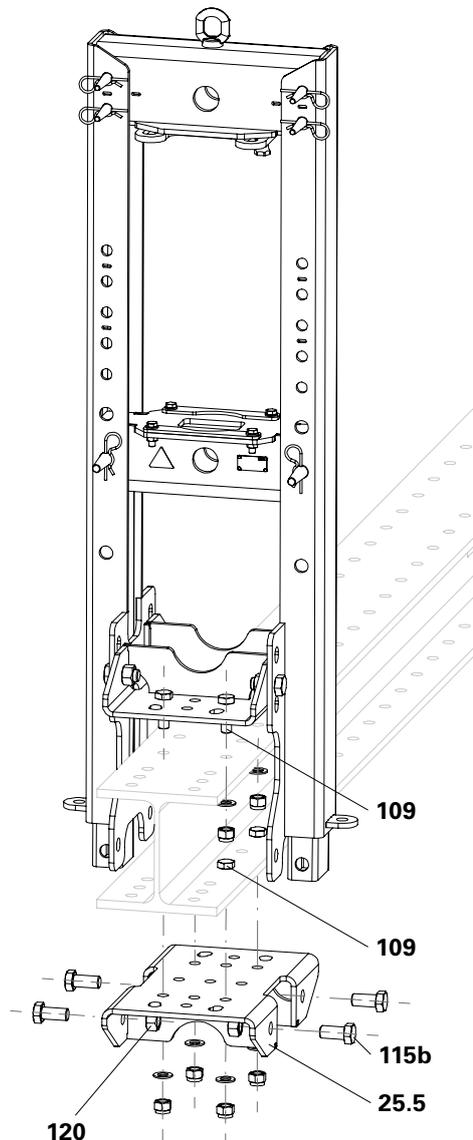


Fig. G2.03

Disposal of the components must be arranged by an authorised person.



- Materials are to be sorted correctly and according to type.
- The materials are to be disposed of according to local regulations and guidelines.
- Safety data sheet of the hydraulic oil must be taken into consideration when disposing of the hydraulic oil.
- Operating materials, cleaning agents and solvents must not be allowed to enter the drainage system or in the ground.



## General safety instructions

- Do not drop the components.
- Store and transport components ensuring that no unintentional change in their position is possible. Detach lifting gear from the lowered units only if these are in a stable position and no unintentional change is possible.
- When moving the components, make sure they are lifted and set down in a way that any unintentional tilting over, falling apart, sliding or rolling away is prevented.
- Do not stand under suspended loads.
- Use only suitable and approved load-carrying equipment.
- Use only designated load-bearing points on the component.
- During the lifting and moving procedure, ensure that all loose parts are removed or secured.
- During the moving procedure with the crane, always use a rope to guide the components.
- Transport and set down components on clean, flat and sufficiently load-bearing surfaces only.
- Use original PERI storage and transport systems, e.g. Crate Pallets, Pallets or Stacking Devices.
- PERI products must be protected against the effects of the weather and aggressive materials during storage in order to ensure that safety is not affected.
- The access areas on the construction site must be free of obstacles and tripping hazards as well as being slip-resistant.

## Packaging

### Transport crates

- Transport the hydraulic cylinders, hydraulic pumps and hydraulic drives only in the designated transport crates.
- Clearly label the top side of the transport crates.
- Fix lids to the transport crates.
- Drill holes in the bottom of the transport crates to allow drainage.
- Fix accurately cut timbers in the crates to secure the hydraulic cylinders, hydraulic pumps and hydraulic drives.
- When moving transport crates with the crane, use suitable lifting slings that are wrapped around the underside.
- Take into consideration all transport markings (stylised lines) on the crates.
- Only use designated transport crates for transportation and storage. (Fig. H1.01)

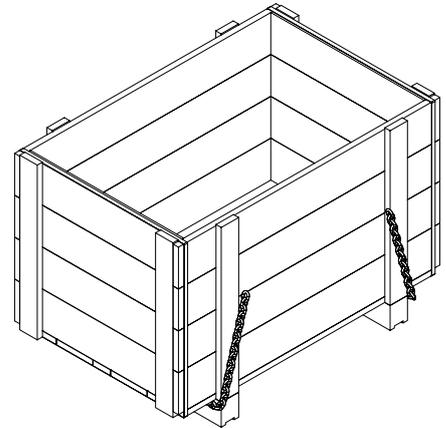


Fig. H1.01

### Ring Pallets

Stack the Lift Frames in pairs in a Ring Pallet 120x80 and secure with tensioning straps. (Fig. H1.02)

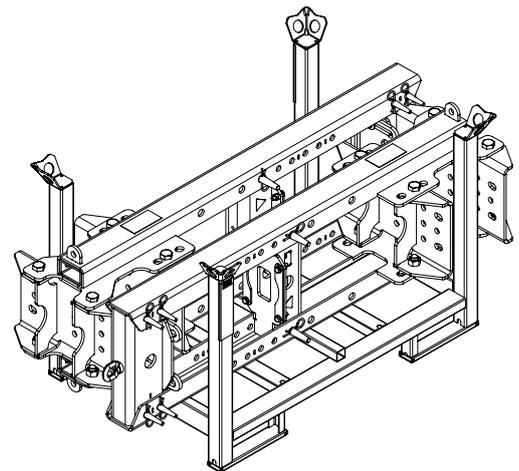


Fig. H1.02

## Transport from and to the construction site

- Clean hydraulic cylinder and hydraulic pump and leave to dry before transporting.
- Clean bushing and connectors of all Quick-Couplers, and fit with protection caps or couple together.
- Ensure the piston rod is in a retracted position before transporting the hydraulic cylinder.
- Place the hydraulic cylinders in the designated transport crate and secure.
- Drain the hydraulic pump.
- Place the hydraulic pumps in their designated transport crates and secure them.
- Sort and clearly label hydraulic hoses according to length.
- Roll up the hydraulic hoses and store in suitable transport containers.

## Transportation and intermediate storage on the construction site

- If the storage temperature falls below  $-40\text{ }^{\circ}\text{C}$ , check the hydraulic oil for uneven viscosity and replace if necessary.
- Keep the transport crates after delivery in order to allow safe return transport and storage.
- Before storing, clean dirt off the hydraulic cylinder and hydraulic pump, and then leave to dry.
- Clean the bushing and connectors of all Quick-Couplers, and fit with protection caps or couple together.
- Transport the hydraulic cylinder ensuring that the piston rod is in a retracted position.
- Place the hydraulic cylinders in the designated transport crate and secure.
- Place the hydraulic pumps in the designated transport crates and secure them.
- Do not store or transport hydraulic pumps in a horizontal position otherwise oil escapes through the ventilation valve.
- Roll up the hydraulic hoses, store and transport in suitable transport containers.

## Longer storage periods

- Protect connections against corrosion through a suitable preserving agent.
- Close all openings ensuring they are airtight.
- If stored in regions with high humidity, additionally fill the hydraulic oil tank to the brim with hydraulic oil and ensure that the unit is firmly closed.

# H2 Dimensions

Component	Dimensions			Weight <sup>1)</sup> kg	Illustration	Item no.
	L mm	B mm	H mm			
Hydraulic Pump VARIOKIT 8-cycles	1128	675	1073	245	Fig. H2.01	126852
Hydraulic Cylinder VARIOKIT D120-300	832	140	177	55	Fig. H2.02	127480
Hydraulic Cylinder VARIOKIT D60-650	1040	133	160	21	Fig. H2.03	127481
Wheel Block VARIOKIT 300 kN	500	436	366	135	Fig. H2.04	133664
Hydraulic Drive VARIOKIT	420	581	337	102	Fig. H2.05	133953
Lift Frame LALD VARIOKIT	1735	585	500	167	Fig. H2.06	130955
Hinge Slide LALD VARIOKIT	1221	400	475	132	Fig. H2.07	130902

<sup>1)</sup> All weight details do not include the oil

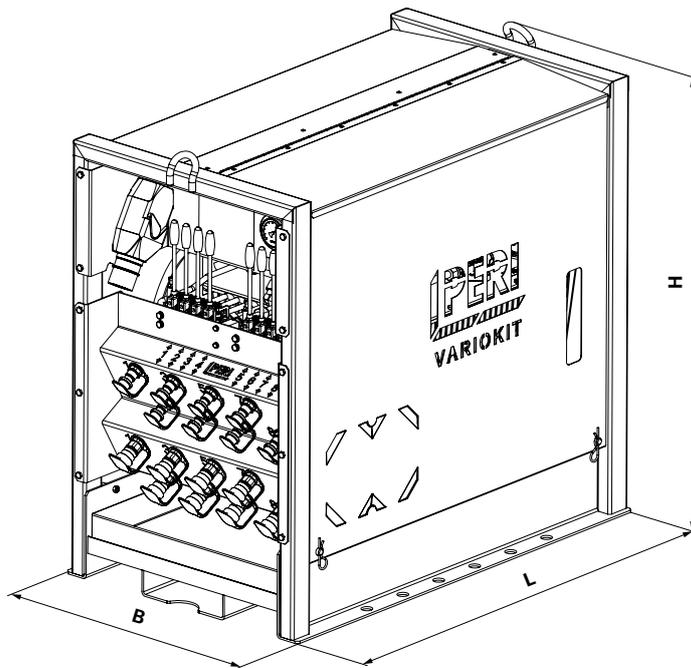


Fig. H2.01

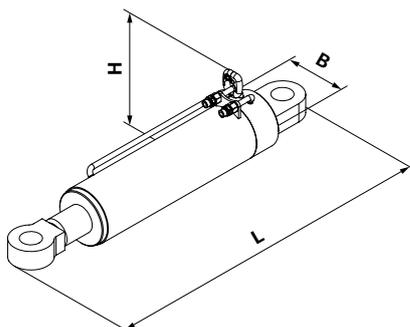


Fig. H2.02

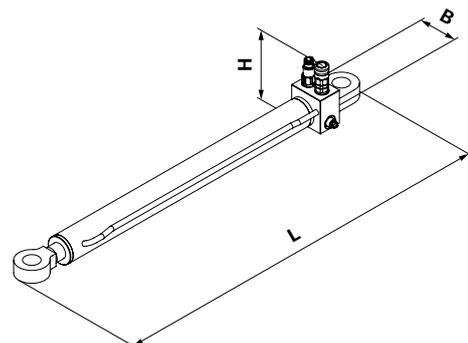


Fig. H2.03

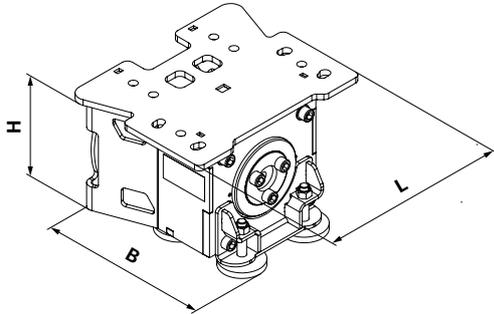


Fig. H2.04

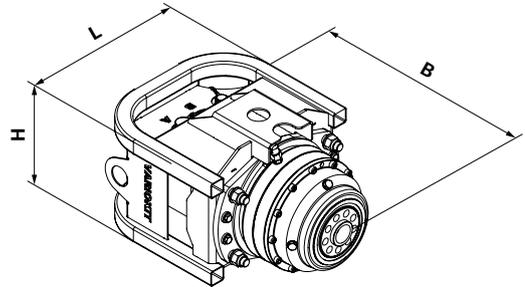


Fig. H2.05

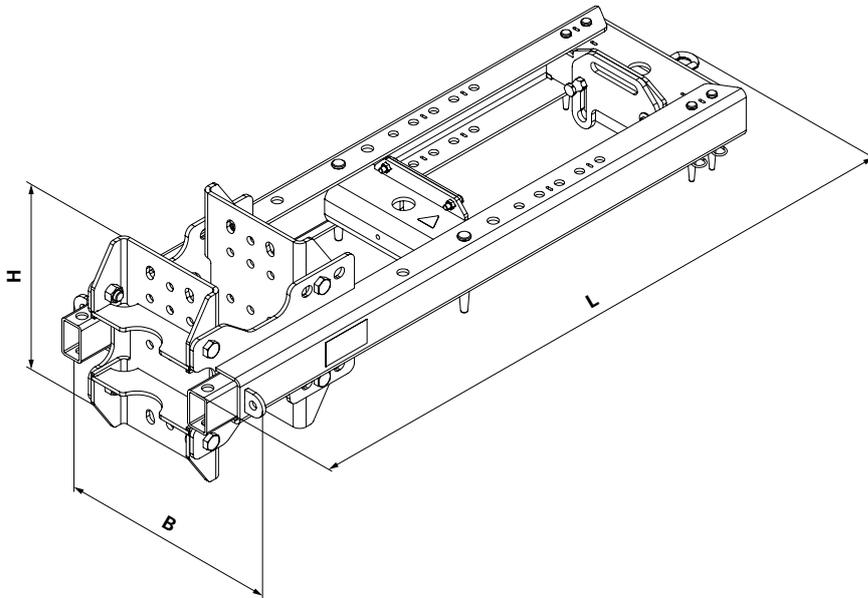


Fig. H2.06

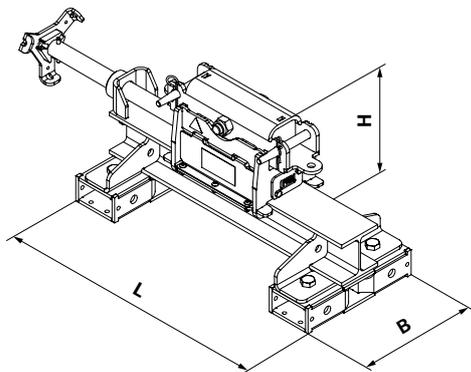


Fig. H2.07



## Participation Protocol and Handover Certificate VTC Tunnel Formwork Carriage

Name: \_\_\_\_\_

Position: \_\_\_\_\_

Training: \_\_\_\_\_

- I have participated in the above training course.
- I have received and understood the assembly instructions for the VTC Tunnel Formwork Carriage.
- I know the safety regulations and will adhere to them in practice.
- If I should have any questions or in the case of any uncertainty, I will contact:

\_\_\_\_\_  
\_\_\_\_\_

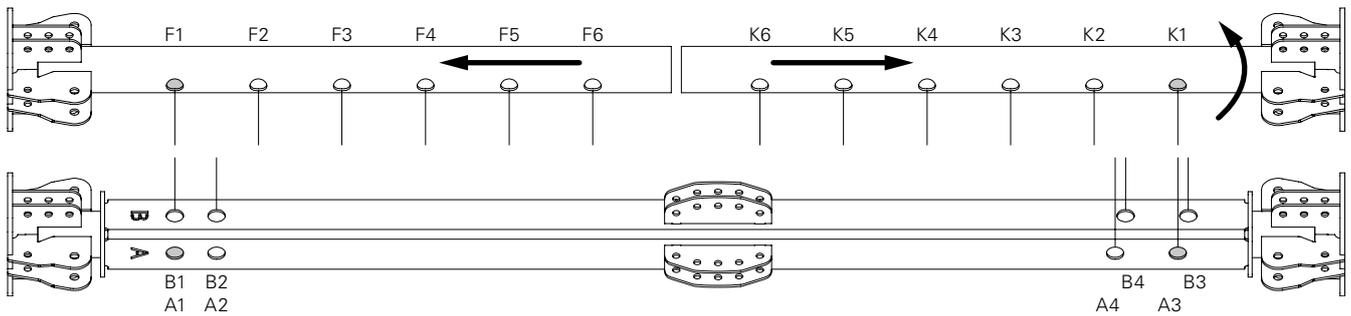
Date / Signature: \_\_\_\_\_

Germany  
PERI GmbH  
P.O. Box 1264

89259 Weissenhorn / Germany

Tel.: +49 7309 950 - 0  
Fax: +49 7309 950 - 6210

# I3 Matrix: Telescopic Prop Extension



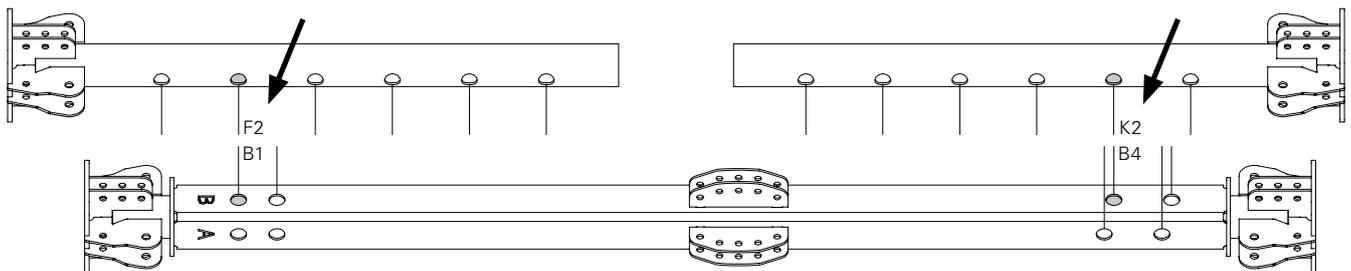
## Example

Extend the Telescopic Prop to a length of 4343.75 mm.

1. In the table, look for the linear measure.
2. Read off the combination for marking out for the Telescopic Arm below: B1F2
3. Read off the combination for marking out for the Telescopic Arm above: B4K2



4281.25	B1F2	B3K1
4312.50	A1F2	A4K2
4343.75	B1F2	B4K2
4375.00	A2F3	A3K1
4406.25	B2F3	B3K1



# I3 Matrix: Telescopic Prop Extension

Length [mm]	TT bottom <sup>1)</sup>	TT top <sup>2)</sup>
4000.00	A1F1	A3K1
4031.25	B1F1	B3K1
4062.50	A1F1	A4K2
4093.75	B1F1	B4K2
4125.00	A2F2	A3K1
4156.25	B2F2	B3K1
4187.50	A2F2	A4K2
4218.75	B2F2	B4K2
4250.00	A1F2	A3K1
4281.25	B1F2	B3K1
4312.50	A1F2	A4K2
4343.75	B1F2	B4K2
4375.00	A2F3	A3K1
4406.25	B2F3	B3K1
4437.50	A2F3	A4K2
4468.75	B2F3	B4K2
4500.00	A1F2	A3K2
4531.25	B1F2	B3K2
4562.50	A1F2	A4K3
4593.75	B1F2	B4K3
4625.00	A2F3	A3K2
4656.25	B2F3	B3K2
4687.50	A2F3	A4K3
4718.75	B2F3	B4K3
4750.00	A1F3	A3K2
4781.25	B1F3	B3K2
4812.50	A1F3	A4K3
4843.75	B1F3	B4K3
4875.00	A2F4	A3K2
4906.25	B2F4	B3K2
4937.50	A2F4	A4K3
4968.75	B2F4	B4K3

Length [mm]	TT bottom <sup>1)</sup>	TT top <sup>2)</sup>
5000.00	A1F3	A3K3
5031.25	B1F3	B3K3
5062.50	A1F3	A4K4
5093.75	B1F3	B4K4
5125.00	A2F4	A3K3
5156.25	B2F4	B3K3
5187.50	A2F4	A4K4
5218.75	B2F4	B4K4
5250.00	A1F4	A3K3
5281.25	B1F4	B3K3
5312.50	A1F4	A4K4
5343.75	B1F4	B4K4
5375.00	A2F5	A3K3
5406.25	B2F5	B3K3
5437.50	A2F5	A4K4
5468.75	B2F5	B4K4
5500.00	A1F4	A3K4
5531.25	B1F4	B3K4
5562.50	A1F4	A4K5
5593.75	B1F4	B4K5
5625.00	A2F5	A3K4
5656.25	B2F5	B3K4
5687.50	A2F5	A4K5
5718.75	B2F5	B4K5
5750.00	A1F5	A3K4
5781.25	B1F5	B3K4
5812.50	A1F5	A4K5
5843.75	B1F5	B4K5
5875.00	A2F6	A3K4
5906.25	B2F6	B3K4
5937.50	A2F6	A4K5
5968.75	B2F6	B4K5

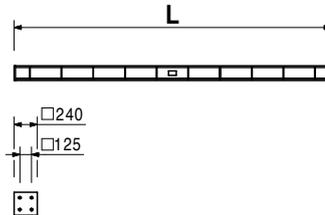
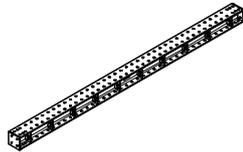
Length [mm]	TT bottom <sup>1)</sup>	TT top <sup>2)</sup>
6000.00	A1F5	A3K5
6031.25	B1F5	B3K5
6062.50	A1F5	A4K6
6093.75	B1F5	B4K6
6125.00	A2F6	A3K5
6156.25	B2F6	B3K5
6187.50	A2F6	A4K6
6218.75	B2F6	B4K6
6250.00	A1F6	A3K5
6281.25	B1F6	B3K5
6312.50	A1F6	A4K6
6343.75	B1F6	B4K6
6375.00	A2F6	A3K6
6406.25	B2F6	B3K6
6437.50 <sup>3)</sup>		
6468.75 <sup>3)</sup>		
6500.00	A1F6	A3K6

<sup>1)</sup> TT bottom: Telescopic Tube bottom

<sup>2)</sup> TT top: Telescopic Tube top

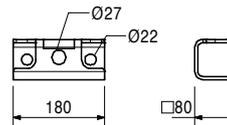
<sup>3)</sup> These missing extension lengths can be compensated via the adjustment range of the Wedge Lowering Device 420kN or by turning the Support Wedge Box VARIOKIT.

