E-OCGM

Operation and Maintenance Manual

TOPFIBRA

EFFECTIVE FILAMENT WINDING® PIONEERS

E-OCGM

OPERATION AND MAINTENANCE MANUAL

TABLE OF CONTENTS

1. INTRODUCTION 1

2. SAFETY 2

2.1. General safety 2

2.2. Proper machine / line shutdown procedure during maintenance or repair 5

2.3. Hazards at work and remedial measures 6

2.3.1. Demolition 6

2.3.2. Crushing 6

2.3.3. Trapping 7

2.3.4. Incisions/Cuts 7

2.3.5. Blows 7

2.3.6. Short-circuit currents 7

2.3.7. Overload 7

2.3.8. Indirect contact of live parts 8

2.3.9. Direct contact of live parts 8

2.3.10. Mechanical damage to electrical equipment 8

2.3.11. Permitted voltage drop 8

2.3.12. Network overvoltage 8

2.3.13. Fire 8

2.3.14. Noise and vibration 9

2.3.15. Dust 9

2.4. Safety equipment 9

3. DESCRIPTION OF CUTTING AND GRINDING 10

3.1. Trolleys 1, 2 and 3 11

3.1.1. Trolley 1 11

3.1.1.1. Lifting wheel assembly 13

3.1.1.2. Turning wheel assembly 13

3.1.1.3. Push roller assembly 14
3.1.2. Trolley 2 16
3.1.3. Trolley 3 17
3.2. Cutting and grinding trolley 18
3.2.1. Lifting platform assembly 20
3.2.2. Blocking rack 22
3.3. Safety devices 22
4. MAINTENANCE 25
4.1. Preventive maintenance 25
4.1.1. Changing chains and sprockets 25
4.1.2. Trolley 1, 2, 3 26
4.1.2.1. Daily schedule 27
4.1.2.2. Weekly Schedule 27
4.1.2.3. Quarterly schedule 27
4.1.3. Cutting and grinding trolley 29
4.1.3.1. Daily Schedule 30
4.1.3.2. Quarterly schedule 30
4.1.4. Electrical equipment 31
4.1.4.1. Daily Schedule 31
4.1.4.2. Quarterly schedule 32
4.2. Spare parts 33
4.3. Lubrication 37
5. LIST OF ATTACHED EQUIPMENT DRAWINGS 43
6. ATTACHMENTS 44

1. INTRODUCTION

Information in the scope of this manual is intended for qualified personnel. Personnel are qualified if they have the necessary knowledge (expertise, safety at work, etc.) and skills.

Continuous monitoring and compliance with instructions, norms and standards by the manufacturer is a guarantee for the safety of personnel and machinery, its economical use and long service life.

To make the manual easier to read, it is divided into individual chapters; to find individual chapters faster, it is recommended to use the index!

The operation and maintenance manual provides information about the following:

- General safety;
- Description of equipment;
- Maintenance and spare parts.

2. SAFETY

2.1. General safety

Read this manual carefully before use, adjustment, or maintenance!

Follow all warnings for machine/line operation and maintenance. Failure to follow basic safety instructions could result in accidents that could injure workers near the line or damage the line.

A worker, as cited above, is not just a worker who manages and supervises the machine/line at work, but any person who deals with the machine/line including maintenance personnel who maintain and inspect the machine/liner safety devices and safety measures associated with it. Among them are also programmers who take care of the program machine/line. Therefore, all persons employed in these operations should read these instructions carefully. But they also need to understand the content in detail before they start working with the machine/line

The machine/line parameters are set by the manufacturer so that the user's safety is guaranteed and that the line offers all its capabilities. Under no circumstances should you ever change the settings or change the line.

Changing the settings or changing the machine/line without consulting the manufacturer may reduce the level of safety or cause accidents with serious injuries. It can also reduce the capacity of the machine/line and shorten its service life. If there is a need to change the machine/liner

of the control program, consult the manufacturer. The manufacturer accepts no liability for accidents caused by the customer's changed settings or changes to the machine/line.

Always use original parts specified by the manufacturer when replacing broken, restored or worn machine parts/lines. Using non-original parts means changing the machine/line. The manufacturer accepts no liability for accidents resulting from non-original parts.

- Before starting the machine/line, make sure that no one is behind the machine/line guards or near rotating or moving parts of the machine/line.
- Never stand near or touch rotating or moving parts of the machine/line while the machine/line is operating. Serious injuries can result if you become entangled in rotating parts or are struck by a moving part of the machine/line.
- Never work with a machine/line that has any protection removed. Do not operate the machine/line when safety devices are ineffective.
- Keep the floor around the machine/line clean, do not leave things lying on the floor, and wipe up spilled water or oil immediately. Failure to do so may result in someone tripping or slipping on wet ground.
- Before you start working with the machine/line, check where you will be standing and walking to make sure you are in a safe working position. If you do not check the floor, space, you may lose your balance while working. You can injure your arms or head when looking for support.

- Before using a switch, button, or other activation item, make sure by looking that it is the one you intended to use. Pressing the wrong activation element can cause accidents with serious injuries or damage to the machine/line.

- Always follow the instructions on the warning labels and other warnings installed on the machine/line and the operating instructions supplied with the machine/line carefully. If the labels become illegible, damaged or peel off, contact the machine/line manufacturer. Consult the manufacturer if you do not understand the instructions on the labels. Replacing or misunderstanding the instructions on the labels when working with the machine/line can lead to dangerous or incorrect procedures, which can lead to accidents with serious injuries or damage to the machine/line.

- Never operate the machine/line or maintain it under the influence of narcotics. Your concentration will decrease, and you may lose your balance and fall towards dangerous parts of the machine/line. Under the influence of narcotics, you can do the wrong procedure and cause accidents with serious injuries or damage to the machine/line.

- The worker behind the machine/line and the staff working near the machine/line must have suitable clothing so that they do not get stuck. Long hair and loose clothing is dangerous because the worker can get entangled in the machine/line. Rotating and moving machine parts lines can cause serious injuries. Always wear safety work shoes and other protective equipment if necessary.

- Remember the position of the emergency stop buttons so that you can immediately press them from any space at any time during machine/line operation. The emergency stop buttons stop all procedures in the event of a problem. It will not be possible to press the emergency stop button in a moment of danger if there is an obstacle in front of it, which can lead to accidents with serious injuries and damage to the machine/line.

- The plant manager must prevent anyone who does not have sufficient knowledge of safety at work from entering the machine/line. Leaving people who do not have enough knowledge of safety at work unhindered near the line can lead to accidents with serious injuries.

- Due to the inertia of the machine/line, the moving parts of the machine/line do not stop as soon as you press the emergency stop machine/line button. Always make sure all

procedures are stopped before approaching these parts. If you approach moving parts carelessly, you can become entangled and injured.

- Do not leave objects such as tools or rags in the machine/line. Moving parts of the machine/line can become entangled during the operation of the machine/line, which can lead to accidents with serious injuries and damage to the machine/line.
- The mechanical worker must have the appropriate medical certificate. Sensory perception is very important. Improper perception of the condition can lead to accidents with serious injuries and damage to the machine/line.
- Ensure that the workplace is adequately lit. In insufficient light, the worker may stumble, be unable to perform or check his work accurately, which can lead to accidents with serious injuries and damage to the machine/line.
- Remove obstacles around the machine/line. Provide enough space for work and a suitable passage. Consider work comfort and safety. Obstacles at work, lack of space, or insufficient passage can cause a worker to stumble and fall, or not work properly. All this can lead to accidents with serious injuries and damage to the machine/line
- If the machine/line stops for any reason, it is indicated by an alarm entered on the main control panel. The operator is obliged to correct the error that is displayed. Only then he can put the device back into operation. If it is not able to correct the fault, it is necessary to contact the manufacturer.

2.2. Proper machine / line shutdown procedure during maintenance or repair

Before starting any maintenance or repair procedure notify workers that the machine/line will be switched off. The machine must be switched off by turning the main switch lever to position O and LOCKING it. Any other energy sources (air, water, oil/hydraulics) must also be shut down. Stored energy, such as that in pneumatic and hydraulic systems, springs, rotating flywheels, etc. and air, gas, steam or water pressure, must also be relieved or restrained by methods such as grounding, repositioning, blocking, and bleeding down. It is necessary to check that we have turned off all energy sources, so we try to operate the machine/line normally and thus check that it is not working. Now the machine is properly shut down.

This operation may only be performed by a suitably qualified operator or maintainer who knows how to use the machine/line. When the machine/line is not working, mark it with an appropriate inscription.

Once maintenance or repair has been carried out and the machine/line is ready for testing or operation, make sure that no one is near the machine/line. If the machine/line is free, then the machine/line can be restarted (open/restart all energy sources and turn on the main switch).

2.3. Hazards at work and remedial measures

Workers who operate, use and maintain the installed equipment must be familiar with these instructions.

2.3.1. Demolition

Demolition of the structure, device, machine part, element and consequent damage is eliminated by proper sizing of machine elements, parts, assemblies and devices. Sizing is performed according to applicable standards and regulations that apply to individual elements, assemblies and devices and take into account the type of load and in this regard the allowable stresses that can occur in machine parts without damage to the structure, device and element.

2.3.2. Crushing

The cause of crushing can be the failure of the machine part of the device, the structure, element, etc., which is prevented by proper sizing as described in the point above. However, it can happen when improperly handling devices that have moving parts. To prevent consequences, moving parts are protected by nets and/or covers and prevent interference with danger zones.

2.3.3.Trapping

Trapping can also occur for the same reason as crushes, so the safety precautions to prevent them are the same as in the point described above. However, trapping can also be the result of the use of incorrect clothing (coats, uncovered long hair), so it is necessary to have the right protective equipment that corresponds to the work operations that the operator encounters in his work. Tight work clothes are recommended.

2.3.4.Incisions/Cuts

The sharp edges of the structure, which are the result of machining, are chamfered during the construction itself so that the possibility of damage is reduced. The entire construction consists of individual sets, which are connected in a certain sequence due to the operating process. These are installed in such a way that when moving next to them they prevent contact with exposed parts of devices such as ribs, brackets, protruding screws, and sharp edges of structures, which can cause cuts.

2.3.5.Blows

For the same reason as cuts and trapping, blows can also occur. The machine is designed so that the risk of impact is minimal. The prohibition of interfering with moving parts must be observed.

2.3.6.Short-circuit currents

Protection against dangerous short-circuit currents is carried out with adequate protection of all circuits in switch cabinets. The switch cabinet is dimensioned for maximum short-circuit currents.

2.3.7.Overload

Overload protection is provided by the correct selection of the conductor cross-section according to the permitted current load and the correct selection of installation fuses and motor protection switches. After the installation is completed, a test of the correct setting of the thermal motor protection switches is performed.

2.3.8. Indirect contact of live parts

Protection against indirect contact of live parts is performed by automatically turning off the power. Therefore, all conductive parts of the devices that could come under dangerous contact voltage in the event of a fault must be connected to a special protective conductor (PE) of yellow-green colour. All protective conductors are connected in the switch box to a special protective busbar, which is connected to the protective busbar in the plant by a protective conductor in the power cable.

2.3.9. Direct contact of live parts

Protection against direct contact with live parts is carried out by the correct choice of equipment installed in the appropriate switch cabinet.

2.3.10. Mechanical damage to electrical equipment

The equipment is selected according to the purpose and place of installation.

The cables are laid in protective tubes or properly located so that they are not exposed to mechanical damage.

2.3.11. Permitted voltage drop

The not permitted voltage drop is prevented by the correct sizing of the connecting cable.

2.3.12. Network overvoltage

The equipment is selected according to the appropriate voltage and insulation level. Surge arresters must be installed in the distributor from which the system is powered (provided by the customer).

2.3.13. Fire

Fire protection is performed by the correct selection and dimensioning of appropriate electrical equipment, which, if the electrical installation is performed correctly and maintained properly during use, cannot be the cause of the fire.

2.3.14. Noise and vibration

The noise level of the machine does not exceed 85 dB until cutting or grinding starts. Safety earmuffs or earplugs are required when using this machine.

2.3.15. Dust

There is no possibility of harmful dust or gases occurring when operating the machine.

2.4. Safety equipment

Any operator who operates this machine must use safety earmuffs or earplugs, gloves, glasses, safety work shoes and a safety helmet.

3. DESCRIPTION OF CUTTING AND GRINDING

Cutting and grinding machinery is intended for cutting and grinding defective pipes in dimensions from ND 12″ to ND 120″.

Cutting and grinding machinery consists of three trolleys that hold the pipe, Cutting and grinding trolleys, rails, cable chains and other holders.

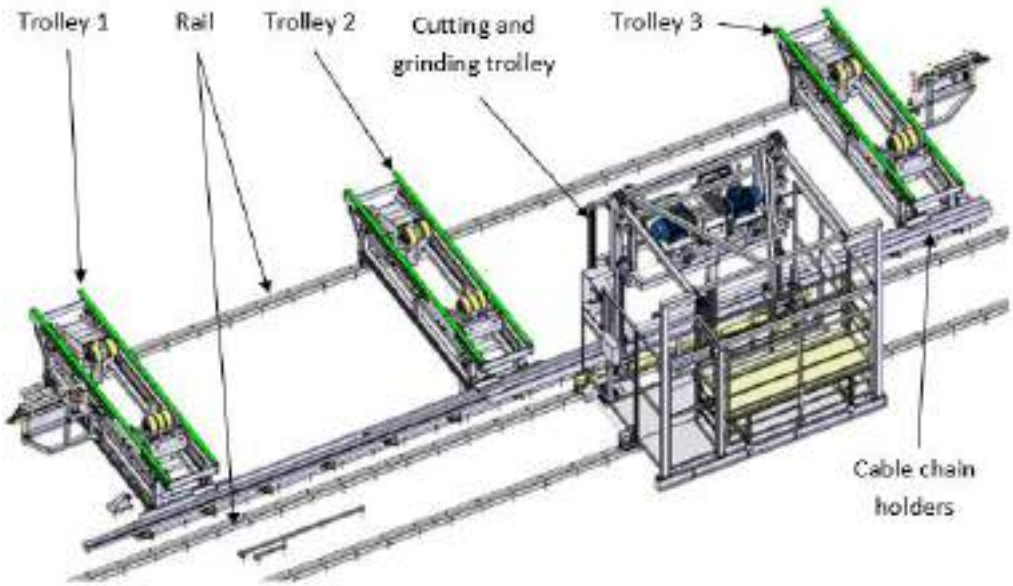


Figure 1: Cutting and grinding

Workflow:

The pipe is transported to the cutting and grinding machinery with a pipe transportation trolley that is not within the scope of the instructions. The trolley stops at the same place at all times and then waits for a signal from the operator and sensors to roll the pipe onto TrolTrolleys2 and 3. Before rolling the pipe on the trolleys, the trolleys must be in the right places according to the length of the pipe, both wheel assemblies on the trolleys must be in the position determined by the pipe dimension and all lifting wheel assemblies on the trolleys must be in the lower position. Once the pipe is on the trolleys, it can be lifted by the hydraulic cylinder that is part of the lifting wheel assemblies. Before we can lift the pipe, it is necessary to secure the position with a position locker. The pipe must always be lifted with all three hydraulic cylinders. On the first and last trolley, there is a pneumatic movable arm with a wheel (Push roller assembly), which ensures that the pipe does not fall from the trolleys when rotating. After the arm grabs the pipe, we must secure the arm with screws (Figure 5), so there is no movement.

Only when the pipe is secured from the sides with the arms and with screws, can we start rotating the pipe. All the operations described so far are performed from the counter next to the main electric cabinet (apart from securing the cylinders, which is done manually).

The operator raises the saw and grinder assembly to the required height, which is determined by the size of the pipe, and secures the position with a blocking rack. Only when the position is secured can he enter the cutting and grinding platform on Trolley 4? It is then driven to the position where the pipe needs to be cut. Before we can cut or grind the pipe, it is necessary to start rotating the pipe. The pipe is first grinded before cutting. After grinding is complete, we move the cart so that we can cut the pipe off. When cutting or grinding the pipe, the middle trolley should always be in the middle of the cut. Since the operation of cutting and grinding can be at different heights, there is a platform on which the operators can step on if they can't reach the operating panel. The platform is movable and is also secured with a pin when in the starting or ending position. This prevents uncontrolled movements. After the cutting operation is completed, the rotation of the pipe can be stopped, and the pipe can be lowered with the lifting wheel assemblies and rolled onto the trolley that initially brought the pipe.

3.1. Trolleys 1, 2 and 3

The trolleys are different from each other, but together they perform the following functions:

- They are used as a rail on which the pipe is rolled;
- They are a supporting structure for holding pipes;
- They lift the pipe;
- They rotate the pipe;
- They move the pipe.

3.1.1.Trolley 1

Trolley 1 consists of several assemblies and has several functions. Trolley 1 is powered by a 0.75 kW electric motor drive that drives one pair of wheels via a chain drive. The pair of driven wheels are connected by a shaft. Trolley 1 reaches a maximum speed of 0,1 m/s.

The pipe is rolled on NPU profiles lined with Novilon to prevent pipe damage. The hydraulic cylinder in the Lifting wheel assembly lifts the pipes. Before lifting, the pipe must rest on the Turning wheel assembly. During the lift, the pipe climbs on the Turning wheel assembly. The turning wheel assembly rotates the pipe by moving the wheels, which are driven via a chain drive to an electric motor gear with a power of 1.1 kW.

The Push roller assembly ensures that the pipe does not fall out of the trolley during rotation. It does this with a pneumatic cylinder. The lifting wheel assembly and Turning wheel assembly are movable inside the NPU profile, so they can be placed in a specific place for each diameter of the pipe. The position for each pipe is marked on the side of the NPU profile. Before lifting the pipe, both positions of Lifting wheel assembly and Turning wheel assembly must be secured with a position locker.

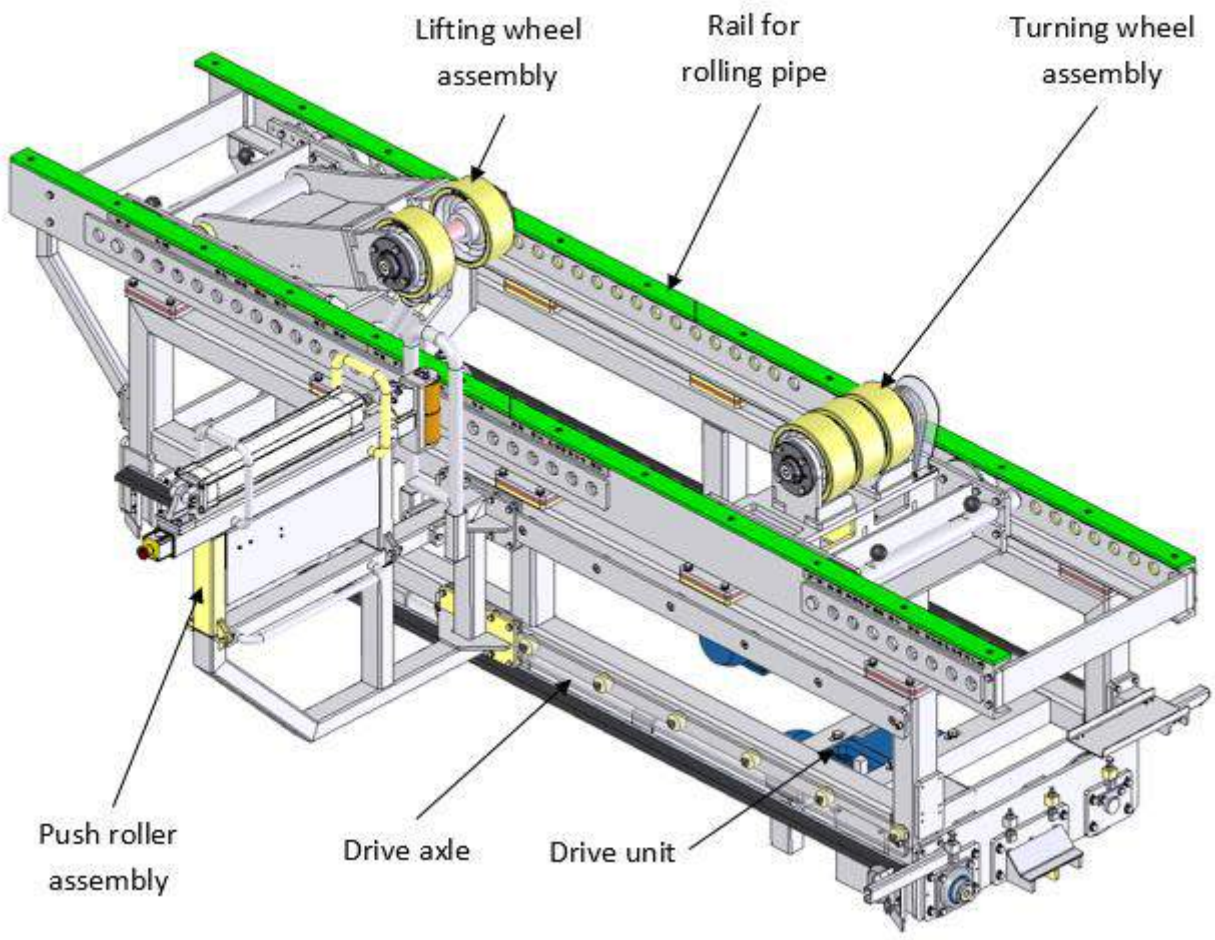


Figure 2: Trolley 1

3.1.1.1. Lifting wheel assembly

The lifting wheel assembly is intended for lifting pipes. It consists of hydraulic equipment, a supporting structure, movable arms with wheels and a position locker. The supporting structure has two pairs of wheels with which you can manually move the whole assembly around the Trolley. The hydraulic cylinder is mounted on the bottom of the supporting structure and on a movable arm with wheels that lifts the pipe. The hydraulic power unit, valves and tank are attached to the side of the supporting structure. At the back of the assembly is the position locker with which we fix the position of the assembly on the trolley.

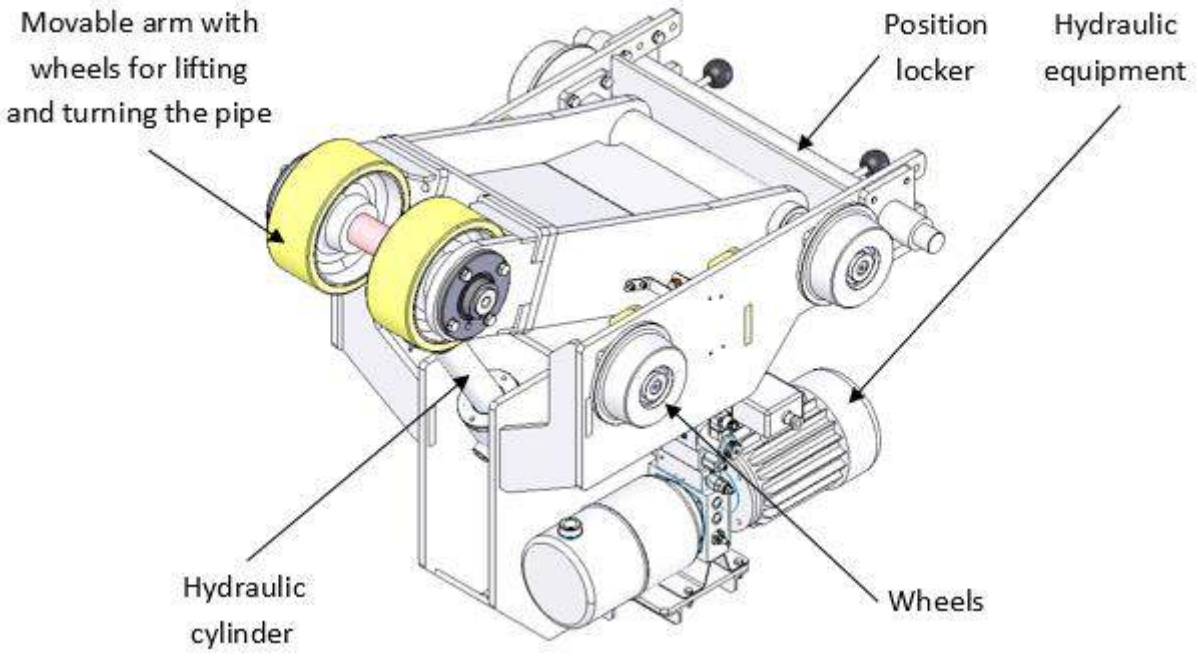


Figure 3: Lifting wheel assembly

3.1.1.2. Turning wheel assembly

The turning wheel assembly is intended for turning the pipe. It consists of a drivetrain, supporting structure, wheels and position locker. The supporting structure has two pairs of wheels with which you can manually move the whole assembly around the Trolley. The 1.1kW electric motor drive drives three wheels via a chain drive. These wheels rotate the pipe. By default, the motor spins the wheels and the pipe at 0,14 m/s or 11 rpm/min. At the back of the assembly is the position locker with which we fix the position of the assembly on the trolley.

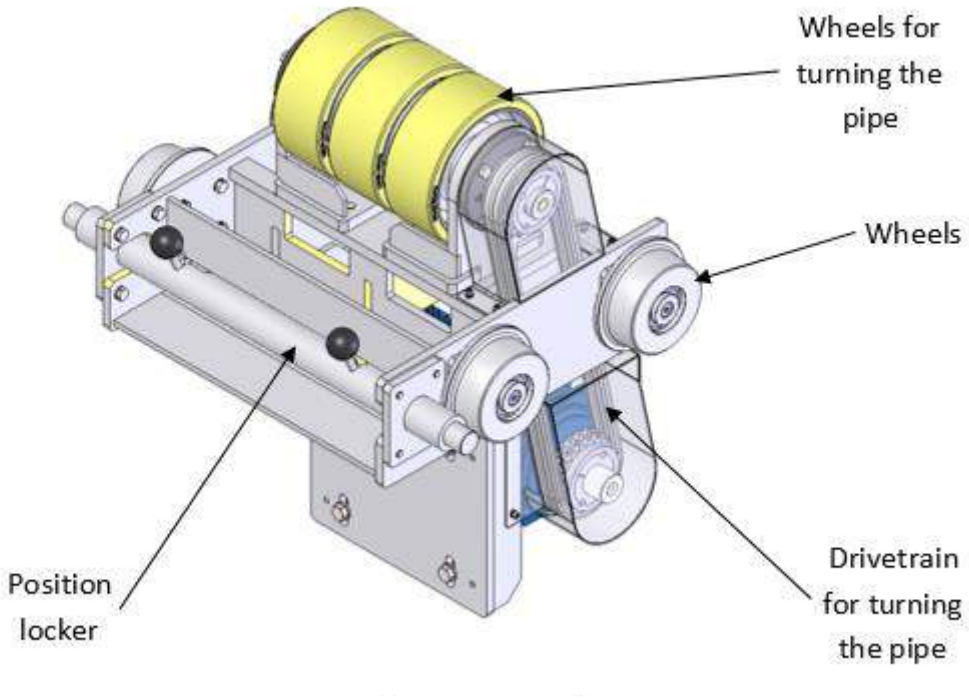


Figure 4: Turning wheel assembly

3.1.1.3. Push roller assembly

The push roller assembly is designed to hold the pipe so that it does not come down from the trolley during rotation. It consists of pneumatic equipment, a supporting structure and wheels. The assembly has bearings on the front part that allow free movement left and right on the trolley. We secure the position of the assembly by tightening two screws. The pneumatic cylinder is mounted on the supporting structure and on the movable arm with the h wheel which holds the pipe in place during rotation. The cylinder and the movable arm are protected in the initial position by the tubular structure against impacts. The entire upper part of the construction with the cylinder is on hinges and can be rotated 180 degrees so that it moves below the level of the pipe rails on the trolley.

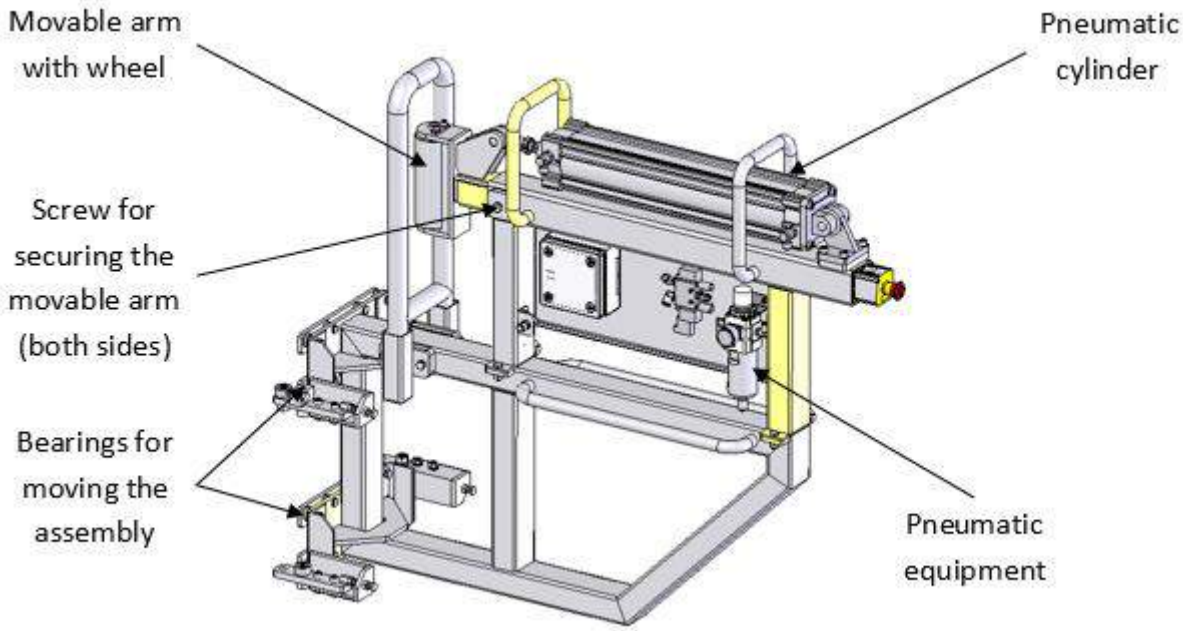


Figure 5: Push roller assembly (working position)

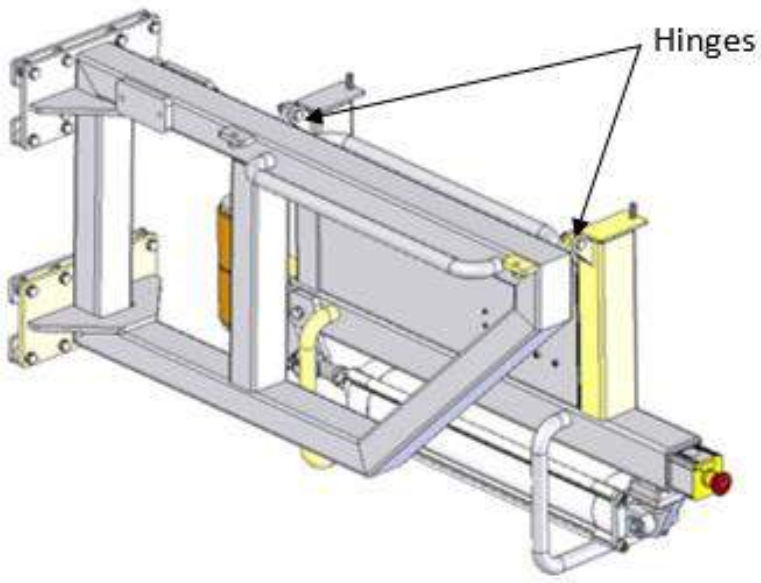


Figure 6: Push roller assembly (folded)

3.1.2.Trolley 2

The Trolley 2 is very similar to the Trolley 1 in features and appearance. The difference between them is that the Trolley 2 does not have the Push roller assembly, because it is the second trolley in a row ant it does not have an electric motor gear unit in the Turning wheel assembly. However, the Turning wheel assembly design is prepared in such a way that it is possible to add an electric motor gear unit.

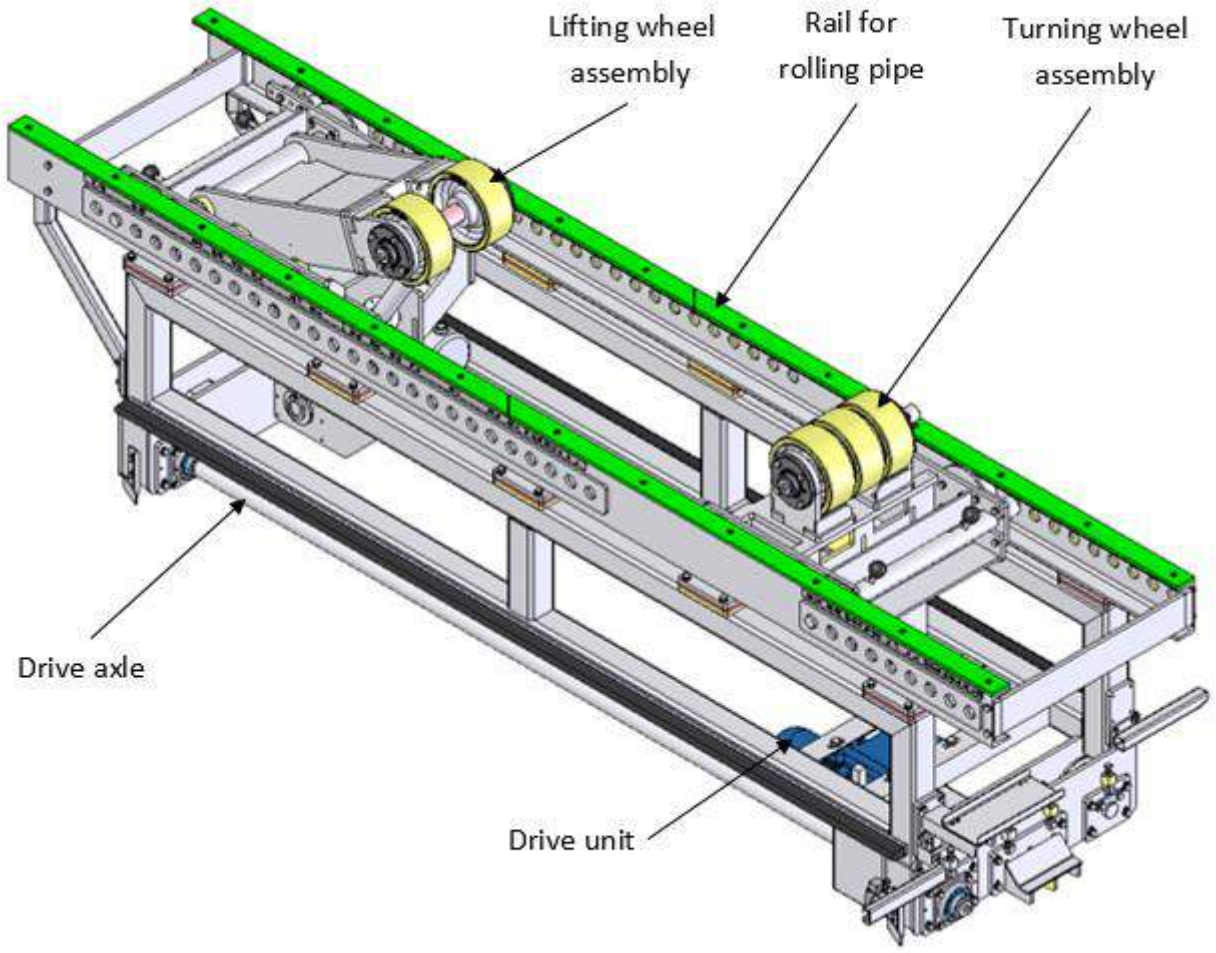


Figure 7: Trolley 2

3.1.3.Trolley 3

The Trolley 3 is very similar to the Trolley 1 in features and appearance. The difference between them is that the Trolley 3 is not driven, which means it is moved by hand and the Push roller assembly is mirrored on the other side.

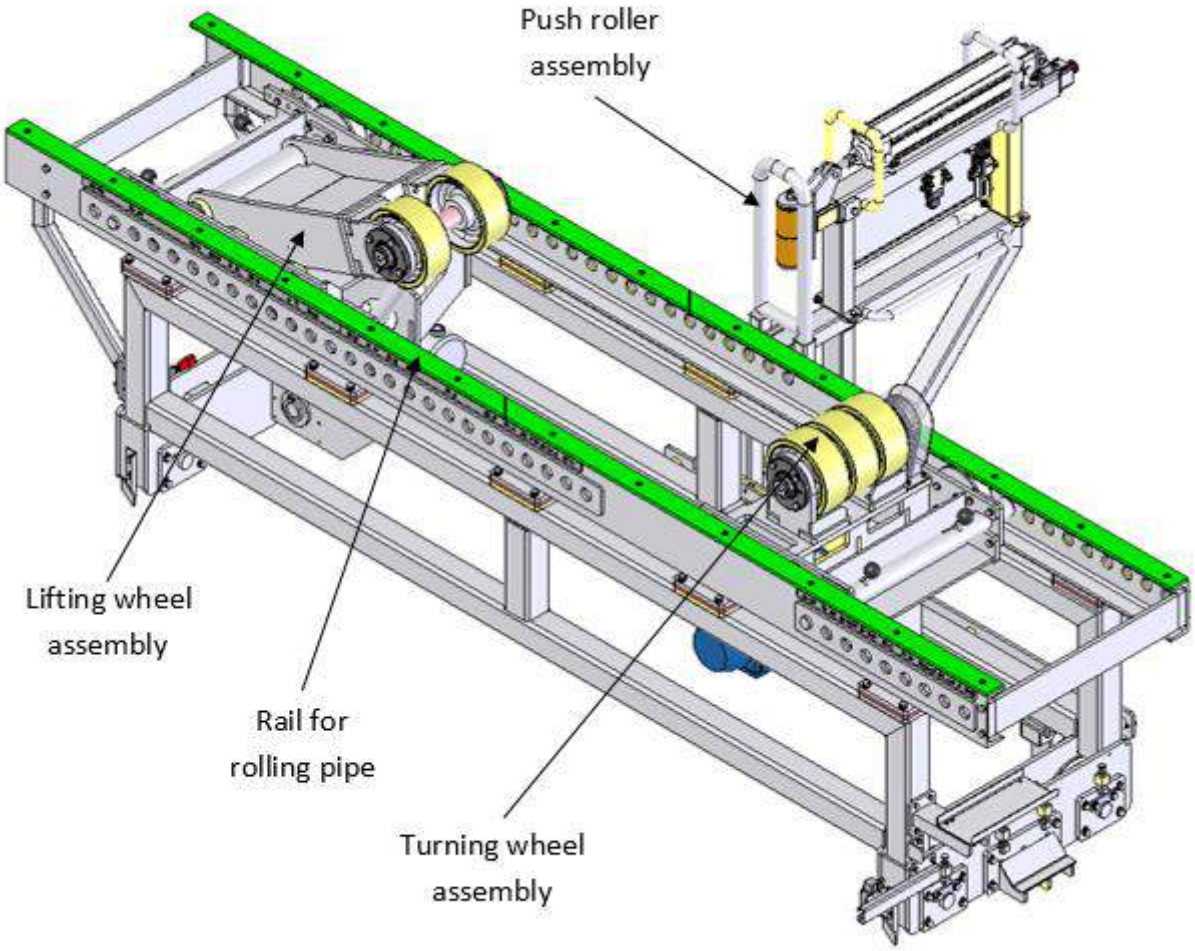


Figure 8: Trolley 3

3.2. Cutting and grinding trolley

The cutting and grinding trolley is designed for cutting and grinding pipes. It consists of a supporting structure on wheels, a lifting platform assembly with a grinder and cutter, and a platform on wheels. The cutting and grinding trolley is powered by a 1.1 kW electric motor drive that drives one pair of wheels via a chain drive. The pair of driven wheels are connected to each other by a shaft. The cutting and grinding trolley reaches a maximum speed of 0,4 m/s. Trolley movement is controlled via an operating panel on the inside of the trolley.

The grinder and saw are mounted on a lifting platform assembly, which is lifted by a servo-electric motor gearbox via a belt drive. The grinder and saw have the option of moving back and forth and left and right manually via the spindle transmission.

The trolley is protected by fences to prevent unwanted entry or exit to/from the trolley. Before the operator can enter the trolley, the position of the lifting mechanism must be secured with a blocking rack.

Since the operation of cutting and grinding can be at different heights, there is a platform on which the operators can step on if they cannot reach the operating panel. The platform is manually movable and is also secured with a pin when in the starting or ending position. This prevents uncontrolled movements.