Item no.	Weight kg		L
129895	141.000	<b>Longitudinal Beams VARIOKIT</b>	
		<b>Longitudinal Beam VARIOKIT 150</b>	1500
129898	229.000	<b>Longitudinal Beam VARIOKIT 250</b>	2500
129901	273.000	<b>Longitudinal Beam VARIOKIT 300</b>	3000
129904	317.000	<b>Longitudinal Beam VARIOKIT 350</b>	3500
129907	448.000	<b>Longitudinal Beam VARIOKIT 500</b>	5000
129910	667.000	<b>Longitudinal Beam VARIOKIT 750</b>	7500
129913	886.000	<b>Longitudinal Beam VARIOKIT 1000</b>	10000

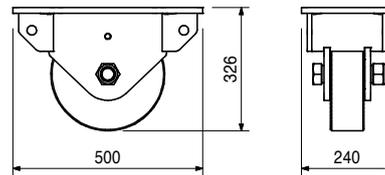
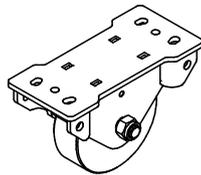


For use in temporary shoring systems and heavy-duty structures. Profile HEB 240.

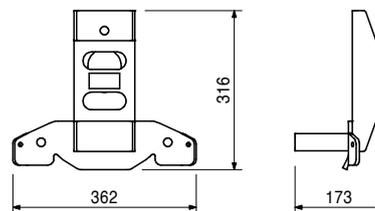
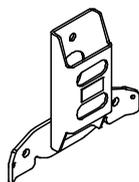
131040	1.810	<b>Cross Connector RCS VARIOKIT</b> For crosswise connection of Longitudinal Beams VARIOKIT and Climbing Rails RCS.
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131001	75.100	<b>Heavy Duty Wheel VARIOKIT</b> To be used with crane rails with 130981.
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130981	4.830	<b>Flange Cage HDW VARIOKIT</b> For mounting of 131001 when used on crane rail.	<b>Note</b> Use in pairs.
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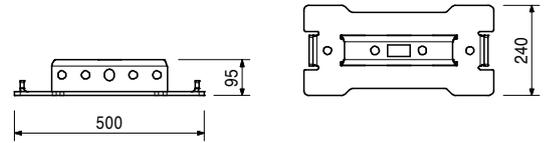
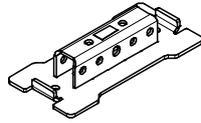
#### Accessories

113990	0.600	<b>Bolt ISO 4017 M16 x 25-8.8, galv.</b>
113349	0.087	<b>Washer ISO 7094 100 HV, A 16, galv.</b>
710049	0.262	<b>Bolt ISO 4014 M16 x 150-8.8</b>
070890	0.030	<b>Nut ISO 7040 M16-8, galv.</b>

Item no.	Weight kg
130842	11.600

### Adapter RCS HDW VARIOKIT

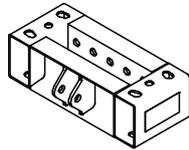
For the connection of Heavy Duty Wheel VARIOKIT or Wheel Block VARIOKIT 300 kN to Climbing Rail RCS.  
Compatible with Thrust Frame LALD HDW VARIOKIT.



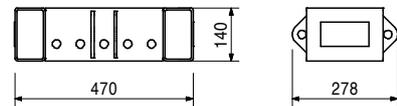
130843	17.900
--------	--------

### Thrust Frame LALD HDW VARIOKIT

Distance piece between Heavy Duty Wheel VARIOKIT or Wheel Block VARIOKIT 300 kN and the base girders.



**Note**  
Fixing 131001 / 133664 with 133911.



Accessories

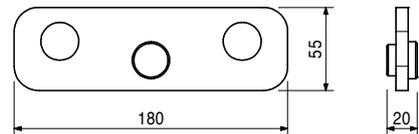
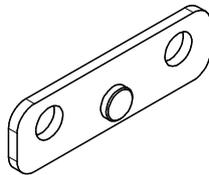
133911	0.583
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### Assembly Kit Thrust Frame

133911	0.583
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### Assembly Kit Thrust Frame

For use with 130843.



Accessories

130843	17.900
132382	0.360
105032	0.070
722663	0.032

### Thrust Frame LALD HDW VARIOKIT

**Bolt ISO 4017 M24 x 70-8.8, galv.**

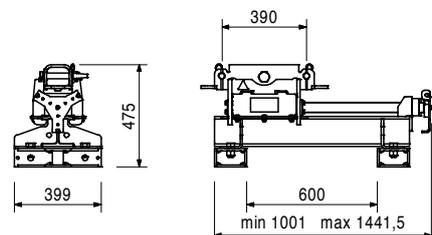
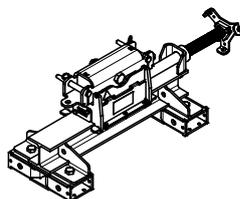
**Nut ISO 7040 M24-8, galv.**

**Washer ISO 7089-24-200HV, galv.**

130902	132.000
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### Hingeside LALD VARIOKIT

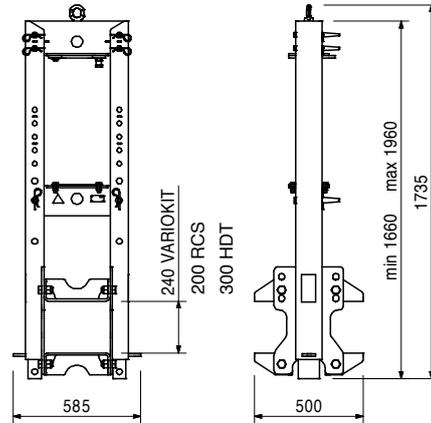
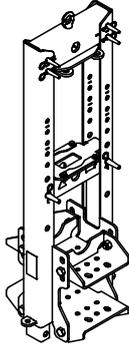
Bottom-side, articulated bearing position and positioning aid for temporary shoring systems and heavy-duty structures during the lifting and lowering process. To use with 130955.



Item no.	Weight kg
130955	166.000

## Liftframe LALD VARIOKIT

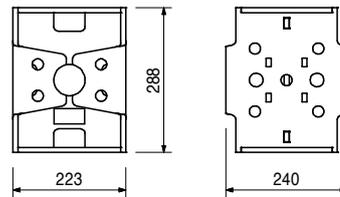
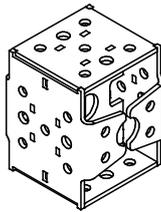
Lifting device for screwing onto the base girders of the temporary shoring system. The entire heavy-duty structure is guided during the lifting and lowering process. To use with 130902.



130970	20.700
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## Support Wedgebox VARIOKIT

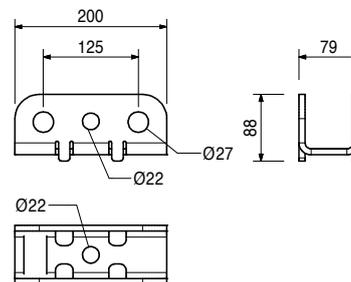
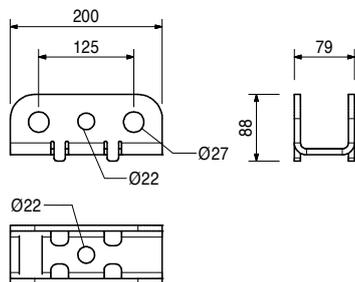
Distance piece for transferring loads.



130972	2.320
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## Connector RCS LALD VARIOKIT

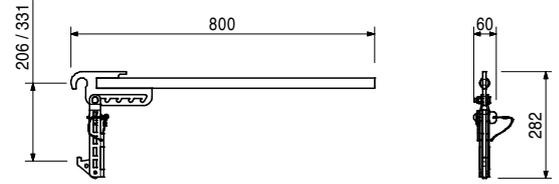
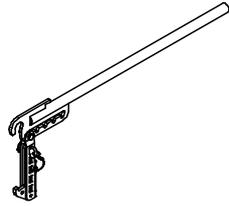
For the connection of Support Wedgebox VARIOKIT or Heavy Duty Roller Swivel Plate to Climbing Rail RCS.



Item no.	Weight kg
131072	2.560

## Liftingtool LALD VARIOKIT

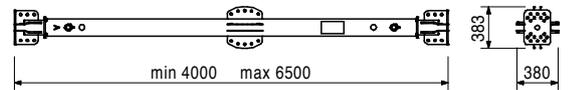
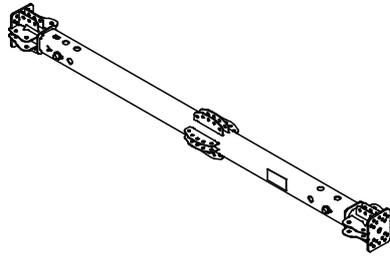
For manual lifting of the Hingeslide LALD VARIOKIT with hydraulic jack while the operation of the lifting and lowering device.



131060	288.000
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## Telescopic Prop VARIOKIT

Height-adjustable heavy-duty prop for transferring vertical loads in temporary shoring systems and heavy-duty constructions.



Accessories

130848	6.980
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## Multiadapter RCS VARIOKIT

115599	53.300
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## Brace Connector-2 HD

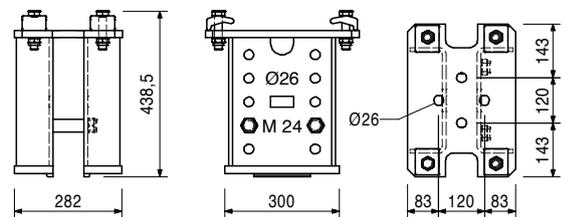
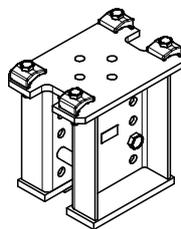
For connecting VARIOKIT Struts to the Main Beam HDT. Bolted to the main beam.

### Complete with

- 2 pc. 110023 Spacer M24-82
- 4 pc. 115145 Clamping Plate M16 Nova Grip
- 4 pc. 710226 Bolt ISO 4014 M20 x 90-8.8, galv.
- 4 pc. 108201 Nut DIN 980 M20-8, galv.

### Technical Data

Min. locking torque for clamping screws 100 Nm.

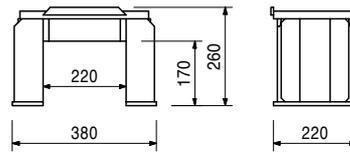
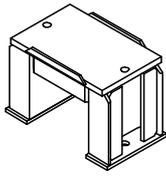


Item no. Weight kg

113770 32.200

## Brace Support 250, Rail

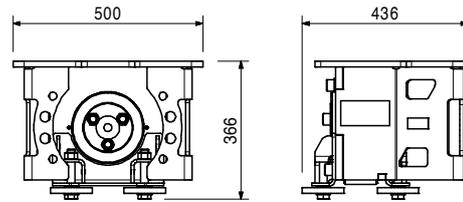
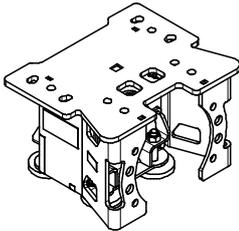
For transferring loads when using rails.



133664 134.000

## Wheel Block VARIOKIT 300 kN

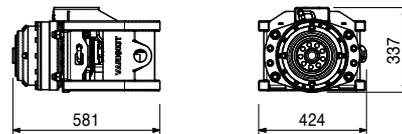
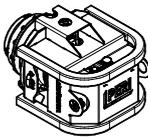
To use with 133953.



133953 102.000

## Hydraulic Drive VARIOKIT

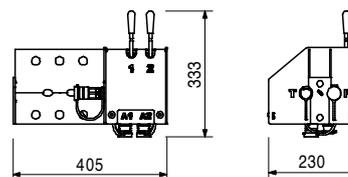
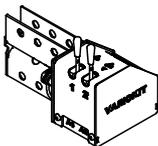
To use with 133664.



134002 25.000

## Valve Block Hydraulic Drive

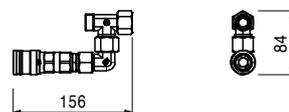
For the hydraulic control of Hydraulic Drive VARIOKIT.



133676 0.687

## Conversionset Hydr. Aggr. RCS-VTC

Conversion set for the use of Hydraulic Drive VARIOKIT with Hydraulic Pump RCS 4-fold.



Item no.	Weight kg
112421	3.000

### Hydraulic Accumulate Piece RCS

To double the volume of the oil at the Hydraulic Pump RCS. Also doubles the speed of the Hydraulic Winch RCS.



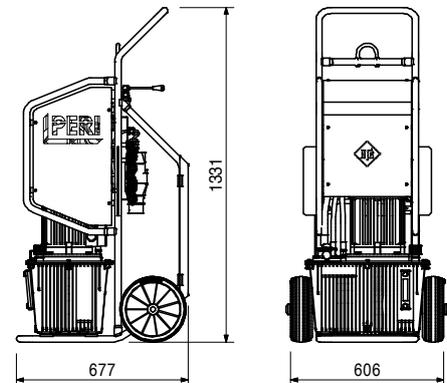
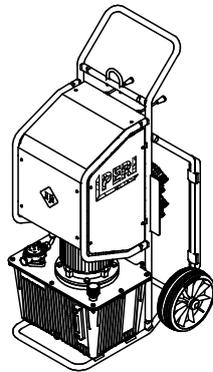
109766	109.000
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### Hydraulic Pump RCS 4-fold, 380 – 460 V

Hydraulic pump for actuating the Climbing Device RCS 50 and LPS 30.

#### Note

Follow Instructions for Use.  
Use only original PERI Hydraulic Oil HV LP46.



#### Accessories

057376	18.300
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### Hydraulic Oil ISO 11158 HVI46, 20 l

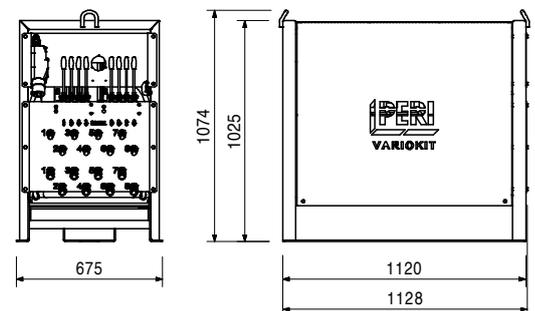
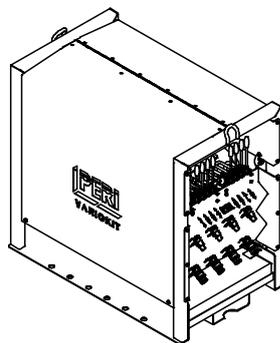
126852	245.000
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### Hydraulic Unit VARIOKIT 8-cycles

Hydraulic pump for shuttering and striking of up to 8 hydraulic cylinders (extendable up to 5 Way Valve Units, Quad, item-no. 128338).

#### Note

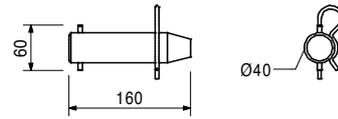
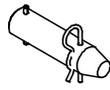
Follow Instructions for Use!  
Use only original PERI hydraulic oil HVCP 46.



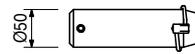
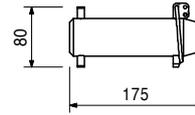
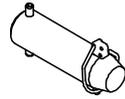
Item no.	Weight kg		
110280	0.500	<b>Adapter Cable RCS</b> For the power supply to the Hydraulic Pump RCS.	<b>Note</b> Follow Instructions for Use! With CEE plug connector 400 V 16 A.
110279	0.250	<b>Plug Socket RCS, black</b> For providing the power supply to the Hydraulic Pump RCS with 380 – 460 V, 50 – 60 Hz.	<b>Note</b> Follow Instructions for Use!
127480	55.200	<b>Hydraulic Cylinder VARIOKIT Ø 120 - 300</b>	<b>Note</b> Follow Instructions for Use!
		Accessories <b>Pin 50 x 175</b>	
127397	2.660		
127481	21.500	<b>Hydraulic Cylinder VARIOKIT Ø 60 - 650</b>	<b>Note</b> Follow Instructions for Use!
		Accessories <b>Pin 40 x 160</b>	
127400	1.490		

# VTC Tunnel Carriage

Item no.	Weight kg	
127400	1.490	<b>Pin 40 x 160</b>

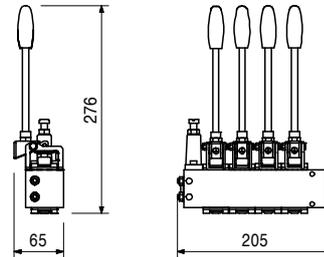
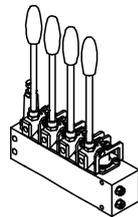


127397	2.660	<b>Pin 50 x 175</b>
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128338	4.200	<b>Way Valve Unit - Quad</b>
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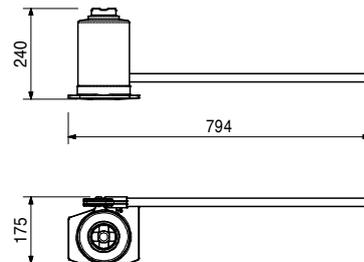
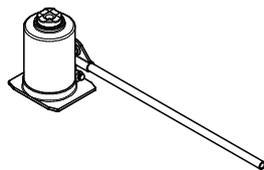
With more than 8 cylinders which can be controlled with the connectors of the hydraulic unit a connection is used to connect further way valve units.



130965	21.170	<b>Hydraulic Jack 250 kN</b>
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### Note

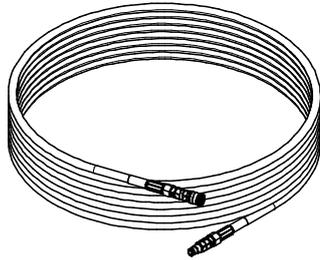
Hydraulic Jack 250 kN always to be used in connection with item no. 131072 Lifting Tool LALD VARIOKIT.



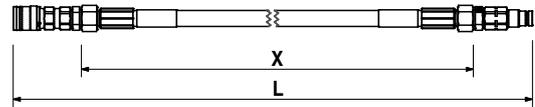
Item no.	Weight kg
131019	7.230
131021	13.700

**Hydraulic Hose 2SN-DN12-FF**  
**Hydraulic Hose 2SN-DN12-FF 10.0 m**  
**Hydraulic Hose 2SN-DN12-FF 20.0 m**

Hydraulic hoses with quick-release couplings at both ends and large nominal diameter 12 mm to minimize line pressure loss.



**Note**  
 Follow applicable Safety Regulations for the installation and maintenance of hydraulic lines!



129035	0.996
129036	1.430

**Hydraulic Hoses EN 853 2SN DN08**  
**Hydraulic Hose EN 853 2SN DN08 1.0 m**  
**Hydraulic Hose EN 853 2SN DN08 2.0 m**

For connecting hydraulic striking modules with hydraulic climbing devices.

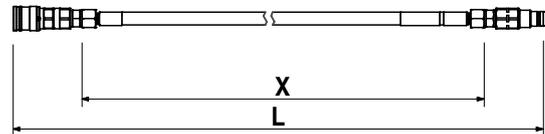
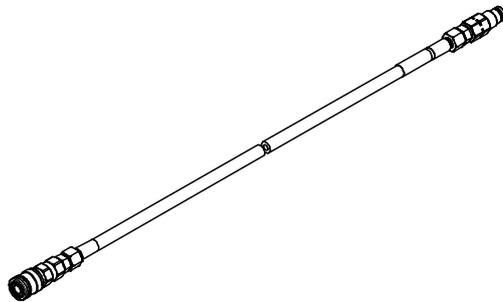
L	X
1169	1000
2169	2000

**Complete with**

- 1 pc. 128992 Pin ISO16028 DN10 R3/8IG
- 1 pc. 128993 Sleeve ISO16028 DN10 R3/8IG
- 2 pc. 051750 Male Stud Coupler X-GE12PSR-ED

**Note**

Follow applicable Safety Regulations for the installation and maintenance of hydraulic lines!



Item no.	Weight kg
129419	2.690
129420	4.900
129421	7.120
129422	9.330

**Hydraulic Hoses 2SN-DN08-FF**  
**Hydr. Hose 2SN-DN08-FF 5.0 m**  
**Hydr. Hose 2SN-DN08-FF 10.0 m**  
**Hydr. Hose 2SN-DN08-FF 15.0 m**  
**Hydr. Hose 2SN-DN08-FF 20.0 m**

For connecting hydraulic striking modules with hydraulic climbing devices.

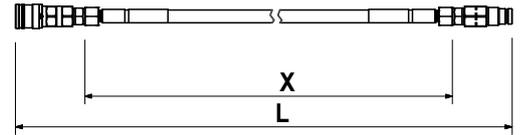
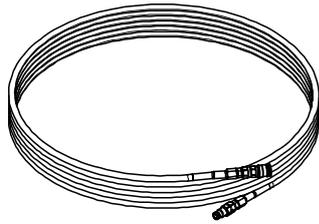
L	X
5170	5000
10170	10000
15170	15000
20170	20000

**Complete with**

- 1 pc. 128992 Pin ISO16028 DN10 R3/8IG
- 1 pc. 128993 Sleeve ISO16028 DN10 R3/8IG
- 2 pc. 051750 Male Stud Coupler X-GE12PSR-ED

**Note**

Follow applicable Safety Regulations for the installation and maintenance of hydraulic lines!

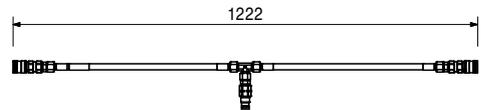
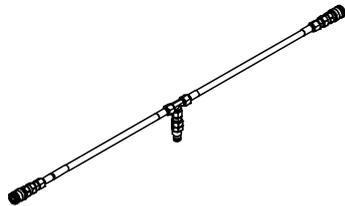


129423	1.370
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**Hydr. T-Piece 2SN-DN08-FF**

**Complete with**

- 2 pc. 128993 Sleeve ISO16028 DN10 R3/8IG
- 1 pc. 128992 Pin ISO16028 DN10 R3/8IG
- 3 pc. 051750 Male Stud Coupler X-GE12PSR-ED



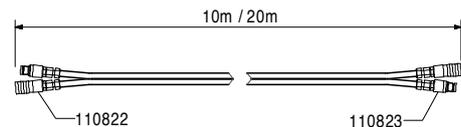
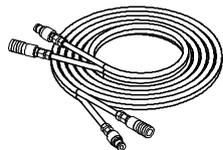
110069	8.500
110070	15.300

**Hydraulic Twin Hoses RCS**  
**Hydraulic Twin Hose RCS, 10 m**  
**Hydraulic Twin Hose RCS, 20 m**

Two permanently connected hydraulic hoses for connecting hydraulic pumps with hydraulic climbing devices.

**Complete with**

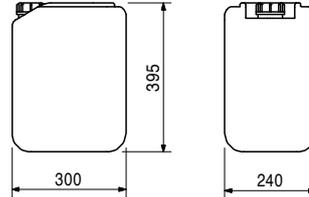
- 2 pc. 128992 Pin ISO16028 DN10 R3/8IG
- 2 pc. 128993 Sleeve ISO16028 DN10 R3/8IG
- 4 pc. 051750 Male Stud Coupler X-GE12PSR-ED



Item no.	Weight kg
057376	18.300

**Hydraulic Oil ISO 11158 HVI46, 20 I**  
 High quality synthetic hydraulic oils for PERI Hydraulic Units.

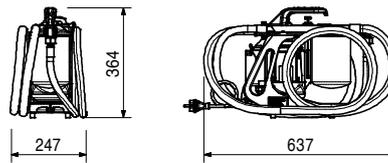
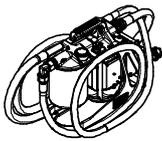
**Note**  
 Observe the safety data sheet and applicable national safety regulations regarding hydraulic oil, in particular for transport, storage and disposal!  
 Observe the technical documentation for the hydraulic unit!  
 Product data sheet on request.



131313	12.500
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**Hydraulic Oil Filter Pump CE, 230V/50Hz**  
 Hydraulic oil filter pump for fast and clean transfer of hydraulic oil in drums with simultaneous filtration.

**Note**  
 Follow Instructions for Use!  
**Technical Data**  
 Power connection 220V/50Hz, plug CEE 7/7



Accessories

131314	1.000
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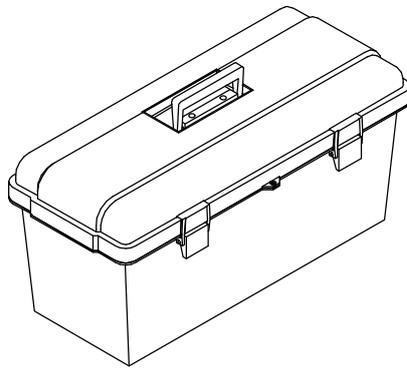
**Hydraulic Oil Filter Element 5 MIC**

Item no.	Weight kg
115581	10.280

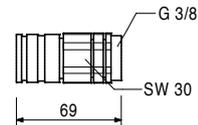
## Hydraulic Service Case

Consisting of:

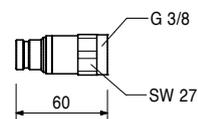
- 1 pc. 115590 Tool Box 580 x 260 x 285 mm
- 6 pc. 115583 Pressure Gauge Typ 570 VA-Geh.
- 6 pc. 115584 Hose MKT 6-02 DN 02
- 12 pc. 115582 Measuring Coupl. SMK 20-G 1/4-PC
- 2 pc. 115591 Double Spanner SW 10 x 13
- 1 pc. 115592 Double Spanner SW 13 x 17
- 1 pc. 115588 Double Spanner SW 19 x 24
- 1 pc. 051778 Double Spanner SW 24 x 27
- 1 pc. 115589 Double Spanner SW 27 x 32
- 1 pc. 057278 Allen Key Set, 8 pcs.
- 1 pc. 115585 Allen Key SW 12
- 1 pc. 057279 Allen Key SW 14
- 1 pc. 115587 Standard Screwdriver 6.5 mm
- 1 pc. 057282 Pipe Wrench
- 1 pc. 115147 Angle Fitting Set PS
- 2 pc. 115396 Fitting Set PS



110822	0.297	<b>Quick Coupler Bushing RCS</b>
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110823	0.171	<b>Quick Coupler Nipple RCS</b>
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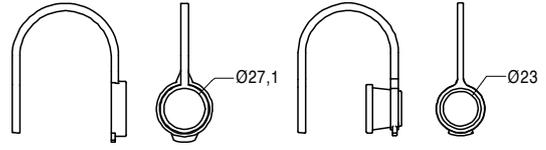
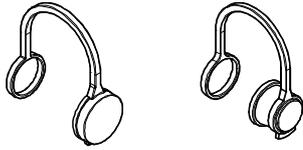


# VTC Tunnel Carriage

Item no.	Weight kg
125632	0.050

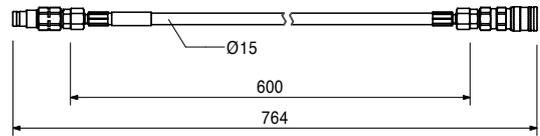
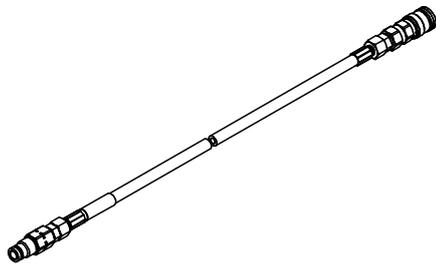
**Protect. Covers Climb. Device RCS**  
To protect unplugged quick couplings  
X-GE 12PSR-ED+ against dirt and damage.

**Technical Data**  
1 set for 1 Climbing Device RCS 50 (2x bushing  
and 2x nipple each).



126646	0.651
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**Bypass Hose RCS**

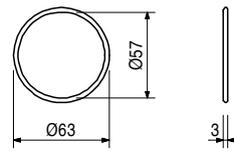


128336	0.200
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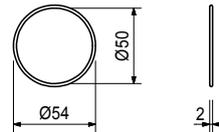
**Return Flow Filter Element**



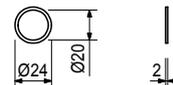
Item no.	Weight kg	
128537	0.002	<b>O-ring 57 x 3, DIN 3771</b>



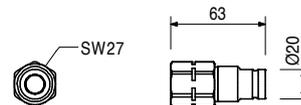
128538	0.002	<b>O-ring 50 x 2, DIN 3771</b>
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128337	0.002	<b>CU-Gasket 20 x 24 x 1.5</b>
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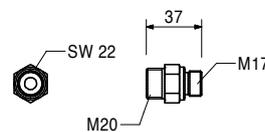
128992	0.140	<b>Pin ISO16028 DN10 R3/8IG</b>
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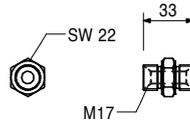
128993	0.280	<b>Sleeve ISO16028 DN10 R3/8IG</b>
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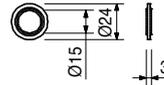
051750	0.010	<b>Male Stud Coupler X-GE12PSR-ED</b>
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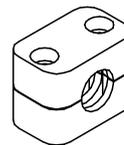
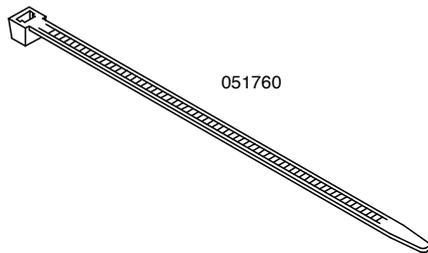
Item no.	Weight kg	
128994	0.045	<b>Double Nipple G3/8</b>



128995	0.004	<b>Washer G3/8</b>
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051760	0.004	<b>Cable Binder NT-240H</b>
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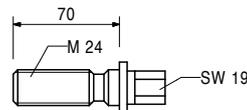


051758

051759

051775

029270	0.331	<b>Advancing Bolt M24, galv.</b> For fixing the M24 Anchor System if the plywood formlining is drilled through.
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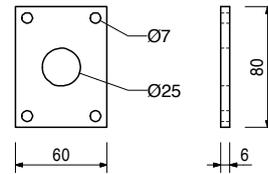
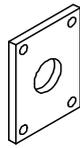


029280	0.196	Accessories <b>Anchor Positioning Plate M24, galv.</b>
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Item no.	Weight kg
029280	0.196

**Anchor Positioning Plate M24, galv.**

For fixing the M24 anchor system if the plywood formlining is drilled through.



Accessories

029440	0.005
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**Lag Screw DIN 571 6 x 20, galv.**

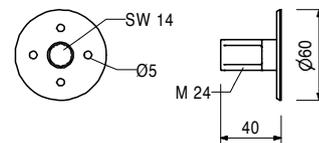
026420	0.123
--------	-------

**Anchor Positioning Stud M24, galv.**

For fixing the M24 anchor system if the plywood formlining is not drilled through.

**Note**

Allen Key SW 14.



Accessories

027212	0.445
710312	0.005

**Allen Key SW 14, long**  
**Nail 3 x 80**

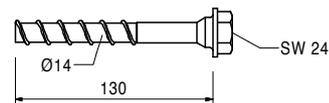
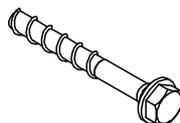
124777	0.210
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**Anchor Bolt PERI 14/20 x 130**

For temporary fixation to reinforced concrete structures.

**Note**

See PERI Data Sheet!  
Drilling Ø 14 mm.



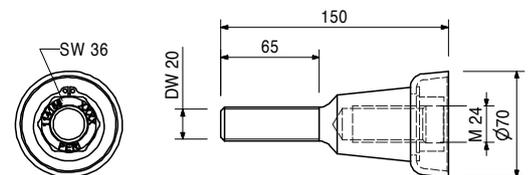
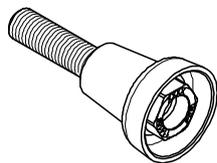
114158	1.030
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**Screw-On Cone-2 M24/DW 20, galv.**

Anchor System M24.  
For anchoring climbing systems.

**Note**

Separate design information on request.



Accessories

030860	0.792
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**Threaded Anchor Plate DW 20**

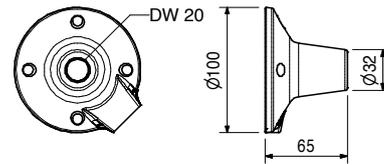
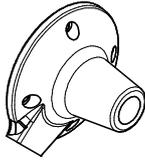
Item no.	Weight kg
030860	0.792

## Threaded Anchor Plate DW 20

For use with Tie Rod DW 20, B 20 or Screw-On Cone-2 M24/DW 20. For anchoring in concrete.

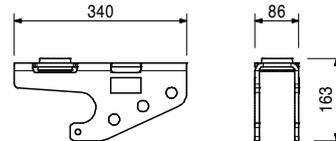
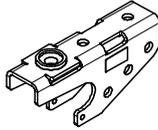
### Note

Lost anchor part.



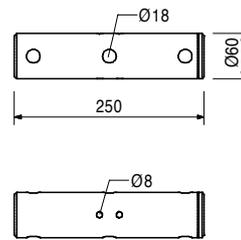
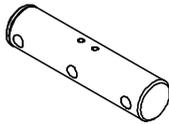
130820	5.170
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## Slab Shoe VARIOKIT



131352	5.130
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## Tie Yoke Ø 60 x 250 - 3 x Ø 18



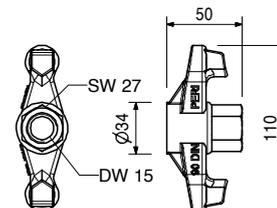
030100	0.439
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## Wingnut DW 15, galv.

For anchoring with Tie Rod DW 15 and B 15.

### Technical Data

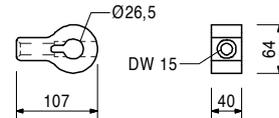
Permissible load 90 kN.



Item no.	Weight kg
115378	1.080

### Eye Nut RCS DW 15

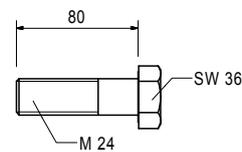
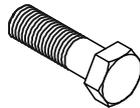
As an articulated connection to the Climbing Rail RCS, Steel Waler SRU for bracing with DW 15.



#### Accessories

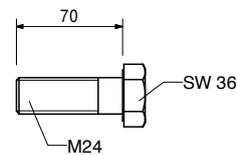
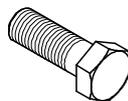
104031	0.462	<b>Fitting Pin Ø 21 x 120</b>
018060	0.014	<b>Cotter Pin 4/1, galv.</b>
111567	0.729	<b>Fitting Pin Ø 26 x 120</b>
022230	0.033	<b>Cotter Pin 5/1, galv.</b>

105416	0.360	<b>Bolt ISO 4014 M24 x 80-8.8, galv.</b>
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026430	0.334	<b>Bolt ISO 4014 M24 x 70-10.9, galv.</b>
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High-strength bolt for anchoring climbing systems.

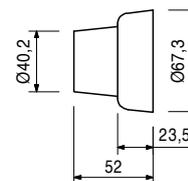
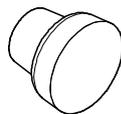


031652	0.247	<b>KK Concrete Cone M24-67/52</b>
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For closing anchor points with Climbing Cone-2, M24/DW 15 and Screw-On Cone-2 M24/DW 20.

#### Note

Delivery unit 50 pieces.



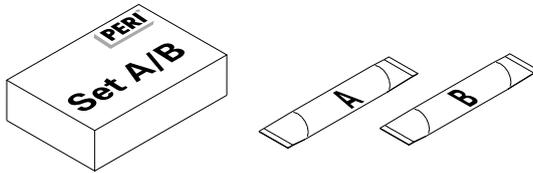
#### Accessories

131709	9.980	<b>Sealing Compound-3, 6 cans-set</b>
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Item no.	Weight kg
113127	5.400

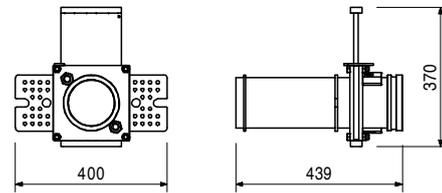
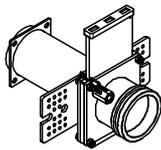
**Glue for Concrete Cones-3, 5,4-kg-Set**  
For bonding PERI Concrete Cones.

**Note**  
See Safety Data sheet!  
Consisting of:  
6 x Component A, 6 x Component B  
2 x Stirring Container, 3 x Stirring Staff



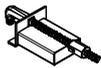
115009	21.700
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**Concrete Pump Connector BPA-2 Ø 125**  
For connecting concrete feed pipes to the formwork.



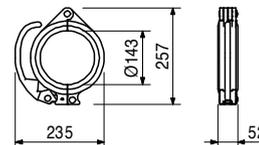
108688	1.810
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**Adapter TRIO BPA Ø 125**  
For attaching the Concrete Pump Connector BPA Ø 125 to TRIO Panels.



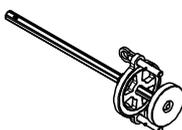
108543	4.900
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**Coupling BPA Ø 125**  
Suitable for all standard concrete feed lines with Ø 125 mm or 5.5"



115010	6.400
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**Clear Slide BPA-2 Ø 125**  
For removing residual concrete from the Concrete Pump Connector BPA-2 Ø 125.



Item no.	Weight kg
024590	32.000

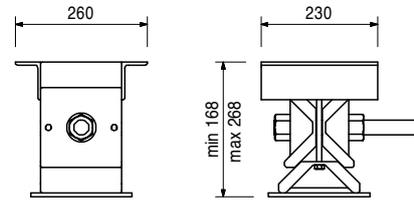
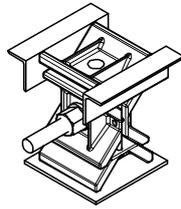
**Wedge Lowering Device 420 kN, painted**  
For releasing and lowering large loads.

**Note**

Take Type Test into consideration.  
Wrench size SW 46.

**Technical Data**

Separate Design Information on request.



117930	53.300
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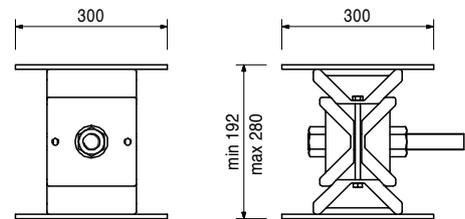
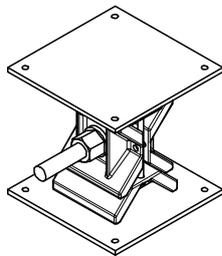
**Wedge Lowering Device 1000 kN, painted**  
For releasing and lowering large loads.

**Note**

Take Type Test into consideration.  
Wrench size SW 46.

**Technical Data**

Separate Design Information on request.

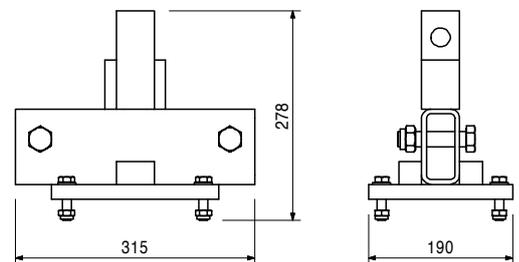
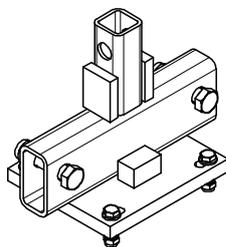


111274	13.600
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**Heavy Duty Roller Bracket VARIOKIT**  
For connecting the Heavy Duty Roller 150 kN, item no. 022040 and 200 kN, item no. 022041 to Steel Waler SRU.

**Complete with**

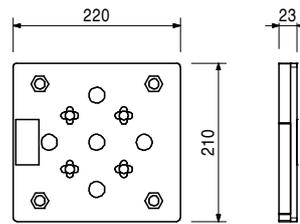
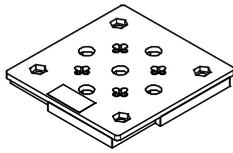
- 4 pc. 721817 Bolt ISO 4014 M12 x 50-8.8, galv.
- 4 pc. 710381 Nut ISO 7042 M12-8, galv.
- 4 pc. 780702 Washer ISO 7089 200 HV, A 12, galv.
- 2 pc. 710226 Bolt ISO 4014 M20 x 90-8.8, galv.
- 2 pc. 781053 Nut ISO 7040 M20-8, galv.



Item no. Weight kg

131811 7.050

## Heavy Duty Roller Swivel Plate



022040

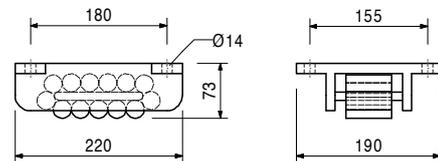
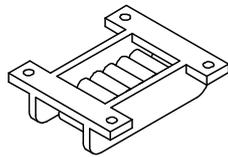
8.400

## Heavy Duty Roller 150 kN, Type B-II

Moving device for special and heavy-duty constructions.

### Technical Data

Permissible load-bearing capacity 150 kN.



022041

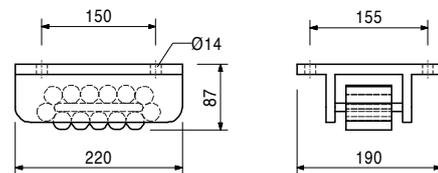
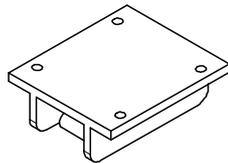
11.700

## Heavy Duty Roller 200 kN, Type A-II

Moving device for special and heavy-duty constructions.

### Technical Data

Permissible load-bearing capacity 200 kN.



022042

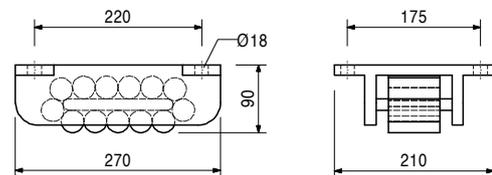
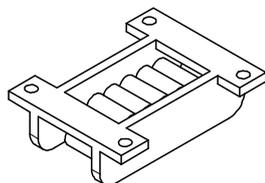
14.100

## Heavy Duty Roller 300 kN, Type B-III

Moving device for special and heavy-duty constructions.

### Technical Data

Permissible load-bearing capacity 300 kN.