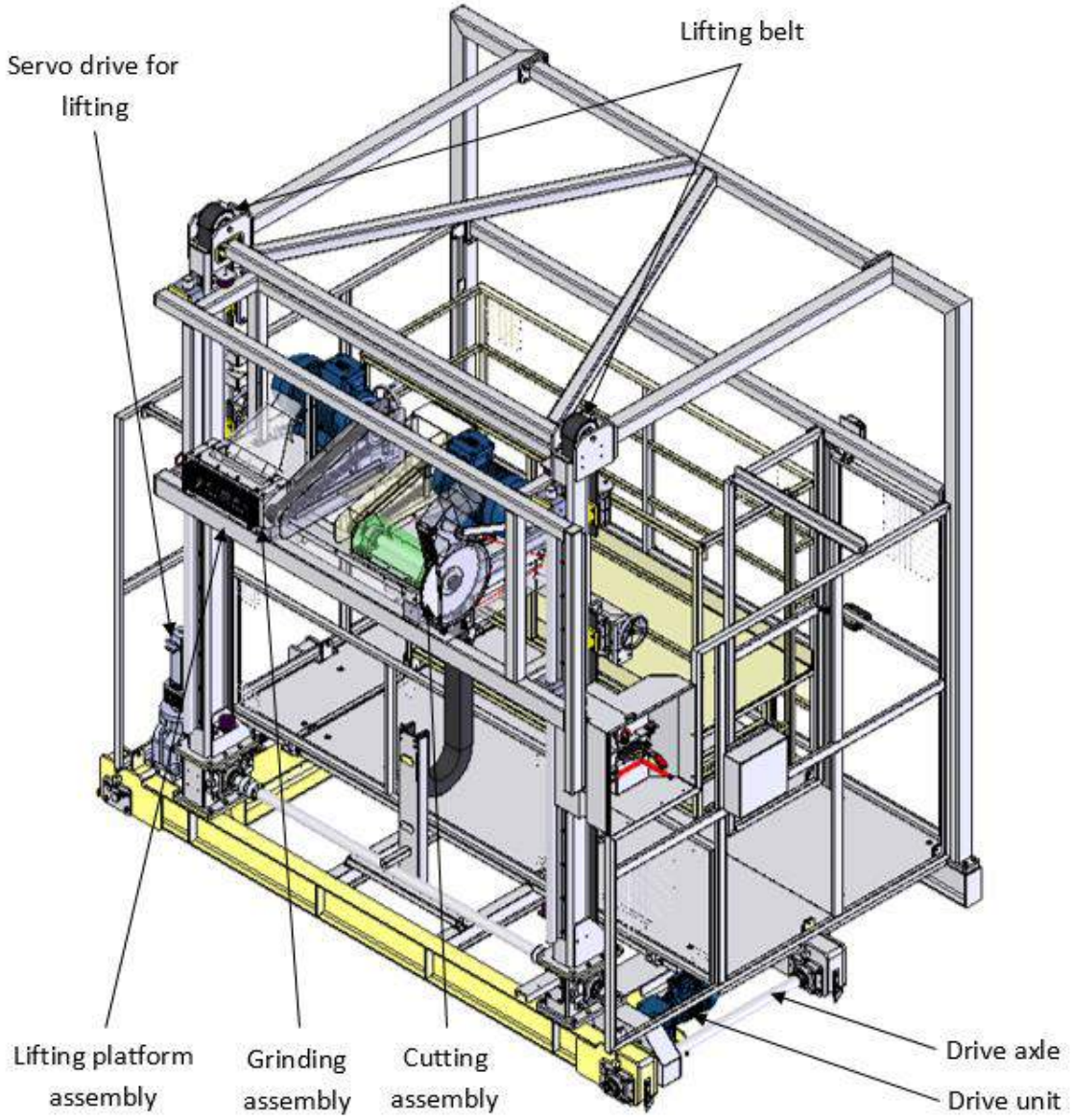


Figure 9: Cutting and grinding trolley

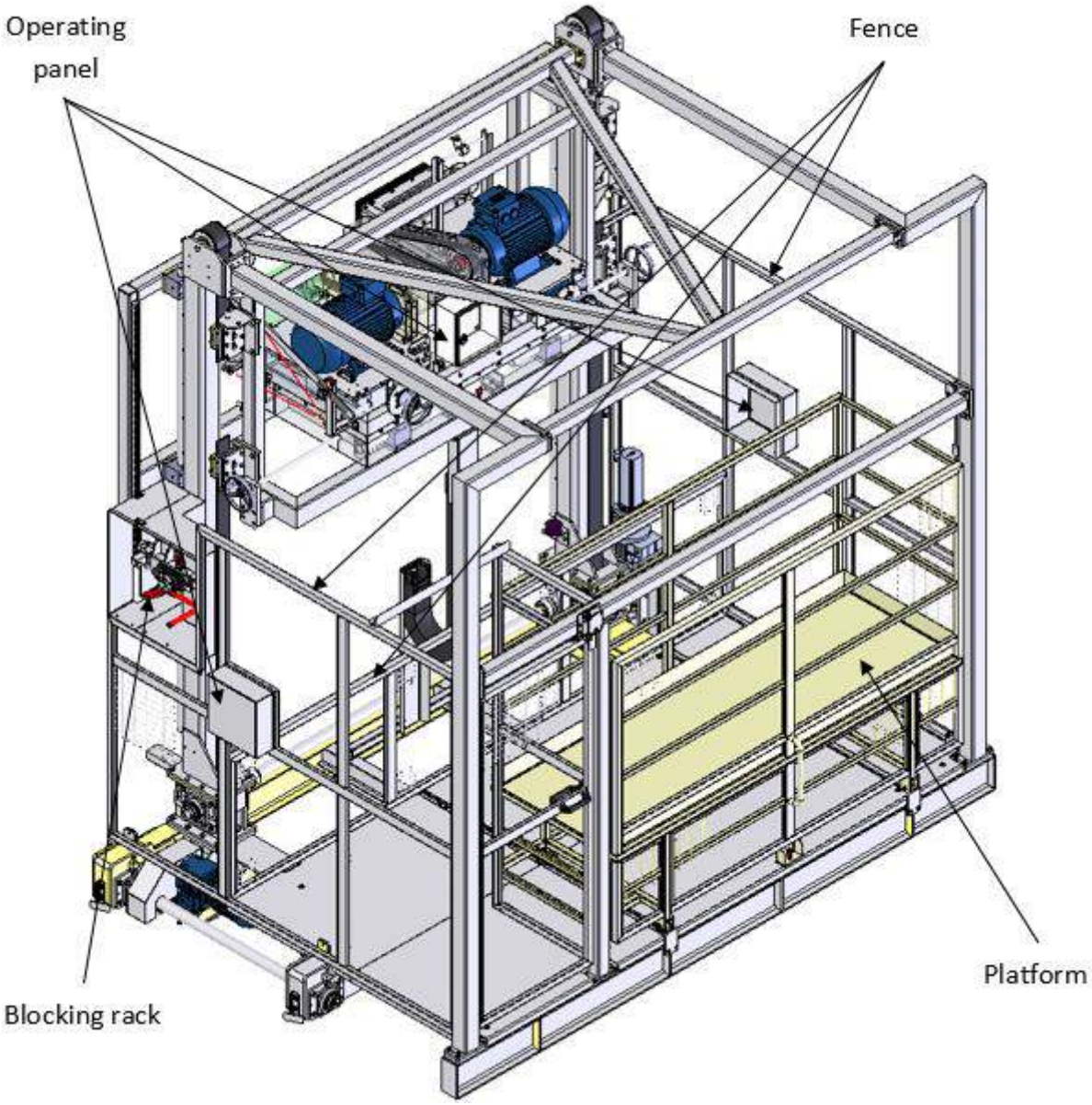


Figure 10: Cutting and grinding trolley

3.2.1. Lifting platform assembly

The lifting platform assembly is designed for cutting and grinding pipes. The lifting platform assembly consists of a Grinding assembly, a Cutting assembly and a supporting structure. The entire assembly can be lifted up or down, depending on the dimensions of the pipe. Thump-and-downtown travel is carried out with two belts.

The entire Lifting platform assembly is attached to the trolley via linear guides. For more precise positioning, it is possible to manually move the cutting and grinding assembly together left and right with a spindle. The cutting and grinding assembly can also be moved individually back and forth. The movement is done manually with a spindle. The depth of movement of the grinder and saw can be seen on the mechanical scale in front of the hand wheel which is connected to a spindle. The motors for the grinder and saw are the same and transmit 11kW of power via V-belts. The saw and grinder rotate at 3560 rpm.

All moving parts are protected with covers. The cover on the saw is movable, because of different diameters of pipe. A laser is available to help determine the location of the grind and cut. In the middle between the grinder and cutter, where there is an operating panel that controls the power to the grinder and cutter motor.

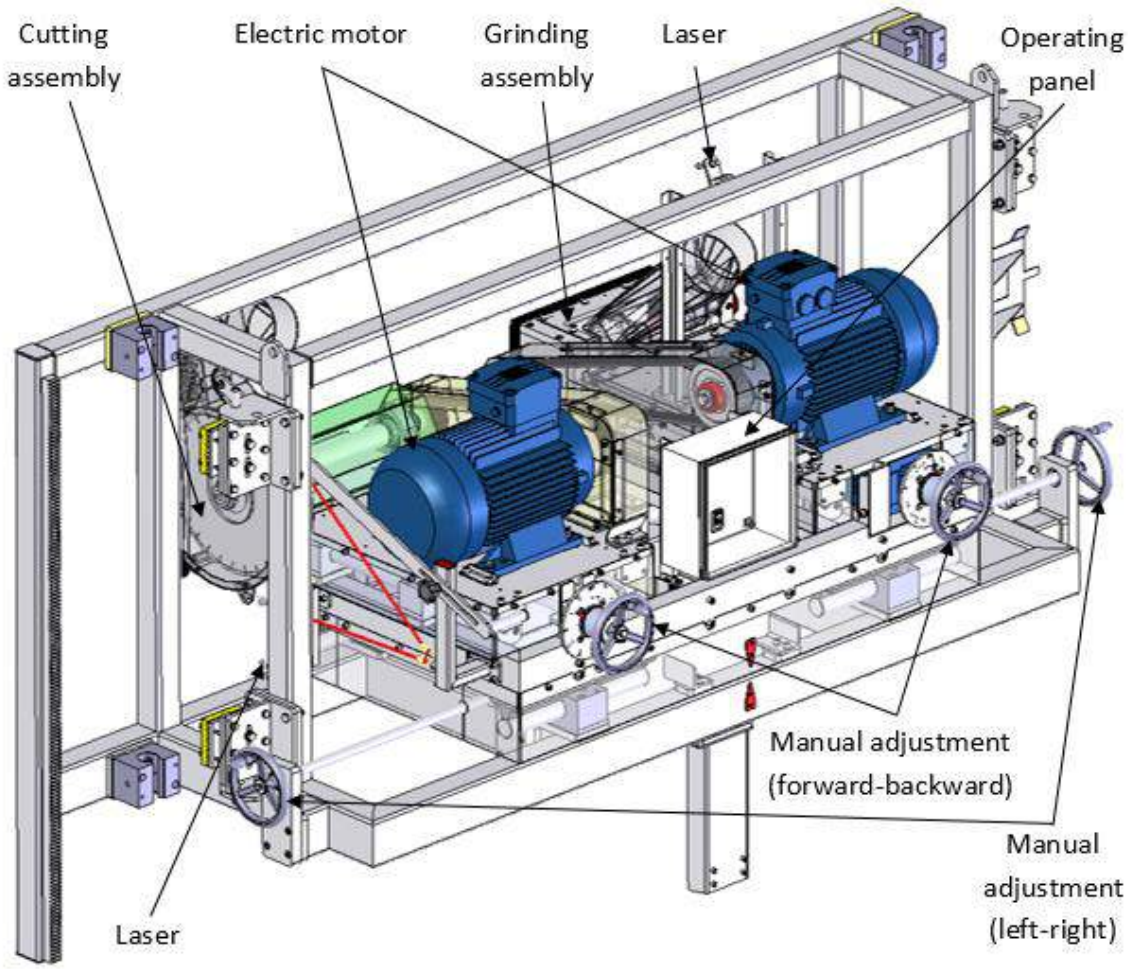


Figure 11: Lifting platform assembly

3.2.2. Blocking rack

The blocking rack is intended to protect the Lifting platform assembly from falling in the event of a belt tear. It consists of a manual clamp, handle, pins and gear rack. When the Lifting platform assembly is at the height required, we can lock this position by moving the manual clamp, which moves the gear rack to the gear rack on the Lifting platform assembly. If the teeth of the gear racks do not match, this can be adjusted with a handle that allows movement in the vertical direction.

When the manual clamp is closed, secure it with a pin above.

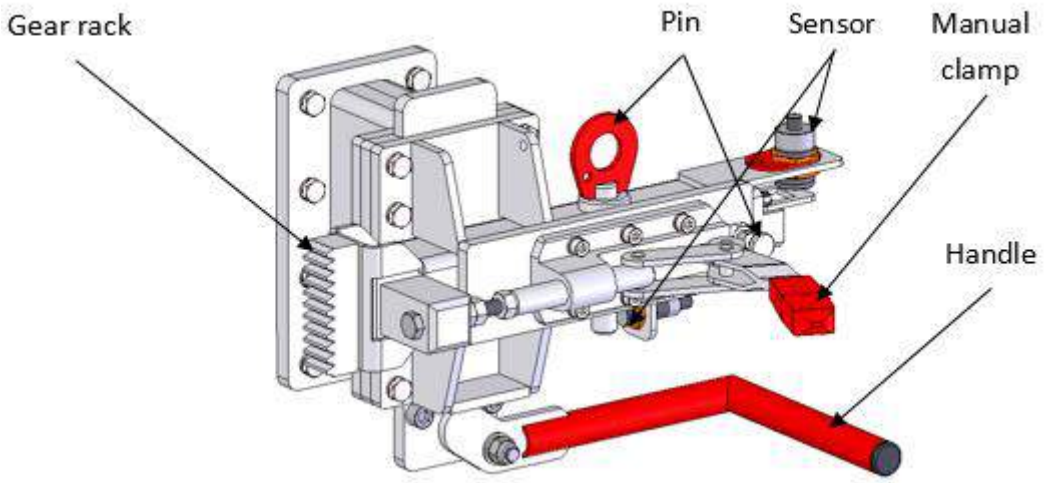


Figure 12: Blocking rack

3.3. Safety devices

Proper and flawless operation of safety devices is a prerequisite for operating the machine safely.

Management of the entire system is by means of a control panel. It is installed in such a way the operator cannot come into a dangerous area of operation during normal operation. The system is controlled in such a way that it does not cause dangerous situations such as automatic restart, in the event of an unexpected power failure, current change and reconnection to the mains.

Stop buttons are installed on several parts of the device and on the operating panel, which immediately stop the line when they are activated.

Access to the trolleys is restricted from the side by a fence. Dangerous and moving parts are closed with covers to ensure unintentional contact.

The trolleys have safety rails installed, which stop the trolley when activated. Trolleys also have a mechanical switch that is positioned to prevent a person from being squeezed between two trolleys and to prevent two trolleys from crashing with each other.

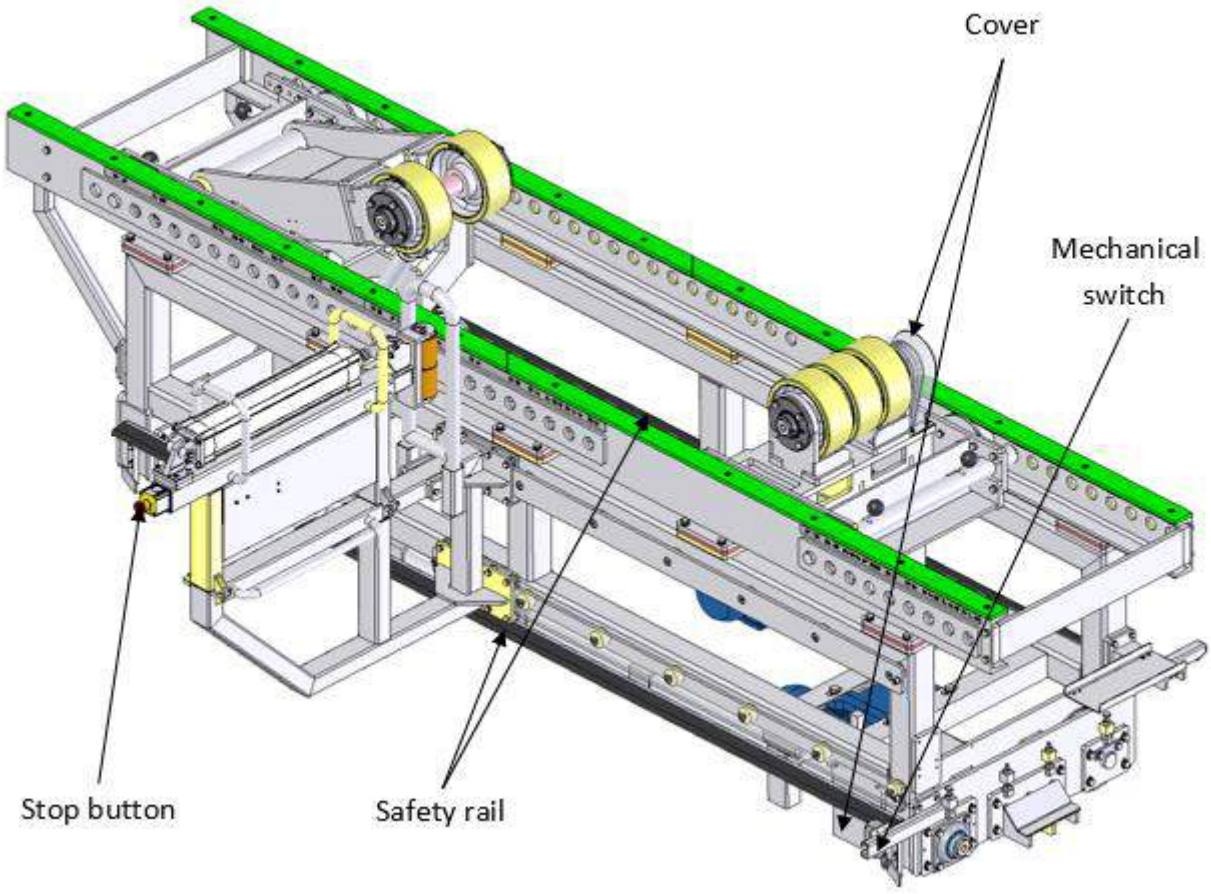


Figure 13: Trolley 1

The cutting and grinding trolley is secured with fences that prevent unwanted entry or exit to/from the trolley. A safety switch is installed on the door of the trolley to prevent unwanted

entry into the trolley. The trolley does not work in the event of a sensor failure or a forced door opening.

In case the belt tears, there is a blocking rack to prevent the Lifting platform assembly with the grinder and saw from falling. All moving parts are secured with covers.

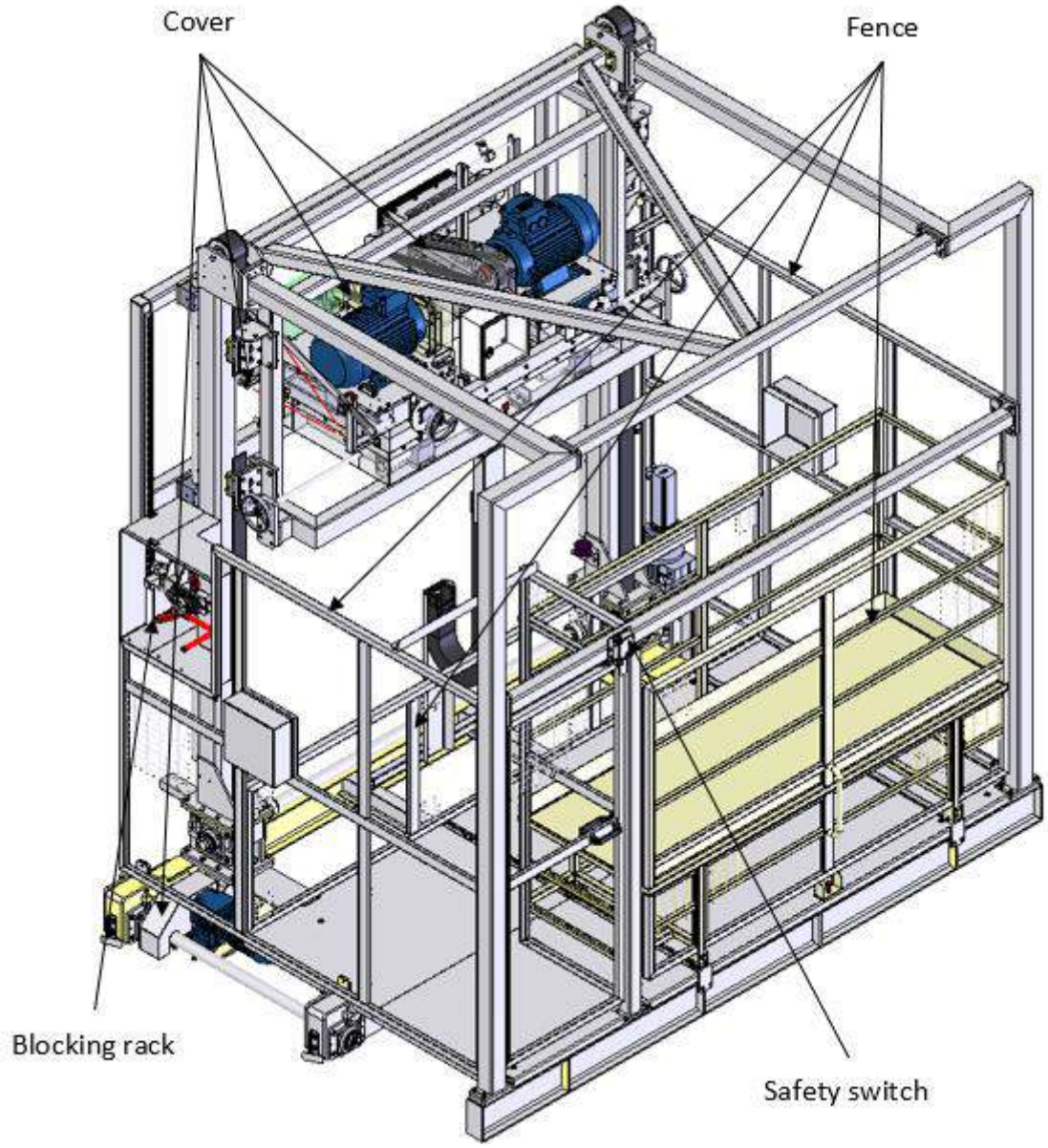


Figure 14: Cutting and grinding trolley

4. MAINTENANCE

Maintenance is divided into preventive and unplanned. The goal of preventive maintenance is optimal machine operation and the longest possible service life.

Preventive maintenance is carried out periodically according to a set schedule. In case of repeated unplanned errors, it is necessary to determine the cause and, if necessary, to optimize the schedule and/or the tasks of preventive maintenance.

Safety maintenance regulations must be observed during all maintenance work and all personal protective equipment must be used.

Before starting any maintenance, it is necessary to turn off the power to the machine and follow all the instructions written in Chapter 2.2 Proper machine / line shutdown procedure during maintenance or repair.

Preventive maintenance consists of:

- Preventive equipment inspections;
- Replacement of worn parts;
- Lubrication.

4.1. Preventive maintenance

4.1.1. Changing chains and sprockets

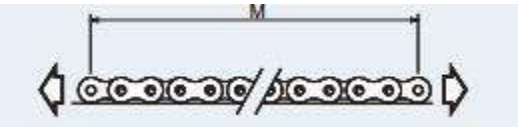
The cutting and grinding machinery can operate in manual mode. In this case, the individual functions of the device are performed by pressing the appropriate buttons.

Chains should be replaced if they are extended by more than 1% of their length due to wear, or earlier if they are in poor condition.

Consider the equation:

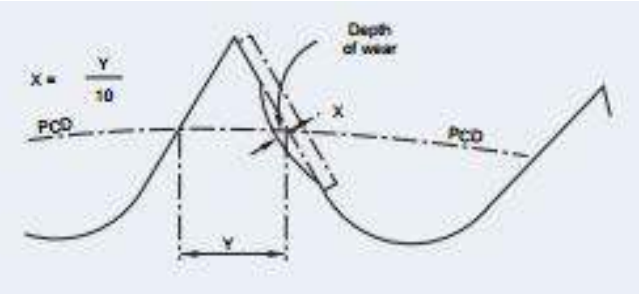
$$\%wear = \frac{M - (C \cdot P) \cdot 100}{C \cdot P}$$

M [mm]	the measured length of a suitably tensioned chain;
C	number of chain links at distance M;
P [mm]	chain pitch 19,05 mm.



When changing the chain, carefully inspect the gears and replace them if they are worn.

Consider the following:



Wear X should not exceed 1/10 of the sprocket tooth thickness. If the wear is greater, replace the sprocket.

$$X = \frac{Y}{10} = 0{,}705\ mm \text{ (applies for sprockets with pitch P = 19,05 mm)}$$

4.1.2.Trolley 1, 2, 3

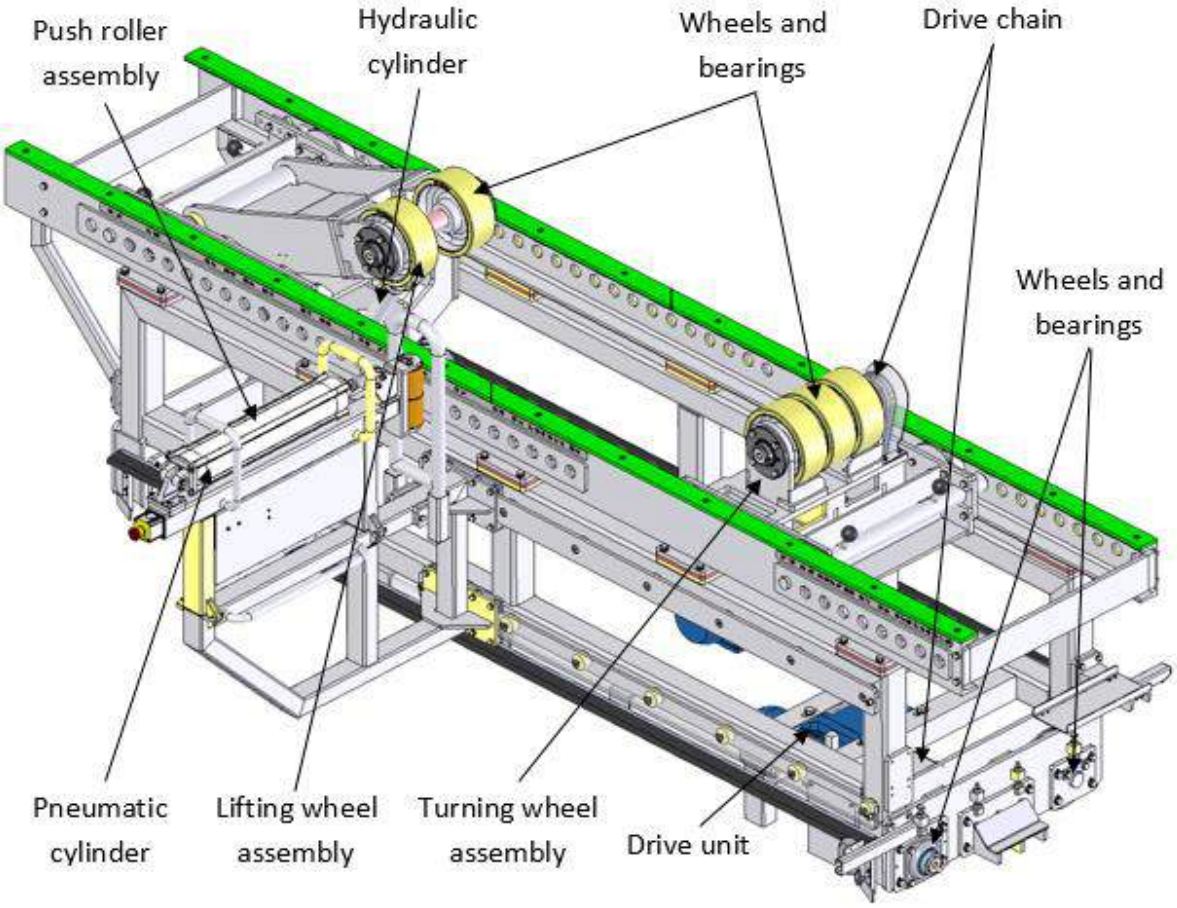


Figure 15: Trolley 1

4.1.2.1. Daily schedule

- Visual inspection of the trollies for any irregularities and damage;
- Cleaning dust and other dirt.

4.1.2.2. Weekly Schedule

- Check for any leaks from the hydraulic system.

4.1.2.3. Quarterly schedule

- Drive chain tension control;

- Control of electrical sensor functions and adjustments as required;
- Control of operation, bearing noise and drive;
- Gearbox oil level check: if the gearbox leaks oil, replace the radial seal. If it leaks at the screws, seal the thread (follow the enclosed manufacturer's instructions);
- Check if the trolley, Turning wheel assembly, Lifting wheel assembly and Push roller assembly move smoothly. If not check if the wheels/bearings have a clear path or replace them if damaged;
- Check the hydraulic cylinder's smooth operation;
- Check the pneumatic cylinders' smooth operation;
- Check the wheels on Lifting wheel assembly, Turning wheel assembly and Push roller assembly for smooth operation. If it is not smooth check if there is a clear path for rotation or replacement if damaged;
- Inspection of screw connections and, if necessary, tighten them;
- Inspection of the running surface of the wheels. Replace the wheels if they show signs of wear on the edges.

4.1.3.Cutting and grinding trolley

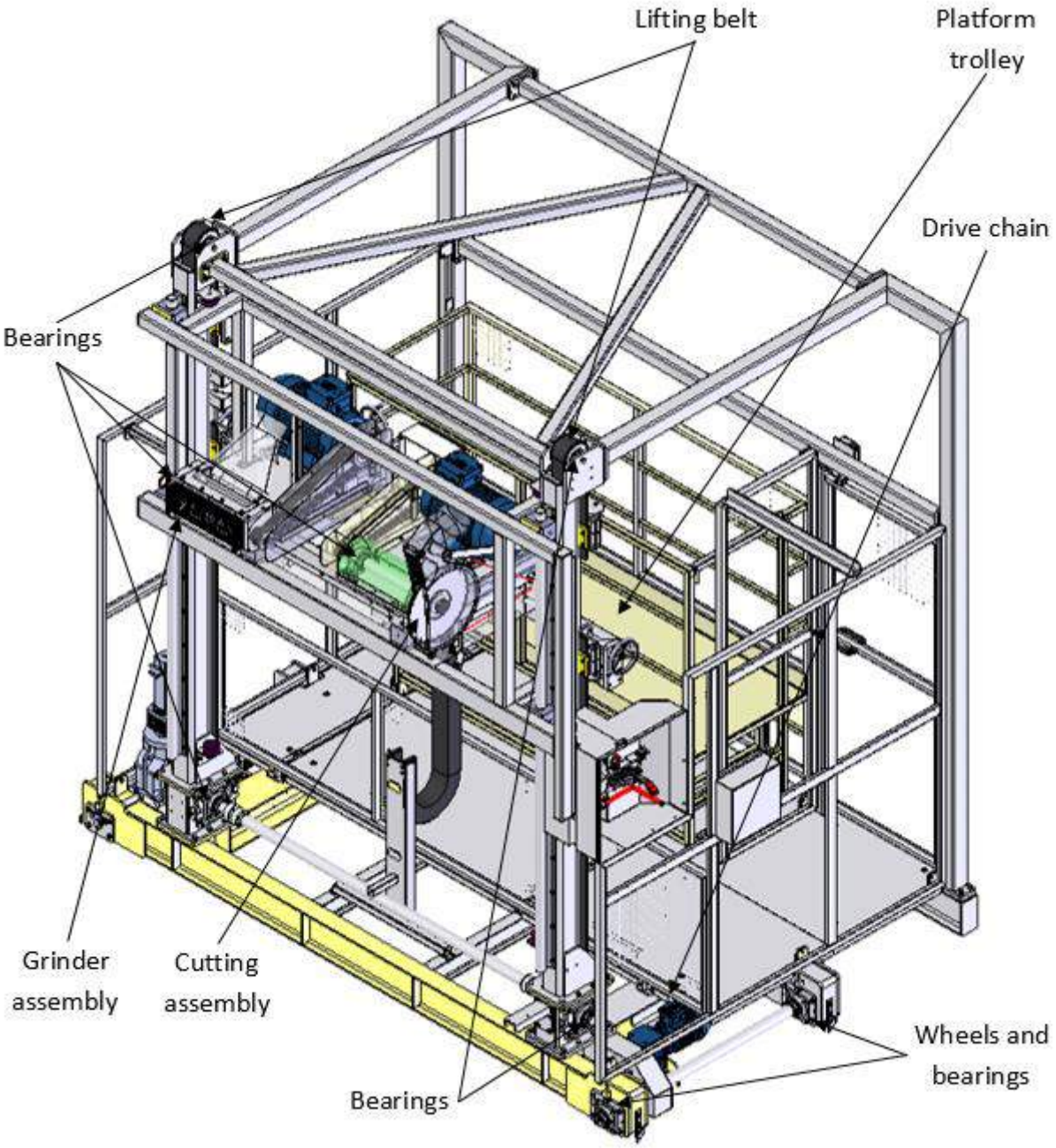


Figure 16: Cutting and grinding trolley

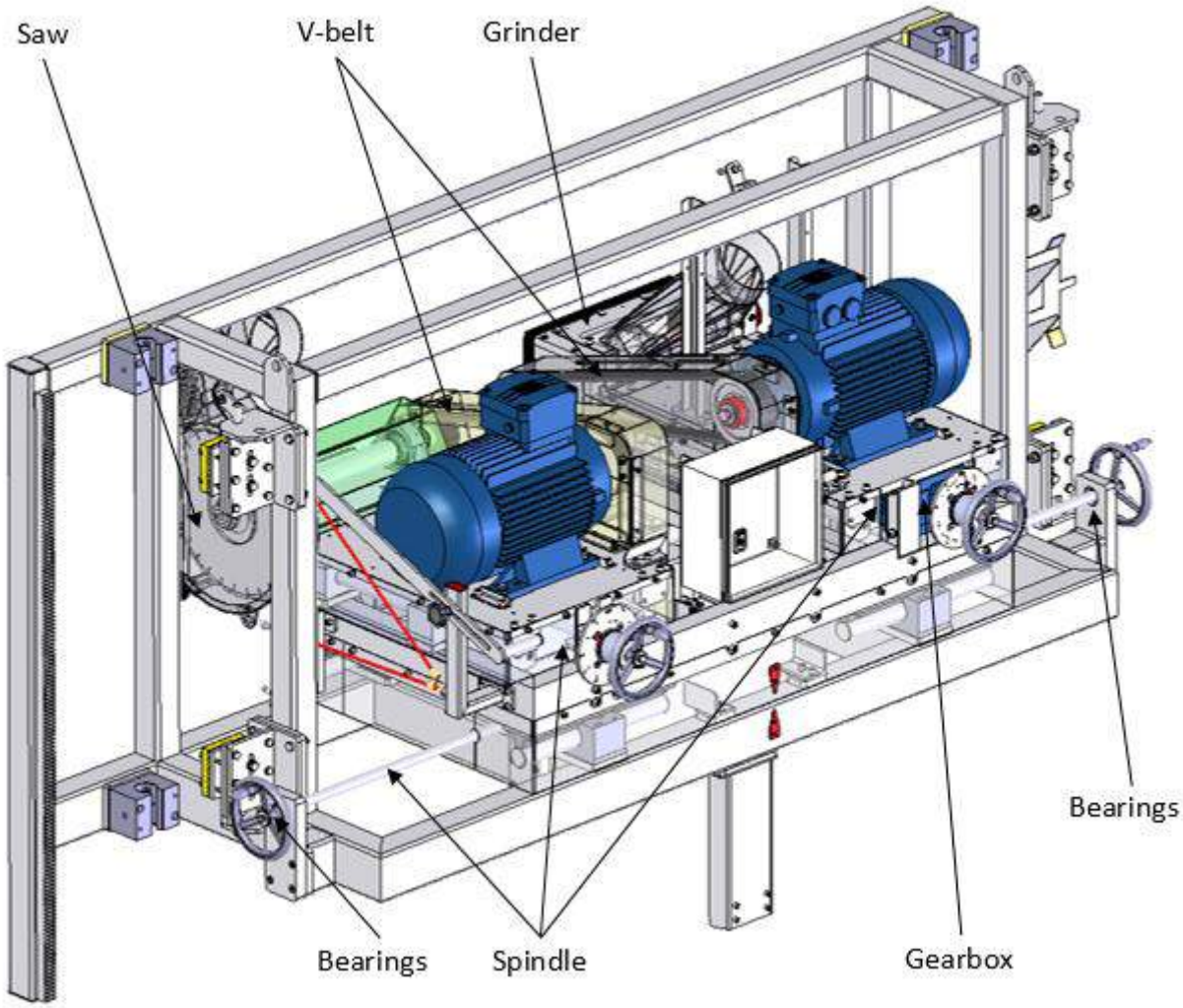


Figure 17: Lifting platform assembly

4.1.3.1. Daily Schedule

- Visual inspection of the trolley for any irregularities and damage;
- Cleaning of dust and other dirt.

4.1.3.2. Quarterly schedule

- Drive chain tension control;
- V-belt tension control. Inspection of V-belt for wear (stretching) or possible damage;

- Lifting belt tension control and damage inspection. If the belt shows signs of damage or is torn, it must be replaced;
- Saw and grinder wear control;
- Check the smoothness of rotating the saw and grinder. If the bearings are noisy, they need to be lubricated or replaced;
- Check the smoothness of moving the cutting and grinder assembly. If it does not move smoothly, check that the spindle is clean and lubricate with spray grease if necessary;
- Control of electrical sensor functions and adjustments as required;
- Control of operation, bearing noise and drive;
- Gearbox oil level check: if the gearbox leaks oil, replace the radial seal. If it leaks at the screws, seal the thread (follow the enclosed manufacturer's instructions);
- Check if the trolley and platform trolley move smoothly. If not check if the wheels/bearings have a clear path or repel them ace if damaged;
- Inspection of screw connections and, if necessary, tighten them.

4.1.4.Electrical equipment

Electrical equipment that is regularly inspected consists of:

- Sensors of electrical equipment;
- Detection plates for sensors;
- Electrical ducts;
- Switch cabinets.

4.1.4.1. Daily Schedule

Visually inspect the equipment listed above for damage. In case of irregularities, rectify them immediately. Clean dust that settles on sensors and mirrors.

4.1.4.2. Quarterly schedule

Check the screw connections and cable attachment. Check the sensor screw connections and their settings.

Work on electrical equipment may only be performed by persons who are familiar with these instructions or are authorized to intervene in such equipment. Switch off the main switch and secure the repair location accordingly.

4.2. Spare parts

Below is a table of recommended spare parts for the cutting and grinding machinery.