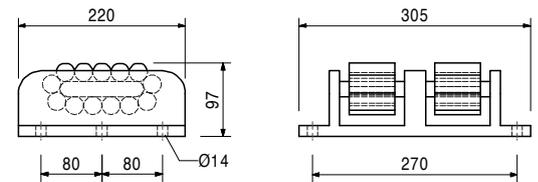
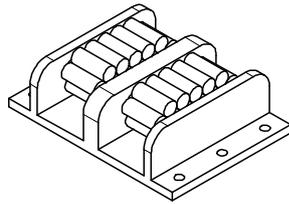


# VTC Tunnel Carriage

Item no.	Weight kg
114335	24.000

**Heavy Duty Roller 340 kN, Type H-II**  
 Moving device for special and heavy-duty constructions.

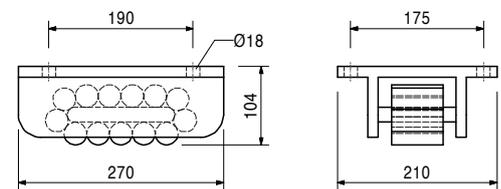
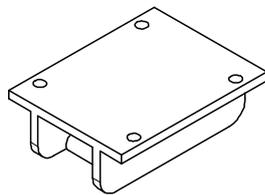
**Technical Data**  
 Permissible load-bearing capacity 340 kN.



022044	19.300
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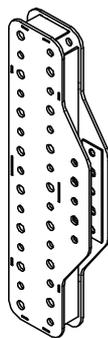
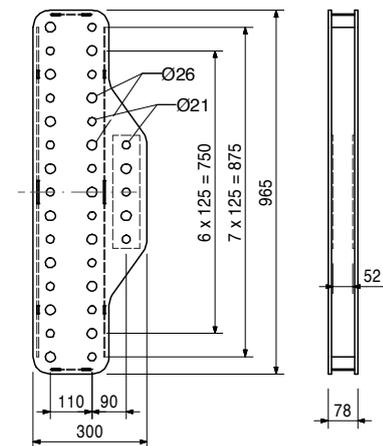
**Heavy Duty Roller 400 kN, Type A-III**  
 Moving device for special and heavy-duty constructions.

**Technical Data**  
 Permissible load-bearing capacity 400 kN.



111390	32.800
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**Climbing Rail Connector RCS 97**  
 For rigidly connecting the Climbing Rails RCS.  
 With connection for the Heavy-Duty Spindles SLS.



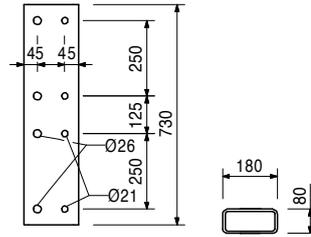
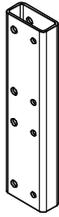
## Accessories

104031	0.462	<b>Fitting Pin Ø 21 x 120</b>
018060	0.014	<b>Cotter Pin 4/1, galv.</b>
111567	0.729	<b>Fitting Pin Ø 26 x 120</b>
022230	0.033	<b>Cotter Pin 5/1, galv.</b>

Item no.	Weight kg
113744	21.000

## Climbing Rail Connector RCS 73

For rigid connection of Climbing Rails RCS. Perm. bending moment limited.



104031	0.462
018060	0.014
111567	0.729
022230	0.033

### Accessories

**Fitting Pin Ø 21 x 120**

**Cotter Pin 4/1, galv.**

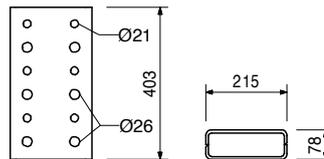
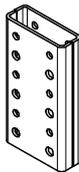
**Fitting Pin Ø 26 x 120**

**Cotter Pin 5/1, galv.**

111833	12.700
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## Climbing Rail Connector RCS 40

For an articulated connection or doubling of the RCS Climbing Rails.



104031	0.462
018060	0.014
111567	0.729
022230	0.033

### Accessories

**Fitting Pin Ø 21 x 120**

**Cotter Pin 4/1, galv.**

**Fitting Pin Ø 26 x 120**

**Cotter Pin 5/1, galv.**

109743	6.370
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## Climbing Rail Connector RCS 33

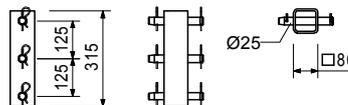
For an articulated connection of Climbing Rails RCS.



### Complete with

3 pc. 710894 Pin Ø 25 x 180, geomet.

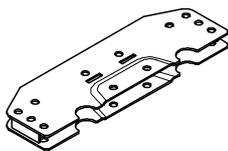
6 pc. 018060 Cotter Pin 4/1, galv.



103737	10.800
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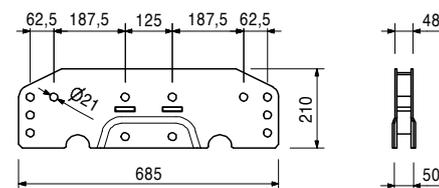
## Universal Coupling UK 70

For a rigid connection of Steel Walers SRU and for connecting Heavy-Duty Spindles SLS.



### Note

Permissible load: see PERI Design Tables.



104031	0.462
018060	0.014

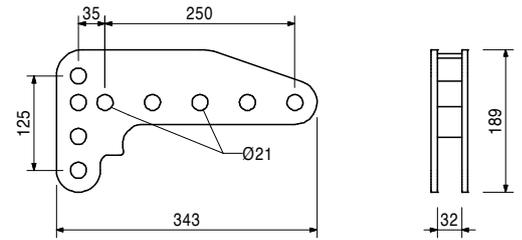
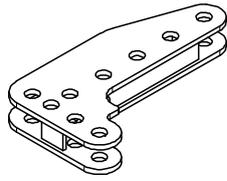
### Accessories

**Fitting Pin Ø 21 x 120**

**Cotter Pin 4/1, galv.**

Item no.	Weight kg
115623	5.060

**Connector SRU VARIOKIT**  
For a rigid connection of Steel Walers SRU.



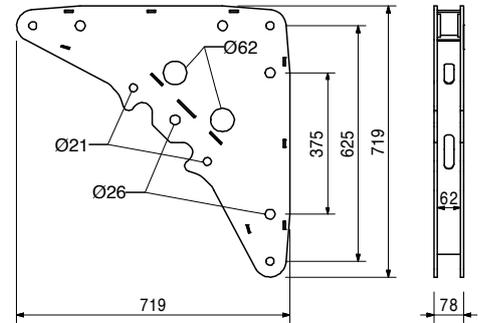
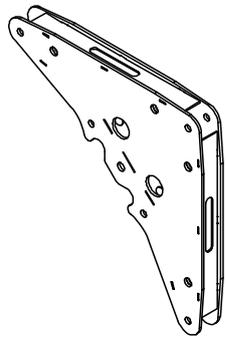
Accessories

104031	0.462
018060	0.014

**Fitting Pin Ø 21 x 120**  
**Cotter Pin 4/1, galv.**

111382	35.200
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**Climbing Rail Angle Connector RCS**  
For rigidly connecting the Climbing Rails RCS at right-angles, for frame construction or as bracket. With connection for the Heavy-Duty Spindle SLS and Tie Rod Cylinder Yoke SRU.



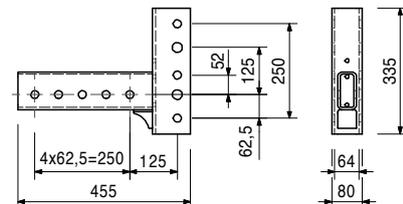
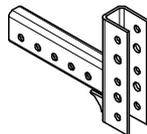
Accessories

104031	0.462
018060	0.014
111567	0.729
022230	0.033
110755	5.140

**Fitting Pin Ø 21 x 120**  
**Cotter Pin 4/1, galv.**  
**Fitting Pin Ø 26 x 120**  
**Cotter Pin 5/1, galv.**  
**Tie Yoke SRU**

111283	9.950
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**Angle Connector RCS/SRU**  
For right-angled connection of Steel Walers SRU to the Climbing Rails RCS and for attaching guardrail posts to Steel Walers SRU.



Accessories

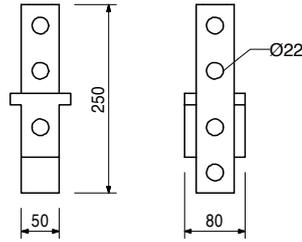
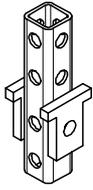
104031	0.462
018060	0.014
111567	0.729
022230	0.033

**Fitting Pin Ø 21 x 120**  
**Cotter Pin 4/1, galv.**  
**Fitting Pin Ø 26 x 120**  
**Cotter Pin 5/1, galv.**

Item no.	Weight kg
111279	2.450

## Cross Connector VARIOKIT

For right-angled connection of Steel Walers SRU with SRU or Steel Walers SRU with RCS.



### Accessories

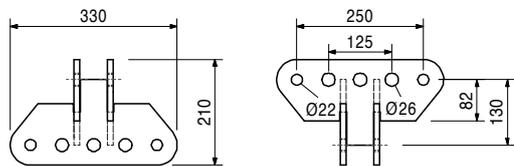
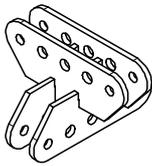
104031	0.462
018060	0.014

**Fitting Pin Ø 21 x 120**  
**Cotter Pin 4/1, galv.**

123509	13.400
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## Cross Connector RCS

For crosswise connection of Climbing Rails RCS.



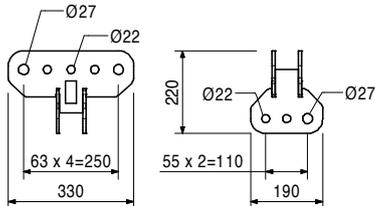
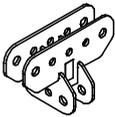
### Accessories

104031	0.462
018060	0.014
111567	0.729
022230	0.033

**Fitting Pin Ø 21 x 120**  
**Cotter Pin 4/1, galv.**  
**Fitting Pin Ø 26 x 120**  
**Cotter Pin 5/1, galv.**

129800	7.500
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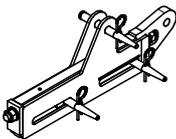
## Vertical Connector RCS



113933	17.400
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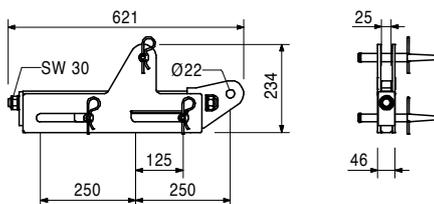
## Adjusting Unit VARIOKIT

For an articulated connection of Steel Walers SRZ and SRU. With integrated adjustment feature.



### Complete with

3 pc. 104031 Fitting Pin Ø 21 x 120  
3 pc. 018060 Cotter Pin 4/1, galv.



### Accessories

104031	0.462
018060	0.014

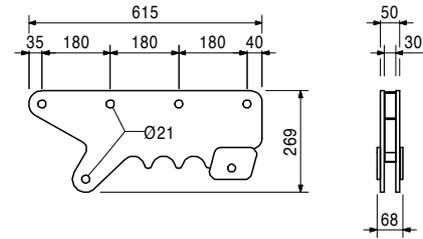
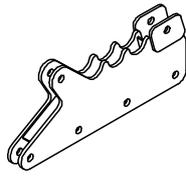
**Fitting Pin Ø 21 x 120**  
**Cotter Pin 4/1, galv.**

# VTC Tunnel Carriage

Item no.	Weight kg
022001	17.900

## Waler Hinge, galv.

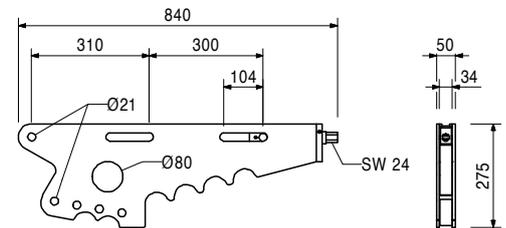
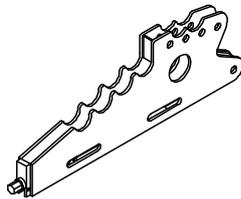
For an articulated connection of Steel Walers SRZ and SRU.



022002	18.500
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## Waler Hinge adjustable, galv.

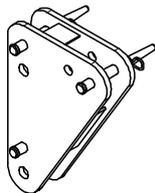
For an articulated connection of Steel Walers SRZ and SRU. With integrated adjustment feature.



123497	15.700
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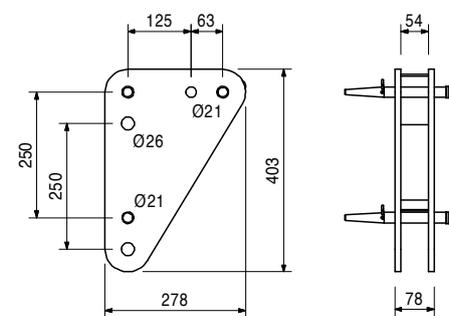
## Spindle Bracket VARIOKIT

For mounting Heavy-Duty-Spindles SLS to the Climbing Rail RCS with little spindle inclination.



### Complete with

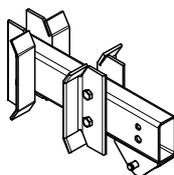
3 pc. 104031 Fitting Pin  $\varnothing$  21 x 120  
3 pc. 018060 Cotter Pin 4/1, galv.



123513	37.800
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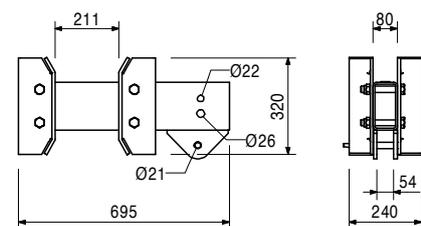
## Slide Connector VARIOKIT

For right-angled and slidable T-connection of Climbing Rails RCS.



### Complete with

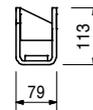
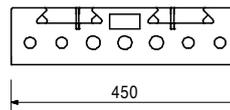
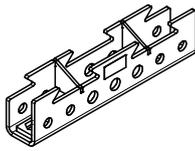
1 pc. 104031 Fitting Pin  $\varnothing$  21 x 120  
1 pc. 018060 Cotter Pin 4/1, galv.



Item no. Weight kg

130848 6.980

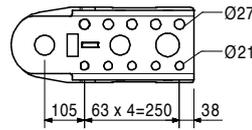
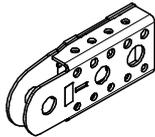
**Multiadapter RCS VARIOKIT**



130825 11.600

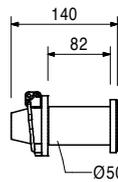
**Hinge Connector RCS**

**Note**  
To use with 130831.



130831 2.430

**Pin Hinge Connector RCS**



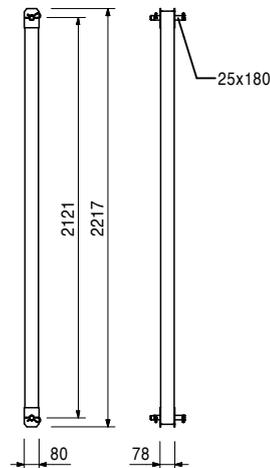
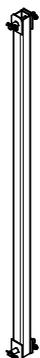
110012 23.500

**Diagonal Strut RCS 212**

For bracing RCS Framework Brackets.

**Complete with**

- 1 pc. 710894 Pin Ø 25 x 180, geomet.
- 1 pc. 018060 Cotter Pin 4/1, galv.
- 2 pc. 109612 Bolt ISO 4014 M24 x 130-8.8, galv.
- 1 pc. 105032 Nut ISO 7040 M24-8, galv.



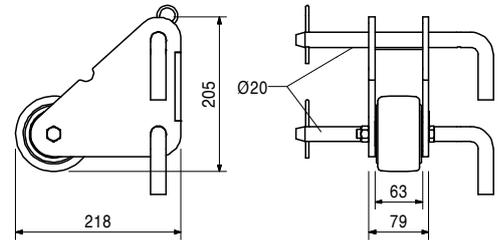
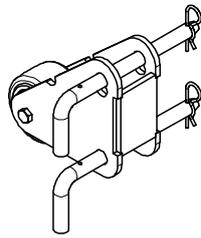
# VTC Tunnel Carriage

Item no.	Weight kg
116469	5.920

**Wheel RCS 1.5 t**  
For assembling in Climbing Rails RCS, foldable.

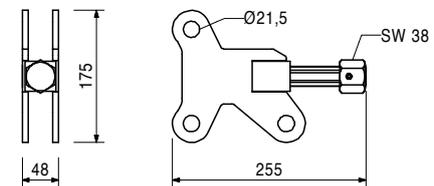
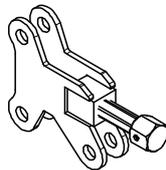
**Complete with**  
2 pc. 113012 Pin  $\varnothing$  20 x 260, galv.  
2 pc. 018060 Cotter Pin 4/1, galv.

**Technical Data**  
Permissible load-bearing capacity 1.5 t.



115616	3.210
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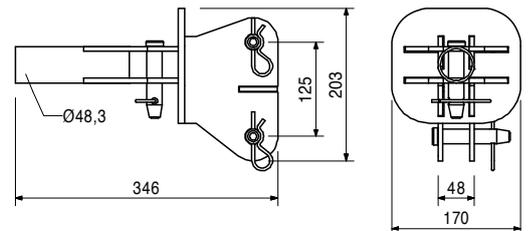
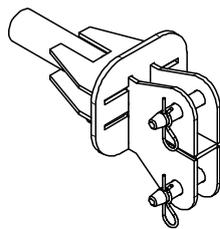
**Waler Jack with Connector VARIOKIT**  
Used as connector part and adjustable compression point.



104083	5.580
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**Waler Connector FTF/SRU**  
For assembly of a horizontal Steel Waler SRU on the FTF Bracket 500 or vertical Steel Walers SRU. With connection for scaffold tube.

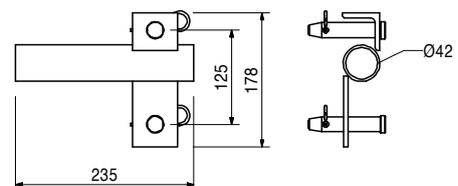
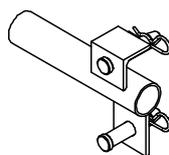
**Complete with**  
3 pc. 105822 Bolt  $\varnothing$  20 x 102, galv.  
3 pc. 018060 Cotter Pin 4/1, galv.



103945	1.840
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**Scaffold Tube Connector FTF**  
For connecting scaffold tubes to the Steel Walers SRU.

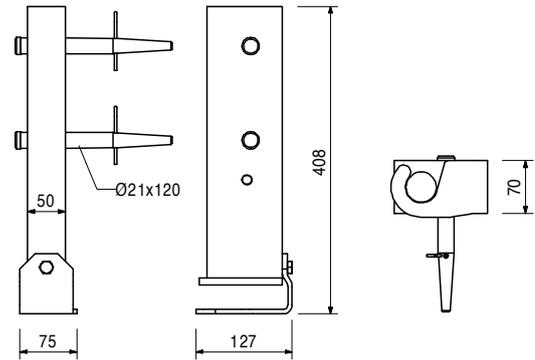
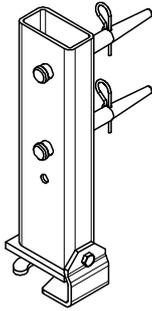
**Complete with**  
2 pc. 105822 Bolt  $\varnothing$  20 x 102, galv.  
2 pc. 018060 Cotter Pin 4/1, galv.



Item no.	Weight kg
115682	5.770

**Height Adjustment VARIOKIT**  
For height adjustment of Steel Walers SRU.

**Complete with**  
2 pc. 104031 Fitting Pin  $\varnothing 21 \times 120$   
2 pc. 018060 Cotter Pin 4/1, galv.



Accessories

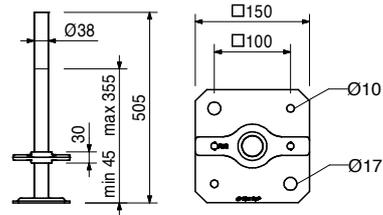
100411	3.390
100242	4.570

**Adj. Base Plate UJB 38-50/30**  
**Adj. Base Plate UJB 38-80/55**

100411	3.390
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**Adj. Base Plate UJB 38-50/30**

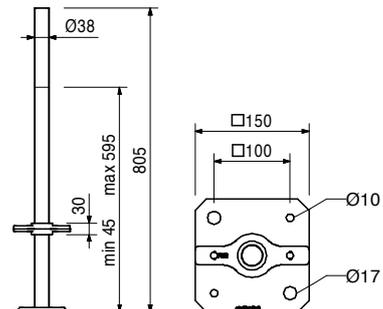
**Note**  
With captive red Quick Jack Nut.



100242	4.570
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**Adj. Base Plate UJB 38-80/55**

**Note**  
With captive yellow Quick Jack Nut.



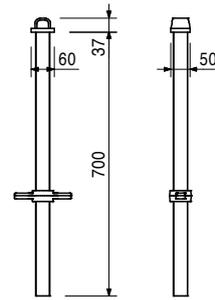
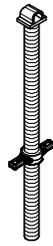
Item no.	Weight kg
109630	4.240

### Spindle Head SRU

For connecting the Steel Walers SRU and SRZ to the shoring.

### Note

With captive Quick Jack Nut.