Plan name: Trolley 1, 2, 3			**Plan number: 420009, 420339, 420340**
No. pcs.	**Name**	**Standard, Type, and Additional data**	**Manufacturer** **Remark**
1	Gear motor HG 80C 3C 90S/L-04E-TH-TF-B3-AI P=1,1 kW; n2=11 min-1; M2=962 Nm;	Output shaft phi 50x100; Mounting B3; Terminal box side A, cable entry I	Watt
1	Gear motor HG 80C 3C 80-04F-TH-TF-BR8-B8-CIV; P=0,75kW, M2=688Nm, n2=10min-1;	Output shaft phi 60x120; Mounting B8; Terminal box side C, cable entry IV	Watt
2	Ball bearing 50/90×20	6210-2RSR	SKF or equivalent
4	Ball bearing 40/80×18	6208-2RSR	SKF or equivalent
4	Ball bearing 10/30×9	6200-2RSR	SKF or equivalent
2	Bearing unit PCF 50		INA
2	Bearing unit PME50-xl-n		INA
2	Bush PAP 5040 P10		INA
1	Sprocket 12B-2, Z=21	Order No.: 12777121	Maedler
1	Chain 12 B-2, 83 links	DIN 8187	

Plan name: Trolley 1, 2, 3

Plan number:

420009, 420339, 420340

No. pcs.	Name	Standard, Type, and Additional data	Manufacturer	Remark
1	Chain connection link 12 B-2, type 3	DIN 8187		
5	Wheel GTHN 253/50H7	Order No.: 459925	Blickle	
2	Wheel HTH 82x100/20-100K		Blickle	

Plan name: Cutting and grinding trolley			**Plan number: 420276**	
No. pcs.	**Name**	**Standard, Type, and Additional data**	**Manufacturer**	**Remark**
1	Servo Drive; KA77BR37CMP63M/BK/PK/ AK0H/SB1; M2=1550Nm; n2=13,72min-1;	Hollow shaft phi 50; Mounting M1AB; Cable entry: T	SEW	
1	Gear motor HG 65A 3C 90S_L-04E-TH-TF; P=1,1 kW; n2=39 min-1; M2=271 Nm;	Output shaft phi 45x90; Mounting B3; Terminal box side B, cable entry I	Watt	
1	Motor 3CWAG 160M_L-02E-TH-TF; P=11 kW; n=3560 min-1; M=30 Nm;	Output shaft phi 42x110; Mounting B3; Terminal box: T - cable entry I	Watt	
2	Ball bearing 50/90×20	6210-2RSR	SKF or equivalent	
2	Ball bearing 25/52×15	6205-2RSR	SKF or equivalent	
2	Ball bearing 35/72×17	6207-2RSR	SKF or equivalent	
2	Ball bearing 20/42×12	6004-2RS	SKF or equivalent	
2	Bearing 25x52x15	B7205-E-2RSD-T-P4S	INA	
2	Bearing unit PCF 50		INA	

Plan name: Cutting and grinding trolley **Plan number: 420276**

No. pcs.	Name	Standard, Type, and Additional data	Manufacturer	Remark
1	Nut TR 36x6	Order No.: T44340	Haberkorn	
1	Clutch; TLK-500-50x90		Tollok	
1	Spring plunger	GN 615.9-M16-K	Elesa+Ganter	
1	Sprocket 12B-2, Z=21	Order No.: 12777121	Maedler	
1	Chain 12B-2, P=19,05mm, L=800,1mm, 41 links	DIN 8187		
1	Chain connection link 12 B-2, type 3	DIN 8187		
4	V Belt SPZ; Ld=1800	Order No.: T51375	Haberkorn (Gates)	
4	V Belt SPZ; Ld=1500	Order No.: T51338	Haberkorn (Gates)	
2	Timing belt HTD 14M PU XHP PAZ black Width=85mm; Length=6600mm		Schiki	

4.3. Lubrication

Pos.	Plan Name	Plan number - standard	Item description	Lubrication frequency	Lubricant	Lubricant quantity	Way of lubrication
1	Hydraulic equipment			See hydraulic equipment instructions in the appendix			
2	Trolley 1, 2	420009, 420339	Gear motor HG 80C 3C 80-04F-TH-TF-BR8-B8-CIV	See Watt's instructions in the appendix			
3	Trolley 1, 2	420009, 420339	Chain	Quarterly	Chain grease spray	Spray the whole chain once	Spray the whole chain once
4	Turning wheel assembly	420046	Gear motor HG 80C 3C 90S/L-04E-TH-TF-B3-AI	See Watt's instructions in the appendix			
5	Turning wheel assembly	420046	Bearing unit PME50-xl-n	Quarterly	Multi-purpose lithium lubricating grease	Lubricate until the old grease is squeezed out	Lubricate until the old grease is squeezed out
6	Turning wheel assembly	420046	Chain 12B-2	Quarterly	Chain grease spray	Spray the whole chain once	Spray the whole chain once
7	Powered wheel assembly	420011	Bearing unit PCF 50	Quarterly	Multi-purpose lithium lubricating grease	Lubricate until the old grease is squeezed out	Lubricate until the old grease is squeezed out
8	Lifting wheel assembly	420022	Bearing unit PME50-xl-n	Quarterly	Multi-purpose lithium lubricating grease	Lubricate until the old grease is squeezed out	Lubricate until the old grease is squeezed out

Pos.	Plan Name	Plan number - standard	Item description	Lubrication frequency	Lubricant	Lubricant quantity	Way of lubrication
9	Trolley assembly	420256	Servo Drive; KA77BR37CMP63M/BK/PK/AKOH/SB	See SEW instructions in the appendix			
10	Trolley assembly	420256	Gear motor HG 65A 3C 90S_L-04E-TH-TF	See Watt instructions in the appendix			
11	Trolley assembly	420256	Chain 12B-2	Quarterly	Chain grease spray	Spray the whole chain once	Spray the whole chain once
12	Powered wheel assembly	420257	Bearing unit PCF 50	Quarterly	Multi-purpose lithium lubricating grease	Lubricate until the old grease is squeezed out	Lubricate until the old grease is squeezed out
13	Driven pulley assembly	420274	Bearing unit PCF 50	Quarterly	Multi-purpose lithium lubricating grease	Lubricate until the old grease is squeezed out	Lubricate until the old grease is squeezed out
14	Driven pulley assembly	420279	Bearing unit PCF 50	Quarterly	Multi-purpose lithium lubricating grease	Lubricate until the old grease is squeezed out	Lubricate until the old grease is squeezed out
15	Lifting platform	420242	Trapezoidal screw Tr 36x6	Quarterly	Grease spray	Spray the whole Trapezoidal screw once	Spray the whole Trapezoidal screw once
16	Grinding assembly	420407	Gearbox; HU 60E WN	See Watt instructions in the appendix			

Pos.	Plan Name	Plan number - standard	Item description	Lubrication frequency	Lubricant	Lubricant quantity	Way of lubrication
17	Grinding assembly	420407	Trapezoidal screw Tr 36x6	Quarterly	Grease spray	Spray the whole Trapezoidal screw once	Spray the whole Trapezoidal screw once
18	Cutting assembly	420406	Trapezoidal screw Tr 36x6	Quarterly	Grease spray	Spray the whole Trapezoidal screw once	Spray the whole Trapezoidal screw once
19	Cutting assembly	420406	Bearing housing; PASEY 50	Quarterly	Multi-purpose lithium lubricating grease	Lubricate until the old grease is squeezed out	Lubricate until the old grease is squeezed out
20	Cutting assembly	420406	Bearing Housing; PASE 50	Quarterly	Multi-purpose lithium lubricating grease	Lubricate until the old grease is squeezed out	Lubricate until the old grease is squeezed out

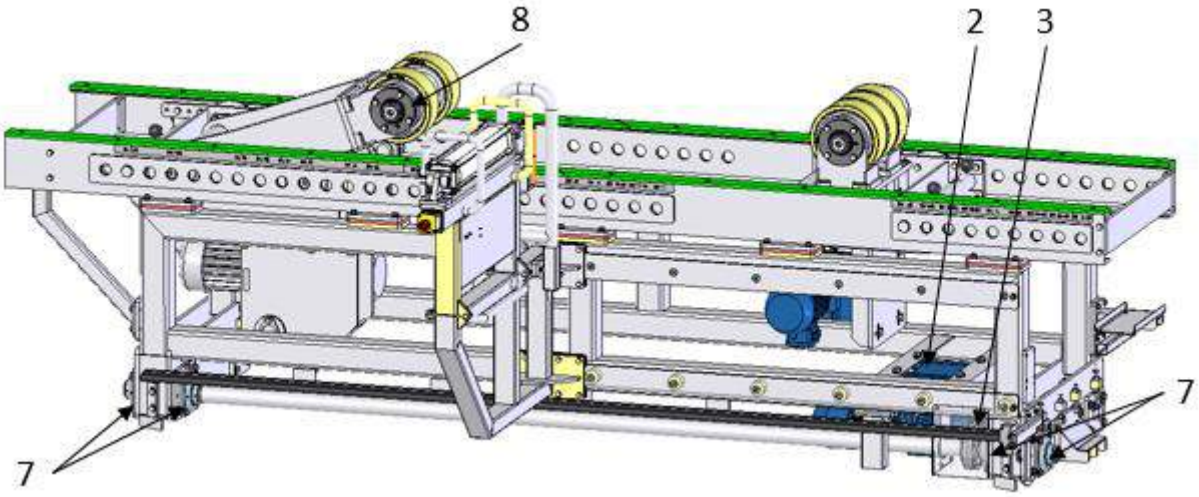


Figure 18: Trolley 1

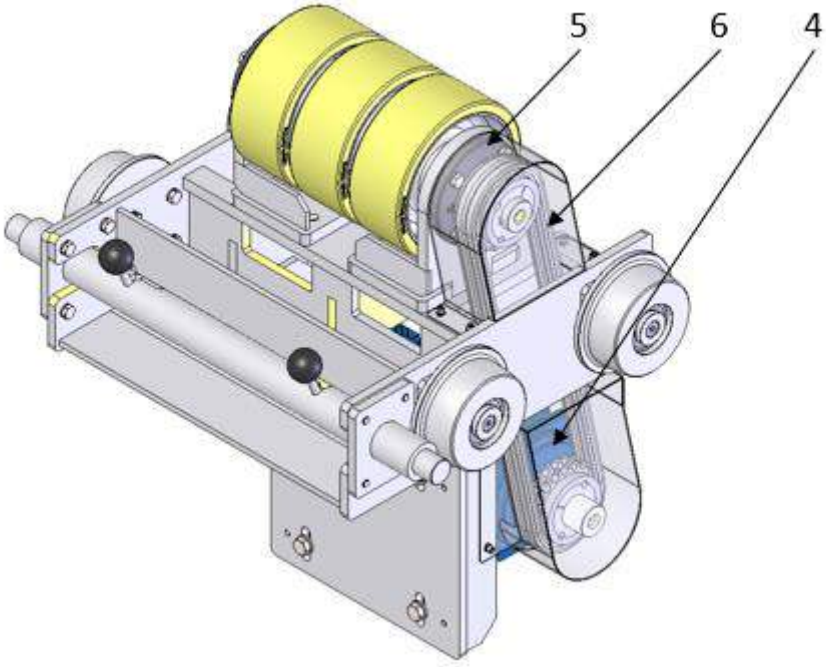


Figure 19: Turning wheel assembly

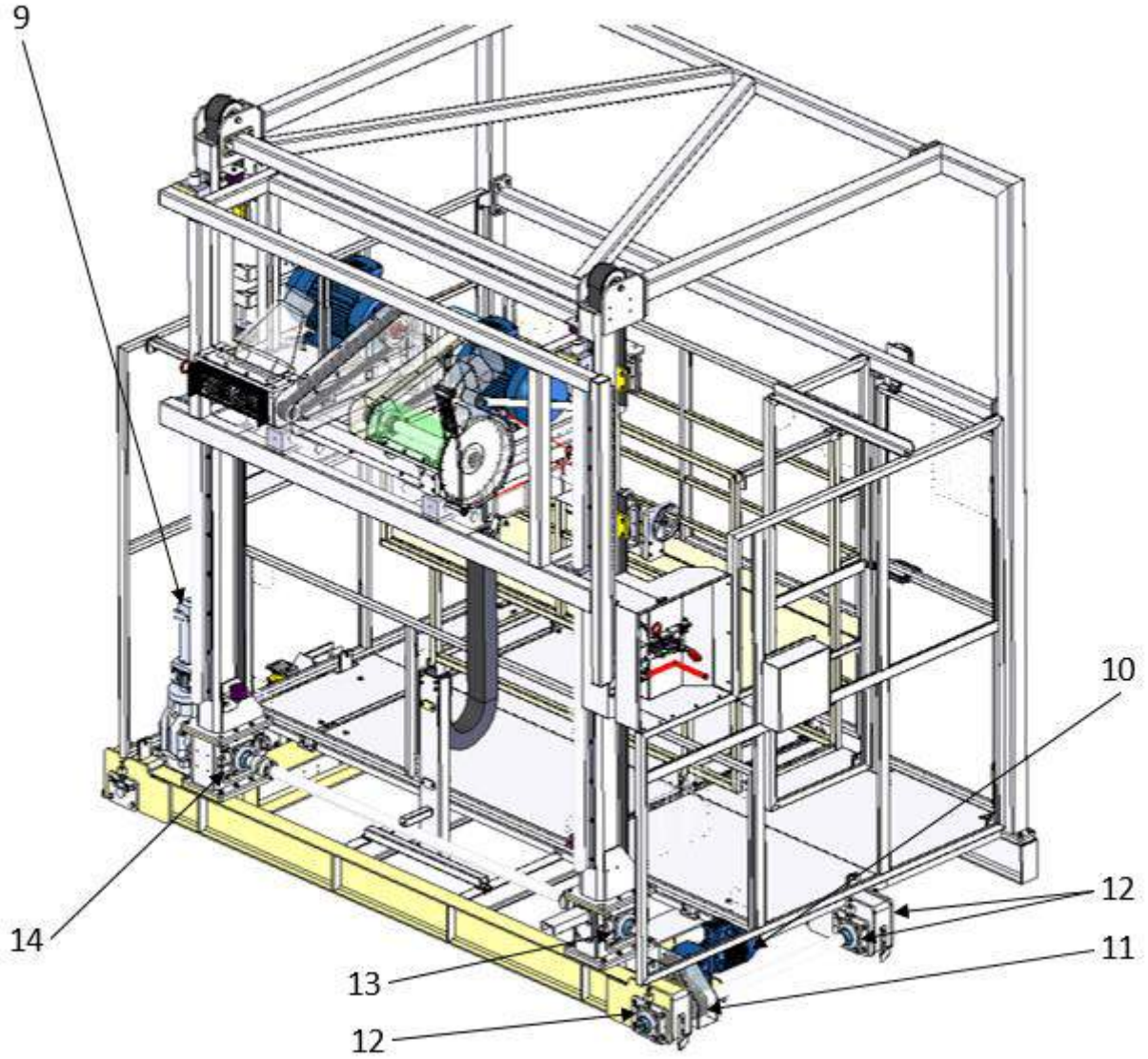


Figure 20: Cutting and grinding assembly

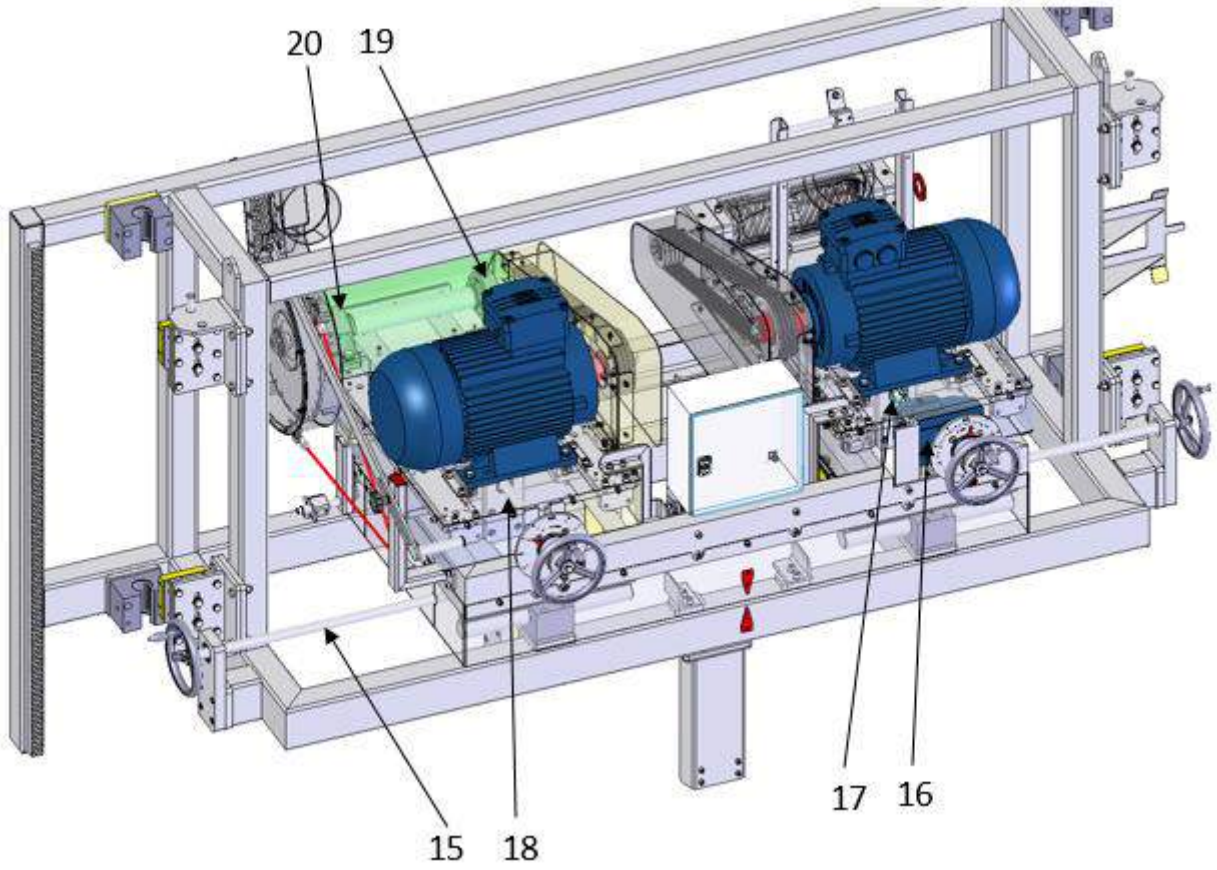


Figure 21: Lifting platform assembly

5. LIST OF ATTACHED EQUIPMENT DRAWINGS

1	**Cutting and grinding machinery**	**420000**
2	Trolley 1	420009
3	Trolley 2	420339
4	Trolley 3	420340
5	Freewheel assembly 1	420003
6	Powered wheel assembly	420011
7	Freewheel assembly 2	420013
8	Lifting wheel assembly	420022
9	Wheel assembly	420034
10	Turning wheel assembly	420046
11	Turning wheel assembly	420345
12	Wheel assembly	420034
13	Push roller assembly	420267
14	Roller assembly	421123
14	Cutting and grinding trolley	420276
15	Trolley assembly	420256
16	Powered wheel assembly	420257
17	Driven pulley assembly	420274
18	Driven pulley assembly	420279
19	Driven pulley assembly	420283
20	Guide	420305
21	Door assembly	420391

22	Lifting platform assembly	420234
23	Lifting platform	420242
24	Cutting and grinding platform	420405
25	Grinding assembly	420407
26	Cutting assembly	420406
27	Distance wheel	420389
28	Trolley	420358
29	Wheel dia. 60	420354

6. ATTACHMENTS

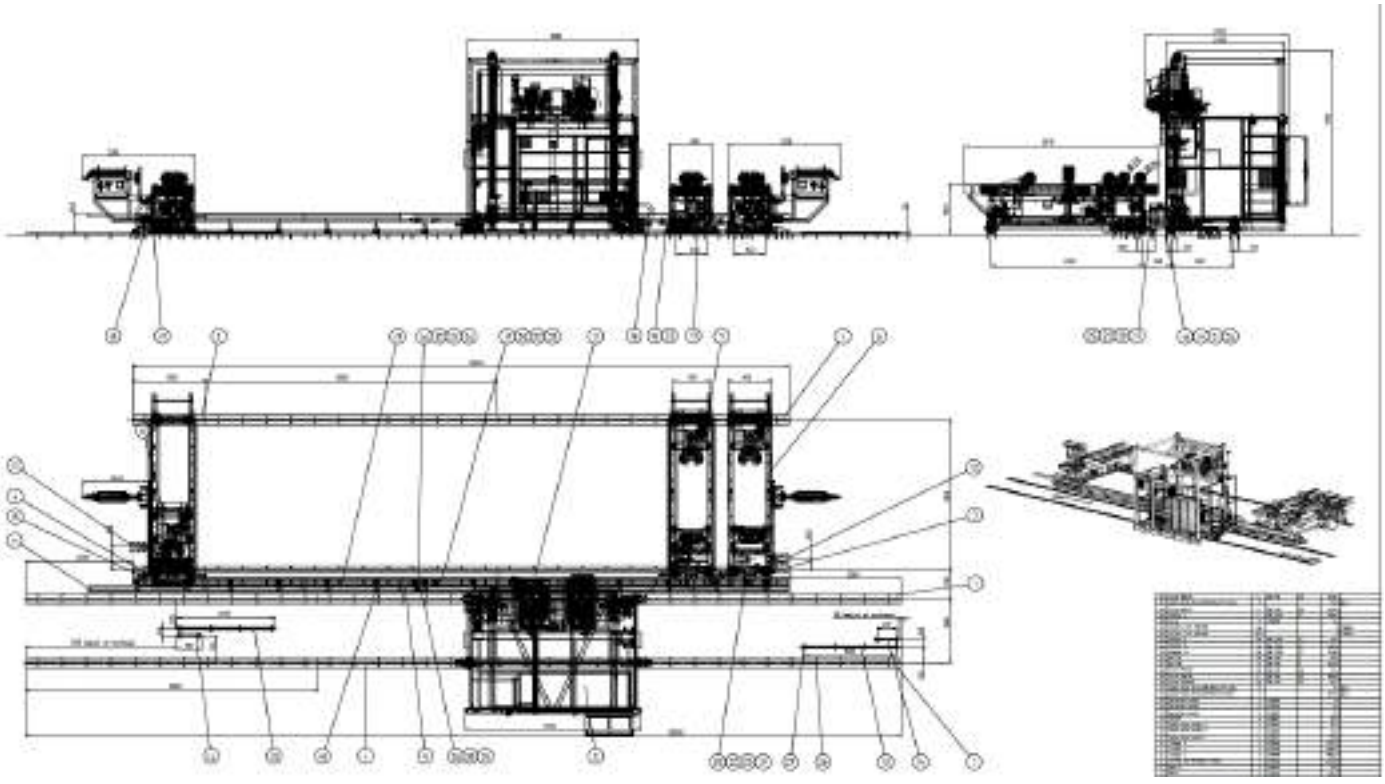


Figure 22: E-OCGM

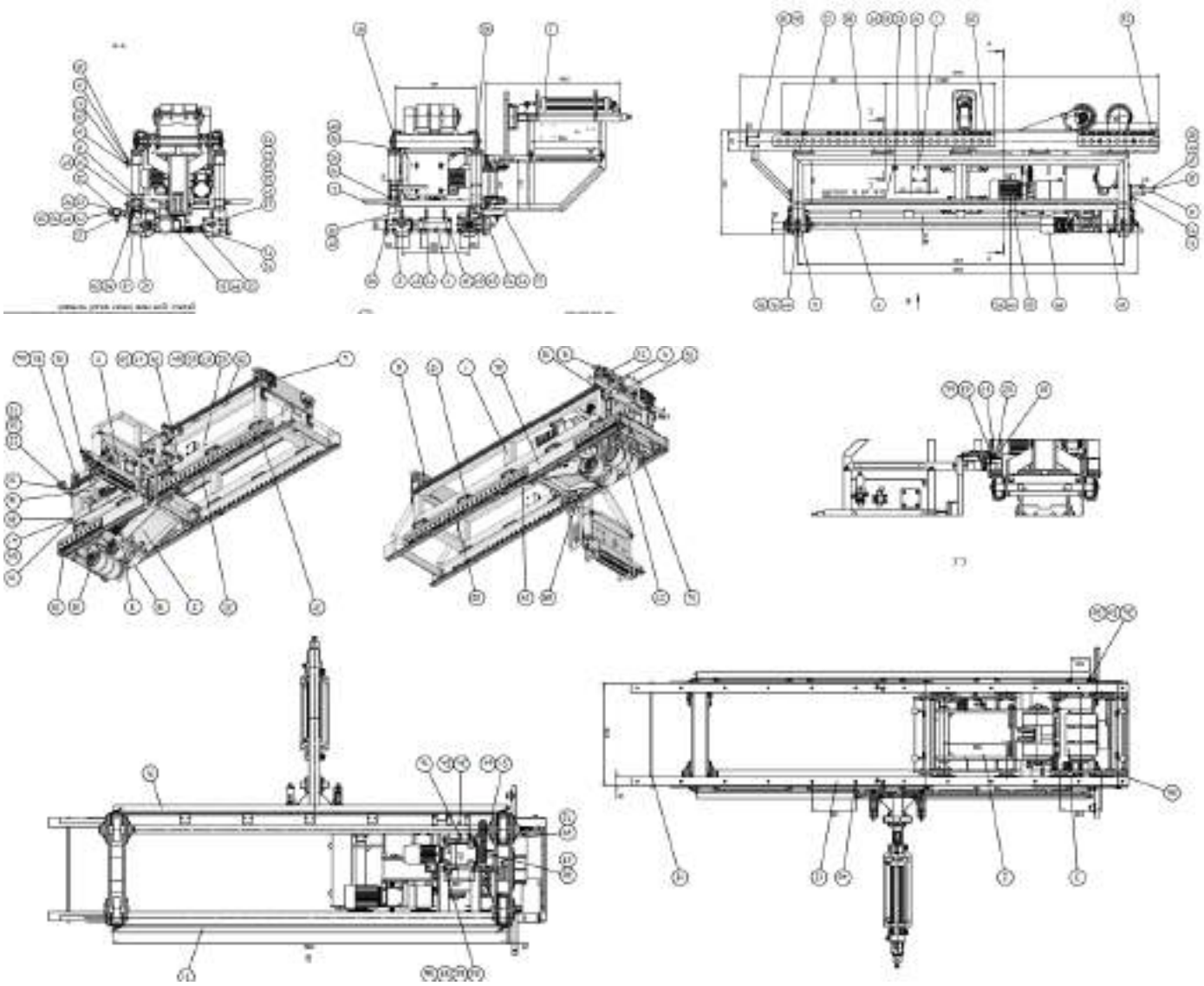


Figure 23: Trolley 1

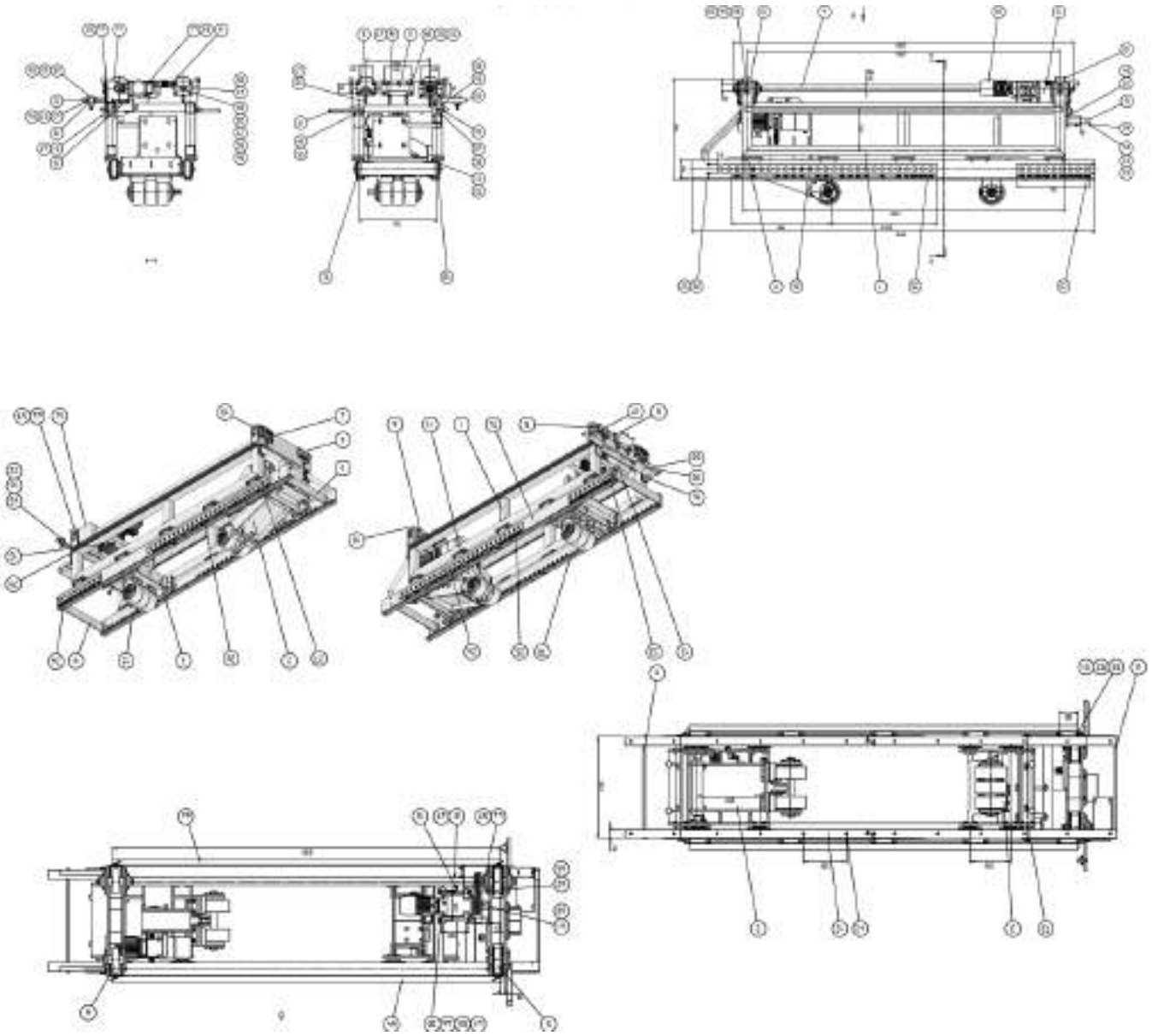


Figure 24: Trolley 2

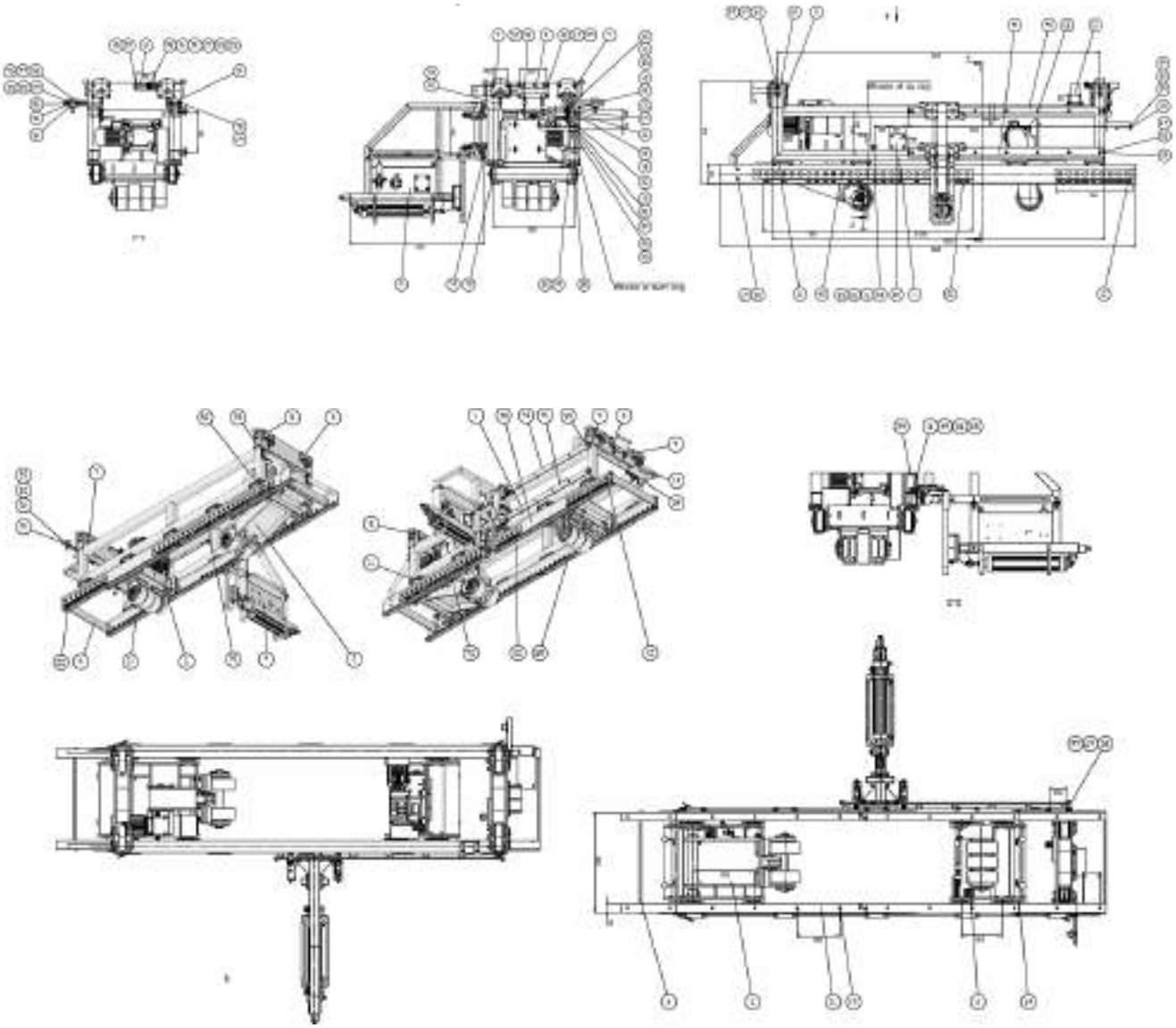


Figure 25: Trolley 3

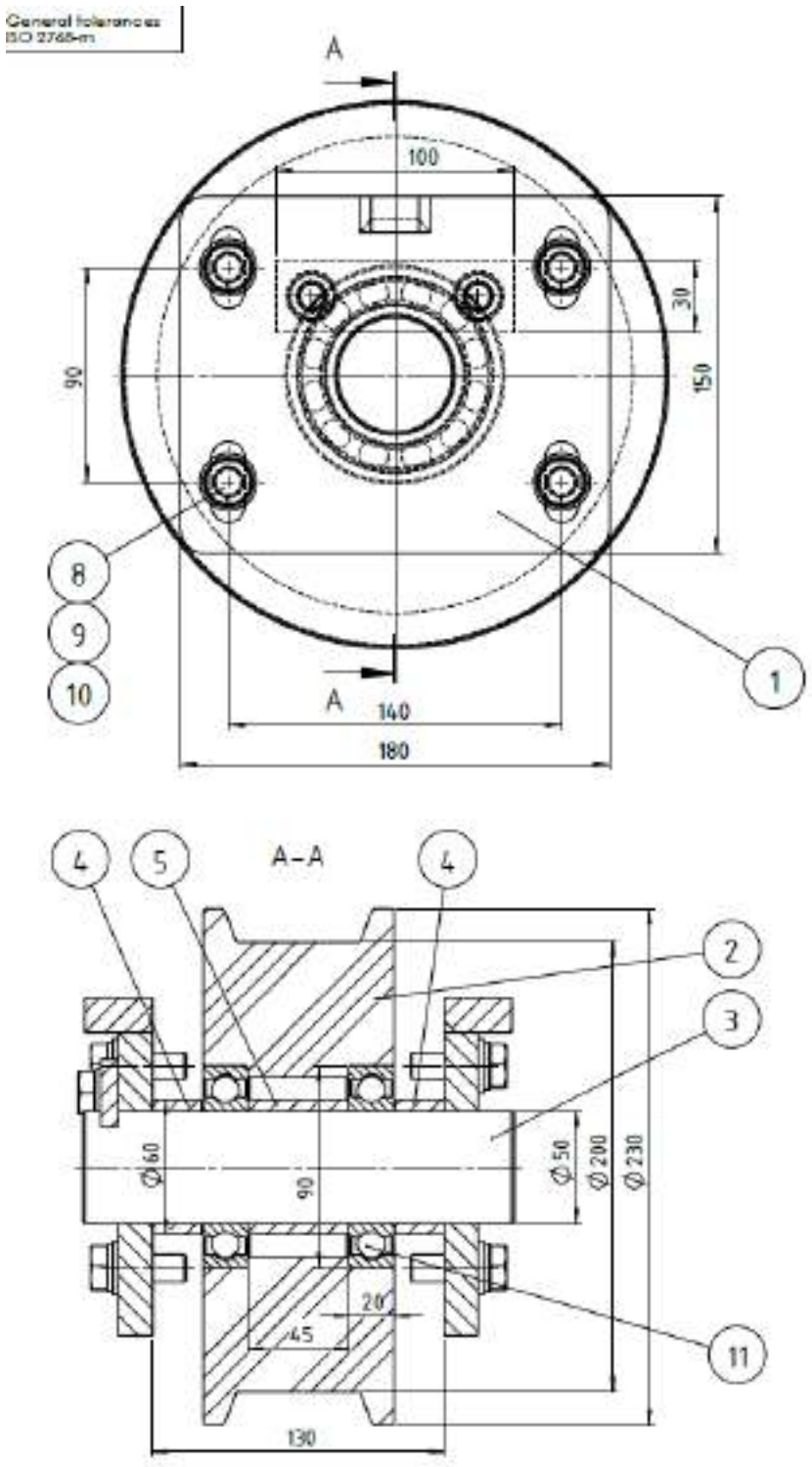


Figure 26: Freewheel Assembly 1

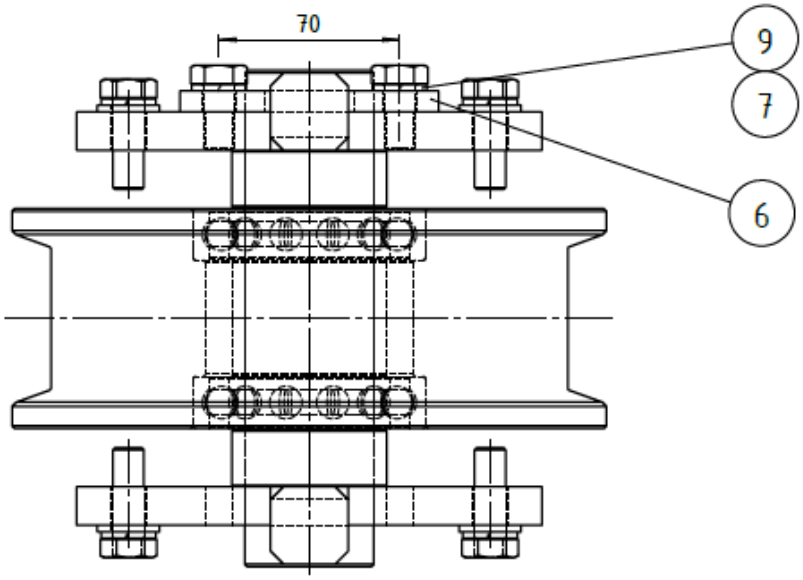


Figure 27: Freewheel Assembly 1

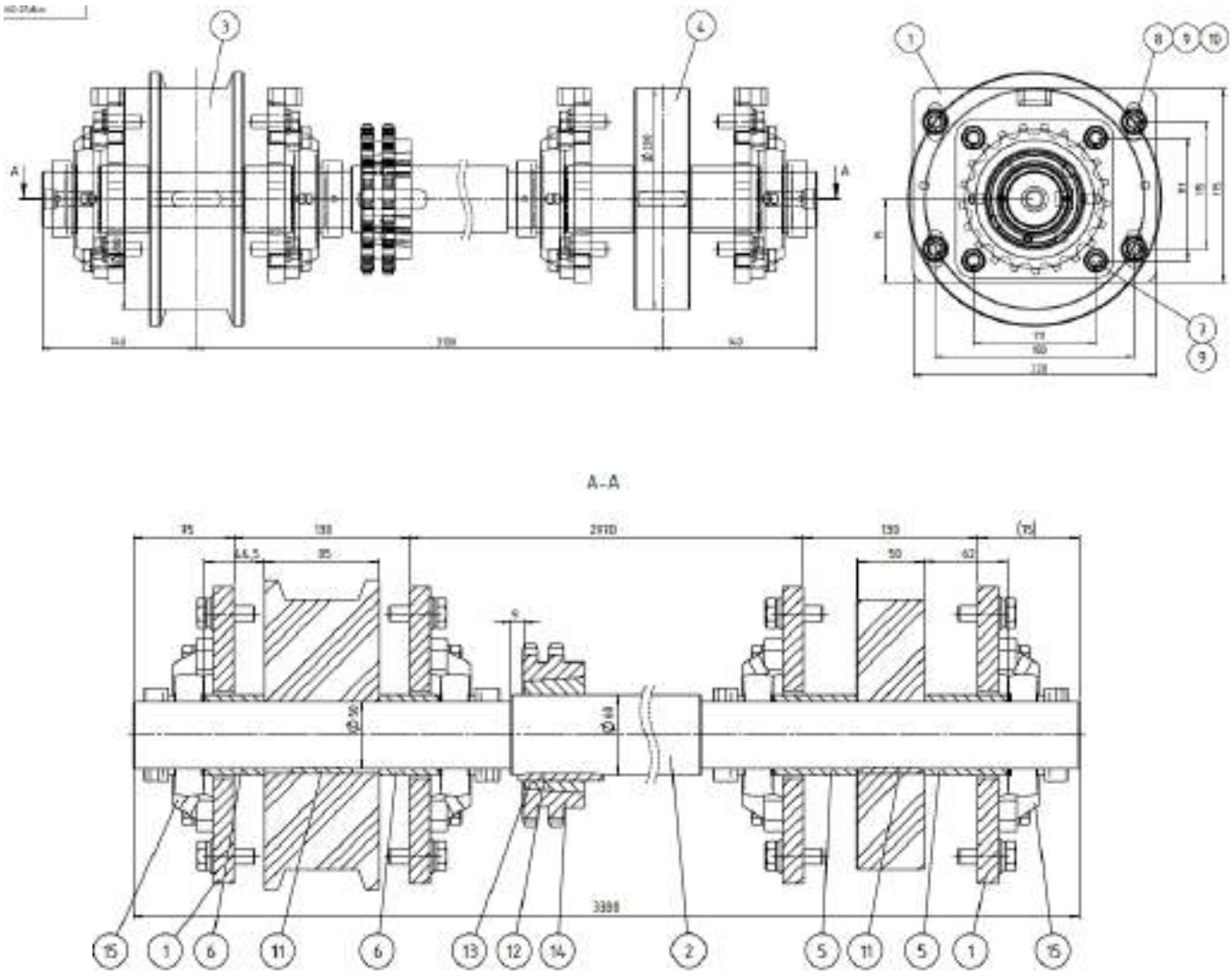


Figure 28: Powered wheel assembly

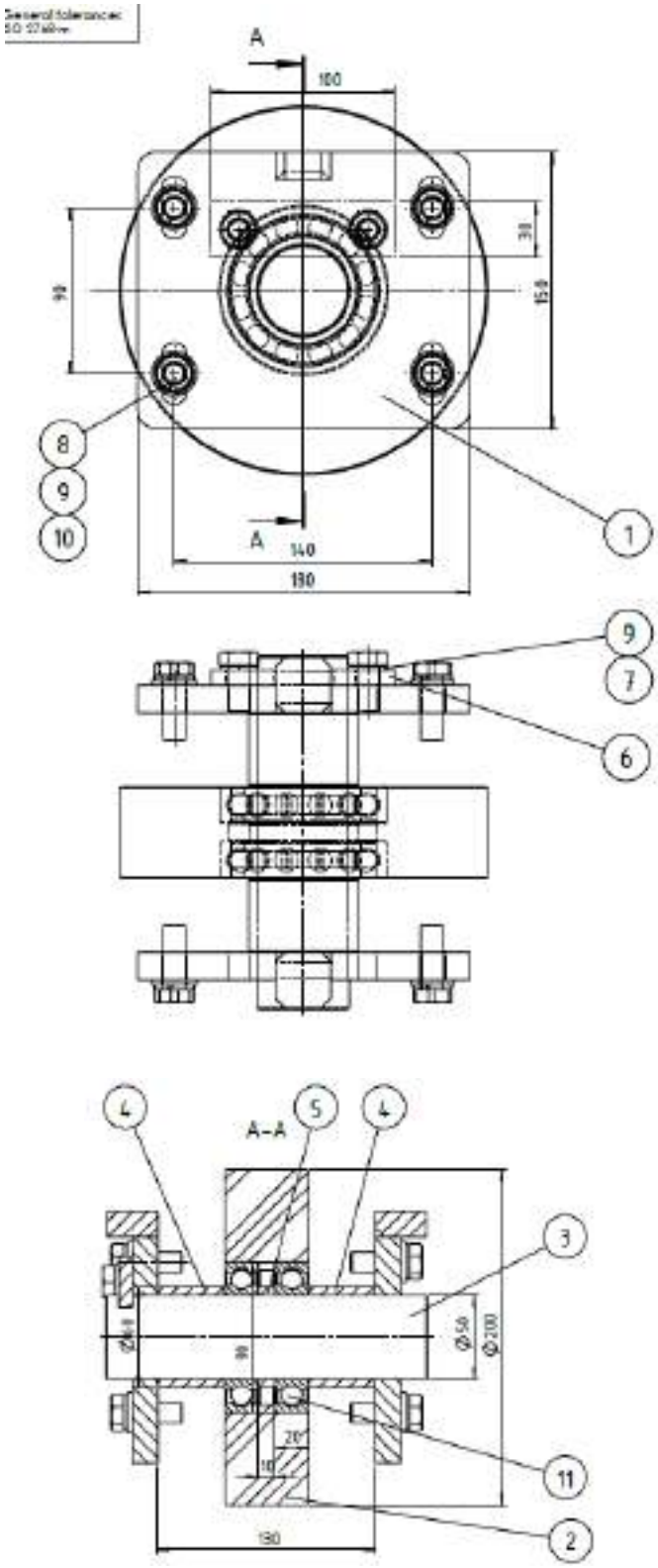


Figure 29: Freewheel Assembly 2

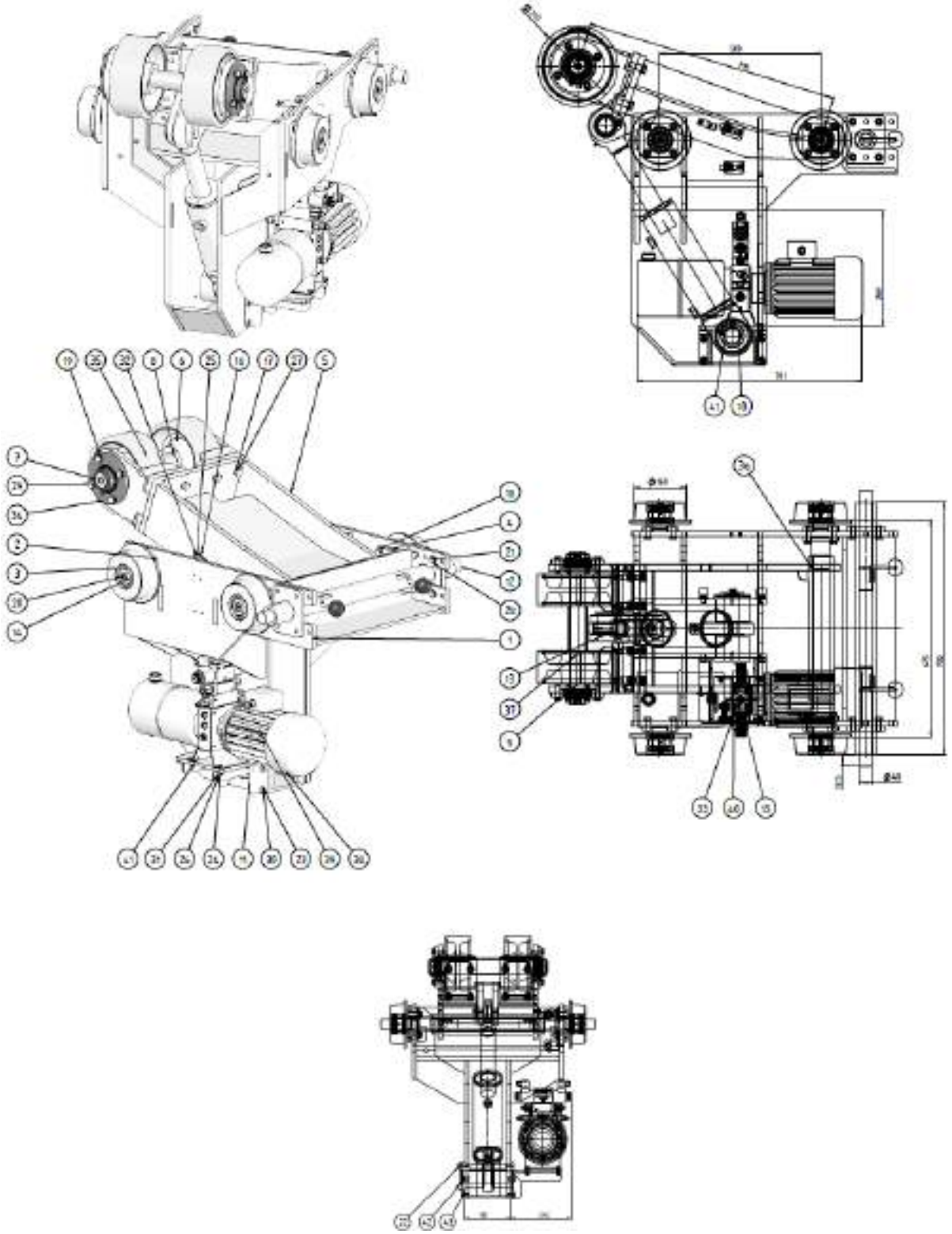


Figure 30: Lifting wheel assembly

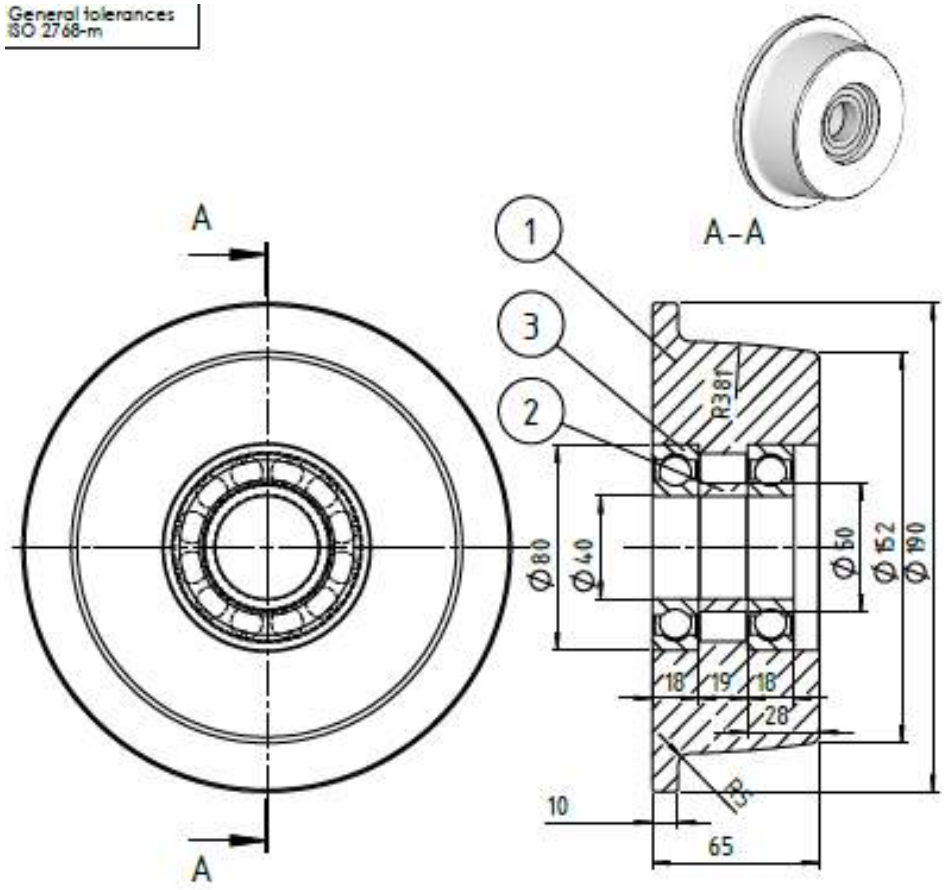


Figure 31: Wheel assembly

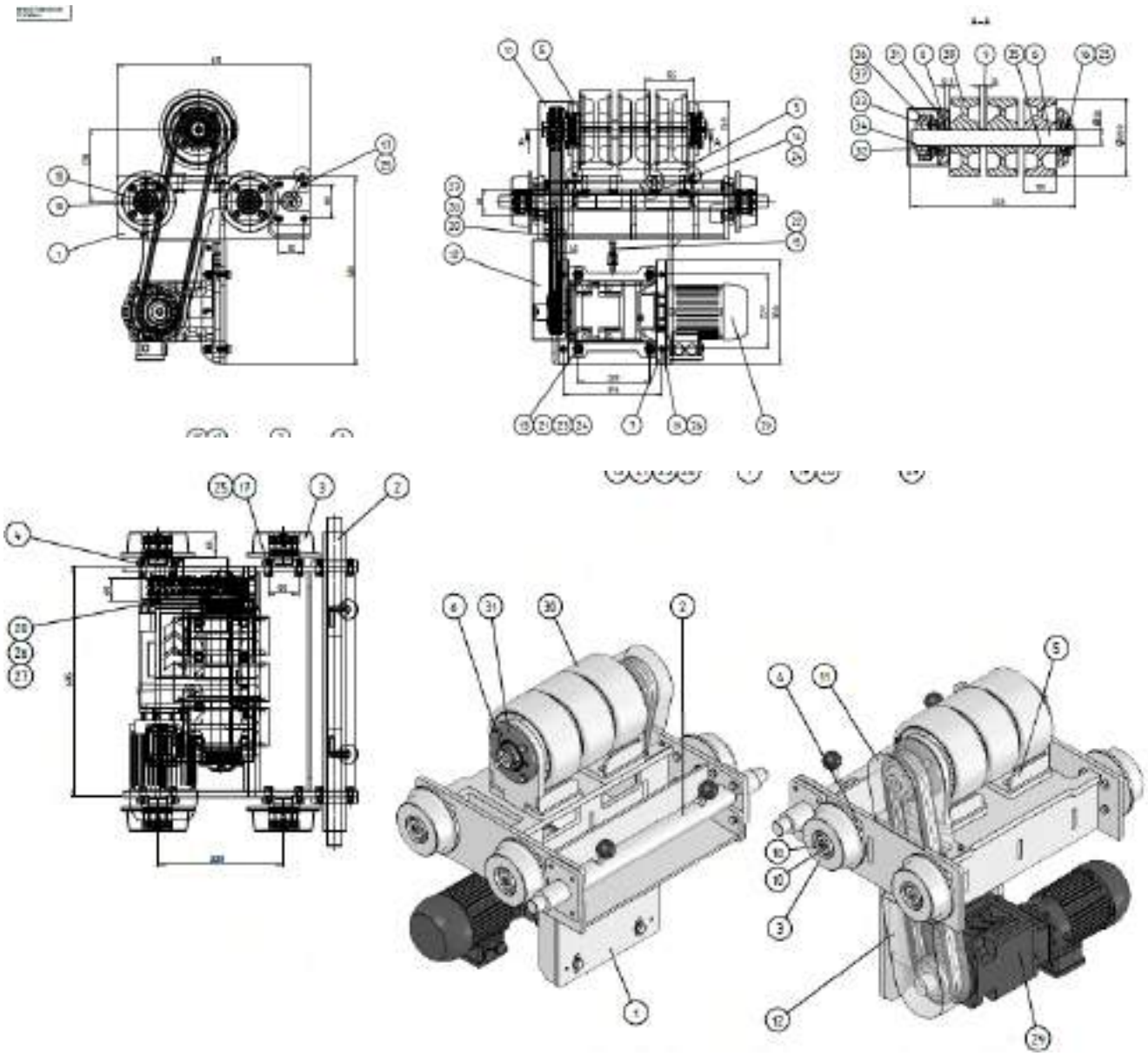


Figure 32: Turning wheel assembly

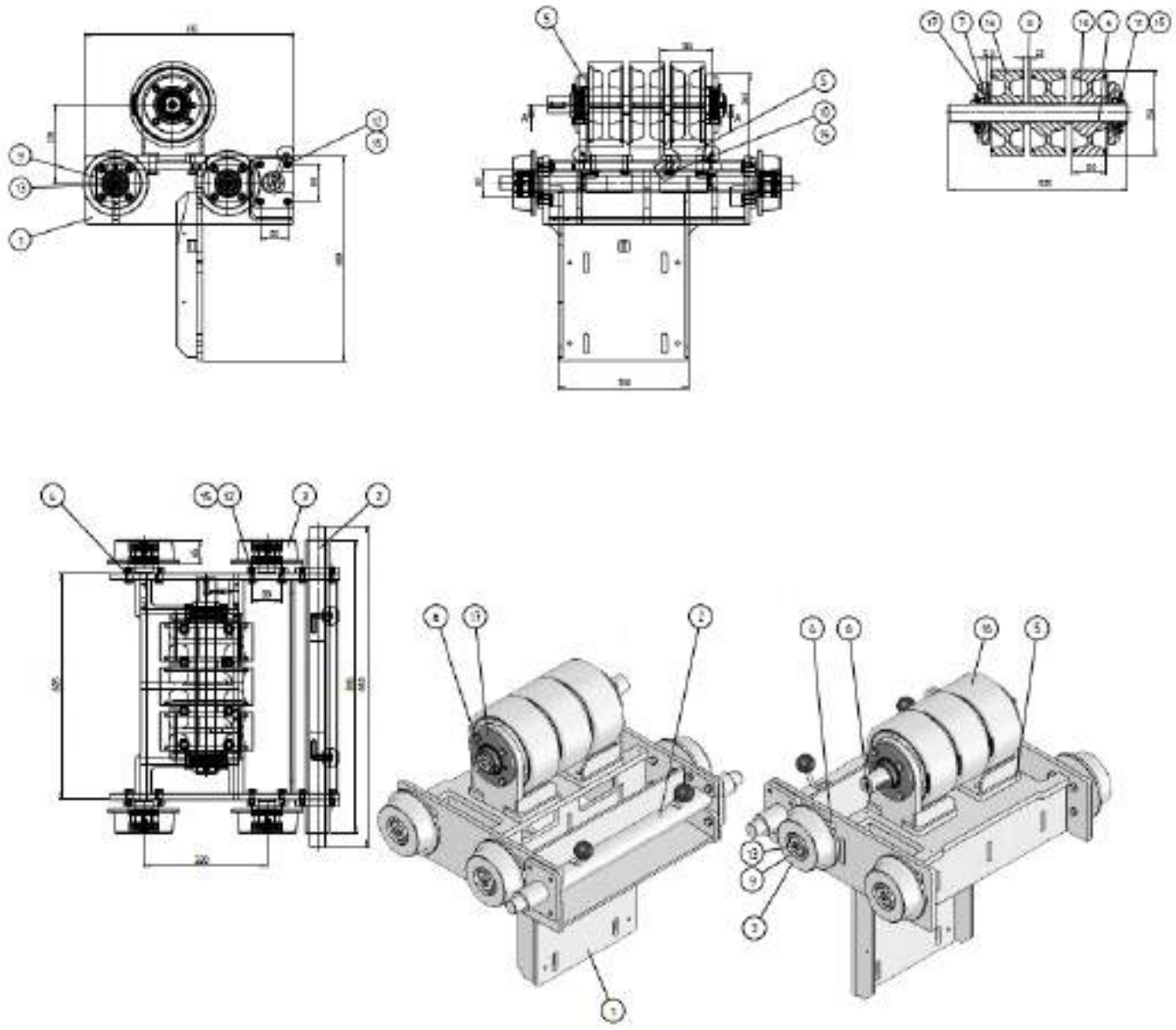


Figure 33: Turning wheel assembly

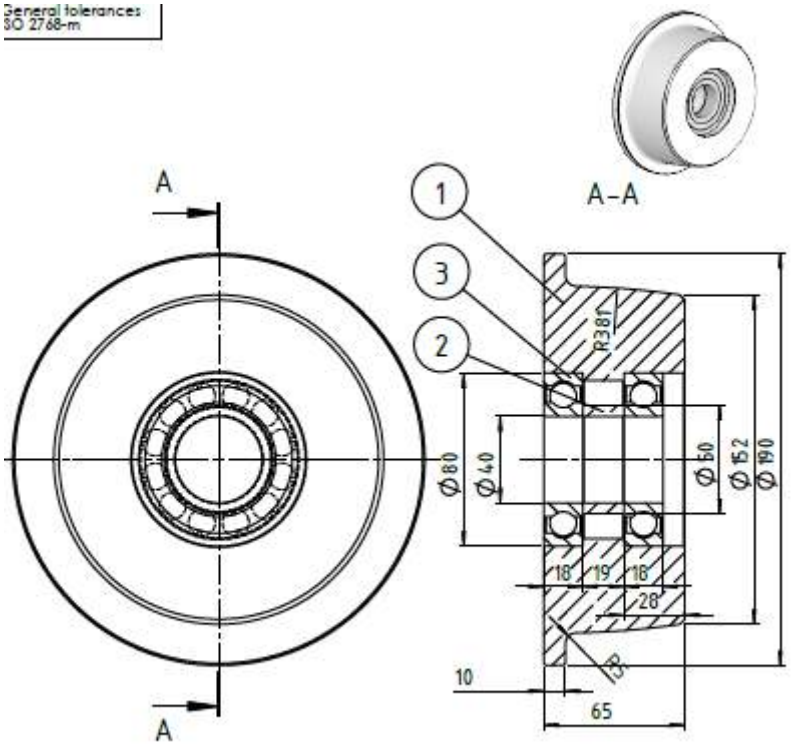


Figure 34: Wheel assembly

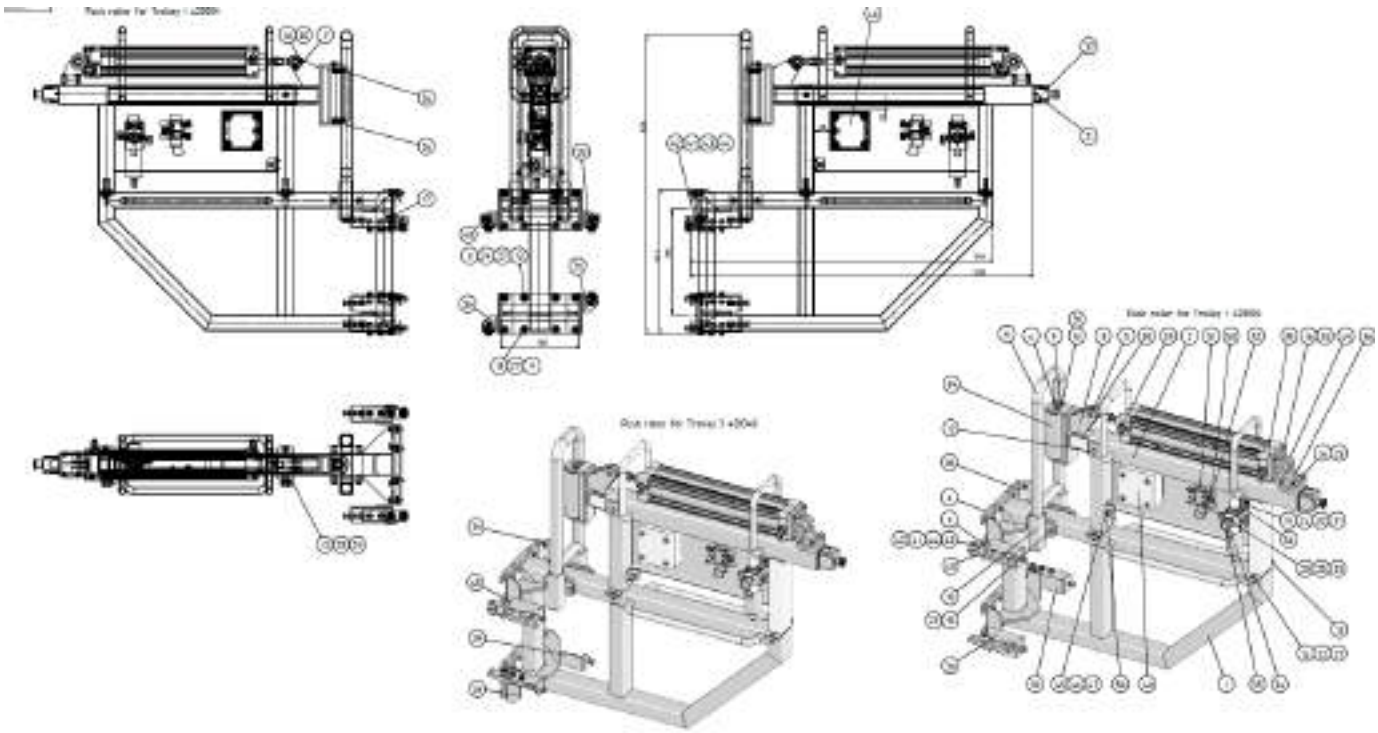


Figure 35: Push roller assembly

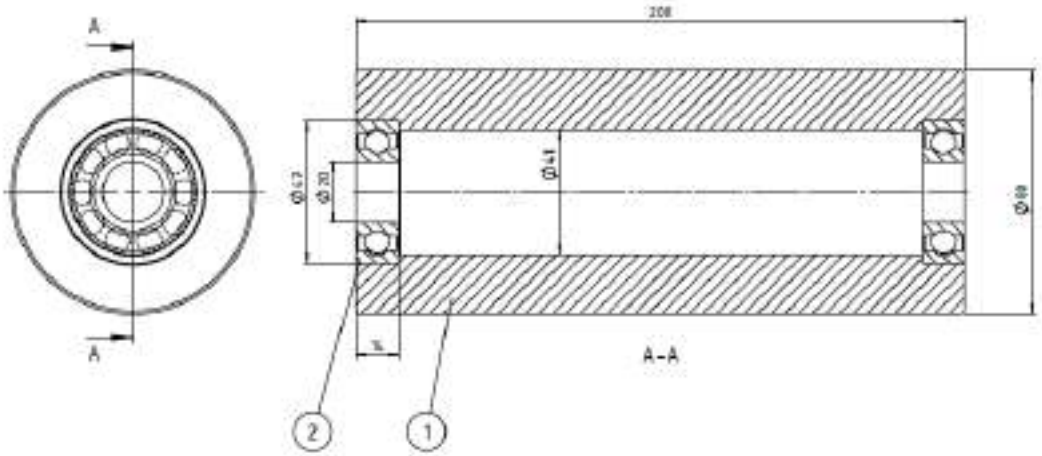


Figure 36: Roller assembly

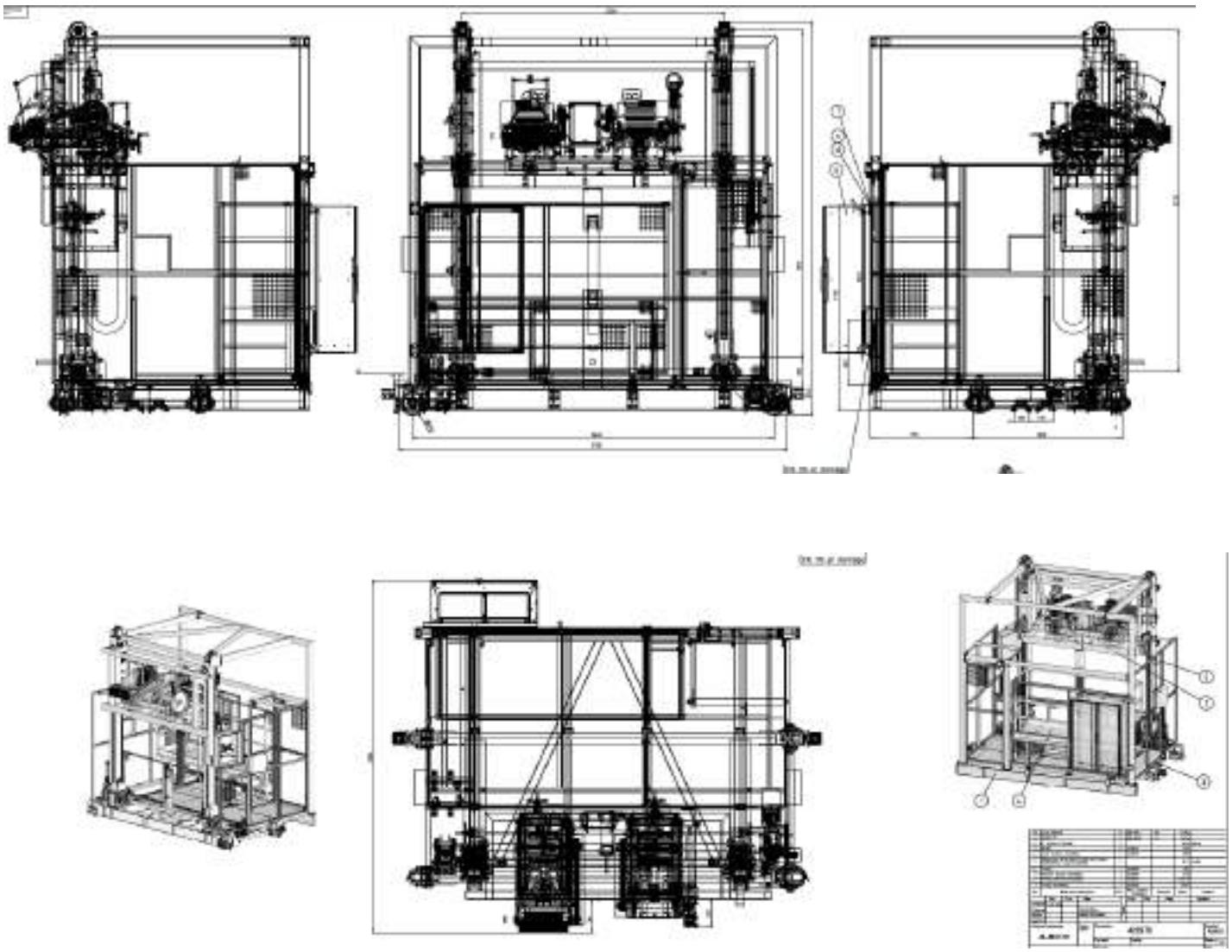


Figure 37: Cutting and Grinding Trolley

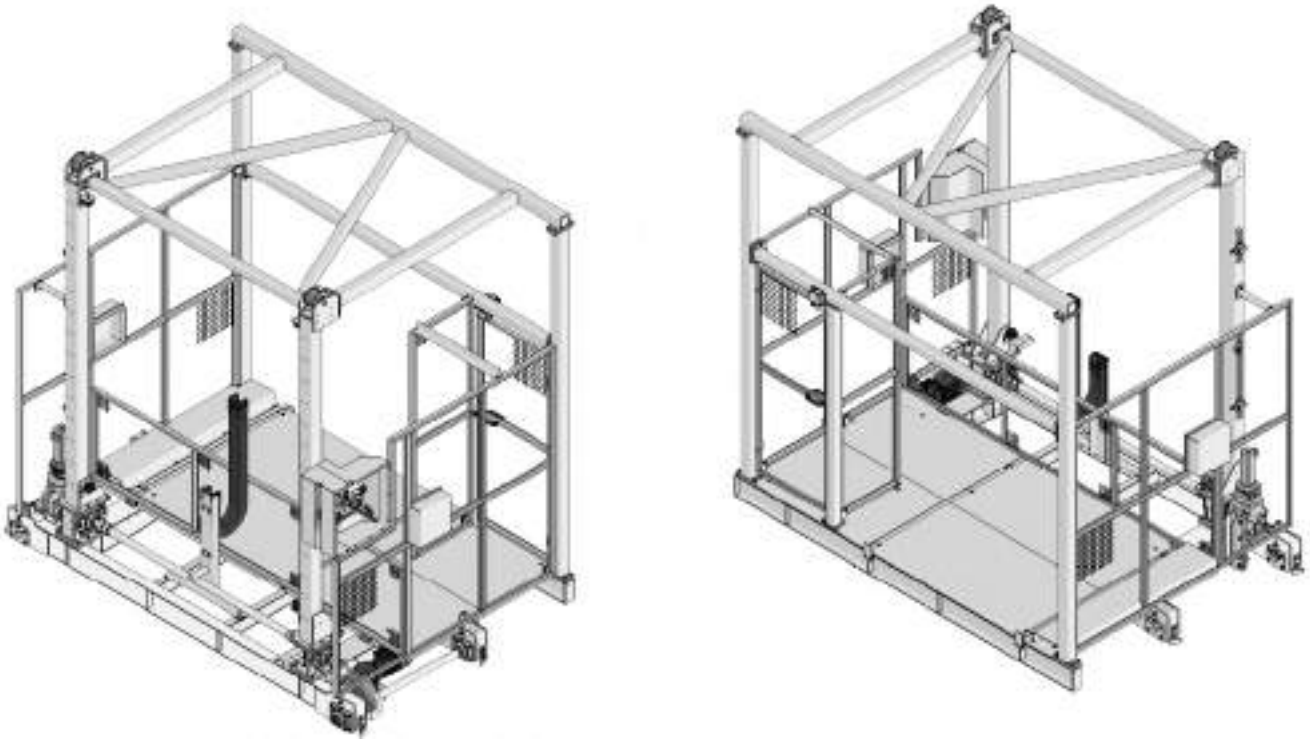


Figure 38: Trolley assembly

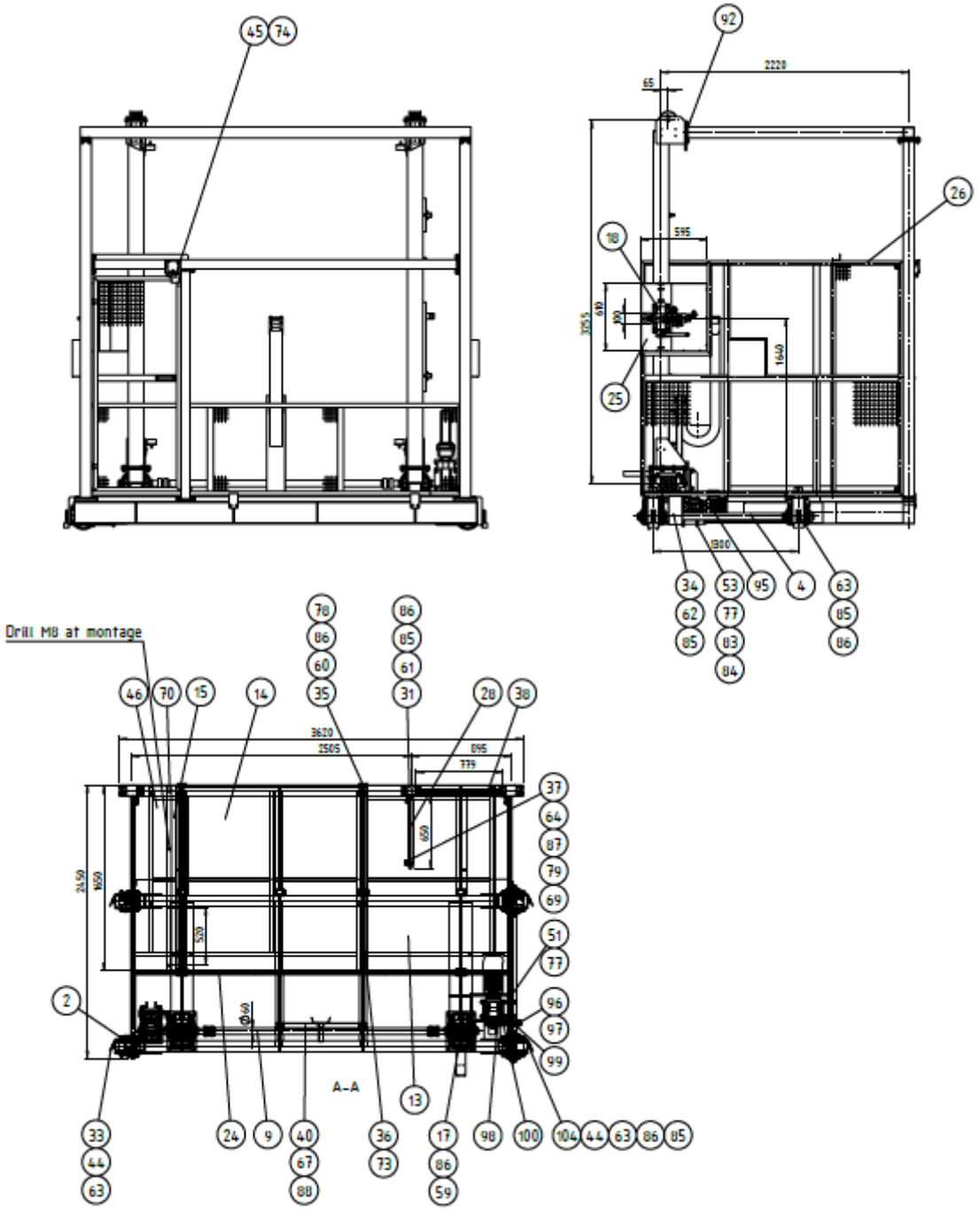


Figure 39: Trolley assembly

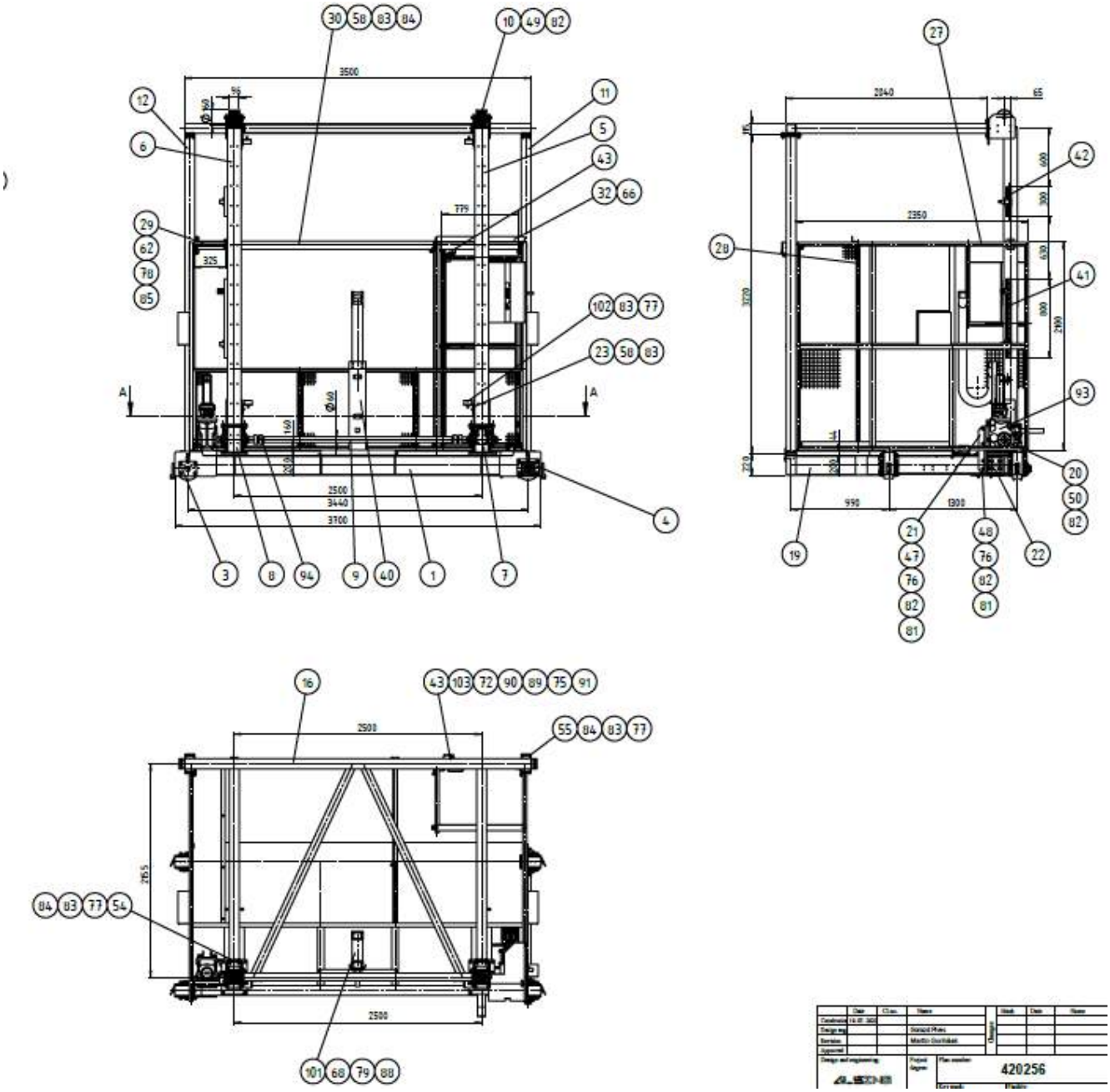


Figure 40: Trolley assembly

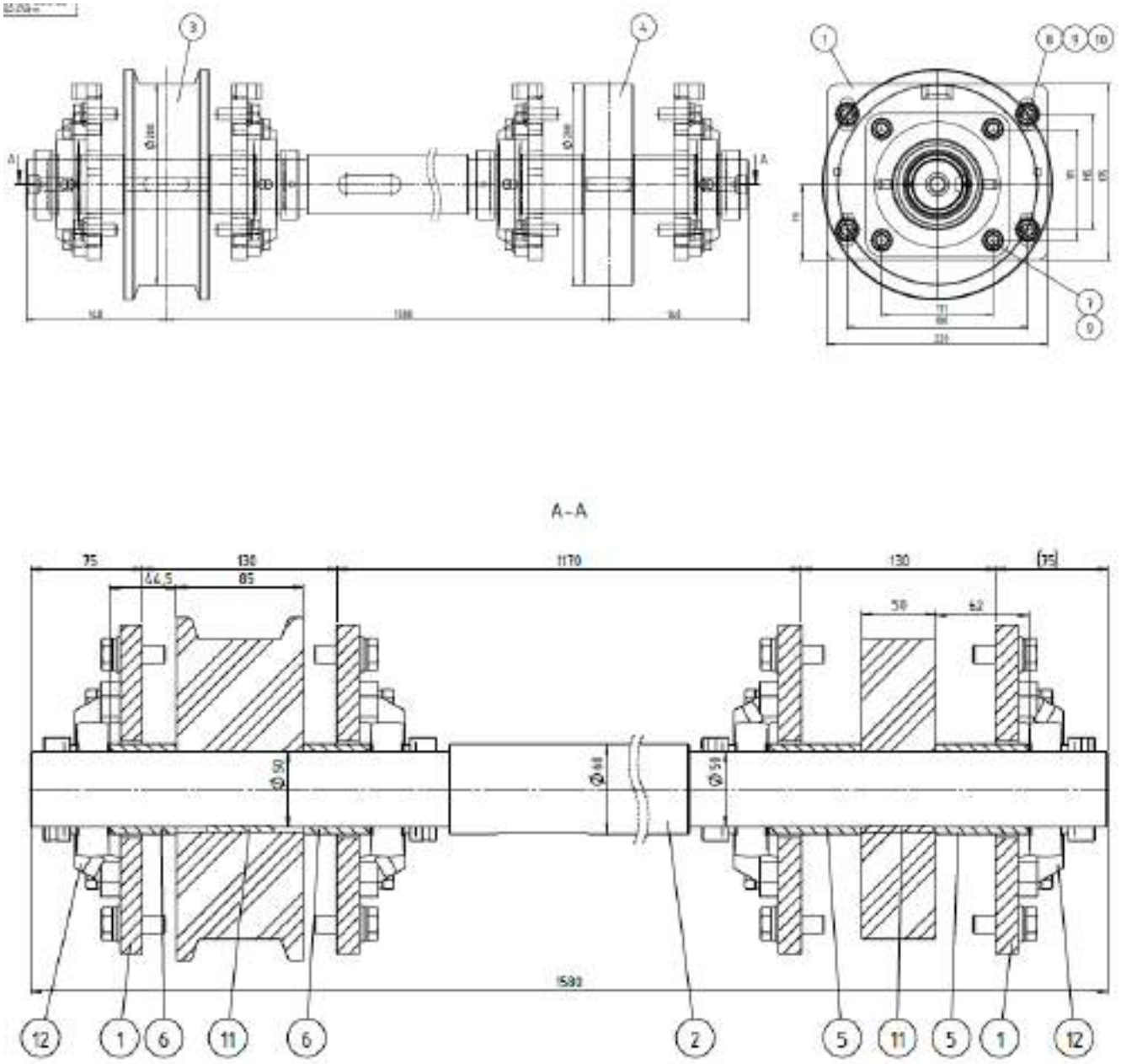


Figure 41: Powered wheel assembly

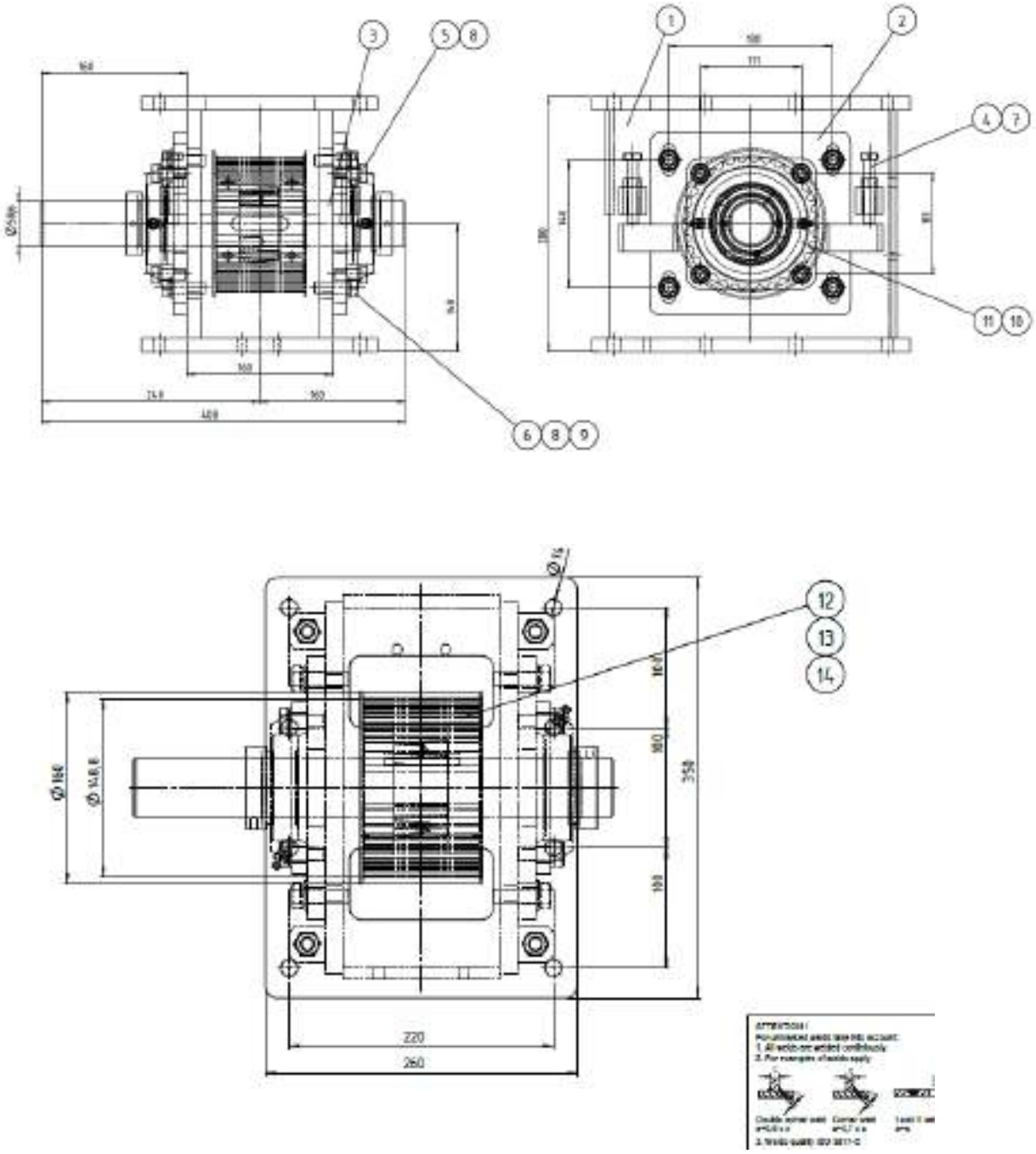


Figure 42: Driven pulley assembly

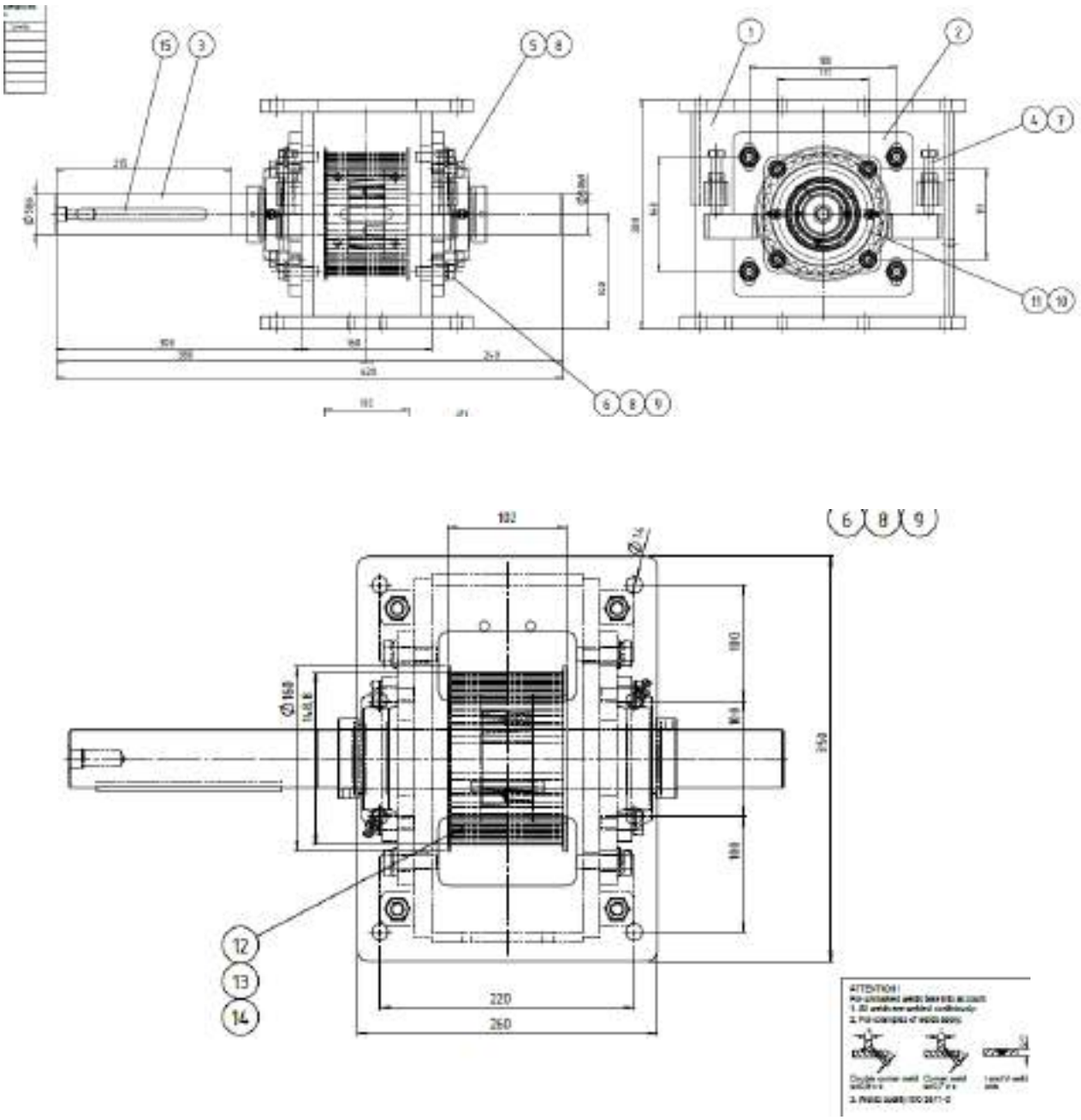


Figure 43: Driven pulley assembly

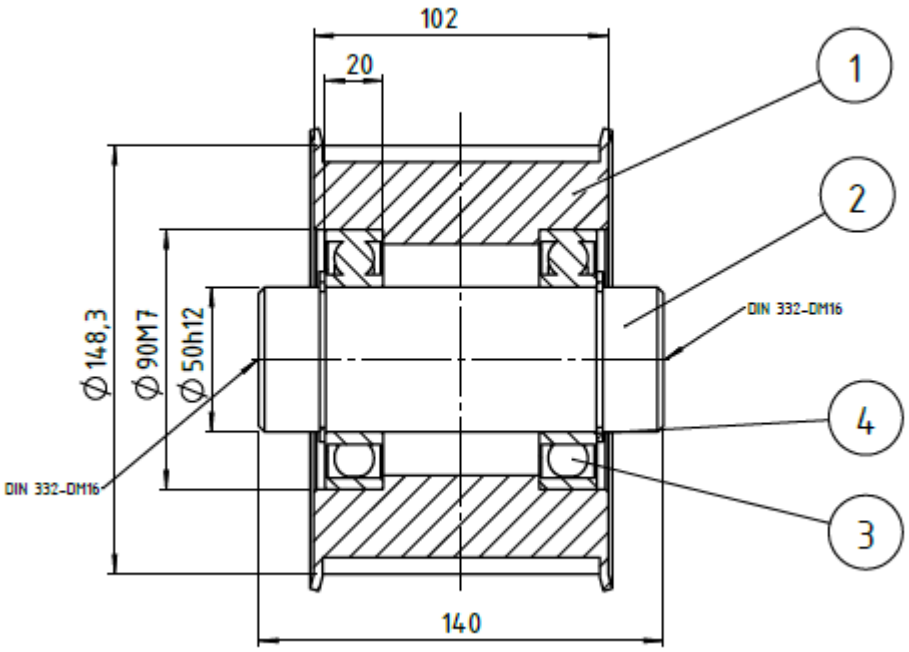


Figure 44: Driven pulley assembly

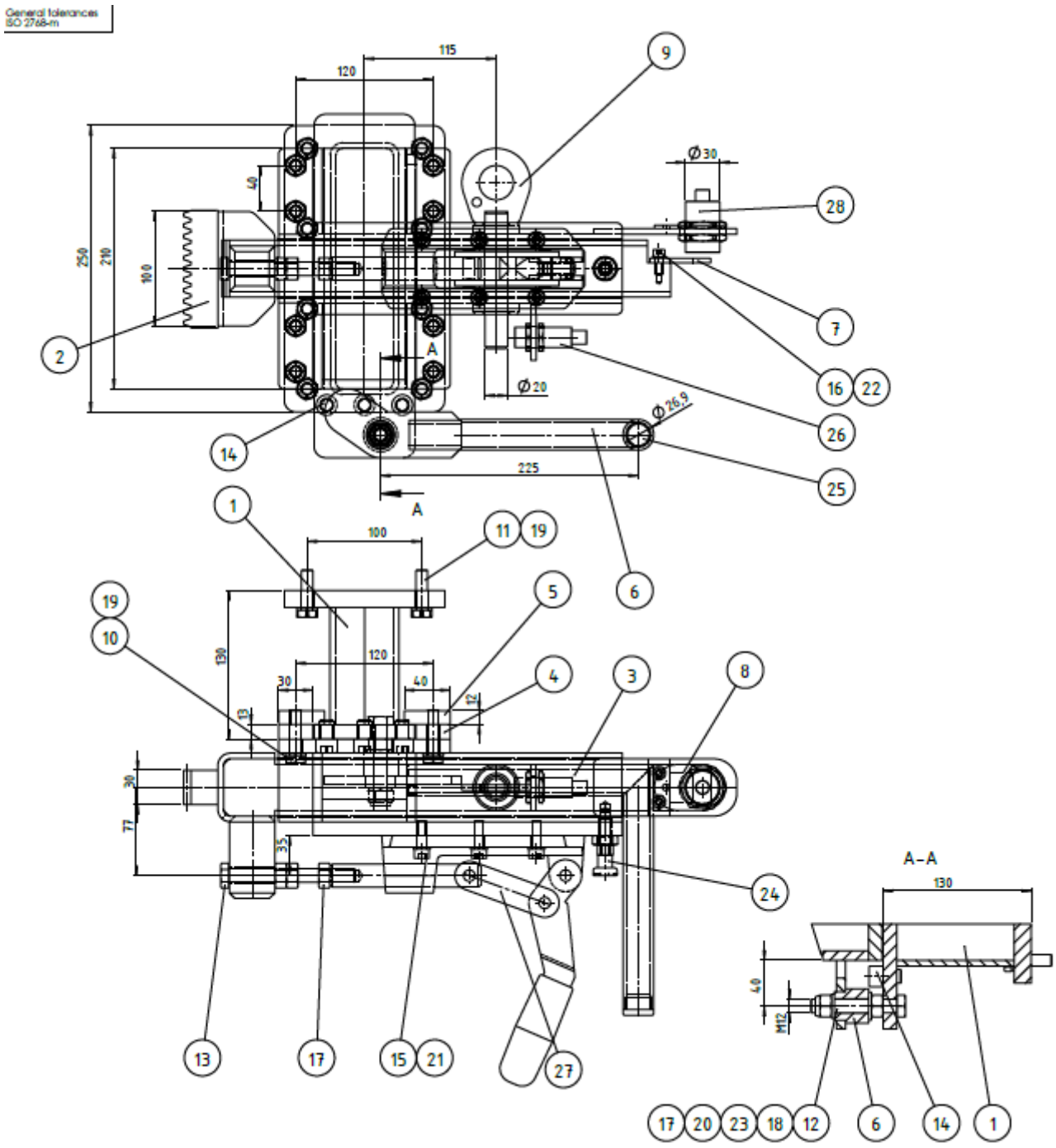


Figure 45: Guide

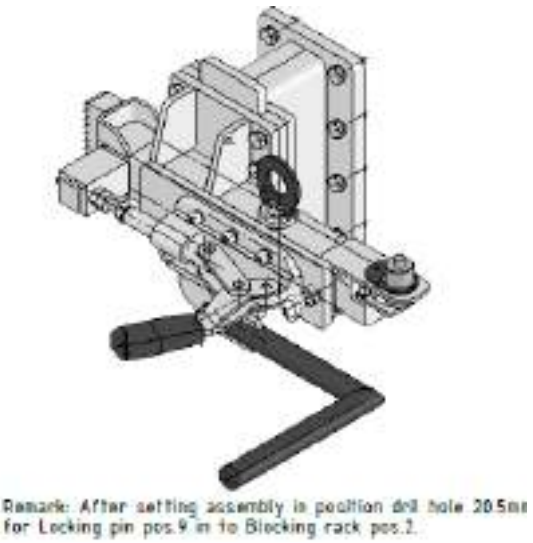


Figure 46: Guide

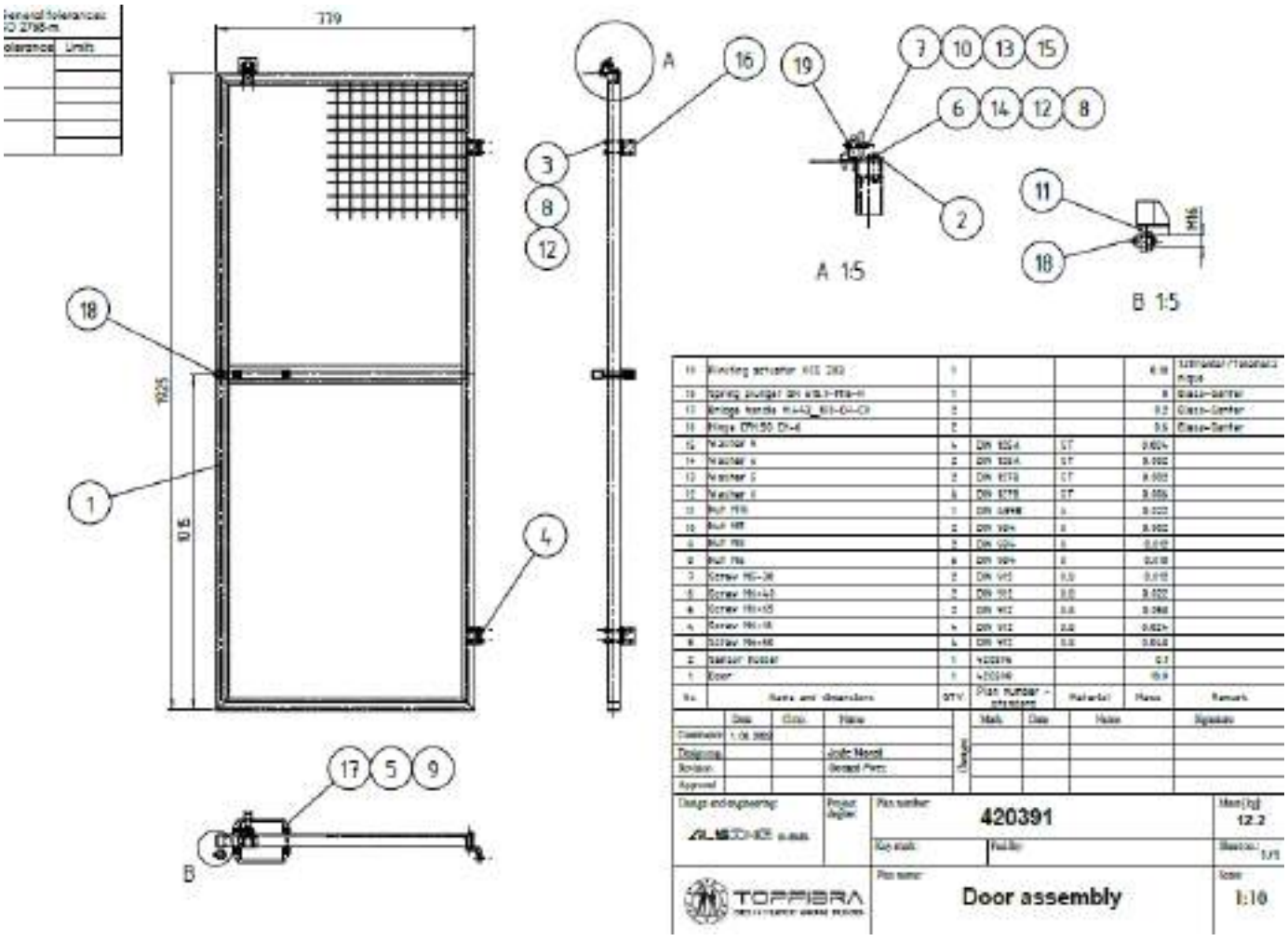


Figure 47: Door assembly

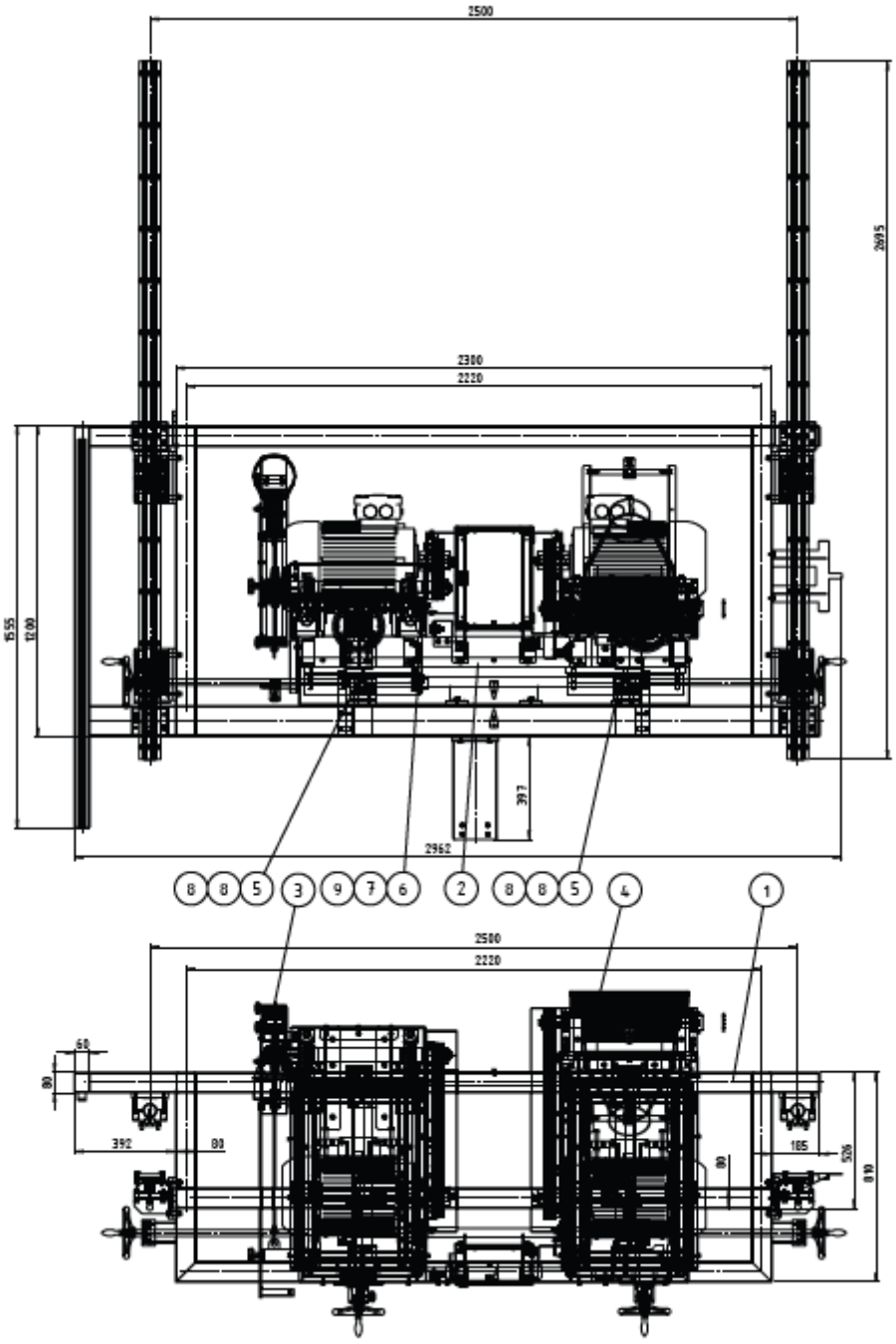


Figure 48: Lifting platform assembly

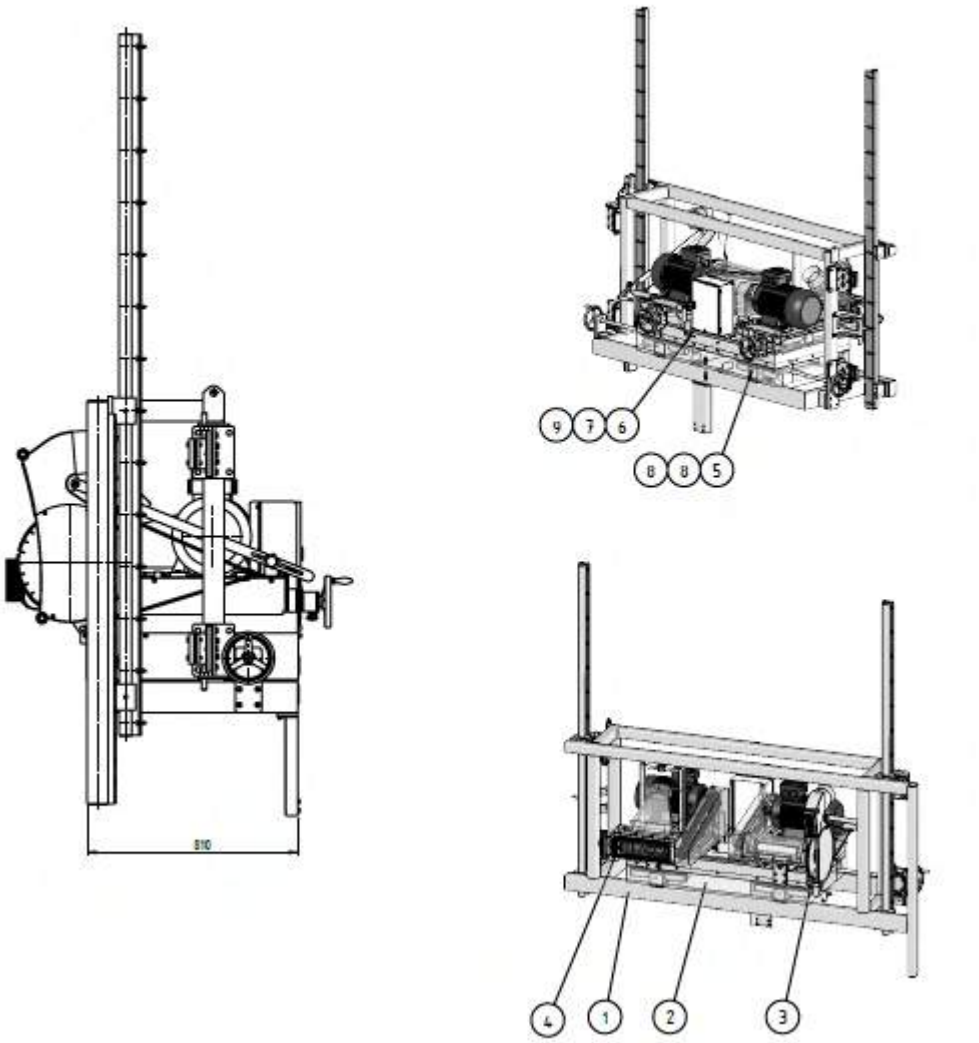


Figure 49: Lifting platform assembly

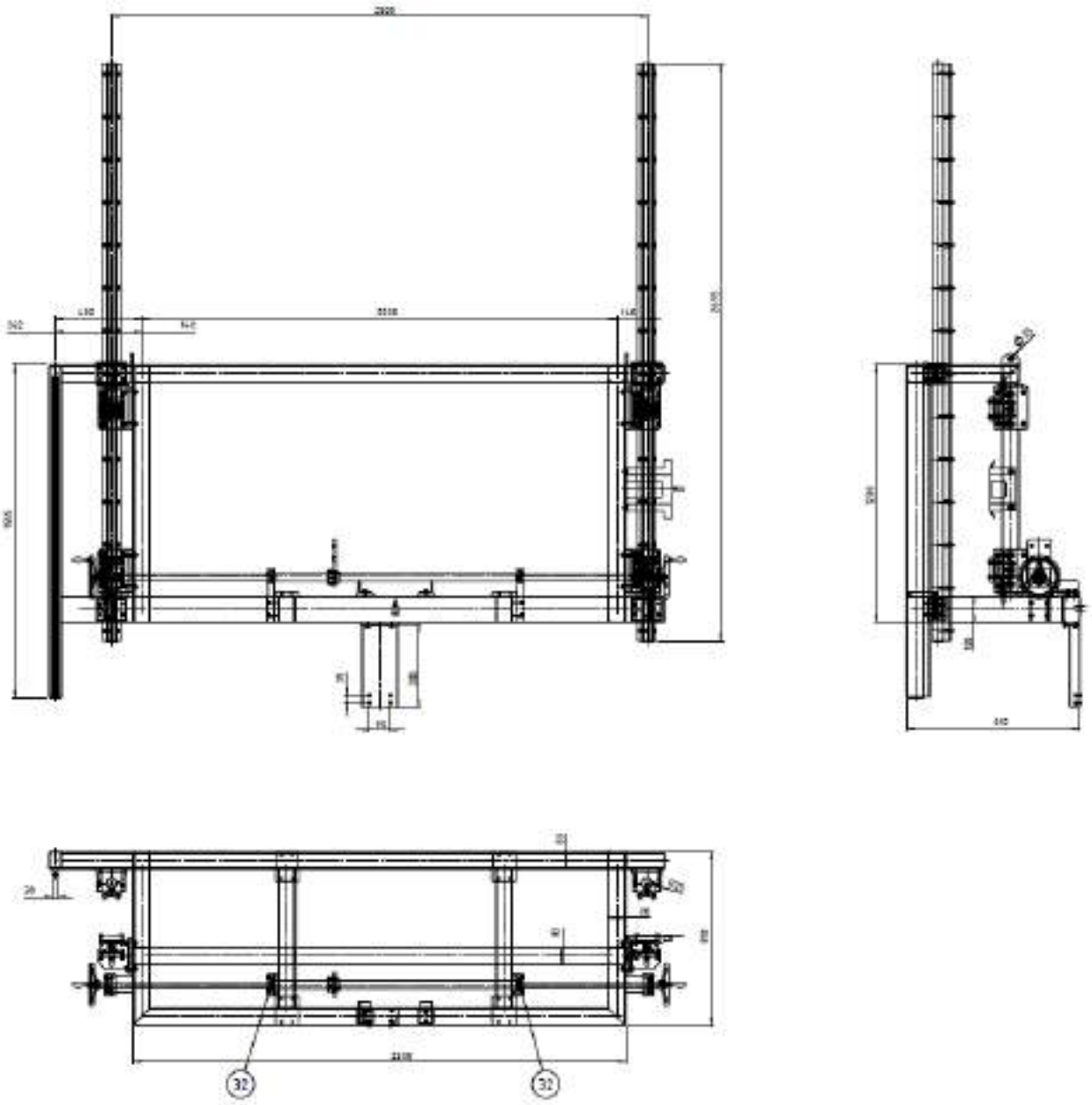


Figure 50: Lifting platform

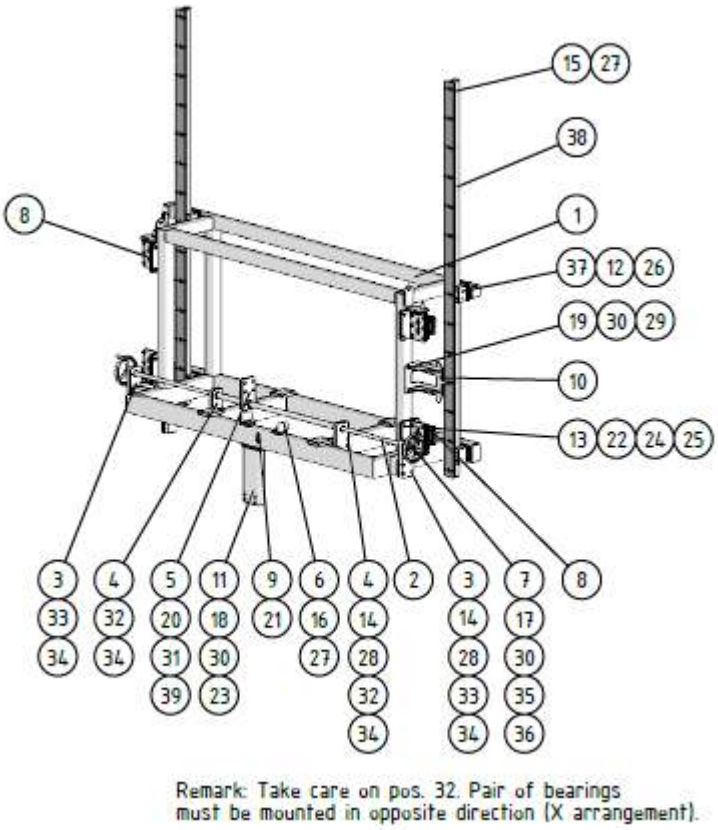


Figure 51: Lifting platform

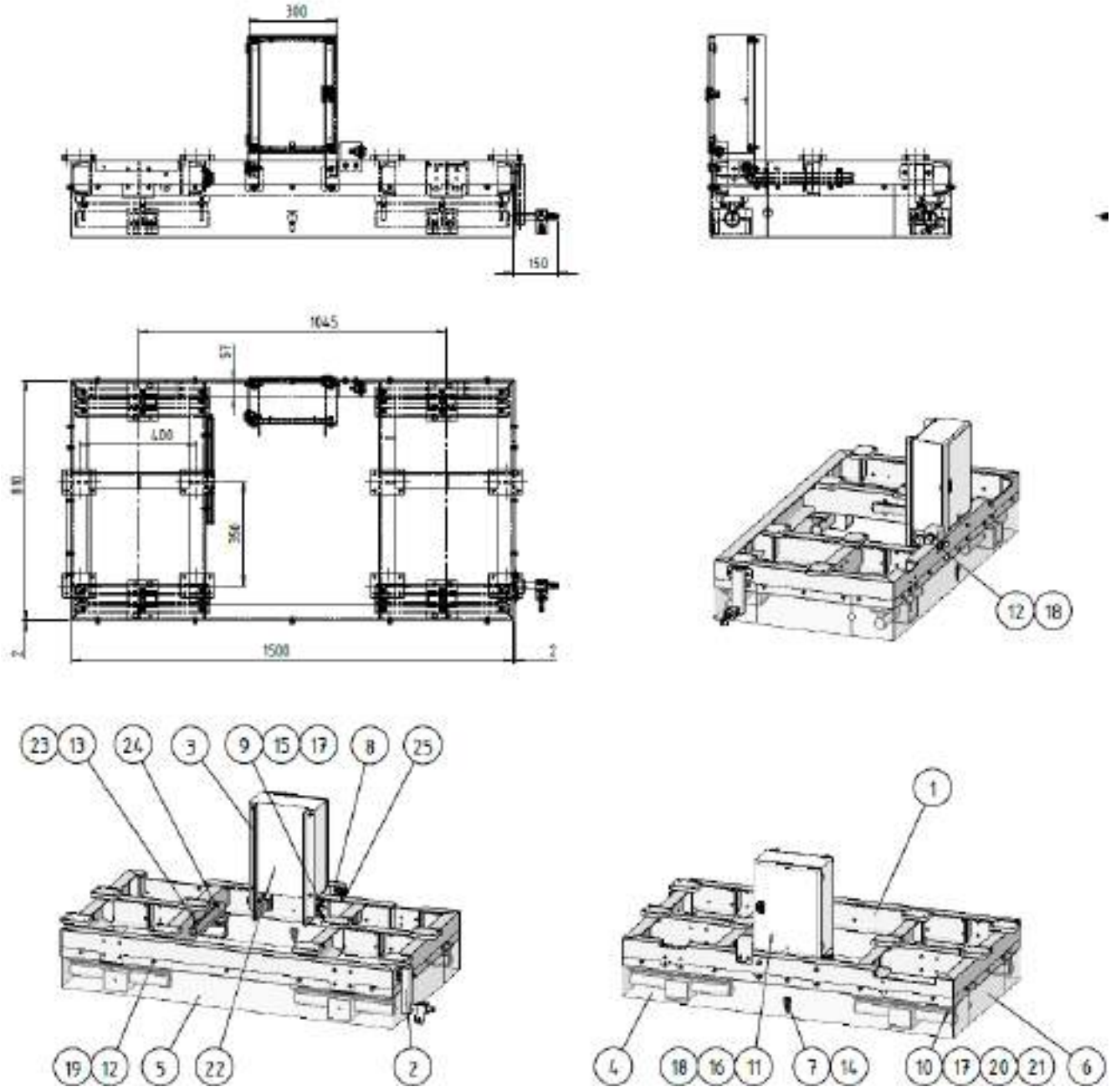


Figure 52: Cutting and grinding platform

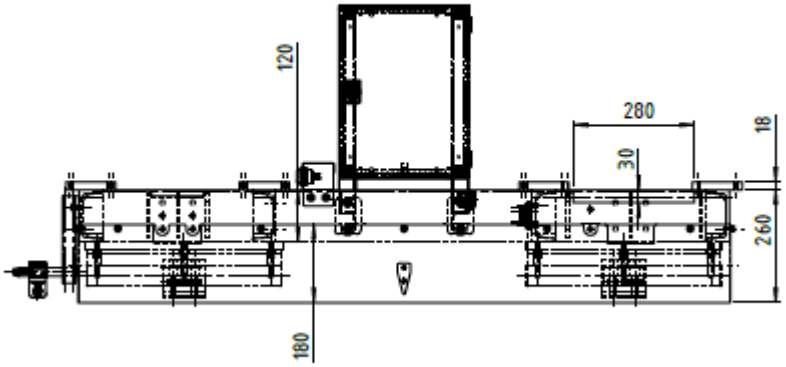


Figure 53: Cutting and grinding platform

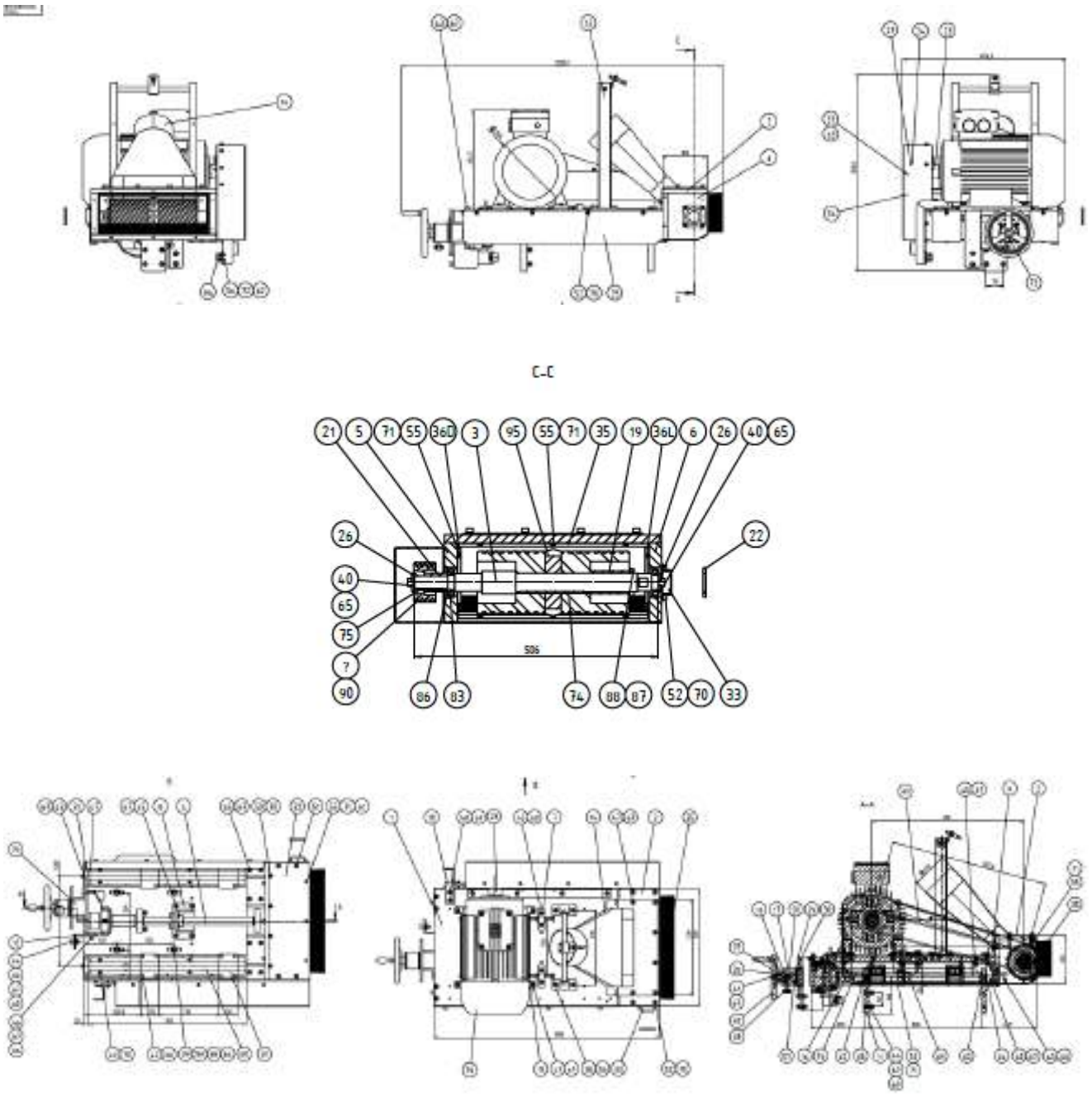


Figure 54: Grinding assembly

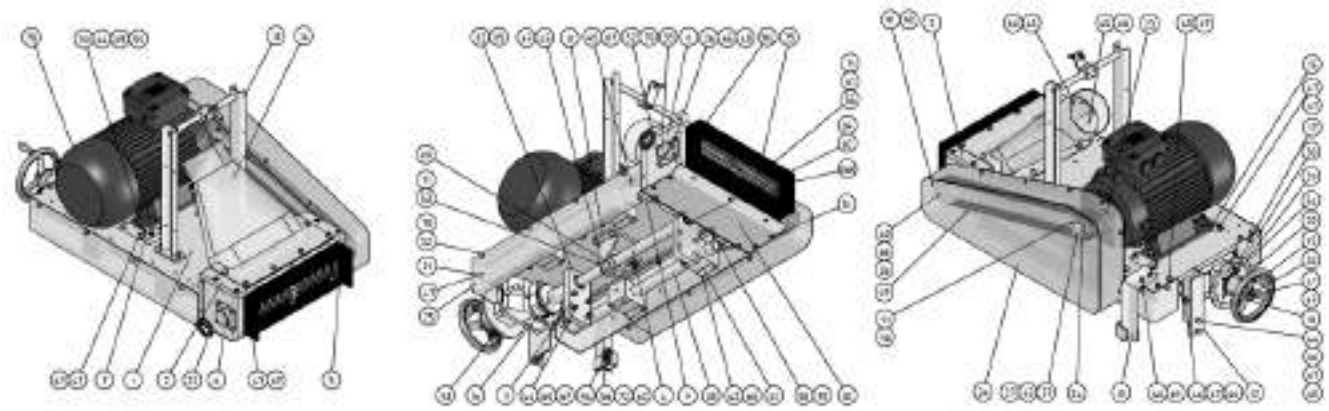


Figure 55: Grinding assembly

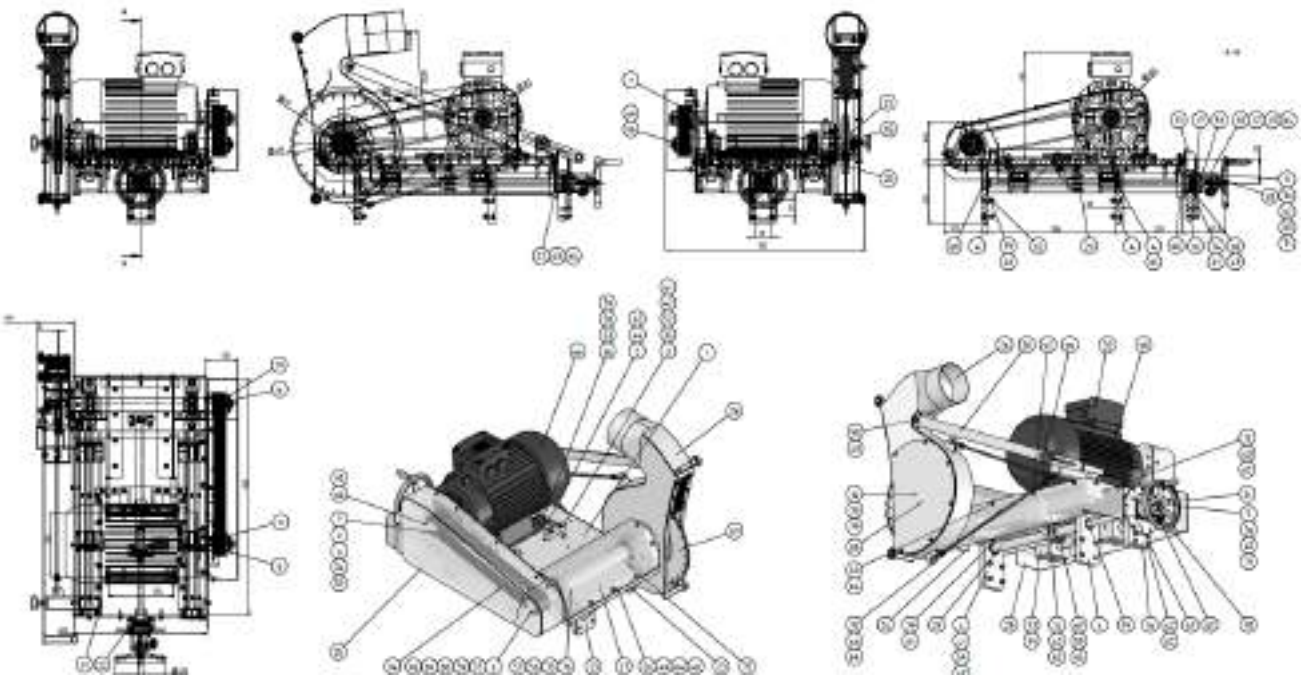


Figure 56: Cutting assembly

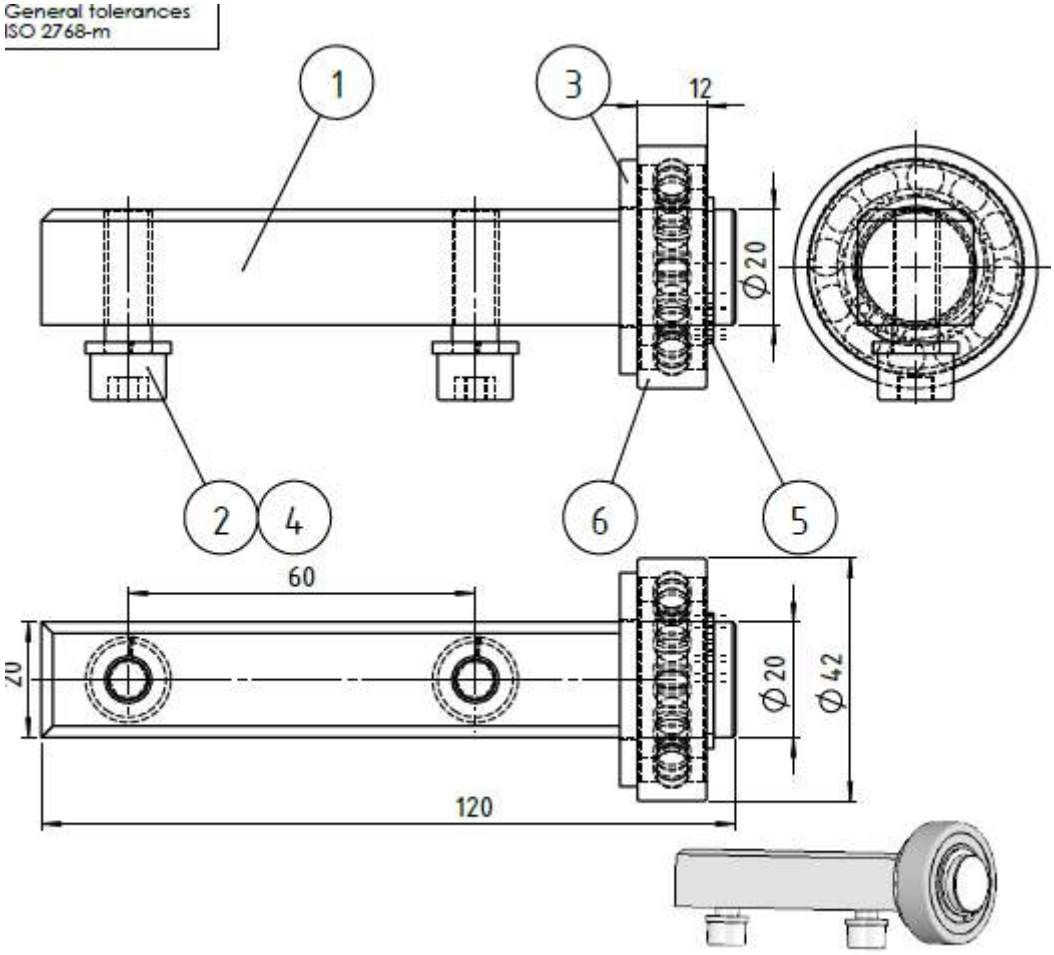


Figure 57: Distance wheel

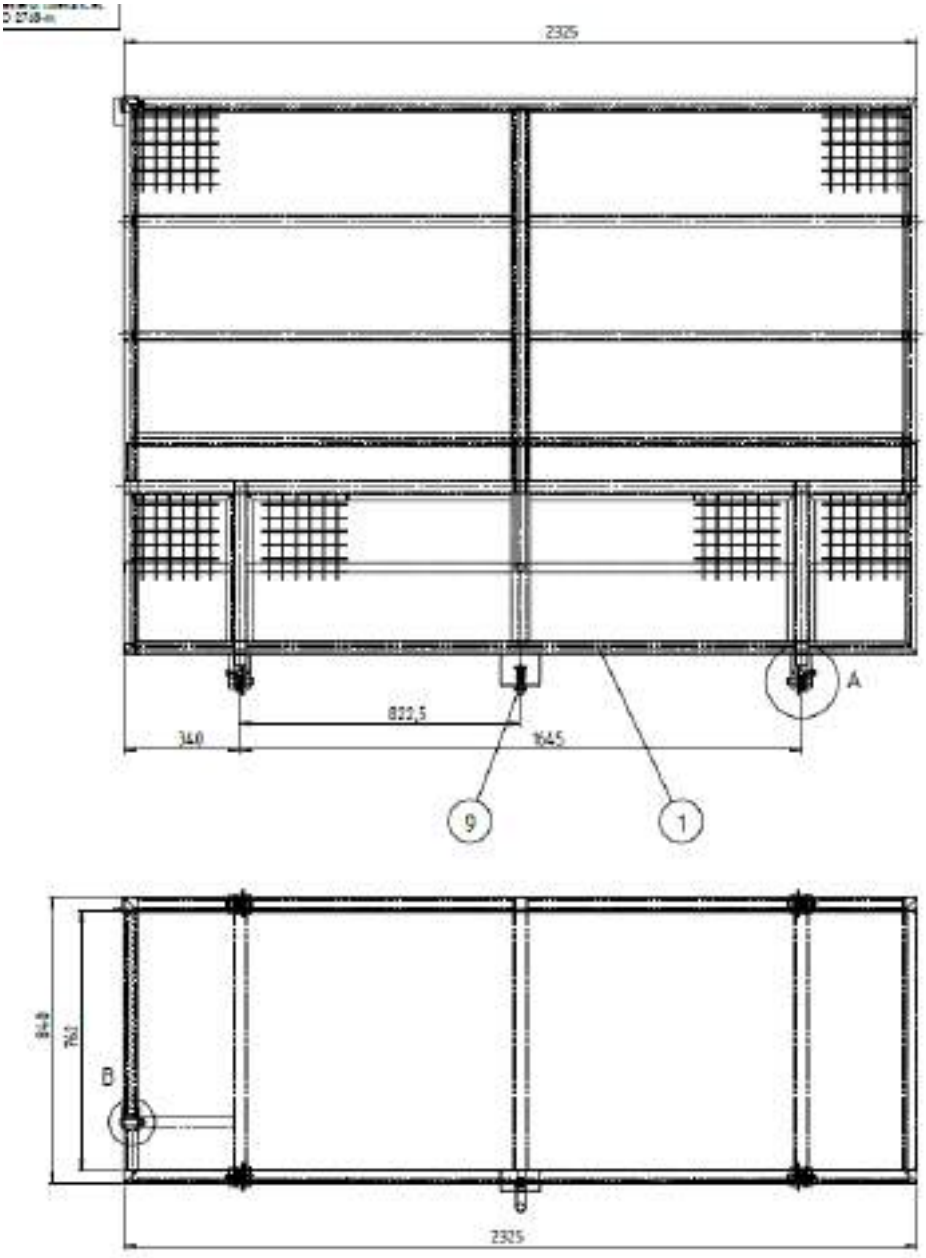


Figure 58: Trolley

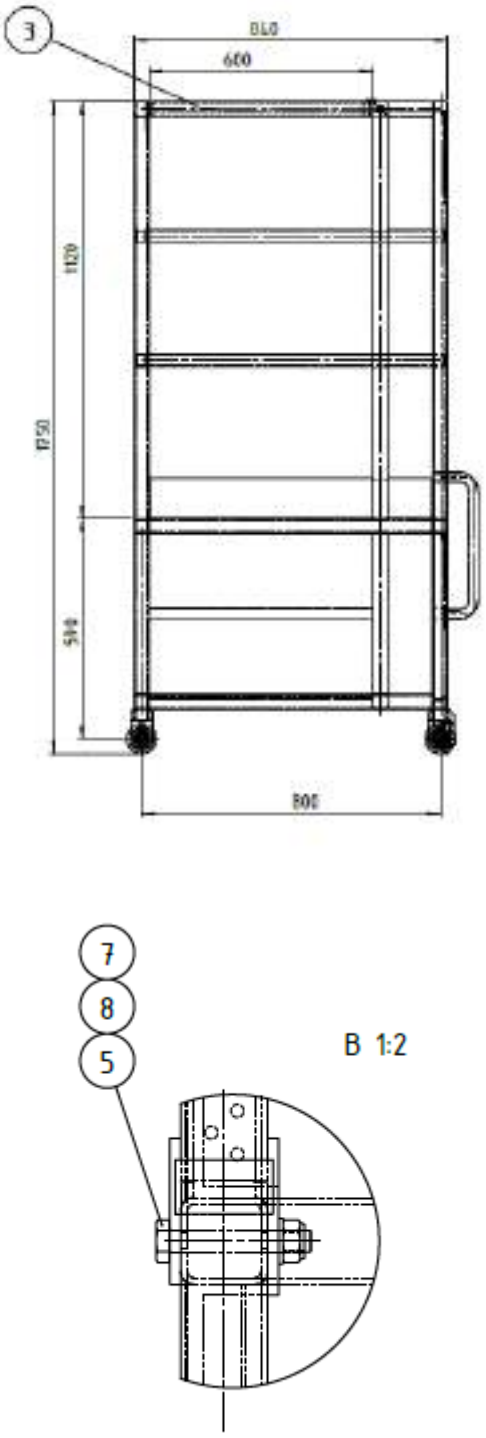


Figure 59: Trolley

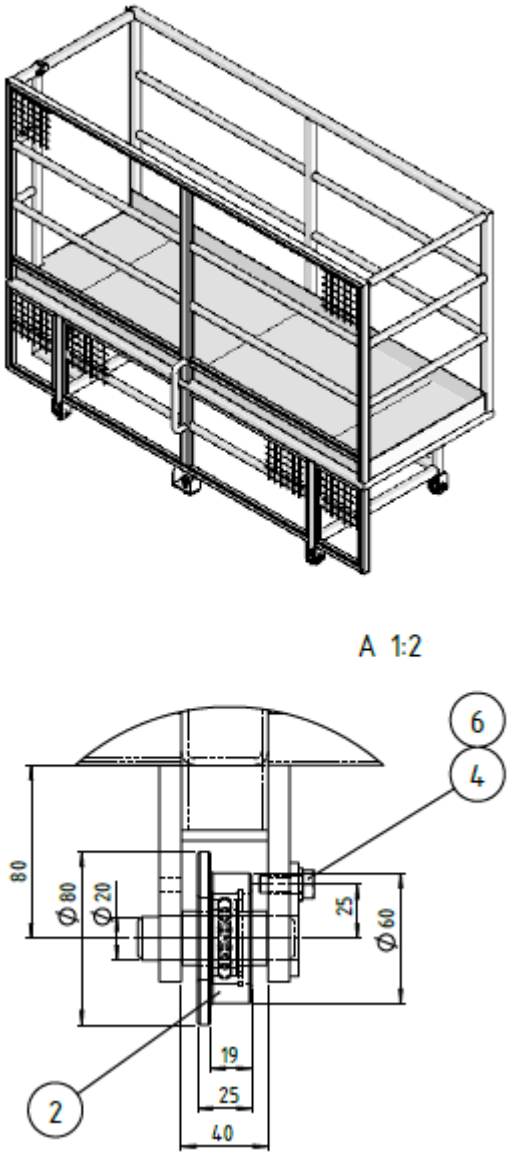


Figure 60: Trolley

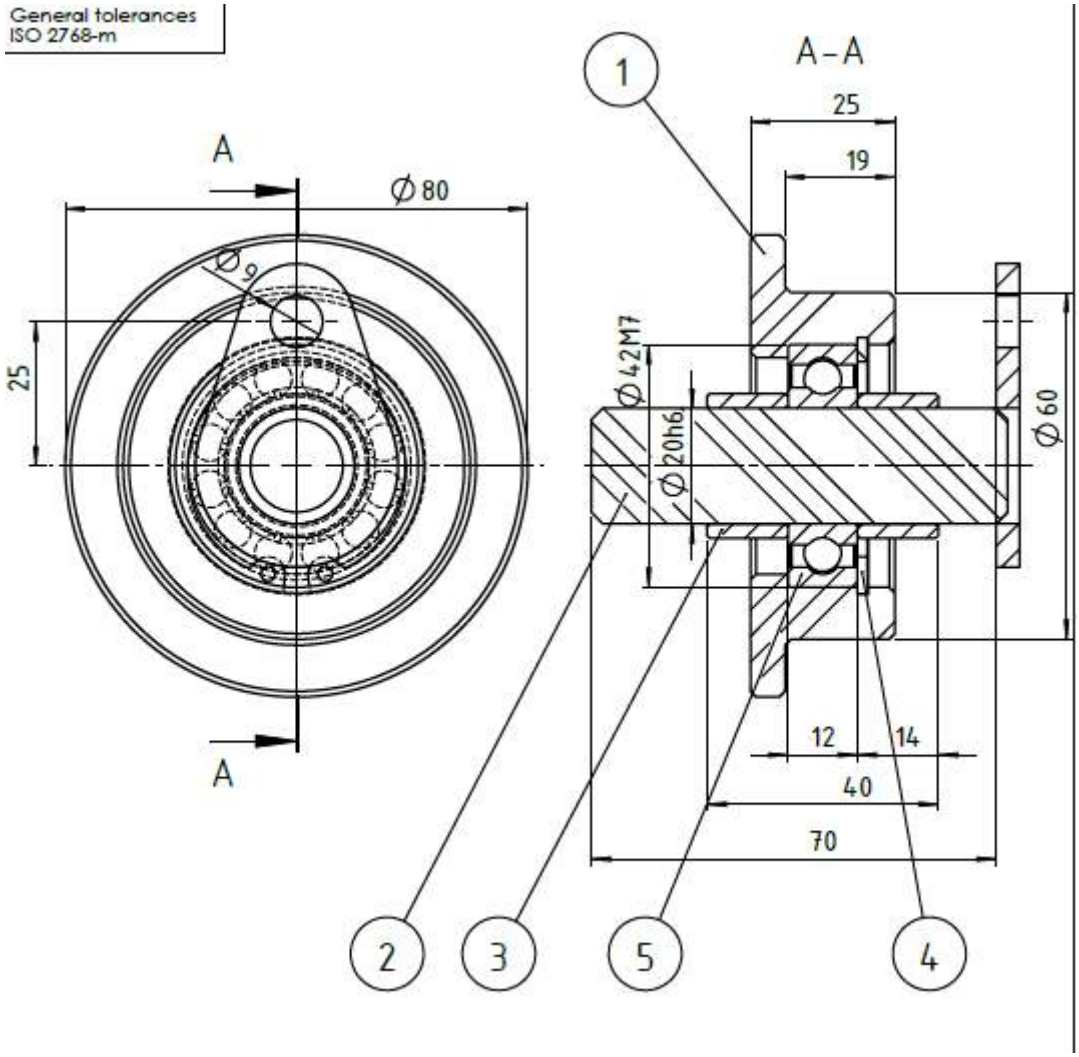


Figure 61: Wheel dia 60

VISTA HIDRAVLIKA

VISTA, hidravlika, d.o.o.
Kosovelova ulica 14
4226 Žiri
Slovenija

Tel.: 04/50 50 600
Fax: 04/51 91 900
E-mail: info@vista-hidravlika.si
www.vista-hidravlika.si
SI 1296148

DOCUMENTATION FOR HYDRAULIC EQUIPMENT

Customer: ALSING D.O.O.
Brnčičeva ulica 5
1000 Ljubljana

Main code: HA 02.3639

Project No.: O.3639.1

Documentation included:

- Part list
- Hydraulic scheme and assembly drawing
- Instruction for start and maintance
- State of conformity

Made by: Božič Denis

Žiri, 29.8.2022

VISTA HIDRAVLIKA d.o.o. Kosovelova 14, 4226 Žiri

The hydraulic system and other equipment presented in this documentation are intended for subsequent installation in machines, devices and systems. Installation, start-up, use and maintenance of the equipment is permitted only by experts (hereafter referred to as the contractor) who have the necessary knowledge and experience and fully understand the contents of this documentation. Before any intervention in the equipment, the contractor must familiarize himself with its purpose and conditions of delivery, and carefully analyze the way the equipment operates from both a functional and a safety point of view. In case of missing, incomplete or unclear instructions or other documents, and in case of other ambiguities related to the equipment, contact Vista d.o.o.. Vista d.o.o. rejects all warranty and compensation claims for defects caused by interventions by non-experts, non-observance of this documentation, due to interventions in the equipment based on the part of Vista d.o.o. unconfirmed assumptions of the contractor, and interventions based on data and instructions provided by an unauthorized third party.

VISTA HIDRAVLIKA

VISTA, hidravlika, d.o.o.
Kosovelova ulica 14
4226 Žiri
Slovenija

Tel.: 04/50 50 600
Fax: 04/51 91 900
E-mail: info@vista-hidravlika.si
www.vista-hidravlika.si
SI 1298148

Part list

Name: MHA-K4/130-P-780-AC3/4/3kW-R5/H

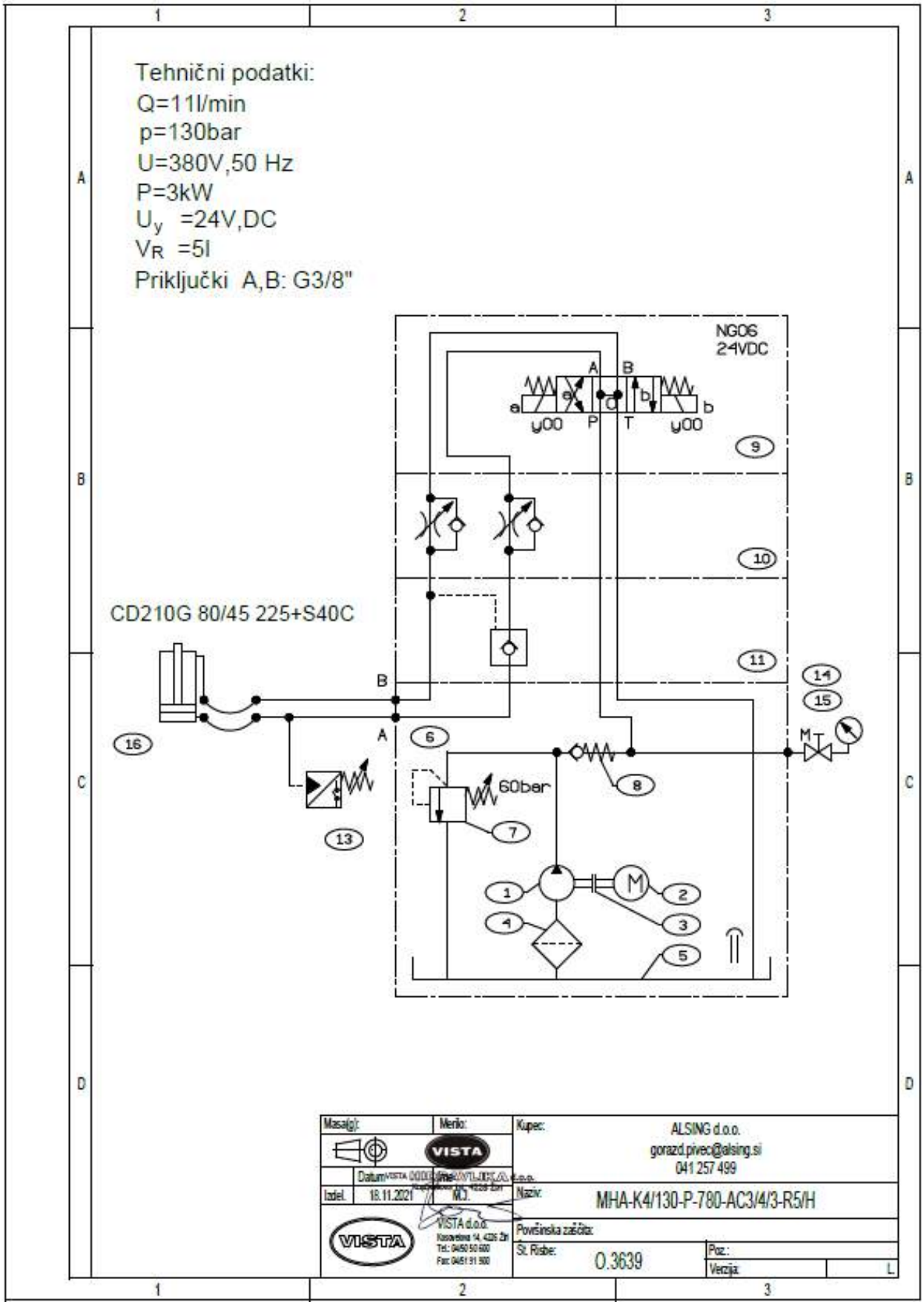
Project No.: O.3639.1

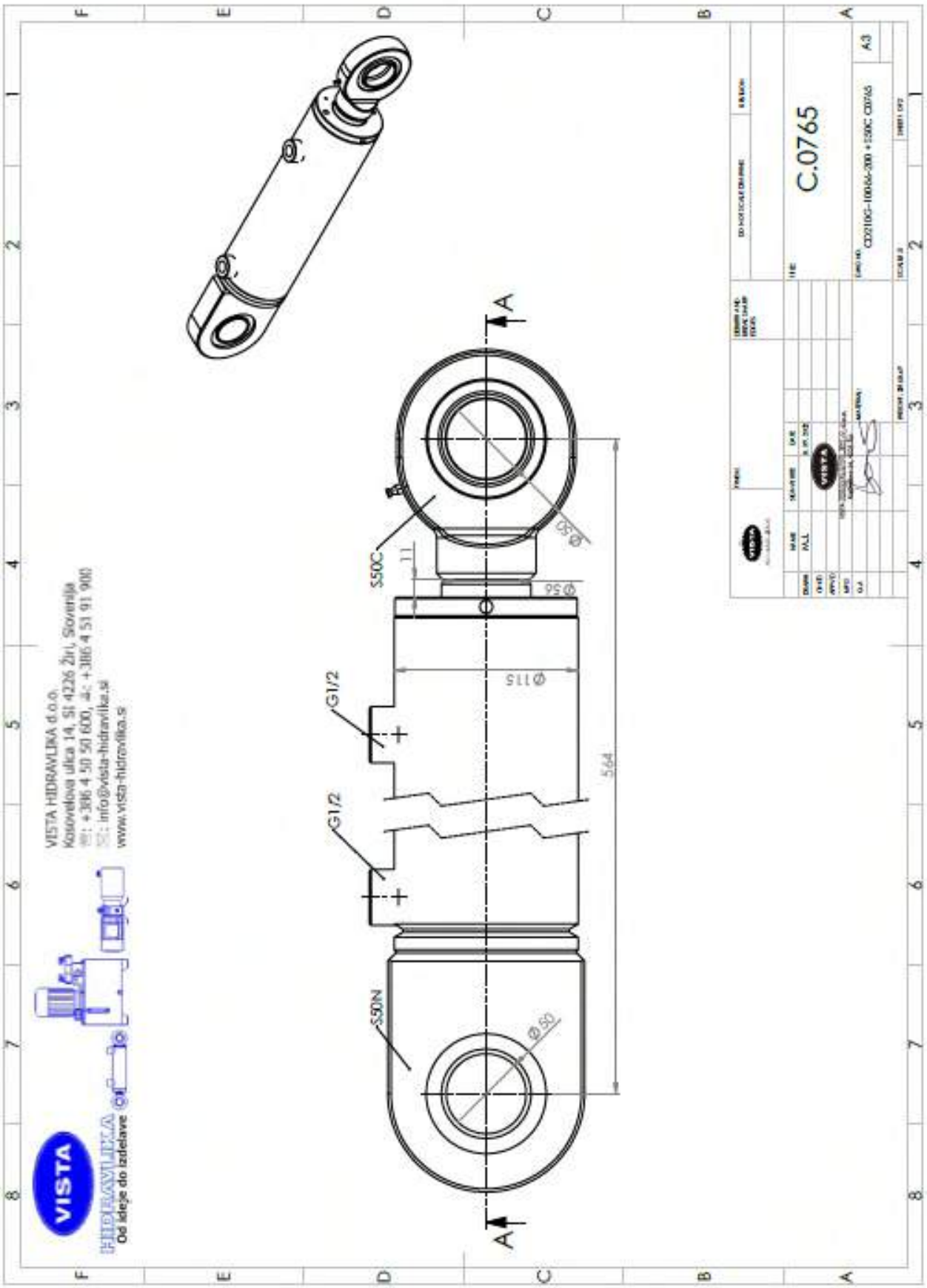
Customer: ALSING D.O.O.

Poz.	Ozn.	Name			Qty.	EM
1	2	MOTOR	W21-IE3 100 L4 B14S 3 KW 230/400V 50 HZ	NBM	1	kos
2	4	FILTER SUC.	MHA SUC.	OMT	1	kos
3	3	FLANGE	F100	VISTA	1	kos
4	1	PUMP	XV-1P/7,8	VIVOIL	1	kos
5	3.1	CLUTCH	MHA-fi28	OKK	1	kos
6	5	TANK	MHA SER-5	OMT	1	kos
7	6	BLOCK MHA	MHA-K4-FI32	VISTA	1	kos
8	8	VALVE NON RETURN	CVH0.S08.0Y.000	VIS H.	1	kos
9	7	VALVE RELIEF	RVB0.S08.0N.000	VIS H.	1	kos
10	14	MANOMETER	TIP A G1/4 (0-250)	PH	1	kos
11	15	MANOMATER PIPE	FT291	PH	1	kos
12	13	PRESSURE SWITCH	DG-35	HAWE	1	kos
13	11	VALVE	VP-NOV-6-EA	PH	1	kos
14	10	VALVE CHOKE	VP-NDV-6	PH	1	kos
15	9	VALVE 4/3	KV-4/3-5KO-6-3	PH	1	kos
16	16	CYLINDER	CD210G 90/56 200+S50C	VISTA	1	kos
17	17	HOSE FLEXI	2SC 10 L=2000 1XRAVNI,1X90	VISTA	1	KPL
18	18	HOSE FLEXI	2SC 10 L=2000 1XRAVNI,1X45	VISTA	1	KPL
19	19	OIL HYD.	OIL HYD. HG46		5	L
20	20	BASE MHA	MHA-140	VISTA	1	kos

Denis Božič

Žiri, 29.8.2022 VISTA HIDRAVLIKA d.o.o. Kosovelova 14, 4226 Žiri


Tehnični podatki:
Q=11l/min
p=130bar
U=380V,50 Hz
P=3kW
U_y =24V,DC
V_R =5l
Priključki A,B: G3/8"
NG06
24VDC
CD210G 80/45 225+S40C
60bar
ALSING d.o.o.
gorazd.pivec@alsing.si
041 257 499
MHA-K4/130-P-780-AC3/4/3-R5/H
0.3639
VISTA d.o.o.


C.0765
A3
CD2105-10066-200 + S50C C0765
S50C
S50N
G1/2
G1/2
564
11
Ø115
Ø56
Ø80
Ø50
A
A
VISTA HIDRAVLIKA d.o.o.
Kosovelova ulica 14, SI 4226 Žiri, Slovenija
VISTA
HIDRAVLIKA
Od ideje do izdelave

VISTA HIDRAVLIKA

VISTA, hidravlika, d.o.o.
Kosovelova ulica 14
4226 Žiri
Slovenija

Tel.: 04/50 50 600
Fax: 04/51 91 900
E-mail: info@vista-hidravlika.si
www.vista-hidravlika.si
SI 1298148

Izjava proizvajalca / Declaration by the manufacturer / Herstellerklärung

Prepoved predaje v obratovanje / Prohibition to put into service / Verbot der Inbetriebnahme

Direktiva EU 98/37 EC, člen 4.2 in Priloga II B/ Pravilnik o varnosti strojev na osnovi Ul. RS št. 25/2006, člen 7 in priloga 2/B
Directive 98/37 EC, Art. 4.2 and Annex II, sub. B
Gemäß EG – Richtlinie 98/37 EG, Artikel 4.2 und Anhang, II, sub. B

Proizvajalec / Manufacturer / Hersteller: Vista, hidravlika, d.o.o.
Naslov / Adress / Adresse: Kosovelova ulica 14, 4226 Žiri, SLOVENIJA

Ime proizvoda / Component – Assembly / Bauteil – Baugruppe

MHA-K4/130-P-780-AC3/4/3kW-R5/H

Št. projekta / Project number / Projekt Nummer: xxxxxx
Leto izdelave / Date of construction / Baujahr: 2022

Proizvajalec s to izjavo izjavlja, da je proizvod namenjen vgradnji v stroje ali postroje, ki so predmet obravnave v zgoraj navedeni direktivi.

Uporabljeni so harmonizirani standardi:

- SIST EN ISO 12100-1
  Varnost strojev - Osnovni pojmi, splošna načela načrtovanja – 1. del: Osnovna terminologija, metodologija
- SIST EN ISO 12100-2
  Varnost strojev – Osnovni pojmi, splošna načela načrtovanja – 2. del: Tehnična načela in specifikacije
- SIST EN 982
  Varnost strojev – Varnostne zahteve za fluidne sisteme in njihove komponente
- SIST EN 1050
  Varnost strojev – Osnovna načela tveganja
- Uradni list RS, št. 27/2004 Pravilnik o električni opremi, ki je namenjena za uporabo znotraj določenih napetostnih mej
- Uradni list RS, št. 132/2006
  Pravilnik o elektromagnetni združljivosti

Prav tako izjavljamo, da je ta izdelek prepovedano predati v obratovanje, dokler stroj, v katerega je ta izdelek vgrajen, ni v skladu s Pravilnikom o varnosti strojev (Ul. RS št. 25/2008).

The Manufacturer declares that stated product is intended to be incorporated into machinery or to be assembled with other machinery to constitute machinery covered by Directive 98/37 EC.

The following harmonised standards have been applied:

- EN ISO 12100-1
  Safety of machinery – Basic concepts, general principles for design – Part 1: Basic terminology, methodology
- EN ISO 12100-2
  Safety of machinery - Basic concepts, general principles for design – Part 2: Technical principles and specifications
- EN 982
  Safety requirements on fluid power installations and components
- EN 1050
  Safety of machinery – Principles for risk assessment
- Directive 2006/95/EC and its amendments
- Directive 2004/108EC and its amendments