104031	0.462
018060	0.014

Accessories

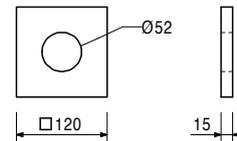
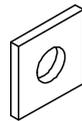
**Fitting Pin Ø 21 x 120**

**Cotter Pin 4/1, galv.**

114618	1.450
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### Spindle Counter Plate VARIOKIT

For transferring the spindle load into SRU/SRZ.



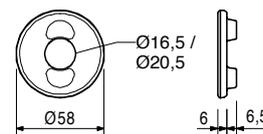
024000	0.131
024180	0.126

### Compensation Washer

**Compensation Washer 16, yellow galv.**

**Compensation Washer 20, galv.**

For assembling in the VKZ holes.



024910	0.303
710219	0.184
781053	0.065
070890	0.030

Accessories

**Bolt ISO 4014 M20 x 100-8.8, galv.**

**Bolt ISO 4014 M16 x 100-8.8, galv.**

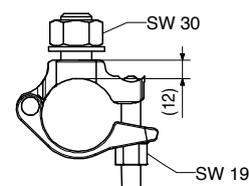
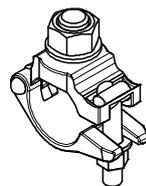
**Nut ISO 7040 M20-8, galv.**

**Nut ISO 7040 M16-8, galv.**

017040	0.850
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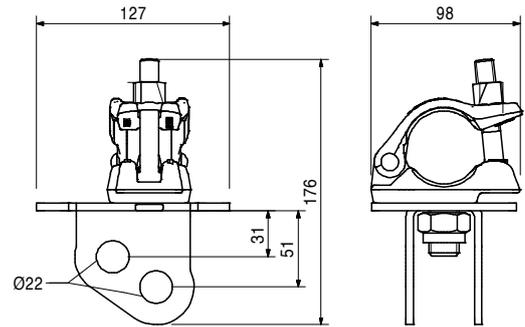
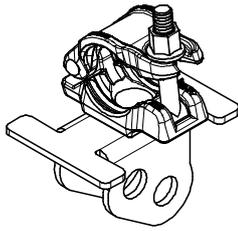
### Screw-On Coupler AK 48, galv.

For Scaffold Tubes Ø 48 mm.



Item no.	Weight kg
130045	1.670

## Scaffold Tube Adapter Ø 48 Alpha



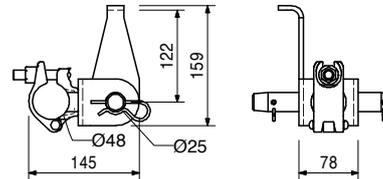
110084	2.510
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## Scaffold Tube Adapter Ø 48 RCS

For connecting Scaffold Tubes Ø 48 mm to Climbing Rails RCS.

### Complete with

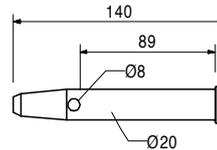
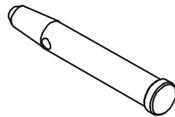
- 1 pc. 017040 Screw-On Coupler AK 48, galv.
- 1 pc. 710894 Pin Ø 25 x 180, geomet.
- 2 pc. 018060 Cotter Pin 4/1, galv.



105400	0.330
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## Pin Ø 20 x 140, galv.

For different connections.



Accessories

018060	0.014
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## Cotter Pin 4/1, galv.

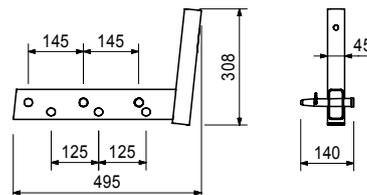
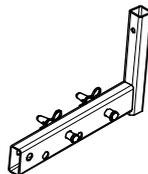
104131	3.940
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## Guardrail Holder SRU/SRZ

For assembling a guardrail to the Steel Walsers SRU and SRZ, Profile U100 to U140.

### Complete with

- 2 pc. 105400 Pin Ø 20 x 140, galv.
- 2 pc. 018060 Cotter Pin 4/1, galv.



Accessories

116292	4.720
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## Guardrail Post HSGP-2

061260	6.150
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## Guardrail Post SGP

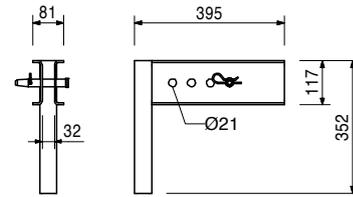
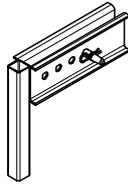
Item no.	Weight kg
101290	5.670

### Guardrail Holder GT 24 / VT 20

For assembling a guardrail to GT 24 and VT 20 Girders.

### Complete with

1 pc. 105400 Pin  $\varnothing$  20 x 140, galv.  
1 pc. 018060 Cotter Pin 4/1, galv.



### Accessories

116292	4.720
061260	6.150

### Guardrail Post HSGP-2

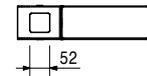
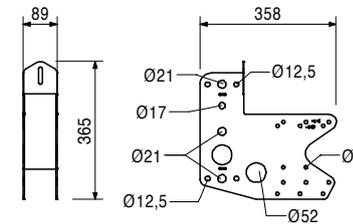
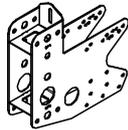
### Guardrail Post SGP

126088	4.390
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### Guardrail Post Holder Multi

For fixing of an end guardrail post on Girders GT 24, VT 20 or Timbers 80/160.

Fixing of the guardrail posts by means of Hex. Bolts M20 or Clamp A64.



### Accessories

710285	0.050
024090	0.005
024470	0.008

### Bolt ISO 4014 M8 x 100-8.8, galv.

### Nut ISO 4032 M8-8, galv.

### TSS-Torx 6 x 60, galv.

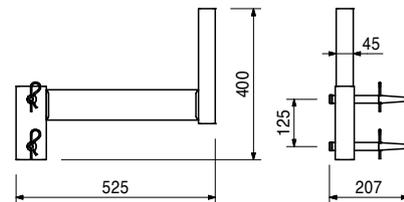
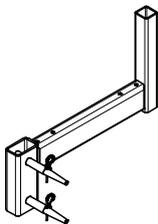
114557	6.980
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### Platform Beam SRU

For assembling a platform and guardrail at vertical Steel Waler SRU.

### Complete with

2 pc. 104031 Fitting Pin  $\varnothing$  21 x 120  
2 pc. 018060 Cotter Pin 4/1, galv.



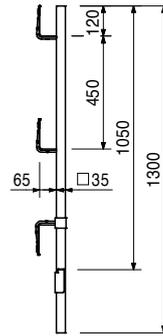
### Accessories

116292	4.720
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### Guardrail Post HSGP-2

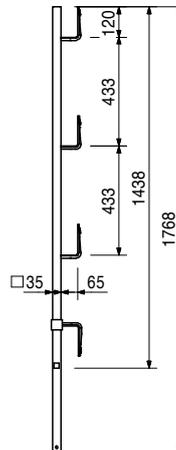
Item no.	Weight kg
116292	4.720

**Guardrail Post HSGP-2**  
As guardrail for different systems.



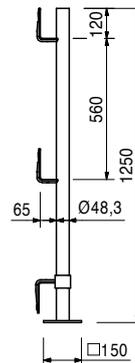
061260	6.150
--------	-------

**Guardrail Post SGP**  
As guardrail for different systems.



019040	6.480
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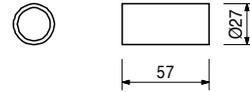
**Guardrail Post PD 8**  
As guardrail for different systems. Screwed onto sub-structure.



Item no.	Weight kg
116363	0.089

### Spacer RCS 184

Compensator between Angle Connector RCS/SRU and Guardrail Post RCS 184.



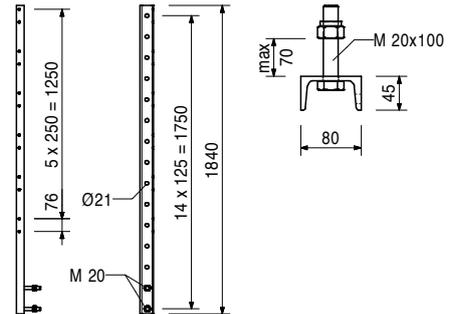
114328	16.600
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### Guardrail Post RCS/SRU 184

For assembly of the guardrail on the Platform Beam RCS/SRU or Angle Connector RCS/SRU.

#### Complete with

2 pc. 114727 Bolt ISO 4017 M20 x 100-8.8, galv.  
2 pc. 781053 Nut ISO 7040 M20-8, galv.



110296	0.220
710330	0.017

#### Accessories

**Clamp A64 DIN 3570 M12, galv.**  
**Nut ISO 4032 M12-8, galv.**

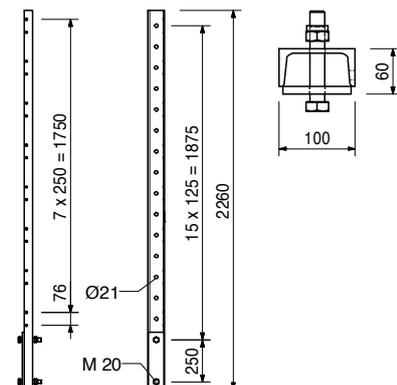
109720	26.600
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### Guardrail Post RCS 226

For assembly of the guardrail on the main platform with RCS Formwork Scaffolding or as horizontal strut in the bracing.

#### Complete with

2 pc. 104477 Bolt ISO 4014 M20 x 120-8.8, galv.  
2 pc. 781053 Nut ISO 7040 M20-8, galv.



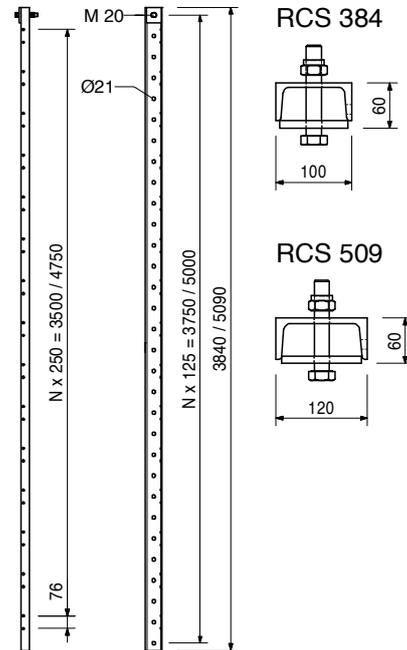
Item no.	Weight kg
109721	40.700
109773	67.900

**Guardrail Posts RCS**  
**Guardrail Post RCS 384**  
**Guardrail Post RCS 509**

For assembly of the guardrail on the intermediate and finishing platforms with RCS Formwork Scaffolding or as horizontal strut in the bracing.

**Complete with**

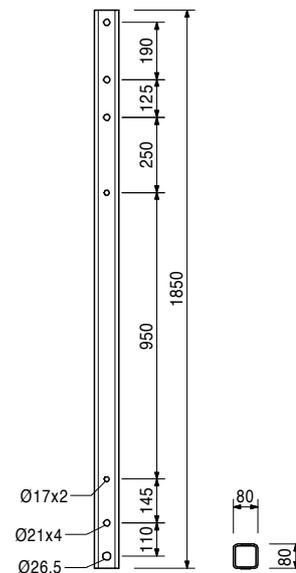
- 1 pc. 104477 Bolt ISO 4014 M20 x 120-8.8, galv.
- 1 pc. 781053 Nut ISO 7040 M20-8, galv.



126495	24.200
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**Guardrail Post RCS-MP**

For fixation of the side protection on Material Platforms RCS-MP with horizontal Climbing Rail RCS.



**Accessories**

104477	0.300
781053	0.065
104031	0.462
018060	0.014

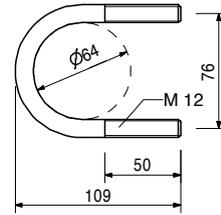
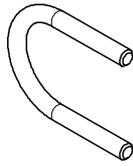
- Bolt ISO 4014 M20 x 120-8.8, galv.**
- Nut ISO 7040 M20-8, galv.**
- Fitting Pin Ø 21 x 120**
- Cotter Pin 4/1, galv.**

# VTC Tunnel Carriage

Item no.	Weight kg
110296	0.220

**Clamp A64 DIN 3570 M12, galv.**  
For assembling Scaffold Tubes  $\varnothing$  48 or  $\varnothing$  60.

**Note**  
Wrench size SW 19.

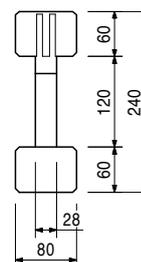
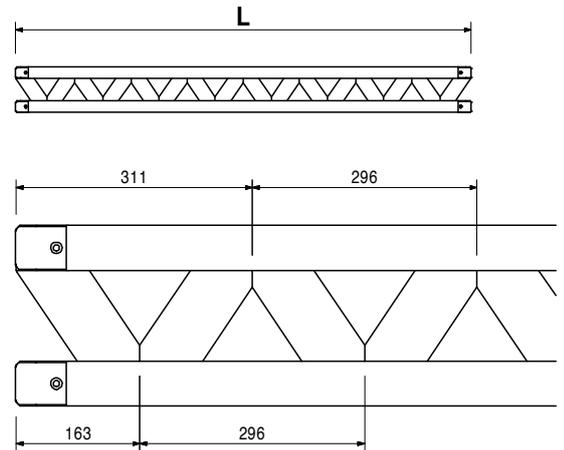
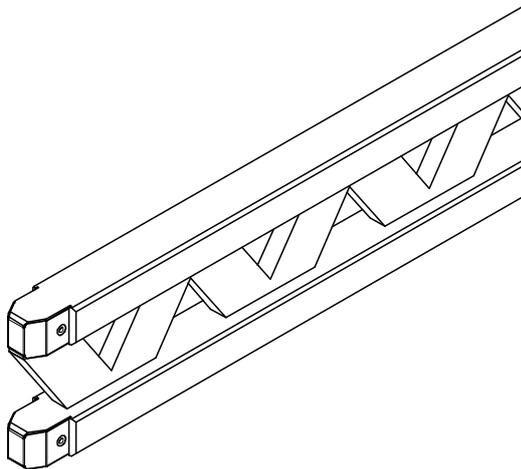


Accessories

710330	0.017
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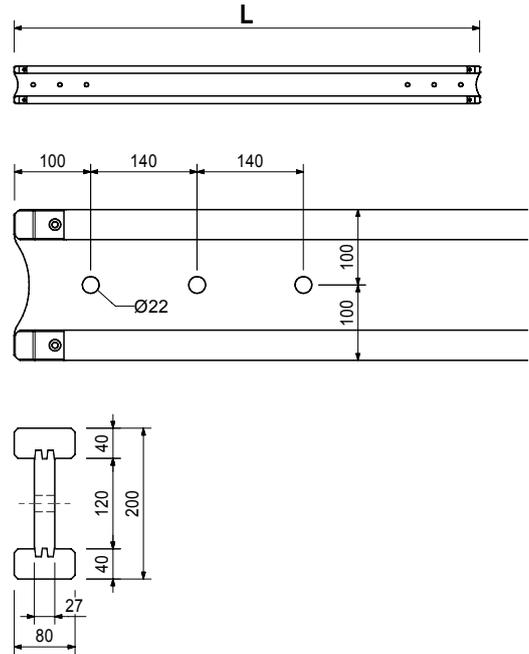
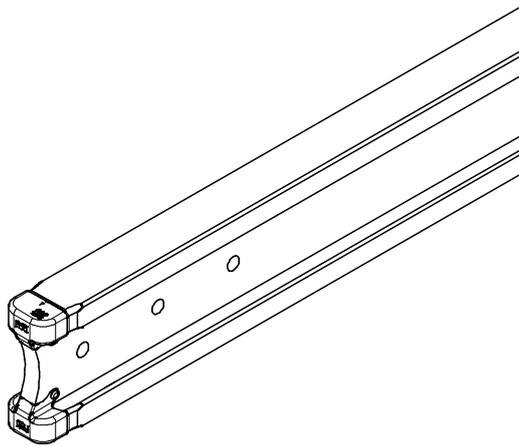
**Nut ISO 4032 M12-8, galv.**

		<b>Girders GT 24</b>	<b>L</b>
075100	5.300	Girder GT 24, l = 0.90 m	918
075120	7.100	Girder GT 24, l = 1.20 m	1214
075150	8.900	Girder GT 24, l = 1.50 m	1510
075180	10.600	Girder GT 24, l = 1.80 m	1806
075210	12.400	Girder GT 24, l = 2.10 m	2102
075240	14.200	Girder GT 24, l = 2.40 m	2398
075270	15.900	Girder GT 24, l = 2.70 m	2694
075300	17.700	Girder GT 24, l = 3.00 m	2990
075330	19.500	Girder GT 24, l = 3.30 m	3286
075360	21.200	Girder GT 24, l = 3.60 m	3582
075390	23.000	Girder GT 24, l = 3.90 m	3878
075420	24.800	Girder GT 24, l = 4.20 m	4174
075450	26.600	Girder GT 24, l = 4.50 m	4470
075480	28.300	Girder GT 24, l = 4.80 m	4766
075510	30.100	Girder GT 24, l = 5.10 m	5062
075540	31.900	Girder GT 24, l = 5.40 m	5358
075570	33.600	Girder GT 24, l = 5.70 m	5654
075600	35.400	Girder GT 24, l = 6.00 m	5950



Item no.	Weight kg	
		<b>Girders VT 20K, with Steel Cap</b>
074990	8.230	<b>Girder VT 20K, l = 1.45 m</b>
074905	12.010	<b>Girder VT 20K, l = 2.15 m</b>
074910	13.630	<b>Girder VT 20K, l = 2.45 m</b>
074890	14.710	<b>Girder VT 20K, l = 2.65 m</b>
074920	16.060	<b>Girder VT 20K, l = 2.90 m</b>
074930	18.220	<b>Girder VT 20K, l = 3.30 m</b>
074940	19.840	<b>Girder VT 20K, l = 3.60 m</b>
074950	21.460	<b>Girder VT 20K, l = 3.90 m</b>
074960	24.700	<b>Girder VT 20K, l = 4.50 m</b>
074970	26.860	<b>Girder VT 20K, l = 4.90 m</b>
074980	32.260	<b>Girder VT 20K, l = 5.90 m</b>
Universal formwork girder made of wood.		

**Note**  
The girder fulfils all requirements of DIN EN 13377 class P20 (Declaration of Conformity).



074900	0.000	<b>Cutting Cost VT Girder</b>
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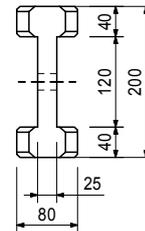
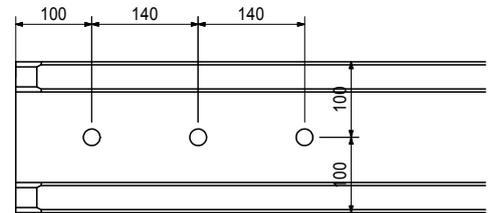
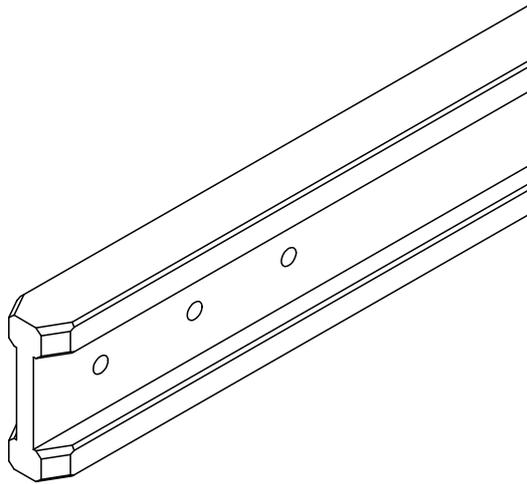
Item no.	Weight kg
073650	7.830
073651	11.610
073652	13.230
073653	14.310
073654	15.660
073655	17.820
073656	19.440
073657	21.060
073658	24.300
073659	26.460
073660	31.860

**Girder VT 20 Alpha**  
**Girder VT 20 Alpha, l = 1.45 m**  
**Girder VT 20 Alpha, l = 2.15 m**  
**Girder VT 20 Alpha, l = 2.45 m**  
**Girder VT 20 Alpha, l = 2.65 m**  
**Girder VT 20 Alpha, l = 2.90 m**  
**Girder VT 20 Alpha, l = 3.30 m**  
**Girder VT 20 Alpha, l = 3.60 m**  
**Girder VT 20 Alpha, l = 3.90 m**  
**Girder VT 20 Alpha, l = 4.50 m**  
**Girder VT 20 Alpha, l = 4.90 m**  
**Girder VT 20 Alpha, l = 5.90 m**

Universal formwork girder made of wood.

**Note**

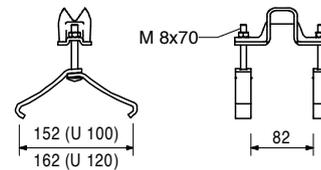
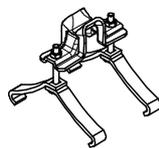
The girder fulfils all requirements of DIN EN 13377 class P20 (Declaration of Conformity).



024070	0.691
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**Hook Strap HB 24-100/120, galv.**

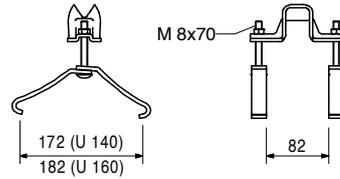
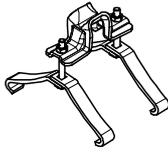
For fixing GT 24 Girders to Steel Walers SRZ, SRU and BR: U100 – U120.



Item no.	Weight kg
024080	0.735

## Hook Strap HB 24-140/160, galv.

For fixing GT 24 Girders to Steel Walers SRZ, SRU and BR: U140 – U160.



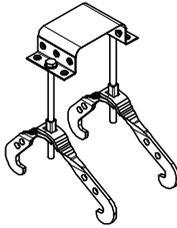
104931	0.865
103845	0.893

## Hook Straps Uni HBU

### Hook Strap Uni HBU 20-24

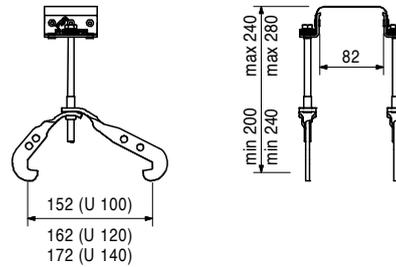
### Hook Strap Uni HBU 20-28

For fixing GT 24 Girders or VT 20 Girders to Steel Walers SRZ and SRU Profiles U100 – U140.



## Note

The girders can be mounted at right-angles or diagonally to the steel walers and also outside of the nodes.



024540	0.005
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## Accessories

### TSS-Torx 6 x 40, galv.

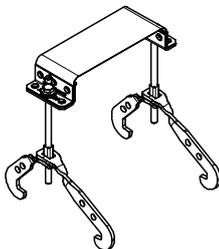
104930	0.887
104096	0.912

## Hook Straps Uni Double HBUD

### Hook Strap Uni Double HBUD 20-24

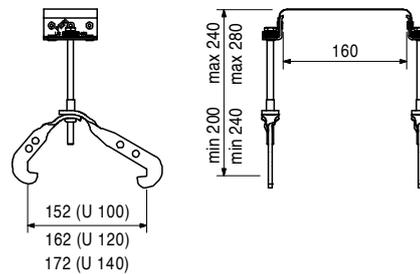
### Hook Strap Uni Double HBUD 24-28

For fixing two GT 24 Girders or VT 20 Girders to SRZ Steel Walers and SRU Profiles U100 – U140.



## Note

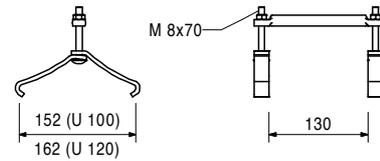
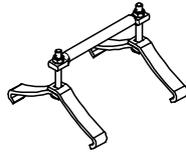
The girders can be mounted at right-angles or diagonally to the steel walers and also outside of the nodes.



Item no.	Weight kg
024860	0.616

### Hook Strap HB 24 QB 150, galv.

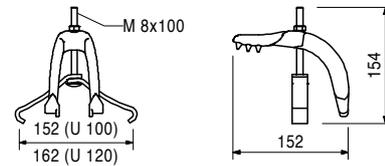
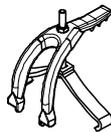
For fixing GT 24 Girders independent from girder node and timber beams to Steel Walers SRZ, SRU and BR: U100 – U120.



024600	0.907
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### Girder Claw HB

For mounting the GT 24 Edge Girder on the Steel Waler SRZ and SRU Profile U100 – U120.



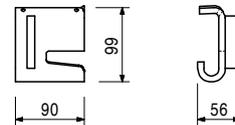
024640	0.923
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### Quick Str. Hook Strap 24-100/140, galv.

For fixing GT 24 Girders to Steel Waler SRZ, SRU, Profile U100 – U140 outside of the girder nodes.

#### Note

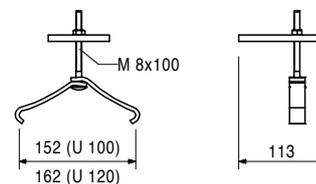
Girders fixed in position with the quick strap must be specially screwed to the formlining when using crane lifting gears.



024630	0.742
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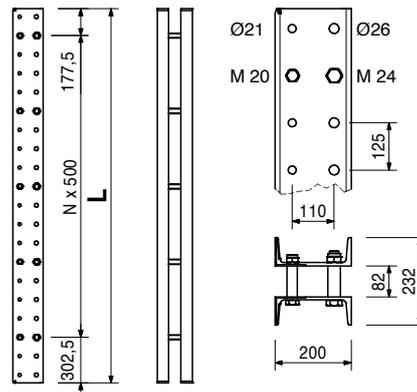
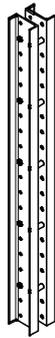
### Fix Strap U100 – U120, galv.

For fixing the GT 24 Girder in the VARIO Corner.

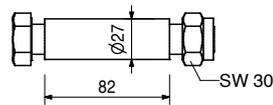
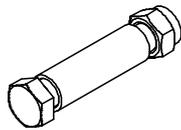


Item no.	Weight kg		L
114166	78.200	<b>Climbing Rails RCS</b>	1480
109469	130.000	<b>Climbing Rail RCS 148</b>	2480
112102	156.000	<b>Climbing Rail RCS 248</b>	2980
109470	182.000	<b>Climbing Rail RCS 298</b>	3480
112141	209.000	<b>Climbing Rail RCS 348</b>	3980
109471	262.000	<b>Climbing Rail RCS 398</b>	4980
109472	393.000	<b>Climbing Rail RCS 498</b>	7480
109610	524.000	<b>Climbing Rail RCS 998</b>	9980

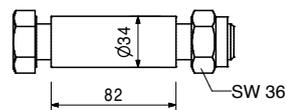
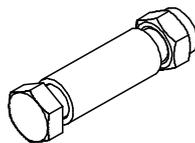
Steel profile for all-purpose use of climbing application or civil constructions. With Spacers M20-82 and M24-82.



110022	0.491	<b>Spacer M20-82</b> Spacer for Climbing Rails RCS.	<b>Complete with</b> 1 pc. 104477 Bolt ISO 4014 M20 x 120-8.8, galv. 1 pc. 130341 Nut ISO 7042 M20-8, galv.
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110023	0.910	<b>Spacer M24-82</b> Spacer for Climbing Rails RCS.	<b>Complete with</b> 1 pc. 109612 Bolt ISO 4014 M24 x 130-8.8, galv. 1 pc. 130342 Nut ISO 7042 M24-8, galv.
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Item no.	Weight kg		L
103868	18.100	<b>Steel Waler Universal SRU U120</b>	722
103871	24.200	<b>Steel Waler Universal SRU U120, l = 0.72 m</b>	972
123809	29.500	<b>Steel Waler Universal SRU U120, l = 1.17 m</b>	1172
103874	30.900	<b>Steel Waler Universal SRU U120, l = 1.22 m</b>	1222
103877	38.100	<b>Steel Waler Universal SRU U120, l = 1.47 m</b>	1472
103886	44.700	<b>Steel Waler Universal SRU U120, l = 1.72 m</b>	1722
125088	46.100	<b>Steel Waler Universal SRU U120, l = 1.77 m</b>	1772
103889	52.000	<b>Steel Waler Universal SRU U120, l = 1.97 m</b>	1972
103898	58.600	<b>Steel Waler Universal SRU U120, l = 2.22 m</b>	2222
123812	63.000	<b>Steel Waler Universal SRU U120, l = 2.37 m</b>	2372
103892	65.600	<b>Steel Waler Universal SRU U120, l = 2.47 m</b>	2472
103929	72.000	<b>Steel Waler Universal SRU U120, l = 2.72 m</b>	2722
103903	81.000	<b>Steel Waler Universal SRU U120, l = 2.97 m</b>	2972
103906	92.600	<b>Steel Waler Universal SRU U120, l = 3.47 m</b>	3472
103915	106.000	<b>Steel Waler Universal SRU U120, l = 3.97 m</b>	3972
103918	119.000	<b>Steel Waler Universal SRU U120, l = 4.47 m</b>	4472
103922	135.000	<b>Steel Waler Universal SRU U120, l = 4.97 m</b>	4972
103925	146.000	<b>Steel Waler Universal SRU U120, l = 5.47 m</b>	5472
103928	159.000	<b>Steel Waler Universal SRU U120, l = 5.97 m</b>	5972

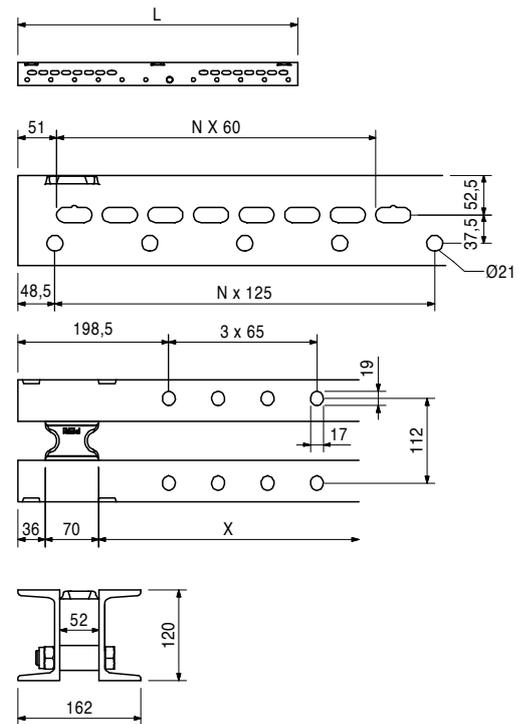
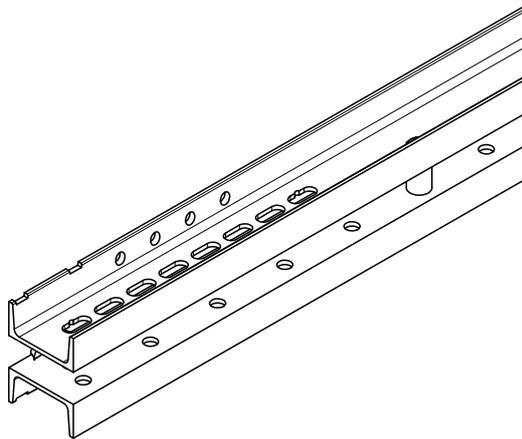
Universal Steel Waler Profile U120 used as waling for girder wall formwork and for diverse special applications. With adjustable spacers.

**Note**

Permissible load: see PERI Design Tables.

**Technical Data**

U120:  $W_y = 121.4 \text{ cm}^3$ ,  $I_y = 728 \text{ cm}^4$ .



# VTC Tunnel Carriage

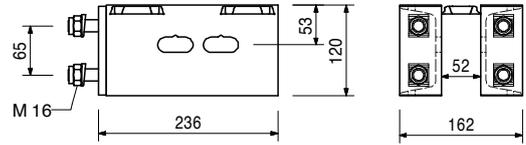
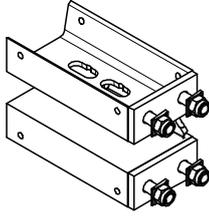


Item no.	Weight kg
104027	7.610

**Extension VARIO 24 U120**  
For assembly on Steel Waler SRU.

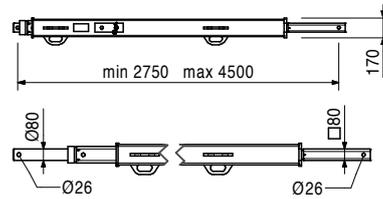
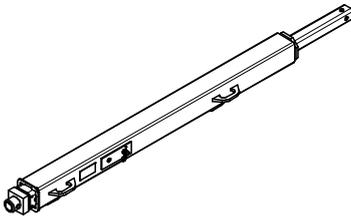
**Complete with**  
4 pc. 710252 Bolt ISO 4017 M16 x 50-8.8, galv.  
4 pc. 104024 Nut ISO 7040 M16-8, galv.  
4 pc. 710880 Washer DIN 434 18, galv.

**Technical Data**  
U120:  $W_y = 121.4 \text{ cm}^3$ ,  $I_y = 728 \text{ cm}^4$ .



118404	165.000
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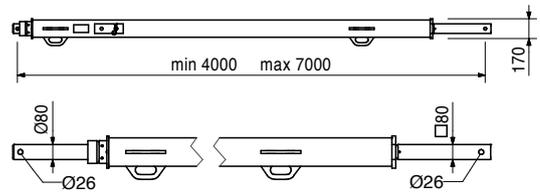
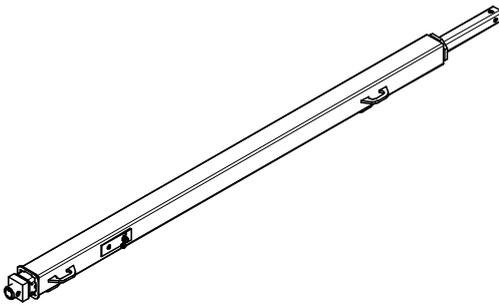
**Strut VARIOKIT I = 275 - 450**



112840	239.000
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**Strut VARIOKIT I = 400 - 700**  
For the bracing of system solutions.

**Note**  
Permissible load: see PERI Design Tables.



Accessories

111567	0.729
022230	0.033

**Fitting Pin Ø 26 x 120**  
**Cotter Pin 5/1, galv.**

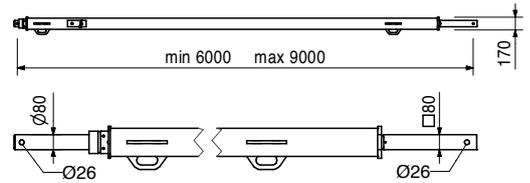
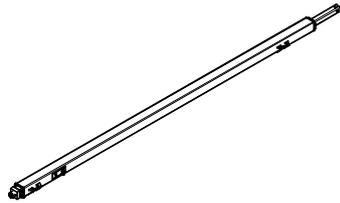
# VTC Tunnel Carriage



Item no.	Weight kg
112841	295.000

**Strut VARIOKIT I = 600 - 900**  
For the bracing of system solutions.

**Note**  
Permissible load: see PERI Design Tables.

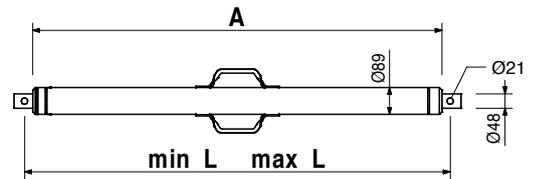
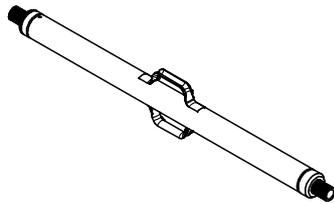


111035	12.000	<b>Heavy Duty Spindles SLS</b>
101773	15.300	<b>Heavy Duty Spindle SLS 40/80</b>
101774	18.300	<b>Heavy Duty Spindle SLS 80/140</b>
101776	24.900	<b>Heavy Duty Spindle SLS 100/180</b>
101778	32.300	<b>Heavy Duty Spindle SLS 140/240</b>
101779	38.500	<b>Heavy Duty Spindle SLS 200/300</b>
109726	44.800	<b>Heavy Duty Spindle SLS 260/360</b>
109785	51.000	<b>Heavy Duty Spindle SLS 320/420</b>
		<b>Heavy Duty Spindle SLS 380/480</b>

Used as adjustable spindle for truss beams made of Steel Walers SRU and Climbing Rails RCS.

A	min. L	max. L
344	400	800
746	800	1400
946	1000	1800
1346	1400	2400
1944	2000	3000
2544	2600	3600
3144	3200	4200
3744	3800	4800

**Note**  
Permissible load see PERI Design Tables.



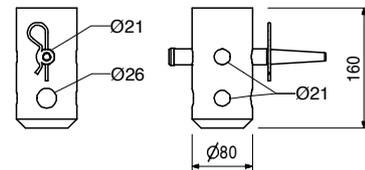
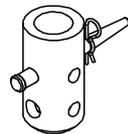
104031	0.462	<b>Fitting Pin Ø 21 x 120</b>
018060	0.014	<b>Cotter Pin 4/1, galv.</b>
110477	3.990	<b>Spindle Adapter SLS/RCS</b>
129695	0.028	<b>Reducing Sleeve Ø 26 - 21, galv.</b>

Accessories  
**Fitting Pin Ø 21 x 120**  
**Cotter Pin 4/1, galv.**  
**Spindle Adapter SLS/RCS**  
**Reducing Sleeve Ø 26 - 21, galv.**

110477	3.990	<b>Spindle Adapter SLS/RCS</b>
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For connecting the Heavy-Duty Spindle SLS to the Climbing Rail RCS.

**Complete with**  
1 pc. 104031 Fitting Pin Ø 21 x 120  
1 pc. 018060 Cotter Pin 4/1, galv.



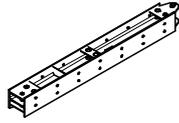
104031	0.462	<b>Fitting Pin Ø 21 x 120</b>
018060	0.014	<b>Cotter Pin 4/1, galv.</b>
111567	0.729	<b>Fitting Pin Ø 26 x 120</b>
022230	0.033	<b>Cotter Pin 5/1, galv.</b>

Accessories  
**Fitting Pin Ø 21 x 120**  
**Cotter Pin 4/1, galv.**  
**Fitting Pin Ø 26 x 120**  
**Cotter Pin 5/1, galv.**

Item no.	Weight kg
022010	379.000

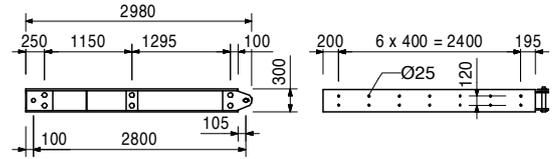
### Main Beam HDT 280

System steel girder for use with HD 200 Main Beam areas and special constructions. Profile HEB 300.



### Complete with

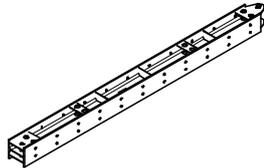
- 1 pc. 105435 Bolt Ø 50 x 330
- 1 pc. 722457 Dowel Pin Ø 10 x 70, galv.
- 1 pc. 710618 Cotter Pin 8, galv.



022009	582.000
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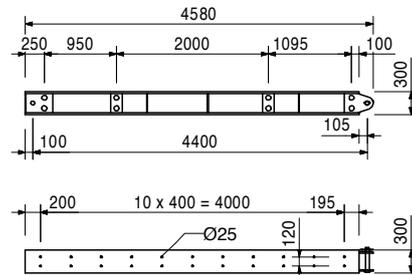
### Main Beam HDT 440

System steel girder for use with HD 200 Main Beam areas and special constructions. Profile HEB 300.



### Complete with

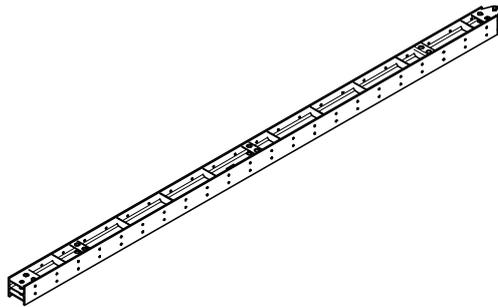
- 1 pc. 105435 Bolt Ø 50 x 330
- 1 pc. 722457 Dowel Pin Ø 10 x 70, galv.
- 1 pc. 710618 Cotter Pin 8, galv.



022008	1130.000
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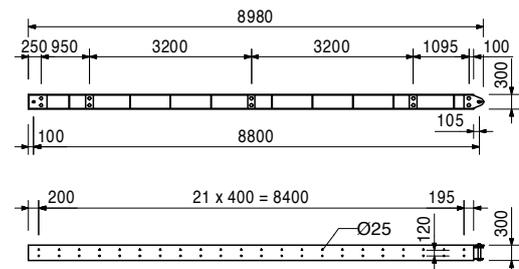
### Main Beam HDT 880

System steel girder for use with HD 200 Main Beam areas and special constructions. Profile HEB 300.



### Complete with

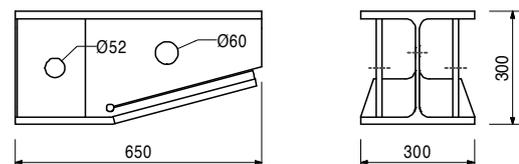
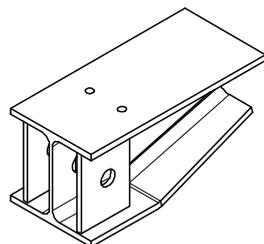
- 1 pc. 105435 Bolt Ø 50 x 330
- 1 pc. 722457 Dowel Pin Ø 10 x 70, galv.
- 1 pc. 710618 Cotter Pin 8, galv.



115074	81.900
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### Beam Starter HDT

Access aid for HDT Main Beams onto the heavy duty rollers. Holes and connectors match the HDT Main Beam.



Item no.	Weight kg
112548	51.100
112549	56.500

**Truss Struts HD**  
**Truss Strut HD 2000**  
**Truss Strut HD 2247**

For assembling truss girders with Main Beam HDT.

**Complete with**

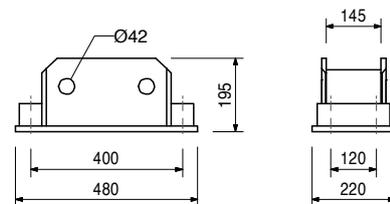
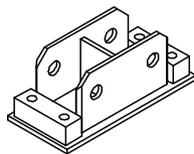
2 pc. 112547 Pin HD Ø 40 x 260



112558	34.900
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**Truss Bracket HD**

For assembly on the Main Beam HDT.