And furthermore declares that it is not allowed to put the machinery into service until the machinery into which it is to be incorporated or of which it is to be a component has been found and declared to be in conformity with the provisions of Directive 98/37 EC and with national implementing legislation, i.e. as a whole, including the machinery referred to in this declaration.

Der Hersteller erklärt, dass angefeuerter Bauteil vorgesehen ist zum Einbau in eine Maschine oder mit anderen Maschinen zu einer Maschine im Sinne der Richtlinie 98/37 EC.

Folgende harmonisierte Normen (oder Teile/Klauseln hieraus) zur Anwendung gelangten:

- EN ISO 12100-1
  Sicherheit von Maschinen – Grundbegriffe, allgemeine Gestaltungsleitsätze – Teil 1: Grundsätzliche Terminologie, Metodologie
- EN ISO 12100-2
  Sicherheit von Maschinen – Grundbegriffe, allgemeine Gestaltungsleitsätze – Teil 2: Technische Leitsätze und Spezifikationen
- EN 982
  Sicherheitstechnische Anforderungen an fluidtechnische Anlagen und Bauteile, Hydraulik
- EN 1050
  Sicherheit von Maschinen – Leitsätze zur Risikobeurteilung
- Richtlinie 2006/95/EC und ihre Änderungen
- Richtlinie 2004/108/EC und ihre Änderungen

Und erklärt des weiteren dass die Inbetriebnahme solange untersagt ist, bis die Maschine oder Anlage, in welche diese Maschine eingebaut wird oder von welcher sie eine Komponente darstellt, als Ganzes (d.h. inklusiven der Maschine, für welche diese Erklärung ausgestellt wurde) den Bestimmungen der Richtlinie 98/38 EC sowie dem entsprechenden nationalen Rechtserlaß zur Umsetzung der Richtlinie in nationales Recht entspricht, und die entsprechende Konformitätserklärung ausgestellt ist.

Ime / Name / Name: Denis Božič
Datum /Date / Datum: 7.9.2022
Podpis / Signature / Unterschrift:

VISTA HIDRAVLIKA d.o.o.
Kosovelova ul. 14, 4226 ŽIRI

VISTA HIDRAVLIKA

VISTA, hidravlika, d.o.o.
Kosovelova ulica 14
4226 Žiri
Slovenija

Tel.: 04/50 50 600
Fax: 04/51 91 900
E-mail: info@ vista-hidravlika.si
www.vista-hidravlika.si
SI 91298148

STATE OF CONFORMITY

Vista Hidravlika d.o.o.
Kosovelova ulica 14
4226 Žiri

with all responsibility we declare that the following products:

Hydraulic cylinders

CD 210...
CD 320...
CE 210...
CT 210...
CS 210...

Are prepared by the following rules and directives:
- Machinery Directive 98/37 EC, 2006/42 EC with amending Directive 95/16/EC (recast) and its amendments
- Low voltage Directive 2006/95 EC and its amendments
- EMC Directive 2004/108 EC and its amendments

And standards:

SIST EN ISO 12100-1
SIST EN ISO 12100-2
SIST EN ISO 13857
SIST EN ISO 13850
SIST EN ISO 7731
SIST EN ISO 13732-1
SIST EN ISO 13849-1
SIST EN ISO 14121-1

This is to certify that the product is not allowed to enter into operation before the system does not suit the purposes of the provisions of the Official Gazette RS, No. 52/2000 and the other security arrangements.

Date: Žiri, 19.12.2012

Prepare: Rok Oblak

Denis Božič

Signature: VISTA HIDRAVLIKA d.o.o. Kosovelova 14, 4226 Žiri

VISTA, hidravlika, d.o.o.
Kosovelova ulica 14
4226 Žiri
Slovenija

Tel.: 04/50 50 600
Fax: 04/51 91 900
E-mail: info@ vista-hidravlika.si
www.vista-hidravlika.si
SI 91298148

INSTRUCTIONS FOR STARTING-UP, MAINTENANCE AND SERVICING OF HYDRAULIC SYSTEMS

STARTING-UP

The manufacturer's test

Every hydraulic device is tested and, where practicable, simulated by the manufacturer. The test comprises a minimal functionality and sealing inspection of all components. The test subjects the hydraulic device to the highest pressure, lower than the nominal pump pressure. Test certificates for specific components, such as pressure accumulators or safety valves, are issued separately on customer's request.

The initial start-up

Undisturbed running and optimal service life of a hydraulic device depend on professional and careful initial start-up. The initial start-up should be carried out jointly for the machine and its control system. Only then, certain components, e.g. throttle valves, pressure switches, pressure regulators etc., can be ultimately adjusted. Before the initial start one must examine thoroughly all the enclosed instructions and technical documentation.

Mounting of a hydraulic device

A hydraulic device must be mounted in a horizontal and stable way. Mini hydraulic aggregates can be mounted also vertically, as shown in the catalogue THE MINI HYDRAULIC AGGREGATES - VISTA. In this case the filling aperture with the vent plug must be located on the upper side in order to prevent oil leaking from the tank. A hydraulic device must be mounted in such a manner that oil indicator, pressure gauge and the other indicators, if available, are visible. The filling and vent filters must be easily accessible and there must be enough space available for exchanging the electromotor, pump and filters. Enough space for access of a lifting device must be provided for heavier components. In addition, the cleaning hole on larger tanks as well as incoming and outcoming pipes must be accessible to facilitate satisfactory fastening of connections. A hydraulic device should not be exposed to large temperature and weather variations in order to prevent condensation of water vapour in the tank and associated tank rusting and accumulation of water at the tank bottom. When cleaning with solving agents and diluents one must be careful and prevent damages to the paintwork and seals on a hydraulic device.

The control system

The hydraulic components are precise control apparatuses. Their handling during the transport and assembly must be very careful. They must be protected against drops and vibrations. Prior to the mounting onto the existing device one must check if all technical data of the hydraulic components correspond to the operating parameters of the existing device. During the assembly one must be extremely careful to prevent impurities, e.g. packaging residues, chips, sealing material residues, sands etc., to enter the device. In hydraulic devices impurities are extremely disturbing elements because they can come between closely aligned components and cause their wear and blocking. They can also clog tiny throttling boreholes in the hydraulic components and thus impede their functioning. The service life of hydraulic components depends on the operating conditions, medium purity, frequency of switching on, pressure and temperature. The recommended operating temperature is 40 - 50□C. If the operating temperature exceeds 70□ C, it is necessary to establish the reason for superheating and, if possible, eliminate it or notify the VISTA after-sales service about the superheating. When the medium is likely to freeze, the components must be protected against freezing by mounting of heaters; on the contrary, if the device is idle, the medium must be drained out of the system.

The pipe leads

A hydraulic device is connected to the machine by seamless steel tubes or by hydraulic hoses. Data and instructions regarding the bending radii, cutting, removing of turf, cleaning and assembly of seamless steel tubes are to be found in the catalogue of connections. During the assembly of the tubes one must pay attention to cleanliness. After cutting, the seamless steel tube should be removed the turf and rinsed. In the case of flame tube

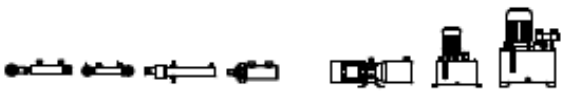
bending the inner side of the radii should be brushed up or cleaned in another appropriate manner. Data and instructions for the assembly of hydraulic hoses are available in the catalogue of tubes. During the assembly attention should be paid to bending radii as a function of nominal dimensions and material. If tubes are connected incorrectly then the design functioning is not obtained, what becomes obvious not earlier than at the initial start-up of the device.

The tank

A tank is a vessel designed to store the hydraulic medium. All parts of the hydraulic device (tank, control system and pipe leads between hydraulic components) are tested and cleaned by the manufacturer. During the transport impurities can enter the tank, therefore it must be checked and, if necessary, cleaned before filling with the medium. In the opposite case, the cleaning of the entire device may be required.

The oil is filled through the pouring filter or a specially designated connection which is usually mounted on the tank cover. The pouring filter serves also as the vent filter. The oil is filtered usually only in the return line, therefore, while filling in the oil, one should be careful not to damage the pouring filter mesh. For oil filling a special aggregate for pumping oil from a barrel can be applied. In this process, the oil is normally filtered through a 10 mm filter. The tank is filled up to the upper

level of the oil indicator and at the same time the sealing (at flanges,



VISTA HIDRAVLIKA

VISTA, hidravlika, d.o.o.
Kosovelova ulica 14
4226 Žiri
Slovenija

Tel.: 04/50 50 600
Fax: 04/51 91 900
E-mail: info@ vista-hidravlika.si
www.vista-hidravlika.si
SI 91298148

welds) is checked. At starting-up of the device some oil is absorbed by the cylinders, the accumulators and the pipe connections, therefore it is necessary to monitor the oil level and, if necessary, to top up the oil during the start-up. Data regarding the filling-in oil and