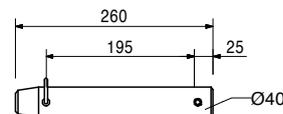
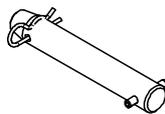
112547	2.490
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**Pin HD Ø 40 x 260**

For connecting the Truss Strut HD with the Truss Bracket HD.

**Complete with**

1 pc. 022230 Cotter Pin 5/1, galv.  
 1 pc. 722457 Dowel Pin Ø 10 x 70, galv.



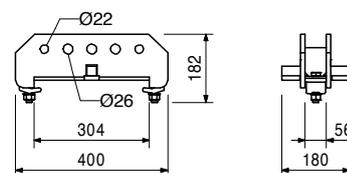
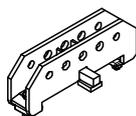
112816	12.100
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**Spindle Spreader VARIOKIT**

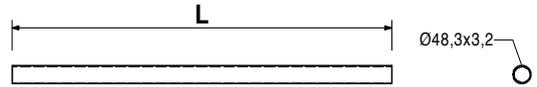
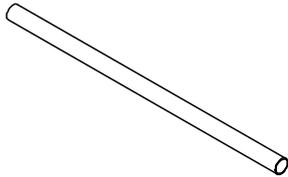
For connecting spindles or Climbing Rail RCS transversely to the Main Beam HDT.

**Complete with**

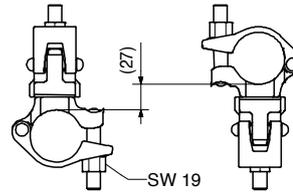
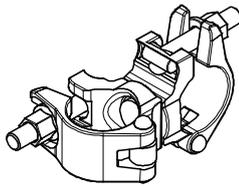
2 pc. 714093 Bolt ISO 4014 M16 x 70-8.8, galv.  
 2 pc. 710229 Nut ISO 4032 M16-8, galv.  
 2 pc. 711074 Washer ISO 7089 200 HV, A 16, galv.  
 2 pc. 112815 Clamping Plate M16 Nova Grip



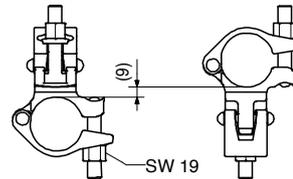
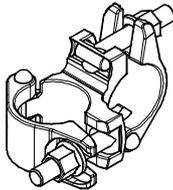
Item no.	Weight kg		L
		<b>Scaffold Tubes Steel Ø 48.3 x 3.2</b>	
026415	3.550	<b>Scaff. Tube Steel Ø 48.3 x 3.2, special length</b>	
026417	0.000	<b>Cutting Cost Scaffold Tube</b>	
026411	3.550	<b>Scaff. Tube Steel Ø 48.3 x 3.2, l = 1.0 m</b>	1000
026412	7.100	<b>Scaff. Tube Steel Ø 48.3 x 3.2, l = 2.0 m</b>	2000
125976	8.900	<b>Scaff. Tube Steel Ø 48.3 x 3.2, l = 2.5 m</b>	2500
026413	10.650	<b>Scaff. Tube Steel Ø 48.3 x 3.2, l = 3.0 m</b>	3000
114287	12.500	<b>Scaff. Tube Steel Ø 48.3 x 3.2, l = 3.5 m</b>	3500
026414	14.200	<b>Scaff. Tube Steel Ø 48.3 x 3.2, l = 4.0 m</b>	4000
026419	17.750	<b>Scaff. Tube Steel Ø 48.3 x 3.2, l = 5.0 m</b>	5000
026418	21.600	<b>Scaff. Tube Steel Ø 48.3 x 3.2, l = 6.0 m</b>	6000



017010	1.400	<b>Swivel Coupling SW 48/48, galv.</b> For Scaffold Tubes Ø 48 mm.
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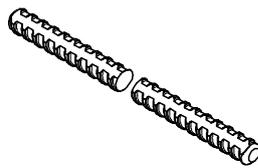
017020	1.120	<b>Standard Coupler RA 48/48, galv.</b> For Scaffold Tubes Ø 48 mm.
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Item no.	Weight kg
030030	1.440
030050	0.000
030005	0.720
030010	1.230
030480	1.440
030490	1.730
030170	2.160
030020	2.450
030180	2.880
030710	3.600
030720	4.320
030730	5.040
030160	8.640

**Tie Rods DW 15**  
**Tie Rod DW 15, spec. length**  
**Cutting Cost Tie Rod DW 15, B 15**  
**Tie Rod DW 15, l = 0.50 m**  
**Tie Rod DW 15, l = 0.85 m**  
**Tie Rod DW 15, l = 1.00 m**  
**Tie Rod DW 15, l = 1.20 m**  
**Tie Rod DW 15, l = 1.50 m**  
**Tie Rod DW 15, l = 1.70 m**  
**Tie Rod DW 15, l = 2.00 m**  
**Tie Rod DW 15, l = 2.50 m**  
**Tie Rod DW 15, l = 3.00 m**  
**Tie Rod DW 15, l = 3.50 m**  
**Tie Rod DW 15, l = 6.00 m**

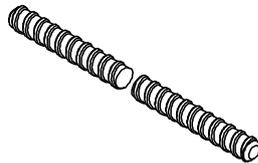
**Note**  
 Non-weldable! Take official Approval into consideration!  
**Technical Data**  
 Permissible tension force 90 kN.



030740	1.550
030050	0.000
030150	0.420

**Tie Rod B 15**  
**Tie Rod B 15, spec. length**  
**Cutting Cost Tie Rod DW 15, B 15**  
**Tie Rod B 15, l = 0.30 m**

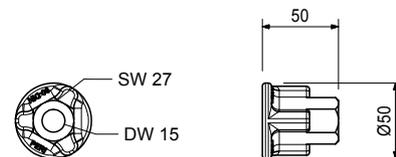
**Note**  
 Weldable! Take official Approval into consideration!  
**Technical Data**  
 Permissible tension force 82 kN.



030130	0.318
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**Cam Nut DW 15, galv.**  
 For anchoring with Tie Rod DW 15 and B 15.

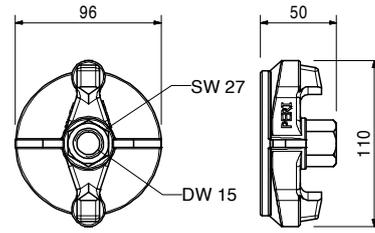
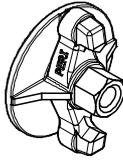
**Technical Data**  
 Permissible load 90 kN.



Item no.	Weight kg
030110	0.799

**Wingnut Counterplate DW 15, galv.**  
For anchoring with Tie Rod DW 15 and B 15.

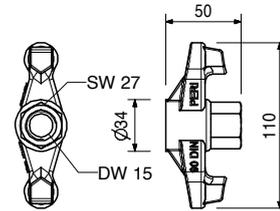
**Technical Data**  
Permissible load 90 kN.



030100	0.439
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**Wingnut DW 15, galv.**  
For anchoring with Tie Rod DW 15 and B 15.

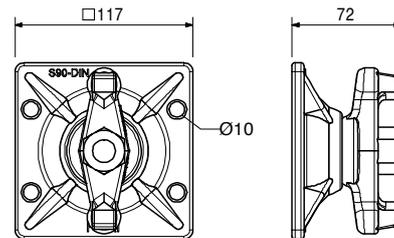
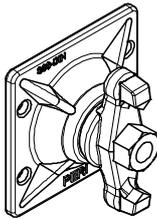
**Technical Data**  
Permissible load 90 kN.



030370	1.660
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**Wingnut Pivot Plate DW 15, galv.**  
For anchoring with Tie Rod DW 15 and B 15. With pivoting captive nut. Maximum angle of tilting 8°.

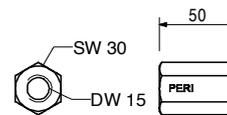
**Note**  
Wrench size SW 27.  
**Technical Data**  
Permissible load 90 kN.



030070	0.222
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**Hex. Nut DW 15 SW 30/50, galv.**  
For anchoring with Tie Rod DW 15 and B 15.

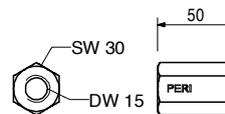
**Technical Data**  
Permissible load 90 kN.



Item no.	Weight kg
030550	0.233

**Hex. Nut DW 15 SW 30/50, weldable**  
For anchoring with Tie Rod DW 15 and B 15.

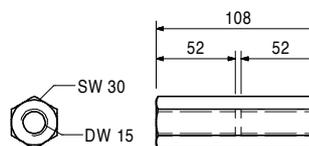
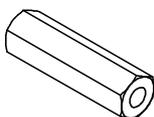
**Note**  
Weldable!  
**Technical Data**  
Permissible load 90 kN.



030090	0.402
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**Hex. Nut DW 15 SW 30/108, galv.**  
For coupling Tie Rod DW 15 and B 15.

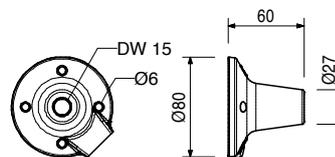
**Technical Data**  
Permissible load 90 kN.



030840	0.515
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**Threaded Anchor Plate DW 15**  
For use with Tie Rod DW 15 or B 15. For anchoring in concrete.

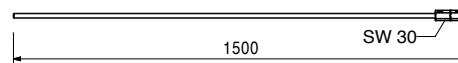
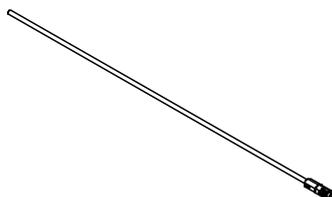
**Note**  
Lost anchor part.



110797	2.790
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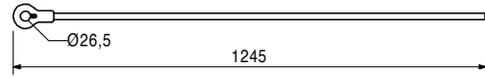
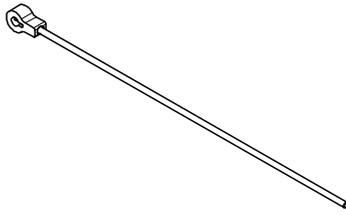
**Tension Rod 15 SRU, l = 1.50 m**  
Suitable for Strut SRU l = 1.65 - 2.40 m, item no. 110765 and the Spacer Tube DW 15-550 VARIOKIT.

**Technical Data**  
Permissible load 85 kN.



Item no.	Weight kg
115538	3.190

**Tie Rod with Yoke VARIOKIT**  
For anchoring tensionloads of the consol brackets.



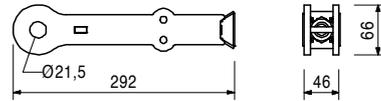
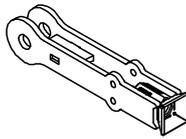
Accessories

111567	0.729
022230	0.033

**Fitting Pin Ø 26 x 120**  
**Cotter Pin 5/1, galv.**

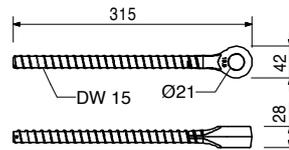
116532	1.890
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**Tie Yoke VARIOKIT Ø 22 / DW 15**  
For assembling in Steel Waler SRU.



037150	0.641
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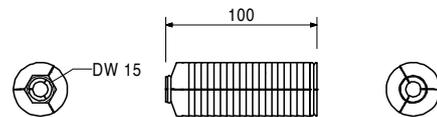
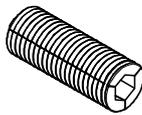
**Tie Yoke DW 15**  
For fixing SRZ Steel Walers to the strongback.



108795	0.450
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**Rock Anchor HB DW 15**  
For subsequent anchoring with DW 15 tie rods.  
Diameter of drilled hole 36.5 - 38 mm.

**Note**  
Follow Instructions for Use!  
**Technical Data**  
Permissible load 90 kN.



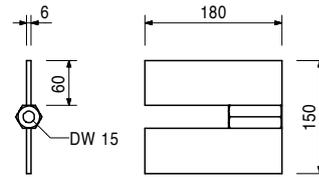
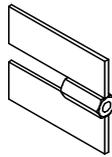
# VTC Tunnel Carriage



Item no.	Weight kg
031300	1.350

**Weld on Anchor DW 15**  
For anchoring single-sided formwork.

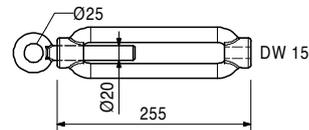
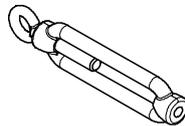
**Technical Data**  
Permissible tension force 90 kN.



116807	1.820
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**Turnbuckle CB M20/DW 15**  
For tensioning of Tie Rod DW 15 to prevent tipping over due to wind loads. Connects Tie Rod DW 15 with Wall Bracing Shoe CB M24.

**Complete with**  
1 pc. 711059 Turnbuckle for tension anchor CB  
1 pc. 711060 Eye Bolt M20, left, galv.



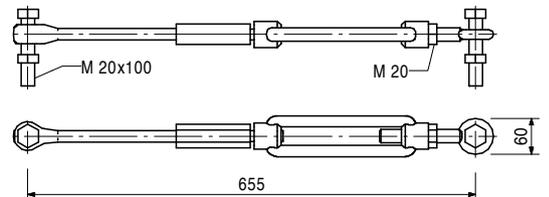
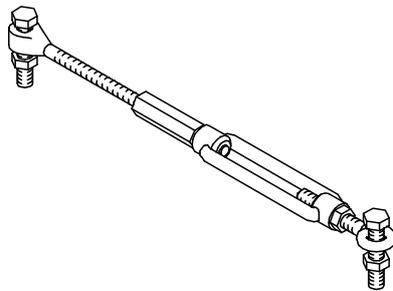
057083	3.820
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**Bracing DW 15 ACS**  
For bracing climbing scaffolds. For bracing large VARIO GT 24 Elements.

**Complete with**  
2 pc. 024910 Bolt ISO 4014 M20 x 100-8.8, galv.  
2 pc. 710334 Nut ISO 4032 M20-8, galv.

**Note**  
Tie Rod DW 15 must be ordered seperately.

**Technical Data**  
Permissible tension force 35 kN.



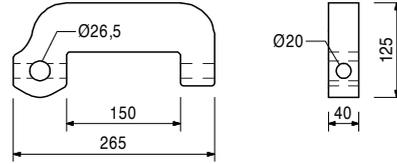
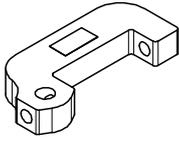
030030	1.440
030050	0.000

Accessories  
**Tie Rod DW 15, spec. length**  
**Cutting Cost Tie Rod DW 15, B 15**

Item no.	Weight kg
115375	6.100

## Articulated Spanner RCS DW 15

For tensioning and as an articulated connection to the Climbing Rail RCS, Steel Waler SRU or Bracing Shoe RCS for bracing with DW 15.



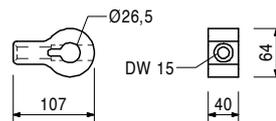
### Accessories

104031	0.462	<b>Fitting Pin Ø 21 x 120</b>
018060	0.014	<b>Cotter Pin 4/1, galv.</b>
111567	0.729	<b>Fitting Pin Ø 26 x 120</b>
022230	0.033	<b>Cotter Pin 5/1, galv.</b>
030070	0.222	<b>Hex. Nut DW 15 SW 30/50, galv.</b>
030030	1.440	<b>Tie Rod DW 15, spec. length</b>

115378	1.080
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## Eye Nut RCS DW 15

As an articulated connection to the Climbing Rail RCS, Steel Waler SRU for bracing with DW 15.



### Accessories

104031	0.462	<b>Fitting Pin Ø 21 x 120</b>
018060	0.014	<b>Cotter Pin 4/1, galv.</b>
111567	0.729	<b>Fitting Pin Ø 26 x 120</b>
022230	0.033	<b>Cotter Pin 5/1, galv.</b>

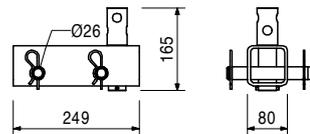
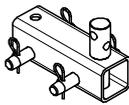
123534	5.910
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## Brace Connector RCS DW 15/M20

For mounting diagonal bracing with Tie Rod DW 15 and a compression strut to the Climbing Rail RCS.

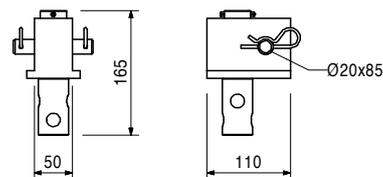
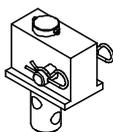
### Complete with

2 pc. 710894 Pin Ø 25 x 180, geomet.  
4 pc. 018060 Cotter Pin 4/1, galv.



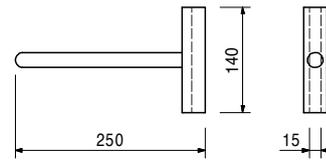
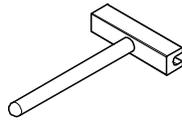
117766	4.450
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## Bracing Connector SRU/DW 15



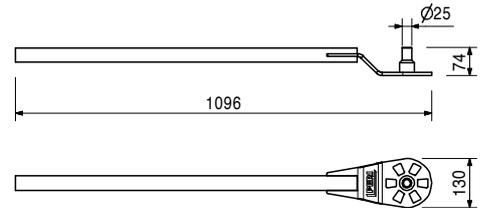
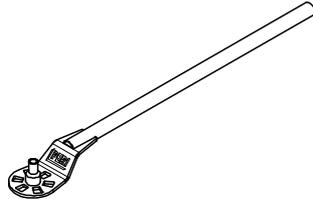
Item no.	Weight kg
031070	1.260

**Tie Rod Wrench 15, galv.**  
For easy handling of Tie Rod DW 15.



108129	3.480
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**Tie Rod Spanner DW 15**  
For Wingnut Counterplate DW 15, Wingnut Pivot Plate DW 15 and Wingnut DW 15.

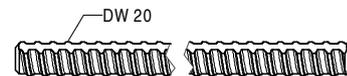
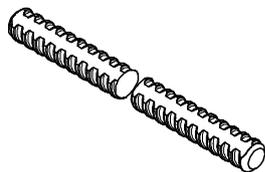


030700	2.560
030800	0.000
030640	1.280
030641	2.560
030680	15.400

**Tie Rods DW 20**  
**Tie Rod DW 20, spec. length**  
**Cutting Cost Tie Rod DW 20/B 20**  
**Tie Rod DW 20, l = 0.50 m**  
**Tie Rod DW 20, l = 1.00 m**  
**Tie Rod DW 20, l = 6.00 m**

**Note**  
Non-weldable! Take official Approval into consideration!

**Technical Data**  
Permissible tension force 150 kN.

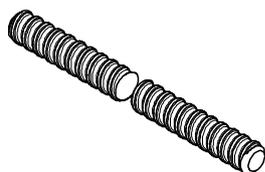


030745	2.600
030800	0.000

**Tie Rod B 20**  
**Tie Rod B 20, spec. length**  
**Cutting Cost Tie Rod DW 20/B 20**

**Note**  
Weldable! Take official Approval into consideration!

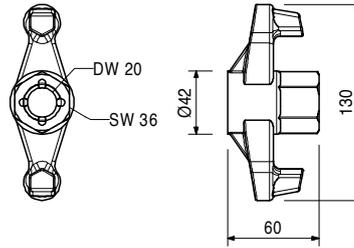
**Technical Data**  
Permissible tension force 150 kN.



Item no.	Weight kg
030990	0.786

**Wingnut DW 20, galv.**  
For anchoring with Tie Rod DW 20 and B 20.

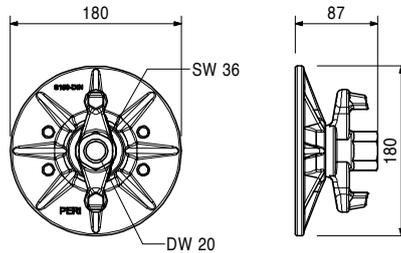
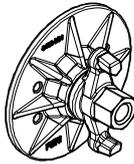
**Technical Data**  
Permissible load 150 kN.



127587	3.210
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**Wingnut Pivot Plate DW 20, galv.**  
For anchoring with Tie Rod DW 20. With pivoting captive nut. Maximum angle of tilting +/- 8°.

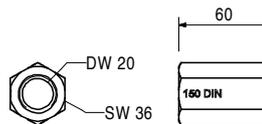
**Technical Data**  
Permissible load 120 kN.



030580	0.371
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**Hex. Nut DW 20 SW 36/60, weldable**  
For anchoring with Tie Rod DW 20 and B 20.

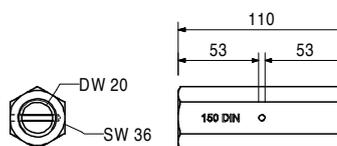
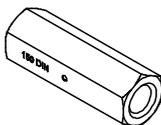
**Note**  
Weldable!  
**Technical Data**  
Permissible load 150 kN.



030590	0.685
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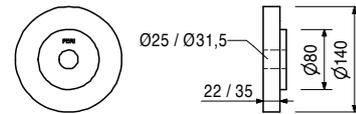
**Hex. Nut DW 20 SW 36/110, weldable**  
For coupling Tie Rod DW 20 and B 20.

**Note**  
Weldable!  
**Technical Data**  
Permissible load 150 kN.



Item no.	Weight kg
114082	2.860

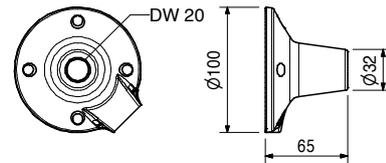
**Counterplate RCS DW 20**  
Counterplate with centring for anchoring through the Climbing Rail RCS.



030860	0.792
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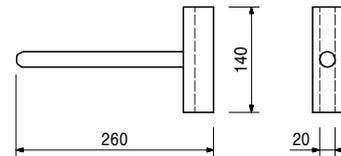
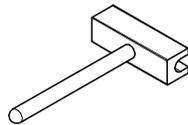
**Threaded Anchor Plate DW 20**  
For use with Tie Rod DW 20, B 20 or Screw-On Cone-2 M24/DW 20. For anchoring in concrete.

**Note**  
Lost anchor part.



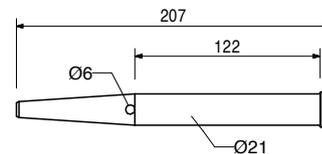
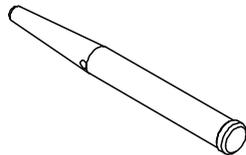
031050	1.780
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**Tie Rod Wrench 20, galv.**  
For easy handling of Tie Rod DW 20.



104031	0.462
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**Fitting Pin Ø 21 x 120**  
For different connections.



Accessories

018060	0.014
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**Cotter Pin 4/1, galv.**

018060	0.014
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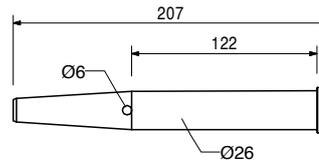
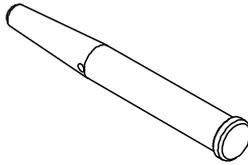
**Cotter Pin 4/1, galv.**



Item no. Weight kg

111567 0.729

**Fitting Pin Ø 26 x 120**  
For different connections.



Accessories

022230 0.033

**Cotter Pin 5/1, galv.**

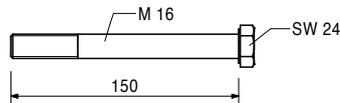
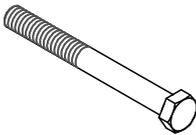


022230 0.033

**Cotter Pin 5/1, galv.**

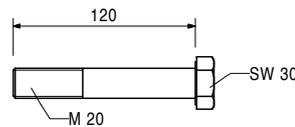
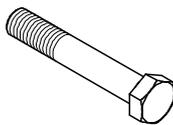
710049 0.262

**Bolt ISO 4014 M16 x 150-8.8**



104477 0.300

**Bolt ISO 4014 M20 x 120-8.8, galv.**



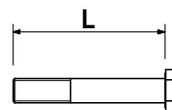
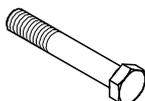
Accessories

781053 0.065

**Nut ISO 7040 M20-8, galv.**

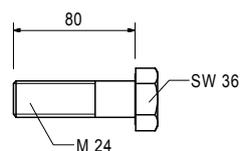
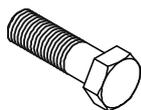
711078 0.360

**Bolt ISO 4014 M20 x 130-8.8, galv.**

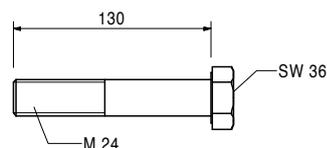
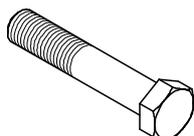


Item no. Weight kg

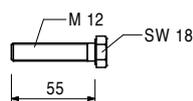
105416 0.360 Bolt ISO 4014 M24 x 80-8.8, galv.



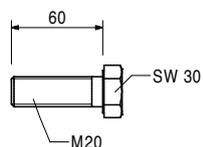
109612 0.600 Bolt ISO 4014 M24 x 130-8.8, galv.



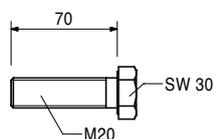
710710 0.059 Bolt ISO 4017 M12 x 55-8.8, galv.



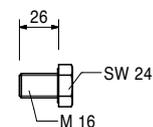
057139 0.199 Bolt ISO 4017 M20 x 60-8.8, galv.



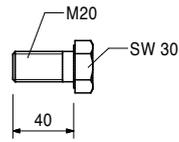
721912 0.244 Bolt ISO 4017 M20 x 70-8.8, galv.



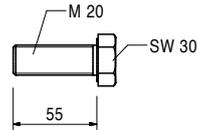
113990 0.600 Bolt ISO 4017 M16 x 25-8.8, galv.



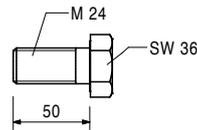
Item no.	Weight kg	
706458	0.157	<b>Bolt ISO 4017 M20 x 40-8.8, galv.</b>



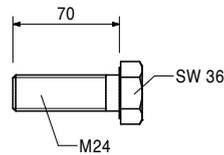
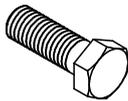
111137	0.223	<b>Bolt ISO4017 M20 x 55-8.8, galv.</b>
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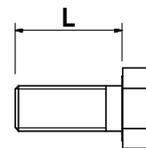
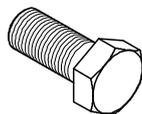
109199	0.280	<b>Bolt ISO 4017 M24 x 50-8.8, galv.</b>
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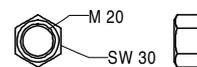
132382	0.360	<b>Bolt ISO 4017 M24 x 70-8.8, galv.</b>
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125462	0.343	<b>Bolt ISO 4017 M24 x 60-8.8, galv.</b>
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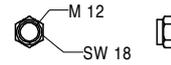
710334	0.064	<b>Nut ISO 4032 M20-8, galv.</b>
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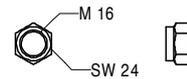
Item no.	Weight kg	
022250	0.100	<b>Nut ISO 4032 M24-8, galv.</b>



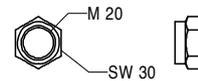
710381	0.017	<b>Nut ISO 7042 M12-8, galv.</b> Self-locking.
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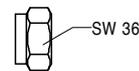
070890	0.030	<b>Nut ISO 7040 M16-8, galv.</b> Self-locking.
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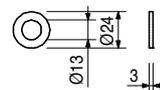
781053	0.065	<b>Nut ISO 7040 M20-8, galv.</b> Self-locking.
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105032	0.070	<b>Nut ISO 7040 M24-8, galv.</b> Self-locking.
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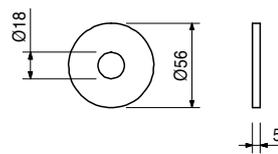


780702	0.006	<b>Washer ISO 7089 200 HV, A 12, galv.</b> Corresponds to old standard DIN 125 Form A
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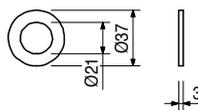


Item no. Weight kg

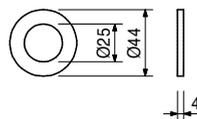
113349 0.087 Washer ISO 7094 100 HV, A 16, galv.



706454 0.017 Washer ISO 7089 200 HV, A 20, galv.



722663 0.032 Washer ISO 7089-24-200HV, galv.





## Einbauerklärung

im Sinne der EG-Maschinenrichtlinie 2006/42/EG, Anh. II 1. B  
für unvollständige Maschinen



---

**Hersteller**

PERI GmbH  
Rudolf-Diesel-Strasse 19  
89264 Weissenhorn

**In der Gemeinschaft ansässige Person, die bevollmächtigt ist, die relevanten technischen Unterlagen zusammenzustellen**

PERI GmbH  
Rudolf-Diesel-Strasse 19  
DE - 89264 Weissenhorn

**Beschreibung und Identifizierung der unvollständigen Maschine**

Produkt / Erzeugnis	FAHRMECHANIK VTC
Typ	Tunnelschalung
Maschinennummer	MO-19-03051#0#
Projektnummer	PRJ-2019-03-25-0001
Handelsbezeichnung	FAHRMECHANIK VTC
Funktion	Die FAHRMECHANIK VTC dient ausschließlich dazu, den VTC Tunnelschalwagen in Längsrichtung zu verfahren und vertikal bzw. horizontal zu positionieren. Mit der Hub- und Absenkeinrichtung wird der Tunnelschalwagen - angehoben und in Betonierstellung gebracht. - abgesenkt und in Transportstellung gebracht. In der Transportstellung wird der Tunnelschalwagen über den hydraulischen Antrieb in Längsrichtung verfahren. Der Teleskopsteher VARIOKIT dient in Verbindung mit dem Auflager-Absenkkeil; dem Absenkkeil und dem Unterstellbock zur Ableitung von vertikalen Lasten.

**Es wird erklärt, dass die folgenden grundlegenden Anforderungen der Maschinenrichtlinie 2006/42/EG erfüllt sind:**

1.1.3, 1.3., 1.6.1, 1.3.7, 1.3.1, 1.3.2, 1.3.9, 1.5.1, 1.5.15, 1.6.3, 1.6.5

**Ferner wird erklärt, dass die speziellen technischen Unterlagen gemäß Anhang VII Teil B erstellt wurden.**

**Es wird ausdrücklich erklärt, dass die unvollständige Maschine allen einschlägigen Bestimmungen der folgenden EG-Richtlinien bzw. Verordnungen entspricht:**

2014/68/EU	Richtlinie 2014/68/EU des Europäischen Parlaments und des Rates vom 15. Mai 2014 zur Harmonisierung der Rechtsvorschriften der Mitgliedstaaten über die Bereitstellung von Druckgeräten auf dem Markt Veröffentlicht in L 189/164 vom 27.06.2014
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## Einbauerklärung

im Sinne der EG-Maschinenrichtlinie 2006/42/EG, Anh. II 1. B  
für unvollständige Maschinen



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### Fundstelle der angewandten harmonisierten Normen entsprechend Artikel 7 Absatz 2:

EN ISO 12100:2010-11	Sicherheit von Maschinen - Allgemeine Gestaltungsleitsätze - Risikobewertung und Risikominderung (ISO 12100:2010)
EN 60204-1:2006-06	Sicherheit von Maschinen - Elektrische Ausrüstung von Maschinen - Teil 1: Allgemeine Anforderungen
EN 614-1:2006+A1:2009	Sicherheit von Maschinen - Ergonomische Gestaltungsgrundsätze - Teil 1: Begriffe und allgemeine Leitsätze
EN ISO 13857:2008	Sicherheit von Maschinen - Sicherheitsabstände gegen das Erreichen von Gefährdungsbereichen mit den oberen und unteren Gliedmaßen (ISO 13857:2008)
EN 349:1993+A1:2008	Sicherheit von Maschinen - Mindestabstände zur Vermeidung des Quetschens von Körperteilen
EN ISO 4413:2010	Fluidtechnik — Allgemeine Regeln und sicherheitstechnische Anforderungen an Hydraulikanlagen und deren Bauteile (ISO 4413:2010)
EN ISO 14118:2018	Sicherheit von Maschinen — Vermeidung von unerwartetem Anlauf (ISO 14118:2017)

Der Hersteller bzw. der Bevollmächtigte verpflichten sich, einzelstaatlichen Stellen auf begründetes Verlangen die speziellen Unterlagen zu der unvollständigen Maschine zu übermitteln. Diese Übermittlung erfolgt  
In Papierform

Die gewerblichen Schutzrechte bleiben hiervon unberührt!

**Wichtiger Hinweis! Die unvollständige Maschine darf erst dann in Betrieb genommen werden, wenn gegebenenfalls festgestellt wurde, dass die Maschine, in die die unvollständige Maschine eingebaut werden soll, den Bestimmungen dieser Richtlinie entspricht.**

Weissenhorn, 03.04.2019

Ort, Datum

Unterschrift  
Dipl.-Ing. Rainer Bolz  
Head of R&D Formwork

Seite 2/2

## Declaration of Incorporation

In accordance with the EC-Machinery Directive 2006/42/EC,  
Annex II 1. B for partly completed machinery



Manufacturer	Persons established within the Community authorized to compile the relevant technical documentation
PERI GmbH	PERI GmbH
Rudolf-Diesel-Strasse 19	Rudolf-Diesel-Strasse 19
89264 Weissenhorn	DE - 89264 Weissenhorn

### Description and identification of the partly completed machinery

Product	Driving Mechanism VTC
Type	Tunnel Formwork
Machine number	MO-19-03051#0#
Project number	PRJ-2019-03-25-0001
Trade name	Driving Mechanism VTC
Function	<p>The Driving Mechanism VTC serves exclusively to move the Tunnel Formwork Carriage VTC in the longitudinal direction and to position it vertically or horizontally.</p> <p>By means of the raise and lowering equipment, the Tunnel Formwork Carriage is</p> <ul style="list-style-type: none"> <li>- lifted into the required concreting position</li> <li>- lowered and brought into transport position.</li> </ul> <p>In the transport position, the Tunnel Formwork carriage is moved longitudinally by the hydraulic drive. The Telescopic Prop VARIOKIT is used in conjunction with the Support Wedgebox, the Lowering Wedge and the Support Frame for the transfer of vertical loads.</p>

**It is declared, that the following essential requirements of the Machinery Directive 2006/42/EC are fulfilled:**

1.1.3, 1.3., 1.6.1, 1.3.7, 1.3.1, 1.3.2, 1.3.9, 1.5.1, 1.5.15, 1.6.3, 1.6.5

**It is also declared, that the specific technical documentation has been drawn up in accordance with Annex VII, Part B.**

**It is expressly declared, that the partly completed machinery complies with all relevant provisions of the following EC Directive or Directives.**

2014/68/EC	<p>Directive 2014/68/EC of the European Parliament and of the Council of 15 May 2014 on the harmonization of the laws of the Member States relating to the availability of pressure equipment on the market</p> <p>Published in L 189/164 of 27.06.2014.</p>
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## Declaration of Incorporation

In accordance with the EC-Machinery Directive 2006/42/EC,  
Annex II 1. B for partly completed machinery



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### Reference to the harmonized standards used, as referred to in Article 7 (2)

EN ISO 12100:2010-11	Safety of machines – General design principles - Risk assessment and mitigation (ISO 12100:2010)
EN 60204-1:2006-06	Safety of machines – Electrical equipment of machines – Part 1: general requirements
EN 614-1:2006+A1:2009	Safety of machines – Ergonomic design principles - Part 1: terminology and general principles
EN ISO 13857:2008	Safety of machines – Safety distances to prevent hazardous areas being reached by the upper and lower limbs (ISO 13857:2008)
EN 349:1993+A1:2008	Safety of machines – Minimum gaps to avoid crushing of parts of the human body
EN ISO 4413:2010	Fluid technology – General rules and safety requirements for hydraulic systems and their components (ISO 4413:2010)
EN ISO 14118:2018	Safety of machines – Prevention of unexpected start-up (ISO 14118:2017)

The manufacturer or his authorized representative shall be obliged to communicate to the national authorities, on a reasoned request, the specific documentation concerning the partly completed machinery. This information shall be supplied in digital form or, on request, in paper form.

The industrial property rights remain unaffected by this!

**Important note! The partly completed machinery must not be put into service until it has been established, where appropriate, that the machinery into which the partly completed machinery is to be incorporated complies with the provisions of this Directive.**

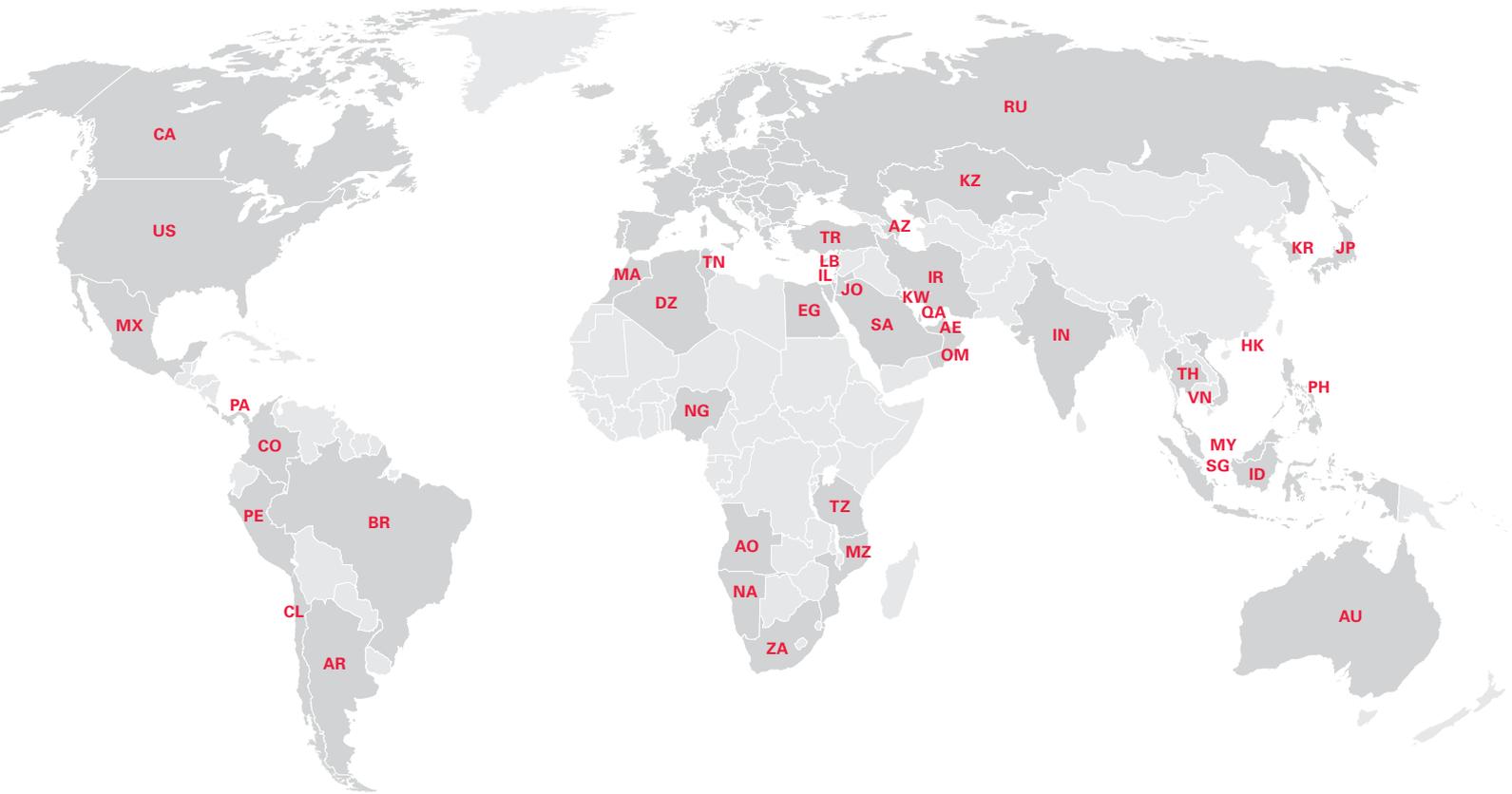
Weissenhorn, 03.04.2019

Place, Date

-----  
Signature  
Dipl. -Ing. Rainer Bolz  
Head of R&D Formwork

Page 2/2

# PERI International



## North America

- CA** Canada  
PERI Formwork Systems, Inc.  
[www.peri.ca](http://www.peri.ca)
- MX** Mexico  
PERI Cimbras y Andamios, S.A. de C.V.  
[www.peri.com.mx](http://www.peri.com.mx)
- PA** Panama  
PERI Panama Inc.  
[www.peri.com.pa](http://www.peri.com.pa)
- US** USA  
PERI Formwork Systems, Inc.  
[www.peri-usa.com](http://www.peri-usa.com)

## South America

- AR** Argentina  
PERI S.A.  
[www.peri.com.ar](http://www.peri.com.ar)
- BR** Brazil  
PERI Formas e Escoramentos Ltda.  
[www.peribrasil.com.br](http://www.peribrasil.com.br)
- CL** Chile  
PERI Chile Ltda.  
[www.peri.cl](http://www.peri.cl)
- CO** Colombia  
PERI S.A.S.  
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- PE** Peru  
PERI Peruana S.A.C.  
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Pericofragens, Lda.  
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- DZ** Algeria  
S.A.R.L. PERI  
[www.peri.dz](http://www.peri.dz)
- EG** Egypt  
Egypt Branch Office  
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- MA** Morocco  
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- NA** Namibia  
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- NG** Nigeria  
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- TN** Tunisia  
PERI S.A.U.  
[www.peri.es](http://www.peri.es)
- TZ** Tanzania  
PERI Formwork and Scaffolding Ltd  
[www.peri.co.tz](http://www.peri.co.tz)
- ZA** South Africa  
PERI Formwork Scaffolding (Pty) Ltd  
[www.peri.co.za](http://www.peri.co.za)

## Asia

- AE** United Arab Emirates  
PERI (L.L.C.)  
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- AZ** Azerbaijan  
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- HK** Hong Kong  
PERI (Hong Kong) Limited  
[www.perihk.com](http://www.perihk.com)
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# PERI

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Germany  
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Fax +49 (0)7309.951-0  
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www.peri.com

## Oceania

**AU** Australia  
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PERI Danmark A/S  
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**IT** Italy  
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