the date of filling are recorded in the machine documentation. When using special media, it is necessary to check prior to filling, if the installed seals and hydraulic components of the entire device are compatible with the medium.

The accumulators

The oil must be drained from the accumulators prior to each intervention into the hydraulic system. The accumulators are charged through a charging valve by gas, usually nitrogen, to the pressure level, specified in the technical documentation. The filling pressure must be defined by means of instructions from the accumulators catalogue. An improper selection of the charging pressure can damage the accumulator rubber bellow. Charging devices differ according to their manufacturer and accumulator type.

Prior to charging with nitrogen, the accumulator must be drained through a tap, so that no oil remains in the accumulator. The accumulator is empty only then when the pressure line is free of overpressure with the pump being switched off - refer to accumulator pressure gauge.No welding, soldering or any mechanical treatment of an accumulator is allowed. The type plate should not be damaged - the data must be legible.

Cooling

The cooling can be provided by means of air-to-oil or water-to-oil coolers. With water-to-oil coolers one must pay attention to maintain water flow in the tubes sufficient to prevent rusting of the cooler. In rooms where air temperature could fall below 0□ C it is advisable to install an air cooler, or the water cooler must be drained.

Electric installation

The mains voltages and other parameters of electromotors, electromagnetic valves and other electric components (level switches, clogged filters indicators, thermostats switches etc.) must be in accordance with the ratings declared on the type plates. They must be compatible with the connected electric control system (regarding the current, voltage, contacts loads). The wiring of the electromotor must be checked. The wiring diagram is usually shown on the terminal housing cover.Initially, the electromagnetic valves must be tested without external loading of cylinders and hydromotors, and their actual function must be found out. The electric components must be labeled and wired in accordance with the control diagram. Prior to the connection, the labels on the control diagram, electric components and electric diagram must be checked and, if necessary, adjusted.

SELECTION OF THE HYDRAULIC OIL

The oil should be selected according to the operating conditions (pressure, temperature) and the ambient conditions (atmosphere, changing ambient temperature). Hydraulic mineral oil is usually used in hydraulic devices. The oil shall be selected according to its kinematic viscosity. For higher operating temperatures (special makes) a higher kinematic viscosity oil is used, and a lower kinematic viscosity oil for lower operating temperatures. In cases of large differences between the lowest and the highest temperature, it is advisable to use a winter and a summer hydraulic oil with different kinematic viscosity. For operating temperatures up to 70□ C, oils having kinematic viscosity of 30-40 mm2/s are usually used.

The recommended class of viscosity as a function of the ambient temperature is shown in Table 1.

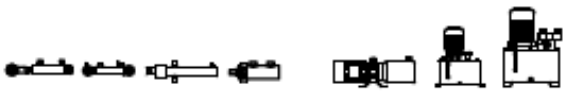
Table 1

Ambient temperature	Recommended class of viscosity	Kinematic viscosity mm^2/s at 40 □ C
Outdoor installation at low temperatures	ISO VG 22	19.8 - 24.2
All-year outdoor installation in Central Europe	ISO VG 32	28.8 - 35.2
In heated rooms	ISO VG 68	61.2 - 74.8

The comparative labels of individual hydraulic mineral oil producers are shown in Table2.

Table 2 HYDRAULIC OILS

INA	SHELL	MOBIL	B.P.	ESSO	PETROL
HIDRAOL HD 5	TELLUS 5			NUTO H 5	
HIDRAOL HD 10	TELLUS 10			NUTO H 10	
HIDRAOL HD 15	TELLUS 15		ENERGOL HLP 15	NUTO H 15	
HIDRAOL HD 22	TELLUS 22	DTE 22	ENERGOL HLP 22	NUTO H 22	
HIDRAOL HD 32	TELLUS 32	DTE 24	ENERGOL HLP 32	NUTO H 32	HIDROLUB 32
HIDRAOL HD 46	TELLUS 46	DTE 25	ENERGOL HLP 46	NUTO H 46	HIDROLUB 46
HIDRAOL HD 68	TELLUS 68	DTE 26	ENERGOL HLP 68	NUTO H 68	HIDROLUB 68
HIDRAOL HD 100	TELLUS 100		ENERGOL HLP 100	NUTO H 100	HIDROLUB 100
HIDRAOL HD 150	TELLUS 150		ENERGOL HLP 150	NUTO H 150	HIDROLUB 150
HIDRAOL HD 220	TELLUS 220				
HIDRAOL HD 320	TELLUS 320				
HIDRAOL HDS 15	TELLUS T 15	DTE 11	ENERGOL SHF 15		
HIDRAOL HDS 22	TELLUS T 22	DTE 13	ENERGOL SHF 22	UNIVIS 22	HIDROLUB S 22
HIDRAOL HDS 32	TELLUS T 32	DTE 15	ENERGOL SHF 32	UNIVIS 32	HIDROLUB S 32
HIDRAOL HDS 46	TELLUS T 46	DTE 16	ENERGOL SHF 46	UNIVIS 46	HIDROLUB S 46
HIDRAOL HDS 68	TELLUS T 68		ENERGOL SHF 68	UNIVIS 68	HIDROLUB S 68
HIDRAOL DVC 22	TELLUS R 22	DTE 22	ENERGOL HLP 22	NUTO HP 22	
HIDRAOL DVC 32	TELLUS R 32	DTE 24	ENERGOL HLP 32	NUTO HP 32	
HIDRAOL DVC 46	TELLUS R 46	DTE 25	ENERGOL HLP 46	NUTO HP 46	
HIDRAOL DVC 68	TELLUS R 68	DTE 26	ENERGOL HLP 68	NUTO HP 68	



VISTA HIDRAVLIKA

VISTA, hidravlika, d.o.o.
Kosovelova ulica 14
4226 Žiri
Slovenija

Tel.: 04/50 50 600
Fax: 04/51 91 900
E-mail: info@ vista-hidravlika.si
www.vista-hidravlika.si
SI 91298148

The comparison between individual producers does not guarantee the same physical and chemical characteristics of hydraulic mineral oils. However, corresponding types of oils by different producers are applicable for the same purposes. The INA-HIDRAOL HD is used for filling of hydraulic systems on hoists, presses and similar devices. The INA-HIDRAOL HDS is used for filling of hydraulic systems exposed to large temperature variations, e.g. spillway gates on dams, standalone lifts, mechanical shovels, loaders, forklift trucks etc. The INA-HIDRAOL DVC is applied in hydraulic systems with sensitive electro-hydraulic servo devices protected by extremely delicate filters. Spillage of mineral oil can pollute a very large area, therefore rapid development of biologically degradable oils is the result of the growing environmental awareness. The biologically degradable oils are designed specifically for hydro power station dams, for civil engineering construction vehicles and for the forestry mechanization. For proper selection of oil for particular application the customer is advised to consult the oil supplier directly.

THE INITIAL START-UP OF A HYDRAULIC DEVICE

Prior to the initial start-up the direction valves shall be set in their neutral positions. No voltage is applied to the valves. The main pressure valves are usually plumb-secured or otherwise mechanically limited, so that they can not be adjusted to higher than allowed pressure. The other pressure valves must be unfastened prior to the initial start-up. The servo valves shall be substituted by cleaning plates to clean up the oil. The gas pressure in the accumulators shall be checked and topped up as necessary. To ensure pump lubrication, the electromotor fan shall be turned for approximately 20 rotations by hand. Then the electromotor shall be switched on for a short period of time and the direction of rotation checked. The proper direction of the electromotor rotation is indicated by the arrow on the electromotor flange. Now it is allowed to start up the hydraulic device. The pump should run for approximately 15 minutes under the pressure set on the main pressure valve to allow the device to warm up. In the meantime one should listen to the sound and special noises, coming out of the pump. This is to be followed by the functional test of the device without external loading. The direction valves shall be switched on one in sequence and the correct operation of actuators shall be checked. The actuators shall be allowed to perform the full motion for a couple of times, to expel the air into the tank. Some air usually remains in the device, therefore the highest situated connections shall be unfastened until the frothy oil stops emerging. All pipe connections, cylinders and hydraulic motors must be completely free of air, since the air would disturb the operation of the hydraulic device. During the starting-up, the oil level in the tank must be monitored continuously. The oil is topped up as necessary and very carefully, to prevent overflow of oil from the tank during the return stroke of the cylinders. The pipe lines and connections are pressure tested and, as necessary, fastened and made leaktight in appropriate manners. The measuring instruments must be monitored constantly (pressure gauges, thermometers,...). The initial start-up is thus finished and the cleaning plates substituted for servo valves. The next start-up is carried out with loading of actuators. This shall be followed by the functional start-up comprising the adjusting of adjustable components. The pressure and temperature in the hydraulic device must be monitored precisely and continuously. The device shall be deaerated at a stabilized temperature. The established characteristics shall be compared with design characteristics and readjusted as necessary.

The filter shall be checked and filter elements replaced as necessary, or cleaned if the filter type permits this. The device is now ready for operation.

SERVICE AND MAINTENANCE

Reliability and availability of machines and devices are becoming more and more important factors in investment decisions. The proper operation and maintenance have significant implications to the optimal service-life, availability and performance of a device. The general supply and payment terms of the company VISTA are applicable on a case-by-case basis for the start-up of the device and guarantee terms.

ROUTINE MAINTENANCE

The servicing costs and the need for minimization of maintenance must be taken into account already in the phase of designing the device. Economizing in the phase of construction is usually offset by increased maintenance costs. The starting-up and maintenance of oil hydraulic devices are described in the directives VDU No. 3027 and DIN 24343. Some additional guidelines and advice follow here. Besides the professional construction and designing, assembly and servicing, the service life of a device chiefly depends on mechanical elements in the system, i.e. pump and motor bearings the service life of which being in general between 5000 and 10000 hours. The service life of direction valves depends on frequency of their switching on. The most important factor regarding pressure valves is the duration of oil flowing through the valve. This is very difficult to determine, therefore operating time of the device is taken as the basis. The pressure valves should be inspected after 2000 to 3000 hours of operation. The valves seats should be checked for wear.

The oil must be changed after the initial 2500 to 3000 operating hours. Subsequent changes must be performed in intervals of 2500 operating hours or at least once a year. In environment with the presence of fine particles of dirt or abrasive materials, the oil must be changed more frequently. Where larger quantities of oil are involved, the oil should be changed on the basis of the laboratory analysis results. Jointly with the oil change, the inside of the tank and filter elements must be cleaned. They must be cleaned or changed after the initial start-up, too. The next change or cleaning of the filters must be done after the first 50 operating hours, and then at intervals of each 200 - 300 operating hours. If a clogging indicator is mounted on the filter, then the filter element must be changed or cleaned when the clogging is indicated. The regular cleaning and changing of filter elements extend the service life of a hydraulic device by preventing the dirt to enter it. It is advisable to instate a machine log-book already at the first start- up. In this log-book time intervals for performing individual inspections shall be recorded. Components of the hydraulic device must be regularly inspected at precisely defined times. The time period of the

VISTA HIDRAVLIKA

VISTA, hidravlika, d.o.o.
Kosovelova ulica 14
4226 Žiri
Slovenija

Tel.: 04/50 50 600
Fax: 04/51 91 900
E-mail: info@ vista-hidravlika.si
www.vista-hidravlika.si
SI 91298148

inspection depends on mounting and ambient conditions, purity of the oil, frequency of switching on, intermittence, pressure, temperature and other parameters. The most reliable guarantee for the functioning, reliability and long service life is proper servicing of the device.

The following inspections must be carried out weekly:

- the inspection of the device cleanliness
- the inspection of the state of seamless steel tubes
- the inspection of the hoses regarding their damages, stiffness and tightness
- the inspection of the tightness of connections and hydraulic components
- the inspection of filter cleanliness
- the inspection of the fluid level and temperature in the tank
- the inspection of the silica gel
- the inspection of accumulator charging gases
- the inspection of the pressure settings of the pressure valves and pressure switches.

The hydraulic pump delivery flows and actual times of loads (cylinders, hydromotors) are inspected monthly.

The subsequent start-up of the hydraulic device

The hydraulic device can be idle for a longer time. At the subsequent start-up the same instructions and warnings must be taken into account as in the case of the initial start-up.

Stoppages and their elimination

The first task in eliminating a "defect" is to discover its origin. The systematic searching of the cause makes the troubleshooting time shorter and reduces costs and stoppage time. The systematic approach can even prevent unnecessary or even damaging interventions during maintenance or defect searching respectively. Troubleshooting of a hydraulic system requires knowledge of functioning of individual components, their duties and functions in a particular device. In troubleshooting hydraulic and electric diagrams, time-travel diagrams etc. can be used.

Troubleshooting requires, beside ordinary assembly tools, also pressure, current, temperature, voltage etc. measuring instruments.

The following technical data are by rule indicated in the diagrams:

- the control voltage of electromagnetic valves
- the setting values of pressure switches
- the setting values of flow valves and throttling elements
- the delivery flowrates of the pumps
- the power and the number of revolutions of driving motors
- the volume and pressure of the accumulator
- the locations of inlet and outlet leads
- the tank size
- the oil quality and viscosity
- the cylinders dimensions
- the number of revolutions, direction and torque of hydromotors
- the nominal flowrates of the filters
- the capacities of the coolers and heaters.

The most frequent defects of hydraulic systems are the following:

- excessive noise
- insufficient pressure and / or pressure oscillation
- insufficient delivery flowrates quantity and/or their instability
- system oscillations
- leaking on cylinders and hydromotors
- medium overheating
- medium foaming.

Each such defect can be further analyzed to locate the potential origin, i. e. the drive unit (pump, motor, ...), the control system (direction valves, pressure valves, ...), actuators (cylinders, hydromotors, ...) or tubings.

CONTACT OUR SERVICE DEPARTMENT FOR ANY INTERVENTIONS ON HYDRAULIC DEVICES OF VISTA OR ANY OTHER MANUFACTURER EITHER UNDER GUARANTEE OR NOT.

VISTA, hidravlika, d.o.o.
Kosovelova ulica 14
4226 Žiri
Slovenija

Tel.: 04/50 50 600
Fax: 04/51 91 900
E-mail: info@ vista-hidravlika.si
www.vista-hidravlika.si
SI 91296148

INSTRUCTIONS FOR STARTING-UP, MAINTENANCE AND SERVICING OF THE HYDRAULIC CYLINDERS

- hydraulic device turn off when you check all connections.
- cylinder rod must have free move direction.
- any error repairing or any component disassembly perform only when the hydraulic system not is pressurized, so when pressure gauge shows no excess pressure.
- Do not work with greasy hands.

PURPOSE OF THE USE TECHNICAL DESCRIPTION AND GENERAL INFORMATION

Hydraulic cylinders are devices with reciprocating translatory while the force. They are designed for installation in industrial and mobile machinery.
The following types:
CD... acting bilaterally
CE... acting unilaterally
CT...telescopic
CS...symmetric

TECHNICAL DATAS

Type	Piston dia.(mm)	Rod dia. (mm)	Stroke (mm)	Port	Max.work prescure (bar)
CD 210....	25-280	12-140	4000	M12x1.5-M48x2	210
CD 320....	25-280	12-140	4000	M12x1.5-M48x2	320
CE 210....	-	25-200	4000	M12x1.5-M48x2	210
CT 210....	40-200	25-140	4000	M12x1.5-M48x2	210
CS 210....	25-200	12-140	4000	M12x1.5-M48x2	210

COMMISSIONG AND OPERATION

Test at manufacturer

The manufacturer tested all cylinders. The test consists of minimal control function and tightness of all installed components. The test sheet shall be issued separately at the request of the customer.

Installation of the hydraulic cylinder

Hydraulic cylinder is installed in to the device. Hydraulic cylinder not to be further radially loaded! Hydraulic cylinders should not be exposed to higher temperatures than are allowed in order to avoid damage to the tubes in the cylinder. When cleaning with solvents and thinners should be careful that the liquid does not damage the color and seals in hydraulic cylinders.
Hydraulic cylinders are precision hydraulic components. When transporting and installing them should be treated with caution. It is necessary to protect against drops and shocks. Prior to installation on an existing device, check whether the specifications of hydraulic components match the operating conditions at the existing plant. In the assembly, be extremely careful to avoid the introduction of impurities such as packaging waste, parings, scrap sealing materials, sand, etc.. Impurities are extremely disturbing elements in hydraulic components, it can come between fine set parts and causing wear and blockage. It can also clog the fine throttle in hydraulic components and thus render inoperable.
Lifespan hydraulic components depends on the operating conditions, the purity fluid, number of starts, pressure, and temperature. The recommended operating temperature is 40-50 ° C. If the operating temperature exceeds 70 ° C, it is necessary to determine the cause overheating and possibly eliminate or. of overheating inform customer service VISTA. In the option of freezing fluid necessary ingredients to protect against freezing by installing heaters, otherwise. if the machine is not operating, it is necessary to release fluid from the system.

Pipe connections

Hydraulic cylinder is connected to the machinery of seamless steel pipes and flexible hydraulic hoses. Information and instructions on bending radii, cutting, raziglanju, cleaning and installation of seamless steel pipes are in the catalog connections.
When installing the pipe, ensure cleanliness. After cutting seamless steel pipe should be just-to needle roller and washed. In the case of bending pipes with flame radii should be within the brush or otherwise cleaned. For hydraulic hoses data and installation instructions are available in the catalog tube. When installing, make sure the bending radius depending on the nominal size and material. Due to an error related pipes do not get the desired function, which appears only when you start the device in which it is incorporated cylinder.

Electric wires

When mounted inductive switches (sensors) must be follow to the manufacturer's instructions.

FIRST RUN OF HYDRAULIC CYLINDER

Actuated valve and observe the accuracy of the cylinder. Allow cylinder to move a few times and done this pushes air into the tank. All cylinders must be fully vented, because the air in oil affect on the operation of the hydraulic system. Pipes and connections checked for tightness and to attract or otherwise eliminate leaks. We must constantly observe instrumentation (pressure gauges, thermometers, ...). Restarting is carried out with the loads on the cylinders. Carry out a functional momentum. Throughout carefully observe the course of pressure and temperature in the hydraulic cylinder. When stabilized temperature re-bled the cylinder. Obtained are compared with the desired characteristics and, if necessary, re-set it.
The cylinder is now ready for operation.

OPERATION, MAINTENANCE AND SERVICING

Ongoing maintenance

Commissioning and maintenance of oil hydraulic equipment, describe the guideline VDI and DIN Nr.3027 24343rd Lifetime cylinders depends on the number of starts. Cylinders should be after 2000 to 3000 hours of work reviewed.
The oil is necessary after 2500 to 3000 hours of operation changed. Further oil changes should be performed every 2500

VISTA HIDRAVLIKA

VISTA, hidravlika, d.o.o.
Kosovelova ulica 14
4226 Žiri
Slovenija

Tel.: 04/50 50 600
Fax: 04/51 91 900
E-mail: info@ vista-hidravlika.si
www.vista-hidravlika.si
SI 91298148

hours of operation, or. at least once a year. In an environment where the presence of fine particles of dirt or abrasive materials, the oil must be changed more often. For larger quantities of oil of it switching to the laboratory oil analysis. Duration of time control depends on the installation conditions and the environment, cleanliness of oil, starting frequency, intermittency, pressure, temperature and other parameters. maximum guarantee for functionality, reliability and long service life is the correct supply cylinder.
A week is necessary to make the following checks:
- purity control cylinder
- Leak detection attachments
- temperature control fluid in the cylinder

Restart hydraulic cylinder
Hydraulic cylinder to the user for a long time out of use. When you restart must be taken at the instructions and warnings as for the first run.

CONGESTION AND IMMUNITY

The first task in eliminating "errors" is to ascertain the cause. Systematic search for the cause reduced search time, reduces costs and downtime. A systematic approach may even prevent unnecessary or harmful interventions to maintain or. finding errors. Finding fault in the hydraulic cylinder requires knowledge of the workings of the individual components, their role and function in a particular installation. For fault finding serve the hydraulic and electrical schemes, time-path diagrams and the like. For debugging, in addition to the usual tools for assembly also need instruments to measure pressure, flow, temperature, voltage, etc..
When major surgery is required and oscilloscope and printer.
The most common mistakes hydraulic cylinders are:
- Insufficient pressure and / or pressure fluctuations
- Leakage of cylinder
- Excessive fluid temperature
- Foaming media

FOR CASE INTERVENTION ON ANY WARRANTY PERIOD TO THE HYDRAULIC CYLINDER CALL SERVICE VISTA.

SELECTION OF THE HYDRAULIC OIL

Oil is chosen according to the operating conditions (pressure, temperature) and the influence of the environment (atmosphere, change in external temperature). Normally, the hydraulic system uses hydraulic mineral oil. Oil is the choice of the kinematic viscosity. At higher temperatures (special types) used oil with a higher kinematic viscosity at lower temperatures and with lower oil kinematic viscosity. In case the difference between the lowest and highest temperature high, it is advisable to use winter and summer hydraulic oil with different kinematic viscosity. Usually used oil with a kinematic viscosity of 30 to 40 mm2 / s for operating temperatures up to 70° C.

Table 1 shows the recommended viscosity grade as a function of temperature.

Ambient temperature	Recommended class viscosity	kinematic viscosity mm2 / s at 40 ° C
Installation outdoors at low temperatures	ISO VG 22	19.8 - 24.2
Year-round outdoor installation outdoors in Central Europe	ISO VG 32	28.8 - 35.2
In warm room	ISO VG 68	61.2 - 74.8

Table 1

Table 2 shows the comparative mark of the manufacturers of hydraulic mineral oil.

INA	SHELL	MOBIL	B.P.	ESSO	PETROL
IDRAOL HD 5	TELLUS 5			NUTO H 5	
HIDRAOL HD 10	TELLUS 10			NUTO H 10	
HIDRAOL HD 15	TELLUS 15		ENERGOL HLP 15	NUTO H 15	
IDRAOL HD 22	TELLUS 22	DTE 22	ENERGOL HLP 22	NUTO H 22	
HIDRAOL HD 32	TELLUS 32	DTE 24	ENERGOL HLP 32	NUTO H 32	HIDROLUB 32
HIDRAOL HD 46	TELLUS 46	DTE 25	ENERGOL HLP 46	NUTO H 46	HIDROLUB 46
HIDRAOL HD 68	TELLUS 68	DTE 26	ENERGOL HLP 68	NUTO H 68	HIDROLUB 68
HIDRAOL HD 100	TELLUS 100		ENERGOL HLP 100	NUTO H 100	HIDROLUB 100
HIDRAOL HD 150	TELLUS 150		ENERGOL HLP 150	NUTO H 150	HIDROLUB 150
HIDRAOL HD 220	TELLUS 220				
HIDRAOL HD 320	TELLUS 320				
HIDRAOL HDS 15	TELLUS T 15	DTE 11	ENERGOL SHF 15		
HIDRAOL HDS 22	TELLUS T 22	DTE 13	ENERGOL SHF 22	UNIVIS 22	HIDROLUB S 22
HIDRAOL HDS 32	TELLUS T 32	DTE 15	ENERGOL SHF 32	UNIVIS 32	HIDROLUB S 32
HIDRAOL HDS 46	TELLUS T 46	DTE 16	ENERGOL SHF 46	UNIVIS 46	HIDROLUB S 46
HIDRAOL HDS 68	TELLUS T 68		ENERGOL SHF 68	UNIVIS 68	HIDROLUB S 68
HIDRAOL DVC 22	TELLUS R 22	DTE 22	ENERGOL HLP 22	NUTO HP 22	
HIDRAOL DVC 32	TELLUS R 32	DTE 24	ENERGOL HLP 32	NUTO HP 32	
HIDRAOL DVC 46	TELLUS R 46	DTE 25	ENERGOL HLP 46	NUTO HP 46	
HIDRAOL DVC 68	TELLUS R 68	DTE 26	ENERGOL HLP 68	NUTO HP 68	

Table 2

Comparison between different manufacturers do not provide the same physical and chemical properties of hydraulic mineral oil, but individual types from different manufacturers used for the same purposes. INA-HIDRAOL definition is used for filling hydraulic systems in cranes, presses, etc.. INA-HIDRAOL HDS is used for filling hydraulic systems that are exposed to high temperature changes, such as locks on dams, feed elevators, excavators, loaders, forklifts, etc.. INA-HIDRAOL DVC is used for hydraulic systems with sensitive electro-hydraulic servo

VISTA HIDRAVLIKA

VISTA, hidravlika, d.o.o.
Kosovelova ulica 14
4226 Žiri
Slovenija

Tel.: 04/50 50 600
Fax: 04/51 91 900
E-mail: info@ vista-hidravlika.si
www.vista-hidravlika.si
SI 91298148

devices that are protected by very fine filters. The spill of mineral oil can contaminate a very large area, so by raising conservation awareness evolve rapidly biodegradable oils. Biodegradable oil will be mainly used in hydroelectric dams, construction machinery and forestry machinery. For choosing the right oil for a particular use, it is recommended that the customer consult directly with the supplier of oil.

REMOVE OIL FROM USE

After the end of life is necessary to remove the cylinder from the application. Disposed to landfill for industrial waste, but not in accordance with the applicable environmental regulations and legislation.

VISTA HIDRAVLIKA

VISTA, hidravlika, d.o.o.
Kosovelova ulica 14
4226 Žiri
Slovenija

Tel.: 04/50 50 600
Fax: 04/51 91 900
E-mail: vista@siol.net
www.vista-hidravlika.si
SI 91298148

GUARANTEE STATEMENT

1. COVERAGE
The guarantee is valid from the date of purchase of the product, which is evident from the Guarantee sheet, which must be accurately completed with the stamp of the manufacturer.

2. DECLARE
-that the product is in guarantee period work flawlessly if the buyer acted on the instructions given;
-that we will provide the guarantee period serviced and necessary spare parts;
-that we guarantee period at its own expense, including the cost of transporting the product (but only for a train or. postal tariffs) to ensure the elimination of defects and drawback, and that within a period no longer than 45 days. Product that will not be repaired within this period, we will, at the request of the buyer to replace it with a new one.

3. WARRANTY recognize
-if you find that the pre-repair performed by an unauthorized person or if the built-in components, which are not original;
-if the buyer has not acted on the instructions given on the application;
-normal wear and tear of machine parts, which need regular maintenance to be changed in accordance with the instructions for use;
-for injuries (physical and other) by the fault of the buyer;
-for improper storage of more neprikloplјenega product.

4. SUBSCRIBE TO GUARANTEE
Please buyer to the written, oral or telephone application error stating the following:
-name and type of the product and serial number
-the date of purchase,
-description of the failure,
-exact address
-include a completed guarantee certificate.

5. TROUBLESHOOTING
Any errors or defects in products in the guarantee period performed exclusively by the manufacturer.

6. compensation claims
We reject all compensation customer requirements for indirect damage, that damage is not caused to the product itself.

7. GUARANTEE PERIOD
Guarantee period for hydraulic equipment is more than 24 months since our sale, and 6 months from the date of the final consumer product purchases.

8. The product should be according to the regulations of the territory.

9. SHELF LIFE: 10 years

10. STORAGE
Products are stored in a dry place.

GUARANTEE STATEMENT for O.3639.1

ALSING D.O.O.

Dobavnica No.: _____

Commitment date: _____

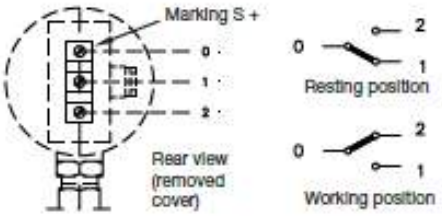
M.P.

VISTA HIDRAVLIKA d.o.o. Kosovelova 14, 4226 Žiri

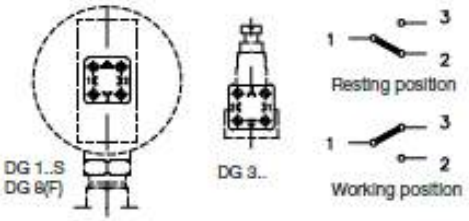
Signature:

3.2 Electrical data

Protection class	DG 1R and DG 8(F) = IP 54 DG 3.. = IP 65 (IEC 60529) (DG 3..S = IP 67 (IEC 60529))
Operations/h [1]	Guideline figure max. 2000 operations/h (rather evenly distributed). Observe the max. number of operation cycles (see curve below). Tigger accuracy ± 2 ... 3% (Repeatability during pressure rise!)
Connection [1]	DG 1R(F): via cable gland Observe that the leads are properly routed in the switch cavity (high-flex line NYLHY 3x0.75). An assembly manual is scope of delivery with every device.



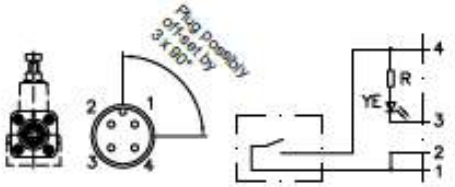
Plug connection [1]	DG 1..S, DG 8(F) and DG 3.. via 3-pin inline socket EN 175 301-803 (ISO 4400). Numbering of the plug lugs beneath overlaid rubber seal. Two plugs are scope of delivery with DG 8(F), see dimensional drawing.



DG 3..M with electric connection M 12x1 (conforming DESINA)

Order coding: **DG 34 M -...**

- Basic type DG 3 acc. to table 1
- Electrical connection M 12x1
- Means of adjustment and hydraulic connection acc. to table 3 and 2



Supply voltage:	U = 24V DC (19-30.2V DC conf. EN 61121-2)
Max. switched current:	I_{max} = 2 A

DG 3..S for quarter-turn plug

Order coding: **DG 33 S -...**

- Basic type DG 3 acc. to table 1
- Electrical connection for quarter-turn plug
- Means of adjustment and hydraulic connection acc. to table 3 and 2

Plug:

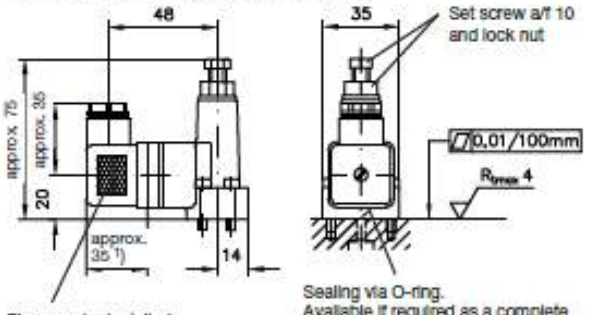
For quarter-turn PA 6, Co. Schlemmer	
Angled plug	7846 010 A
Straight plug	7846 010 B

[1] Figures also apply to DG 2.. acc. to sect. 5

VISTA HIDRAVLIKA

D 5440 page 6

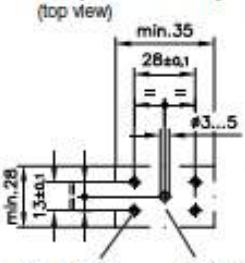
Type DG 3..
Standard (means of adjustment without coding)



Plug may be installed rotated by 4x90°, cable gland

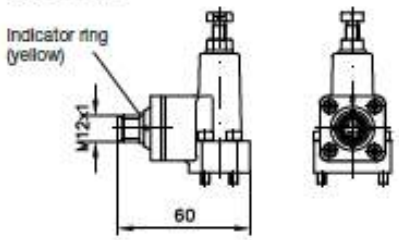
Sealing via O-ring.
Available if required as a complete seal kit: DS 5440-33 (DG 33)
DS 5440-34 (DG 34)
DS 5440-35 (DG 35)
DS 5440-36 (DG 36, DG 365)

Hole pattern for base plate
(top view)

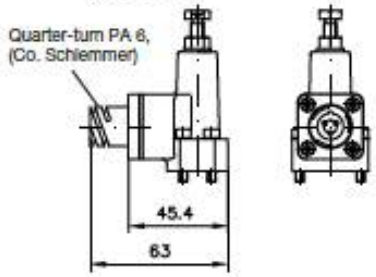


1) **Attention:** This dimension depends on the manufacturer and may be max. 40 mm acc. to EN 175 301-803!

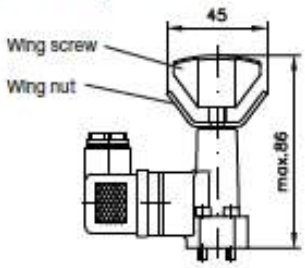
Type DG 3..M



Type DG 3..S

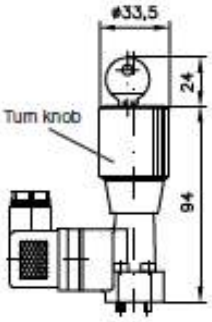


Means of adjustment coding R



Means of adjustment coding V

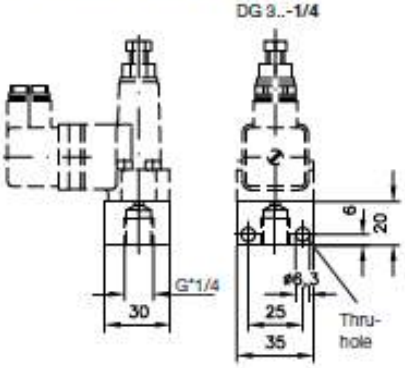
Means of adjustment coding H



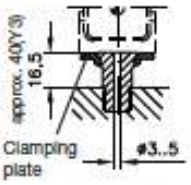
For missing dimensions see below!

G* = (BSPP)

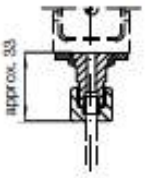
Hydraulical connection suited for DG 3...



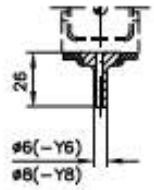
DG 3.. - **Y1** (G*1/4)
DG 3.. - **Y2** (M12x1,5)
DG 3.. - **Y3** (G*1/8)
Tapped journal with sealing edge



DG 3.. - **YS 6**
DG 3.. - **YS 8**
Pipe connection with EO-progressive ring and sleeve nut



DG.. - **Y6**
DG.. - **Y8**
Pipe end



DG 3.. may be installed facing in any direction after slackening bolts M4 of the clamping plate.

Montageanleitung

inklusive Hinweise zu Betrieb und Wartung

Mounting Instruction

Information about operation and maintenance is included

MAS® - Getriebe und Getriebemotoren
MAS® - Gear units and geared motors

ATEX included

BA30 MAS, ATEX
05/2018
Deutsch – English

Originaldokument: Deutsch
Original documentation: German

watt drive®
WEG Group

watt drive WEG Group

Montageanleitung für MAS® - Getriebe und Getriebemotoren
Mounting Instruction for MAS® - Gear units and geared motors

Inhaltsverzeichnis / Contents

1 Allgemeines / General ... 4
1.1 Sicherheits- und Hinweiszeichen / Safety and information markings ... 4
1.2 Allgemeine Informationen / General information ... 4
1.3 Haftungsausschluss / Exclusion of liability ... 5
1.4 Hinweis auf Urheber und Schutzrecht / Indication of copyright and protective right ... 5
2 Allgemeine Sicherheit / General safety ... 6
3 Beschreibung des Getriebes, Getriebemotors / Gear unit, Geared motor description ... 7
3.1 Typenschild / Nameplate ... 7
3.2 Typenbezeichnung / Type designation ... 7
4 Transport ... 10
5 Lagerung / Storage ... 11
6 Getriebeaufbau / Gear unit construction ... 12
6.1 Prinzipieller Aufbau – Stirnradgetriebe H / Basic design principles helical gear unit H ... 12
6.2 Prinzipieller Aufbau – Aufsteckgetriebe A / Basic design principles shaft mounted gear unit A ... 13
6.3 Prinzipieller Aufbau – Flachgetriebe F / Basic design principles parallel shaft gear unit F ... 14
6.4 Prinzipieller Aufbau - Schneckengetriebe S / Basic design principles helical worm gear unit S ... 15
6.5 Prinzipieller Aufbau – Kegelstirnradgetriebe K / Basic design principles helical bevel gear unit K ... 16
6.6 Prinzipieller Aufbau – Kegelflachgetriebe C / Basic design principles angle parallel shaft gear unit C ... 17
7 Mechanische Installation / Mechanical installation ... 18
7.1 Vorarbeiten Getriebe / Preparatory work gear unit ... 18
7.2 Vorarbeiten Motor / Preparatory work motor ... 19
7.3 Aufstellen des Getriebes, Getriebemotors / Setting up the gear unit, geared motor ... 21
8 Checkliste – Getriebe / Check list – Gear unit ... 33
9 Checkliste – Motor / Check list – Motor ... 34
10 Inbetriebnahme / Startup ... 35
10.1 Elektrischer Anschluss des Motor / Electrical connecting the motor ... 35
10.2 Drehrichtung / Direction of rotation ... 35
10.3 Ölstand des gelieferten Getriebes / Oil level in the gear unit as delivered ... 35
11 Betrieb / Operation ... 36
12 Betriebsstörungen / Malfunction ... 36
13 Inspektion und Wartung / Inspection and maintenance ... 37
13.1 Inspektions- und Wartungsintervalle / Inspection and maintenance intervals ... 38
13.2 Inspektions- und Wartungsarbeiten Getriebe / Inspection and maintenance work on gear unit ... 39
14 Schmierstoffe / Lubricants ... 41
15 Bauformen und Schmierstoffmengen / Mounting positions and lubricant capacity ... 42
15.1 Stirnradgetriebe H / Helical gear units H ... 42
15.2 Einstufige Stirnradgetriebe H / Single stage helical gear units H ... 43
15.3 Aufsteckgetriebe A / Shaft mounted gear units A ... 44
15.4 Flachgetriebe F / Parallel shaft gear units F ... 45
15.5 Kegelstirnradgetriebe K40 - K75 / Helical bevel gear units K40 - K75 ... 46
15.6 Kegelstirnradgetriebe K77 - K139 / Helical bevel gear units K77 - K139 ... 47
15.7 Stirnradschneckengetriebe S / Helical worm gear units S ... 48
15.8 Kegelflachgetriebe C / Angle parallel shaft gear units C ... 49

15.9 Ölstandskontrolle bei Getrieben mit Ölstandsschraube in vertikaler Bauform / Oil level control of gear units with oil level plug at vertical mounting position ... 50
16 Klemmenanschluss / Terminal board connection ... 51
17 Optionale Motorzusatzeinrichtungen / Optional motor devices ... 53
17.1 Stillstandsheizung / Anti-condensation heating ... 53
17.2 Kondenswasserbohrung / Drain ... 53
17.3 Fremdlüfter / Forced cooling ... 54
17.4 Temperaturwächter Bimetallschalter "Öffner" (TH) / Temperature controller Bimetal switch "NC contact" (TH) ... 54
17.5 PTC Kaltleitertemperaturfühler (TF) / PTC Thermistor protection (TF) ... 54
17.6 Bremse / Brake ... 55
17.7 Drehgeber / Encoder ... 58
18 Tabelle für Schraubenanzugsmomente / Table of Tightening Torques ... 59
19 Entsorgung / Disposal ... 59
20 Einbauerklärung / Declaration of Incorporation ... 61
21 EU-Konformitätserklärung ATEX 2014/34/EU / EU Declaration of Conformity ATEX 2014/34/EU ... 63
22 EU-Konformitätserklärung Niederspannungsrichtlinie 2014/35/EU / EU-Declaration of Conformity Low Voltage Directive 2014/35/EU ... 67

watt drive WEG Group	Montageanleitung für MAS® - Getriebe und Getriebemotoren Mounting Instruction for MAS® - Gear units and geared motors

1 Allgemeines / General

1.1 Sicherheits- und Hinweiszeichen / Safety and information markings

Diese Sicherheits- und Warnhinweise sind unbedingt zu beachten!

⚠ GEFAHR !

Warnung vor elektrischer oder mechanischer Gefahr.

ATEX !

Wichtige Hinweise zum Explosionsschutz.

VORSICHT !

Wichtige Anweisung für sicheren und störungsfreien Betrieb.

All safety and warning instructions must be followed without exception!

⚠ WARNING !

Warning of electrical or mechanical danger.

ATEX !

Important information on explosion protection.

ATTENTION !

Important instructions for safe and trouble-free operation.

1.2 Allgemeine Informationen / General information

Die vorliegende Montageanleitung (MA) ist Bestandteil der Getriebelieferung und muss bevor Sie mit dem Getriebe arbeiten gelesen werden. Die Anweisungen dieser MA sollten unbedingt eingehalten werden. Bewahren Sie die MA in der Nähe des Getriebes auf.

Für Schäden bzw. Betriebsstörungen, die durch Nichtbeachtung dieser MA resultieren, wird keine Haftung übernommen.

Der Hersteller behält sich in Sinne einer Weiterentwicklung das Recht vor, an den einzelnen Bauteilen bzw. Baugruppen Änderungen vorzunehmen, die unter Beibehaltung der wesentlichen Merkmale zur Verbesserung des Produkts für sinnvoll erachtet werden.

Schutzart:

Die Getriebe entsprechen der Schutzart IP 65.

Motore sind mindestens in Schutzart IP 55 (siehe Typenschild) ausgeführt.

Bestimmungsgemäße Verwendung:

Die Getriebe / Getriebemotoren sind ausschließlich zur Erzeugung einer definierten Drehbewegung innerhalb von Maschinen und Anlagen bestimmt. Die Getriebe entsprechen so weit als möglich den grundlegenden Anforderungen der Maschinerichtlinie 2006/42/EG.

Eine andere oder darüber hinausgehende Benutzung gilt als nicht bestimmungsgemäß. Für hieraus resultierende Schäden haftet allein der Benutzer/Betreiber der Maschine / Anlage.

Die Angaben in dieser Montageanleitung, auf dem Typenschild sowie in der sonstigen technischen Dokumentation sind zu beachten und einzuhalten.

This Mounting Instruction (MI) is part of the gear unit as supplied and must be read carefullybefore working with the gear unit. The instructions in the MI must be followed. Keep the MI close to the gear unit.

We assume no liability for damages or disruptions of operations resulting from the failure to observe this MI.

In order to develop the product further, the producer reserves the right to make modifications to the individual components or assemblies that are believed to be useful to improve the product, while maintaining its essential characteristics.

Protection class:

The gears are in accordance with Protection Class IP 65.

Motors are designed within Protection Class IP 55 at minimum (see nameplate).

Intended use:

The gears / geared motors are exclusively assigned for the generation of a defined rotary motion within machinery and plants. The gears comply with the basic requirements of the machinery directive 2006/42/EC as far as possible.

Any other use or utilisation above this is deemed to be a not intended use. The user / operator of the machine / plant is solely liable for damages resulting therefrom.

The details in this mounting instruction, on the nameplate as well as in other technical documentation, are to be considered and observed.

watt drive WEG Group	Montageanleitung für MAS® - Getriebe und Getriebemotoren Mounting Instruction for MAS® - Gear units and geared motors

Bestimmungsgemäße Verwendung im EX-Bereich:

Getriebe in ATEX-Ausführung entsprechen den gültigen Normen und Vorschriften und erfüllen die Forderungen der Richtlinie 2014/34/EU. Motore, Getriebemotoren welche nicht für den EX-Bereich zugelassen sind, dürfen nicht eingesetzt werden.

Die explosionsgeschützten Getriebe der Baureihen

- H... Stirnradgetriebe
- A... Aufsteckgetriebe
- F... Flachgetriebe
- S... Stirnradschneckengetriebe
- K... Kegelstirnradgetriebe
- C... Kegelflachgetriebe

entsprechen den Bauvorschriften der:

Gerätegruppe I, Kategorie M2 und Gerätegruppe II, Kategorie 2G, 3G (Ex-Atmosphäre Gas) und 2D, 3D (Ex-Atmosphäre Staub).

Das Getriebe K.. 40. darf nicht im explosionsgefährdeten Bereich eingesetzt werden.

Bestimmungsgemäße Verwendung Motor:

Die Motoren entsprechen den grundlegenden Anforderungen der Niederspannungsrichtlinie 2014/35/EU. Sie sind sowohl für Netzbetrieb als auch in Verbindung mit Frequenzumrichtern konzipiert.

Die Motoren in Standardausführung sind für folgenden Betrieb ausgelegt:

- Umgebungstemperatur: -20°C (-4°F) bis +40°C (104°F)
- Aufstellungshöhen ≤ 1000m (über Meeresspiegel)

Intended use in the ex-area:

Drive units in ATEX execution meet valid standards and specifications as well as the requirements set forth in Directive 2014/34/EU. Motors, geared motors that are not approved for the ex-area, must not be used.

The explosion-protected gear units of series

- H... Helical gear unit
- A... Shaft mounted gear unit
- F... Parallel shaft gear unit
- S... Helical worm gear unit
- K... Helical bevel gear units
- C... Angle parallel shaft gear units

meet the design specifications of:

Equipment group 1, Category M2 and Equipment group II, Category 2G, 3G (ex atmospheres gas) and 2D, 3G (ex atmospheres dust).

The gear unit K.. 40. must not be used in areas where there is a risk

Intended use for motors:

The motors comply with the basic requirements of the Low Voltage Directive 2014/35/EU. They are designed for power operating as well as operating in combination with frequency inverters.

They are designed both for mains operation as well as in conjunction with frequency converters.

Standard motors are designed for use at:

- Ambient temperature of -20°C (-4°F) to +40°C (104°F)
- Altitudes of ≤ 1,000m above sea level.of explosions.

1.3 Haftungsausschluss / Exclusion of liability

Die Beachtung der MA ist Grundvoraussetzung für den sicheren Betrieb des Getriebes/Getriebemotors und für die Erreichung der angegebenen Produkteigenschaften und Leistungsmerkmale.

Für Personen-, Sach- oder Vermögensschäden, die wegen Nichtbeachtung der MA entstehen, übernimmt der Hersteller keine Haftung. Die Sachmängelhaftung ist in solchen Fällen ausgeschlossen.

You must comply with the information contained in this MI to ensure safe operation of the gear unit, geared motor and to achieve the specified product characteristics and performance requirements.

The producer assumes no liability for injury to people or damage to equipment or property resulting from non-observance of this MI. In such cases, any liability for defects is excluded.

1.4 Hinweis auf Urheber und Schutzrecht / Indication of copyright and protective right

Alle technischen Unterlagen sind im Sinne des Urheberrechts geschützt. Die Bearbeitung, Vervielfältigung und Verbreitung , von diesen, auch auszugsweise, sowie sonstiger Verwertung sind nicht gestattet, soweit nicht ausdrücklich schriftlich zugestanden.

All technical documents are protected in the sense of the copyright law. The processing, reproduction and dissemination of it, even in extracts, as well as other utilisation is not allowed, unless it has been expressly conceded in written form.

2 Allgemeine Sicherheit / General safety

Der Kunde ist verantwortlich für die fachgerechte Aufstellung des Antriebes.

Bestätigte Eigenschaften der Antriebe sowie die Erfüllung eventueller Garantieansprüche bedingen die Einhaltung der Hinweise in dieser Montageanleitung.

Achten Sie darauf, niemals beschädigte Produkte in Betrieb zu nehmen!

Lesen Sie die Montageanleitung sorgfältig, bevor Sie mit Aufstell-, Montage- oder Wartungsarbeiten beginnen.

Die Montage, Inbetriebnahme sowie Wartungs- und Reparaturarbeiten am Getriebe/Getriebemotor sowie an der elektrischen Zusatzausstattung dürfen nur von **qualifiziertem Fachpersonal** ausgeführt werden, unter Berücksichtigung folgender Punkte:

- Montageanleitung
- Hinweisschilder am Getriebe/Getriebemotor
- aller anderen zum Antrieb gehörenden Projektierungs-unterlagen, Inbetriebnahmeanleitungen
- Anlagenspezifische Bestimmungen und Erfordernisse
- aktuell gültigen nationalen und regionalen Vorschriften über Sicherheit und Unfallverhütung.

⚠ GEFAHR !

Alle Arbeiten dürfen nur :

- am stillstehenden Antrieb,
- im spannungsfreien und
- gegen Wiedereinschalten gesicherten Zustand vor genommen werden.

Der Betrieb des Getriebemotors mittels Frequenzumrichter darf nur unter Einhaltung der Angaben am Typenschild des Motors durchgeführt werden.

ATEX !

Der Einsatz von Getrieben/Getriebemotoren kann in explosionsfähigen Gasgemischen oder Staubkonzentrationen in Verbindung mit heißen, spannungsführenden und bewegten Teilen schwere oder tödliche Verletzungen verursachen.

The customer is responsible for setting up the drive in accordance with good engineering practices.

The instructions in this Mounting Instruction must be followed to achieve the confirmed characteristics of the drive units and to ensure approval in case of warranty claims.

Make certain that you never put damaged products into operation!

Read this Mounting Instruction carefully before you begin any setup, installation, or maintenance work.

Installation, startup, maintenance and repair work on the gear unit / gear motor as well as on electrical accessory equipment may only be performed by qualified **technical personnel**, taking the following items into account:

- Operating Instructions
- Information labels/tags on the gear unit / geared motor
- All other project documents, setup manuals, operating manuals
- Drive-specific specifications and requirements belonging to the drive unit
- the applicable regional and national regulations on safety and accident prevention.

⚠ WARNING !

Work is only permitted :

- on the stationary drive,
- while disconnected and
- prevented form being switched on again.

Operation of the drive unit by means of a frequency inverter may only occur if the specifications shown on the motor nameplate have been carried out.

ATEX !

The use of gear units/gear motors in gas mixtures or dust concentrations that are capable of exploding in combination with hot, load bearing and moving parts, can result in death or serious injury.

3 Beschreibung des Getriebes, Getriebemotors / Gear unit, Geared motor description

3.1 Typenschild / Nameplate

Alle Daten am Typenschild des Getriebes legen die Grenzen seines bestimmungsgemäßen Gebrauchs fest. Diese Daten sind unbedingt einzuhalten.

Weitere technische Daten, Zeichnungen entnehmen Sie Bitte aus dem aktuellesten Getriebemotorenkatalog.

All data on the nameplate of the gear define the limits of its intended usage. It is imperative to adhere to this data.

Please take further technical data and drawings from the latest geared motor catalogue.

Getriebemotor / Geared motor
(Beispielhafte Darstellung / Typical appearance)

Getriebe im EX-Bereich / Gear unit in ex-area
(Beispielhafte Darstellung / Typical appearance)

HU 40A ...	Typenbezeichnung	Type designation
# 950...	Getriebenummer	Gear no.
0,18 kW	Leistung	Power
24 min^{-1}	Drehzahl	Speed
72 Nm	Drehmoment	Torque
B3	Bauform	Mounting position
i=55,30	Getriebeuntersetzung	Gear unit ratio
II	Gerätegruppe	Instrument group
2	Kategorie	Category
D	EX - Atmosphäre	EX Atmosphere
c	Zündschutzart	Type of ignition protection
120°	Temperaturklasse bzw. max. Oberflächentemperatur	Temperature class or maximum surface

3.2 Typenbezeichnung / Type designation

Typenbezeichnung (Beispiel) Type designation (example)	HF 70A 3B 100L-04E TH FL IG	ASA 66C 3B 90S/L-04E BR20
Baureihe / Model range	H (Stirnradgetriebe / Helical gear unit)	A (Aufsteckgetriebe / Shaft mounted gear unit)
Mögliche Getriebeausführung / Possible gear unit execution	HU (Uniblock®) HF (Flansch / Flange) HG (Fuß / Foot)	ASA (Support+Hohlwelle / Hollow shaft) AS (Support+Abtriebswelle / Output shaft) ASS (Support+Schrumpfscheibe / Shrink disc) ASZ (Support+Doppelabtriebswelle / Double output shaft) AFA (Flansch+Hohlwelle / Flange+Hollow shaft) AF (Flansch+Abtriebswelle / Flange+Output sh.) AFS (Flansch+Schrumpfscheibe / Flange+Shrink disc) ARA (Rührwerksausführung mit Hohlwelle / Agitator drive with hollow shaft) AR (Rührwerksausführung mit Abtriebswelle / Agitator drive with output shaft) ARS (Rührwerksaus. mit Schrumpfscheibe / Agitator drive with shrink disc)

watt drive WEG Group	Montageanleitung für MAS® - Getriebe und Getriebemotoren Mounting Instruction for MAS® - Gear units and geared motors

Mögliche Getriebegrößen / Possible gear unit sizes	40, 41, 50, 51, 55, 60, 65, 70, 80, 85, 110, 130, 133, 136	46, 56, 66, 76, 86
Zahnradstufencode / Gear stage code	E (1-stufig, 1-stage) A, S (2-stufig, 2- stages) C (3-stufig, 3-stages) D (4-stufig, 4-stages) F (5-stufig, 5-stages)	A, S (2-stufig, 2- stages) C (3-stufig, 3-stages) D (4-stufig, 4-stages)

Typenbezeichnung (Beispiel) Type designation (example)	**FUA 111C 3B 112M-04E MIP**	**KUA 75C 3A 63-04F SD**
Baureihe / Model range	F (Flachgetriebe / Parallel shaft gear unit)	K (Kegelstirnradgetriebe / Helical bevel gear unit)
Mögliche Getriebeausführung / Possible gear unit execution	FUA (Uniblock®+ Hohlwelle / Hollow shaft) FU (Uniblock®+Abtriebswelle / Output shaft) FUS (Uniblock®+Schrumpfscheibe / Shrink disc) FUZ (Uniblock®+ Abtriebswelle beidseitig / Double output shaft) FFA (Flansch+Hohlwelle / Flange+Hollow shaft) FF (Flansch+Abtriebswelle / Flange+Output sh.) FFS (Flansch+Schrumpfscheibe / Flange+Shrink disc) FSA (Support+Hohlwelle / Hollow shaft) FS (Support+Abtriebswelle / Output shaft) FSS (Support+Schrumpfscheibe / Shrink disc) FSZ (Support+Abtriebswelle beidseitig / Double output shaft) FRA (Rührwerksausf.mit Hohlwelle / Agitator drive with hollow shaft) FR (Rührwerksausf. Abtriebswelle / Agitator drive with output shaft) FRS (Rührwerksaus. Mit Schrumpf-scheibe / Agitator drive with shrink disc)	KUA (Uniblock®+ Hohlwelle / Hollow shaft) KU (Uniblock®+Abtriebswelle / Output shaft) KUS (Support+Schrumpfscheibe / Shrink disc) KUZ (Uniblock®+ Abtriebswelle beidseitig / Double output shaft) KSA (Support+Hohlwelle / Hollow shaft) KSS (Support+Schrumpfscheibe / Shrink disc).) KFA (Flansch+Hohlwelle / Flange+Hollow shaft) KF (Flansch+Abtriebswelle / Flange+Output sh.) KFS (Flansch+Schrumpfscheibe / Flange+Shrink disc) KRA (Rührwerksausführung mit Hohlwelle / Agitator drive with hollow shaft) KR (Rührwerksausführung mit Abtriebswelle / Agitator drive with output shaft) KRS (Rührwerksaus. mit Schrumpfscheibe / Agitator drive with shrink disc)
Mögliche Getriebegrößen / Possible gear unit sizes	111, 131, 137	40, 50, 60, 70, 75, 77, 80, 86, 110, 136, 139
Zahnradstufencode / Gear stage code	111, 131: A, S (2-stufig, 2- stages) C (3-stufig, 3-stages) D (4-stufig, 4-stages) F (5-stufig, 5-stages) 137: A (3-stufig, 3-stages) C (4-stufig, 4-stages) D (5-stufig, 5-stages)	40, 50, 60, 70, 75: A (2-stufig, 2- stages) C (3-stufig, 3-stages) D (4-stufig, 4-stages) 77, 80, 86, 110, 136, 139: A (3-stufig, 3-stages) C (4-stufig, 4-stages) D (5-stufig, 5-stages)

watt drive WEG Group	Montageanleitung für MAS® - Getriebe und Getriebemotoren Mounting Instruction for MAS® - Gear units and geared motors

Typenbezeichnung (Beispiel) **Type designation (example)**	**SSA 455A 3A 80-04E**	**CF 130A 3C 200M/L-04E SG**
Baureihe / Model range	S (Stirnradschneckengetriebe / Helical worm gear unit)	C (Kegelflachgetriebe / Angle parallel shaft gear unit)
Mögliche Getriebeausführung / Possible gear unit execution	SUA (Uniblock®+ Hohlwelle / Hollow shaft) SU (Uniblock®+Abtriebswelle / Output shaft) SUS (Uniblock®+Schrumpfscheibe / Shrink disc) SUZ (Uniblock®+ Abtriebswelle beidseitig / Double output shaft) SFA (Flansch+Hohlwelle / Flange+Hollow shaft) SF (Flansch+Abtriebswelle / Flange+Output sh.) SFS (Flansch+Schrumpfscheibe / Flange+Shrink disc) SSA (Support+Hohlwelle / Hollow shaft) SS (Support+Abtriebswelle / Output shaft)	CUA (Uniblock®+ Hohlwelle / Hollow shaft) CU (Uniblock®+Abtriebswelle / Output shaft) CUS (Uniblock®+Schrumpfscheibe / Shrink disc) CUZ (Uniblock®+ Abtriebswelle beidseitig / Double output shaft) CFA (Flansch+Hohlwelle / Flange+Hollow shaft) CF (Flansch+Abtriebswelle / Flange+Output sh.) CFS (Flansch+Schrumpfscheibe / Flange+Shrink disc) CSA (Support+Hohlwelle / Hollow shaft) CS (Support+Abtriebswelle / Output shaft) CSS (Support+Schrumpfscheibe / Shrink disc) CSZ (Support+Abtriebswelle beidseitig / Double output shaft)
Mögliche Getriebegrößen / Possible gear unit sizes	454, 455, 506, 507, 608, 609	70, 80, 85, 110, 130
Zahnradstufencode / Gear stage code	A, B, S (2-stufig, 2- stages) C (3-stufig, 3-stages)	A (3-stufig, 3-stages) C (4-stufig, 4-stages) D (5-stufig, 5-stages)

Getriebeeintriebsvarianten / Gear unit input types	
63.. – 225...	Motorbaugröße / motor frame size
IA.., IAK..	IEC-Adapter
SA..	Servo-Adapter
NA..	Nema-Adapter
WN	Antriebswelle / Input shaft
WN-RSG	Antriebswelle mit Rücklaufsperre / Input shaft with back stop
IEC..	Motordirektanbau / Direct motor fixing

Optionale Motorzusatzeinrichtungen / Optional additional motor devices	
Typenbezeichnung (Beispiel) Type designation (example)	3B 100L-04F SH K1 KB MIP BRH40 FL SD
3B 100L-04F	Motortype / Motor type
TH, TF, KTY	Temperaturüberwachung / Temperature control
FL	Fremdlüfter / Forced cooling
IG, SG	Inkrementalgeber / Encoder
BR..	Bremse / Brake
BBR..	Doppelbremse / Double brake
BRH..	Bremse mit Handlüftung / Brake with manual release
BRHA..	Bremse mit Handlüftung und Arretierung / Brake with manual release and locking device
KKM, RSM	Rücklaufsperre / Back stop
U, UW	Unbelüftet / unventilated
KB	Kondenswasserbohrung / Drain
SH	Stillstandsheizung / Anti condensation heating
K1, K2	Klimaschutz / Climatic protection
MIP, MIG	Klemmkastenausführung / Terminal box design
SD	Schutzdach / Protection cap
HR	Handrad / Hand wheel
ZM	Metalllüfter / Metal fan
ZL	Schwerer Lüfter / Fly wheel fan
ZWM, ZWV	Zweites Wellenende / Second shaft end

4 Transport

Die Lieferung ist nach Erhalt auf etwaige Transportschäden zu untersuchen. Die Inbetriebnahme ist gegebenenfalls auszuschließen.

VORSICHT!

Zum Heben der Getriebemotoren müssen Ringschrauben nach DIN 580 verwendet werden. Die Ringschraube muß, falls nicht im Lieferumfang enthalten, in die dafür vorgesehene Gewindebohrung im Getriebe (siehe Bild 1) komplett auf Anschlag eingedreht werden!

Die Ringschrauben müßen fest angezogen sein. Sie sind nur für das Eigengewicht des Getriebes bzw. Getriebemotors ausgelegt. Die Vorschriften in der DIN 580:2010 sind einzuhalten.

Es dürfen keine zusätzlichen Lasten angebracht werden.

Die Masse m [kg] (Tabelle 1) entspricht der maximal anzuhängenden Last bei Zug in Richtung F der Schraubenachse.

Die Ringschrauben sind möglichst senkrecht in Richtung der Schraubenachse zu belasten. Wenn nötig, müssen zusätzlich geeignete Transportmittel eingesetzt werden.

After delivery, the unit must be inspected for any damage that may have occurred during transport. If the unit's condition warrants, it may be necessary to take action to prevent the unit from being put into operation.

ATTENTION!

To lift the geared motors you have to use eye bolts as per DIN 580. If the eye bolt isn't included, it has to be screwed in the designated thread hole in the gear unit completely (see figure 1 below)!

The eye bolts must be securely tightened. They are designed to hold the gear unit's own weight and that of the gear motor. The requirements contained in DIN 580:2010 must be observed.

No additional loads may be applied.

The mass m [kg] (Table 1) corresponds to the maximum dependent load in tension in direction F of the bolt axis.

The eye bolts should possibly be weighted vertically in direction of the screw axis. If necessary, adequate means of transport have to be used additionally.

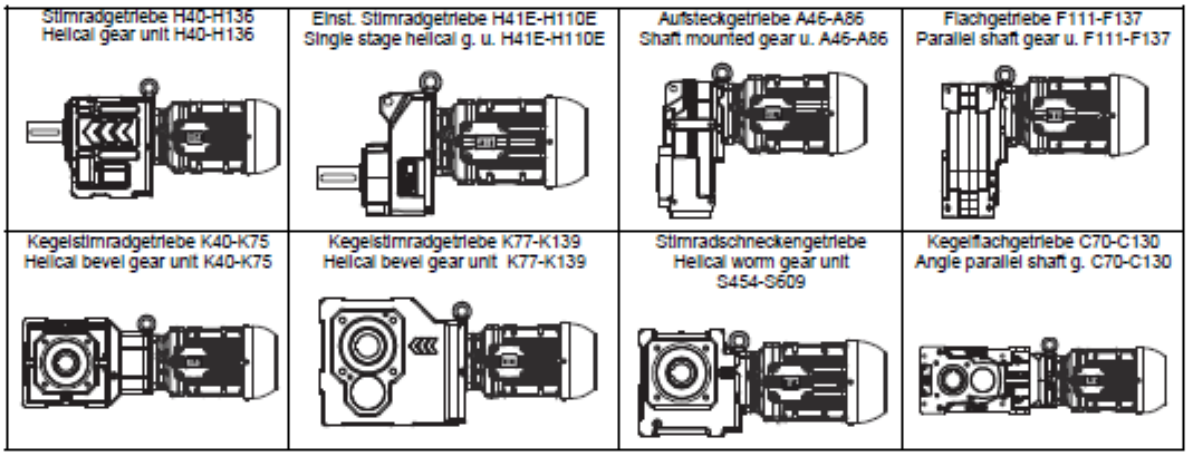
Tabelle 1: Maximal zulässige Last

Table 1: Max. permissible load

Gewinde Thread	M8	M10	M12	M16	M20	M24	M30
m [kg]	140	230	340	700	1200	1800	3200

Bild 1: Ringschrauben Position

Fig. 1: Eye bolt position



5 Lagerung / Storage

Allgemeines:

Bei der Lagerung der Getriebe sind folgende Punkte zu beachten:

- Die Lagerung von Antriebseinheiten hat generell in geschlossenen Räumen zu erfolgen.
- Umgebungstemperatur max. 25°C (77°F)
- Relative Luftfeuchtigkeit max. 80%
- Die Antriebseinheiten sind vor Sonneneinstrahlung bzw. UV - Licht zu schützen.
- Es dürfen keine aggressiven und korrosiven Stoffe in der Umgebung gelagert werden.
- Die Lagerung der Getriebe hat in der für die spätere Verwendung vorgesehene Einbaulage zu erfolgen.
- Die Getriebe sind alle 6 Monate abtriebsseitig um 1-2 Umdrehungen zu drehen, um eine Benetzung der Innenbauteile mit Schmierstoff zu gewährleisten.
- Die Einheiten sind vor mechanischer Belastung und Krafteinwirkung von aussen zu schützen.

General:

The following items must be taken into account when storing the gear units:

- In general, the drive units must be stored in closed rooms.
- Ambient temperature max. 25°C (77°F)
- Relative humidity max. 80%
- The drive units are to be protected from exposure to the sun or UV light.
- No aggressive or corrosive materials are to be stored in the vicinity of the unit.
- The gear units are to be stored in the same position that is intended for a later use.
- The gear units are to be rotated 1-2 revolutions on the output side every 6 months to ensure that the interior parts are wetted with lubricant.
- The units are to be protected from mechanical loads and exposure to outside forces.

Langzeitlagerung:

- Bei längerer Lagerdauer als 12 Monate sind die Getriebe komplett mit dem Schmiermittel laut Typenschild bzw. Ölschild zu befüllen.
- Die außenliegenden blanken Teile sind mit Korrosionsschutzmittel zu konservieren (eine halbjährliche Kontrolle ist empfehlenswert). Nach einem Jahr ist der Korrosionsschutz zu erneuern.
- Vor Inbetriebnahme ist das Schmiermittel des Getriebes abzulassen. Falls mehrere Ölräume vorhanden sind, gilt, dass alle Ölräume entleert werden müssen.
- Die Dichtungen setzen sich bei längerer Standzeit. Vor Inbetriebnahme sind die Schrauben nachzuziehen.
- Anschließend ist das Getriebe mit der am Typenschild spezifizierten Schmiermitteltype und angegebenen Schmiermittelmenge zu befüllen.
- Bei längerer Lagerung als 24 Monate sind vor der Inbetriebnahme die Getriebe auf Dichtheit zu überprüfen. Bei eventuellen sichtbaren Rissen an der Oberfläche der Dichtelemente sind diese zu ersetzen.

Long-term storage:

- When the gear units are to be stored for longer than 12 months, they must be completely filled with lubricant per the nameplate or lubricant plate.
- Unfinished, bare-metal parts on the outside of the unit are to be protected with a corrosion protection product (inspection every 6 months is recommended). The corrosion protection must be replaced after one year.
- Before starting the gear unit, drain the lubricant from it. If more than one lubricant chamber is present, make certain that all of the lubricant chambers have been drained out.
- Gasket settles, especially after a longer period without loading. Before starting the screws must be retightening.
- Then fill the gear unit with the lubricant type specified on the nameplate using the specified quantity of lubricant.
- If the gear units are stored for longer than 24 months before being put into service, they must be checked for leaks. If there are any visible cracks on the surfaces of sealing elements, such parts must be replaced.

6 Getriebeaufbau / Gear unit construction

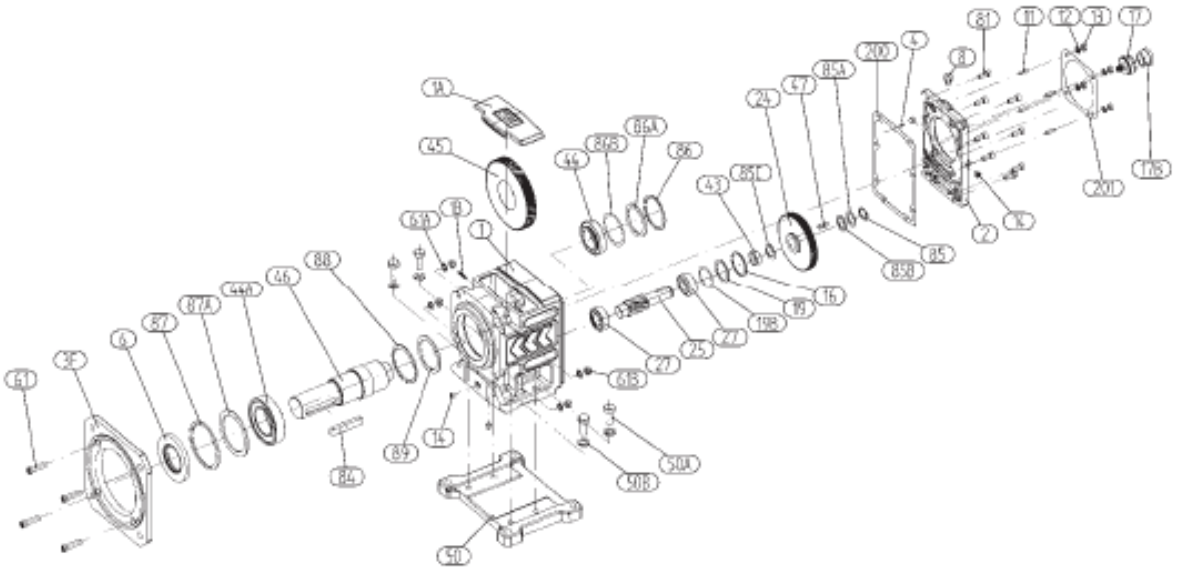
Die nachfolgenden Zeichnungen zeigen den prinzipiellen Aufbau der unterschiedlichen Getriebereihen.

Abweichungen zu anderen Getriebegrößen und Ausführungsvarianten pro Getriebereihe sind möglich.

The following drawings basically show the construction of the various dry series in theory.

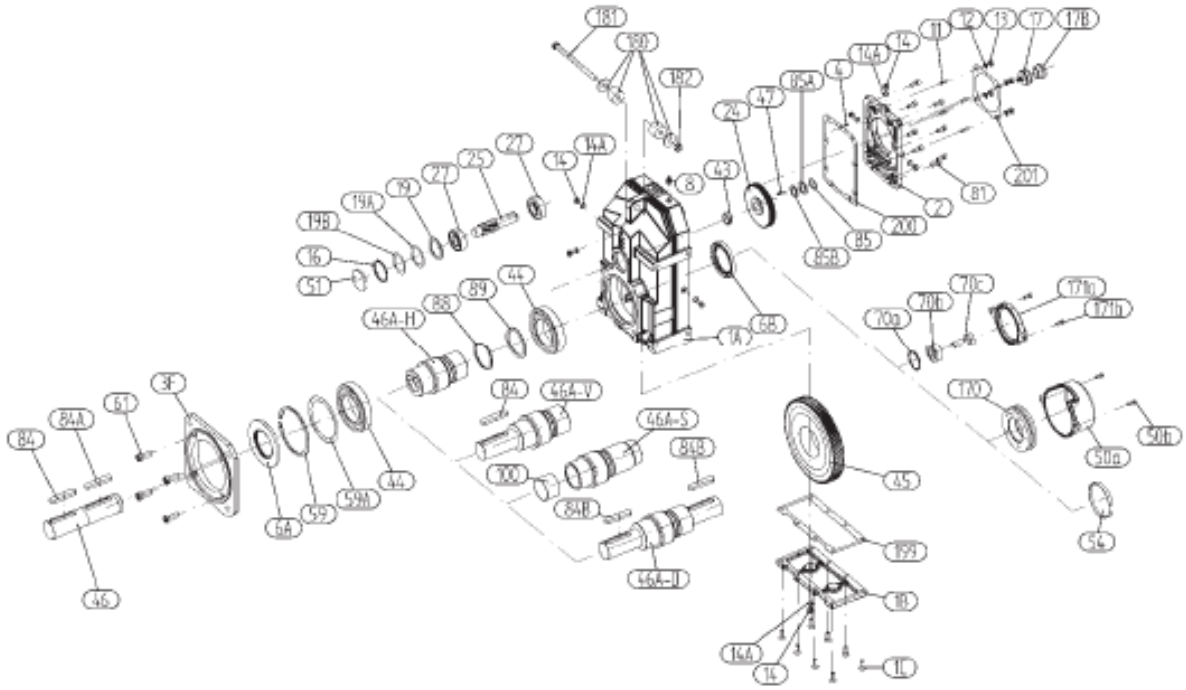
Deviations from other gear unit sizes and design versions are possible per gear unit series.

6.1 Prinzipieller Aufbau – Stirnradgetriebe H / Basic design principles helical gear unit H



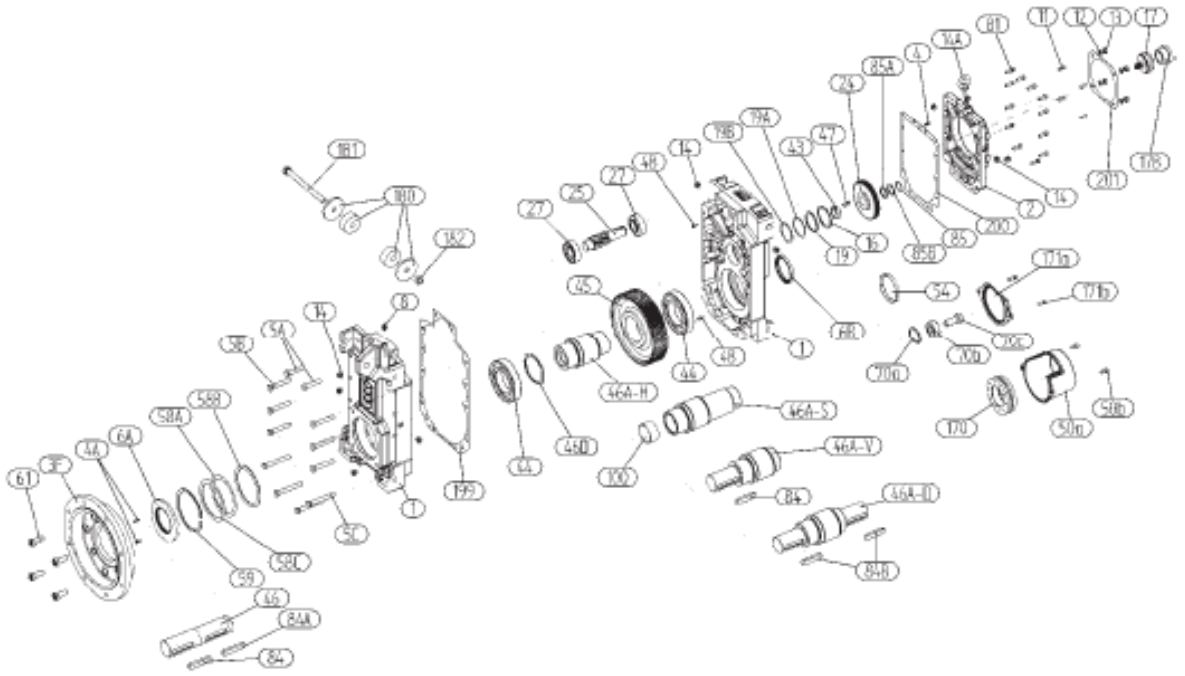
1	Getriebegehäuse	Gear case
1A	Gehäuseplatte	Cover plate
1B	Kegelstift	Taper pin
2	Eingangsdeckel	Case cover
3F	Abtriebsflansch	Output flange
4	Spannstift	Dowel pin
6	Wellendichtring	Shaft seal
8	Entlüftungsschraube	Vent plug
11	Stiftschraube	Stud bolt
12	Federring	Spring washer
13	Sechskantmutter	Hexagon nut
14	Verschlußschraube	Plug
16	Sicherungsring	Circlip
17	Modulritzel	Modul-pinion
17B	Ritzelbuchse	Pinion shaft
19	Stützscheibe	Supporting ring
19B	Paßscheibe	Adjusting disc
24	Zahnrad	Gear wheel
25	Ritzelwelle	Pinion shaft
27	Kegelrollenlager	Taper roller bearing
43	Distanzring	Distance sleeve
44	Kegelrollenlager	Taper roller bearing
44A	Kegelrollenlager	Taper roller bearing
45	Abtriebsrad	Gear wheel end stage
46	Abtriebswelle	Output shaft
47	Zylinderstift	Cylindrical pin
50	Fußplatte	Foot plate
50A	Sechskantschraube	Hexagon head screw
50B	Federring	Spring washer
61	Zylinderschraube mit I6KT	Socket head cap screw
61A	Federring	Spring washer
61B	Sechskantmutter	Hexagon nut
81	Zylinderschraube mit I6KT	Socket head cap screw
84	Paßfeder	Key
85	Sicherungsring	Circlip
85A	Stützscheibe	Supporting ring
85B	Paßscheibe	Adjusting disc
85C	Paßscheibe	Adjusting disc
86	Sicherungsring	Circlip
86A	Stützscheibe	Supporting ring
86B	Paßscheibe	Adjusting disc
87	Sicherungsring	Circlip
87A	Stützscheibe	Supporting ring
88	Sicherungsring	Circlip
89	Stützscheibe	Supporting ring
200	Feststoffdichtung	Gasket
201	Feststoffdichtung	Gasket

6.2 Prinzipieller Aufbau – Aufsteckgetriebe A / Basic design principles shaft mounted gear unit A



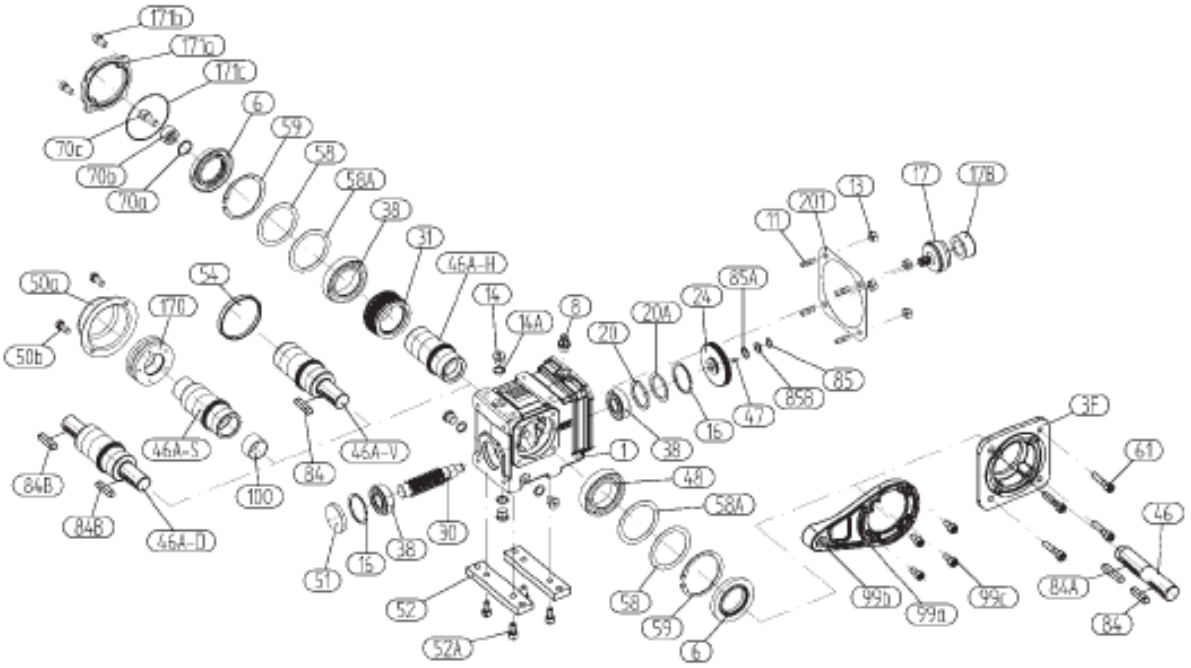
1A	Getriebegehäuse	Gear case
1B	Gehäuseplatte	Cover plate
1C	Senkkopfschrauben	Countersunk head screw
2	Eingangsdeckel	Case cover
3F	Abtriebsflansch	Output flange
4	Spannstift	Dowel pin
6A	Wellendichtring	Shaft seal
6B	Wellendichtring	Shaft seal
8	Entlüftungsschrauben	Vent plug
11	Stiftschraube	Stud bolt
12	Federring	Spring washer
13	Sechskantmutter	Hexagon nut
14	Verschlußschraube	Plug
14A	Dichtring	Gasket
16	Sicherungsring	Circlip
17	Modulritzel	Modul-pinion
17B	Ritzelbuchse	Pinion shaft
19	Stützscheibe	Supporting ring
19A	Paßscheibe	Adjusting disc
19B	Paßscheibe	Adjusting disc
24	Zahnrad	Gear wheel
25	Ritzelwelle	Pinion shaft
27	Kegelrollenlager	Taper roller bearing
43	Distanzring	Distance sleeve
44	Rillenkugellager	Deep groove ball bearing
45	Abtriebsrad	Gear wheel end stage
46	Einsteckwelle	Input shaft
46A-H	Hohlwelle	Hollow shaft
46A-S	Schrumpfscheibenhohlw.	Shrink disc hollow shaft
46A-V	Abtriebswelle	Output shaft
46A-D	Beidseitige Abtriebswelle	Output shaft on both sides
47	Zylinderstift	Cylindrical pin
50a	Schrumpfscheibenabdeckk.	Protection cap for shrink disc
50b	Zylinderschraube mit I6KT	Socket head cap screw
51	Verschlußdeckel	Cover
54	Verschlußdeckel	Cover
59	Sicherungsring	Circlip
59A	Paßscheibe	Adjusting disc
61	Zylinderschraube mit I6KT	Socket head cap screw
70a	Sicherungsring	Circlip
70b	Spannscheibe	Tension disc
70c	Zylinderschraube mit I6KT	Socket head cap screw
81	Zylinderschraube mit I6KT	Socket head cap screw
84	Paßfeder	Key
84A	Paßfeder	Key
84B	Paßfeder	Key
85	Sicherungsring	Circlip
85A	Paßscheibe	Adjusting disc
85B	Paßscheibe	Adjusting disc
88	Sicherungsring	Circlip
89	Stützscheibe	Supporting ring
100	Glykodur-Buchse	Glykodur bush
170	Schrumpfscheibensatz	Shrink disc set
171a	Hohlwellenabdeckkappe	Protection-cap for hollow shaft
171b	Zylinderschraube mit I6KT	Socket head cap screw
180	Gummipufferset	Rubber buffer set
181	Sechskantschraube	Hexagon head cap screw
182	Sechskantmutter	Hexagon nut
199	Gehäusedichtung	Case gasket
200	Feststoffdichtung	Gasket
201	Feststoffdichtung	Gasket

6.3 Prinzipieller Aufbau – Flachgetriebe F / Basic design principles parallel shaft gear unit F



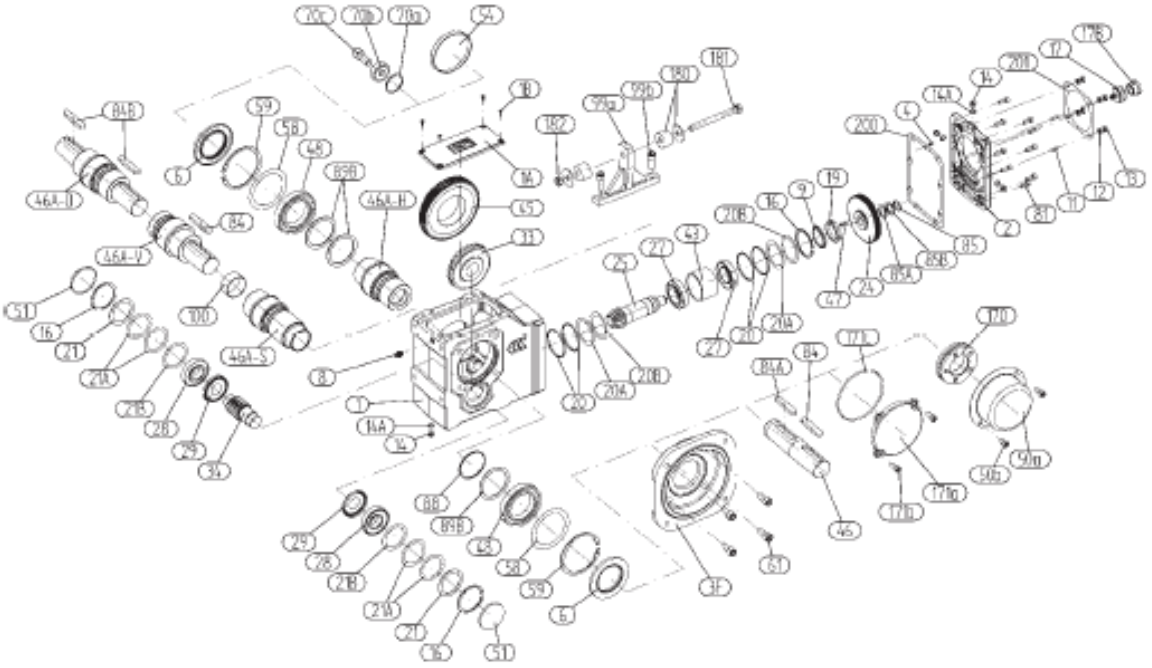
1	Getriebegehäuse (2 T.)	Gear case (2 parts)	46A-S	Schrumpfscheibenhohlwelle	Shrink disc hollow shaft
2	Eingangsdeckel	Case cover	46A-D	Beidseitige Abtriebswelle	Output shaft on both sides
3F	Abtriebsflansch	Output flange	46A-V	Abtriebswelle	Output shaft
4	Spannstift	Dowel pin	46D	Sicherungsring	Circlip
4A	Spannstift	Dowel pin	47	Paßfeder	Key
4B	Zylinderstift	Cylindrical pin	50a	Schrumpfscheibenabdeckk.	Protection cap for hollow s.
5A	Sechskantschraube	Hexagon head cap screw	50b	Sechskantschraube	Hexagon head cap screw
5B	Sechskantschraube	Hexagon head cap screw	54	Verschlußdeckel	Cover
5C	Sechskantschraube	Hexagon head cap screw	58A	Paßscheibe	Adjusting disc
6A	Wellendichtring	Shaft seal	58B	Paßscheibe	Adjusting disc
6B	Wellendichtring	Shaft seal	58C	Paßscheibe	Adjusting disc
8	Entlüftungsschraube	Vent plug	59	Sicherungsring	Circlip
11	Stiftschraube	Stud bolt	61	Zylinderschraube mit I6KT	Socket head cap screw
12	Federring	Spring washer	70a	Sicherungsring	Circlip
13	Sechskantmutter	Hexagon nut	70b	Spannscheibe	Tension disc
14	Verschlußschraube	Plug	70c	Zylinderschraube mit I6KT	Socket head cap screw
14A	Ringschraube	Eye bolt	81	Zylinderschraube mit I6KT	Socket head cap screw
16	Sicherungsring	Circlip	84	Paßfeder	Key
17	Modulritzel	Modul-pinion	84A	Paßfeder	Key
17B	Ritzelbuchse	Pinion shaft	84B	Paßfeder	Key
19	Stützscheibe	Supporting ring	85	Sicherungsring	Circlip
19A	Paßscheibe	Adjusting disc	85A	Stützscheibe	Supporting ring
19B	Paßscheibe	Adjusting disc	85B	Paßscheibe	Adjusting disc
24	Zahnrad	Gear wheel	100	Glykodur-Buchse	Glykodur bush
25	Ritzelwelle	Pinion shaft	170	Schrumpfscheibensatz	Shrink disc set
27	Kegelrollenlager	Taper roller bearing	171a	Hohlwellenabdeckkappe	Protection cap for hollow s.
43	Distanzring	Distance sleeve	171b	Zylinderschraube mit I6KT	Socket head cap screw
44	Rillenkugellager	Deep groove ball bearing	180	Gummipufferset	Rubber buffer set
45	Abtriebsrad	Gear wheel end stage	181	Sechskantschraube	Hexagon head cap screw
46	Einsteckwelle	Insert shaft	182	Sechskantmutter	Hexagon nut
46A-H	Hohlwelle	Hollow shaft	199	Gehäusedichtung	Gear case gasket
			200	Feststoffdichtung	Gasket
			201	Feststoffdichtung	Gasket

6.4 Prinzipieller Aufbau - Schneckengetriebe S / Basic design principles helical worm gear unit S



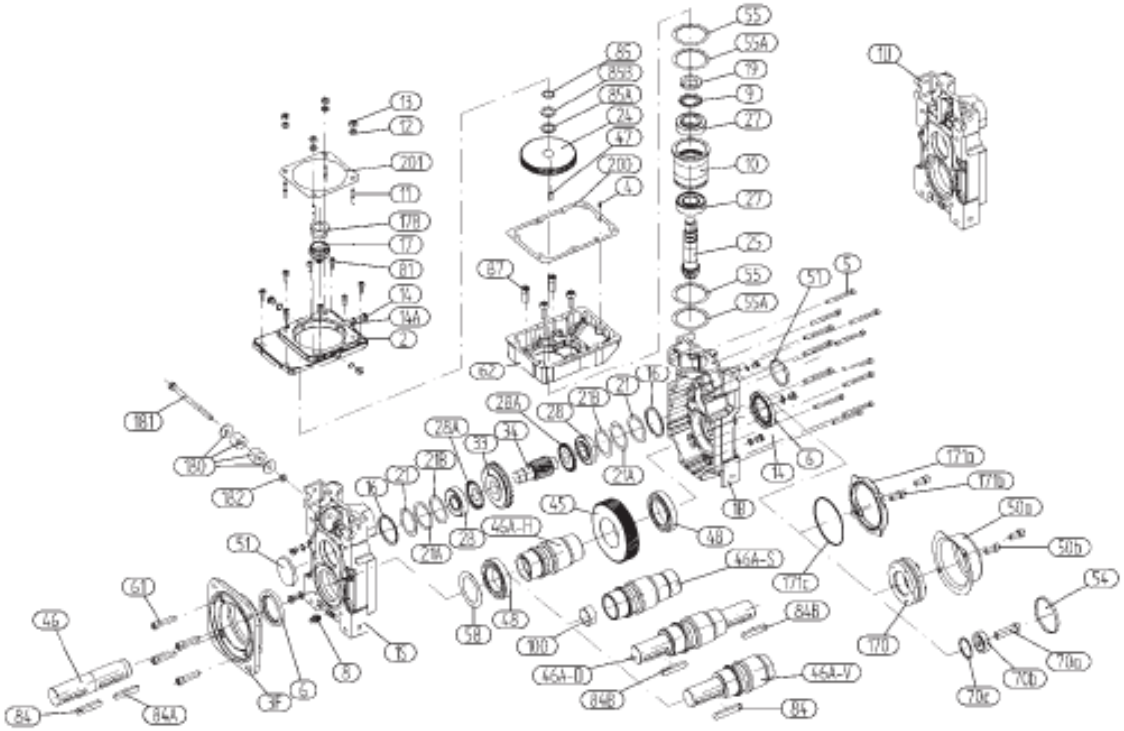
1	Getriebegehäuse	Gear case	51	Verschlußdeckel	Cover
3F	Abtriebsflansch	Output flange	52	Fußleiste	Foot plate
6	Wellendichtring	Shaft seal	52A	Zylinderschraube mit I6KT	Socket head cap screw
8	Entlüftungsschraube	Vent plug	54	Verschlußdeckel	Cover
11	Stiftschraube	Stud bolt	58	Paßscheibe	Adjusting disc
13	Sechskantmutter	Hexagon nut	58A	Paßscheibe	Adjusting disc
14	Verschlußschraube	Plug	59	Sicherungsring	Circlip
14A	Dichtring	Gasket	61	Zylinderschraube mit I6KT	Socket head cap screw
16	Sicherungsring	Circlip	70a	Sicherungsring	Circlip
17	Modulritzel	Modul-pinion	70b	Spannscheibe	Tension disc
17B	Ritzelbuchse	Pinion shaft	70c	Zylinderschraube mit I6KT	Socket head cap screw
20	Stützscheibe	Supporting ring	84	Paßfeder	Key
20A	Paßscheibe	Adjusting disc	84A	Paßfeder	Key
24	Zahnrad	Gear wheel	85	Sicherungsring	Circlip
30	Schneckenwelle	Worm shaft	85A	Paßscheibe	Adjusting disc
31	Schneckenrad	Worm wheel	85B	Paßscheibe	Adjusting disc
38	Rillenkugellager	Deep groove ball bearing	99a	Drehmomentstütze	Torque arm
46	Einsteckwelle	Insert shaft	99b	Elastische Buchse	Flexible bush
46A-D	Beidseitige Abtriebswelle	Output shaft on both sides	99c	Zylinderschraube mit I6KT	Socket head cap screw
46A-H	Hohlwelle	Hollow shaft	100	Glykodur-Buchse	Glykodur bush
46A-S	Schrumpfscheibenhohlwelle	Shrink disc hollow shaft	170	Schrumpfscheibensatz	Shrink disc set
46A-V	Abtriebswelle	Output shaft	171a	Hohlwellenabdeckkappe	Protection-cap for hollow s.
47	Zylinderstift	Cylindrical pin	171b	Zylinderschraube mit I6KT	Socket head cap screw
48	Rillenkugellager	Deep groove ball bearing	171c	Rundschnur für O-Ring	O-ring seal
50a	Schrumpfscheibenabdeckk.	Protection cap for shrink d.	201	Feststoffdichtung	Gasket
50b	Sechskantschraube	Hexagon head cap screw			

6.5 Prinzipieller Aufbau – Kegelstirnradgetriebe K / Basic design principles helical bevel gear unit K



1	Getriebegehäuse	Gear case	46A-V	Abtriebswelle	Output shaft
1A	Gehäuseplatte	Cover plate	46A-D	Beidseitige Abtriebswelle	Output shaft on both sides
1B	Senkschraube mit I6K	Countersunk screw	47	Zylinderstift	Cylindrical pin
2	Eingangsdeckel	Case cover	48	Rillenkugellager	Deep groove ball bearing
3F	Abtriebsflansch	Output flange	50a	Schrumpfscheibenabdeckk.	Protection cap for shrink d.
4	Spannstift	Dowel pin	50b	Sechskantschraube	Hexagon head cap screw
6	Wellendichtring	Shaft seal	51	Verschlußdeckel	Cover
8	Entlüftungsschraube	Vent plug	54	Verschlußdeckel	Cover
9	Sicherungsblech	Locking shim	58	Paßscheibe	Adjusting disc
11	Stiftschraube	Stud bolt	59	Sicherungsring	Circlip
12	Federring	Spring washer	61	Zylinderschraube mit I6KT	Socket head cap screw
13	Sechskantmutter	Hexagon nut	70a	Sicherungsring	Circlip
14	Verschlußschraube	Plug	70b	Spannscheibe	Tension disc
14A	Dichtring	Gasket	70c	Zylinderschraube mit I6KT	Socket head cap screw
16	Sicherungsring	Circlip	81	Zylinderschraube mit I6KT	Socket head cap screw
17	Modulritzel	Modul-pinion	84	Paßfeder	Key
17B	Ritzelbuchse	Pinion shaft	84A	Paßfeder	Key
19	Nutmutter	Groove nut	84B	Paßfeder	Key
20	Stützscheibe	Supporting ring	85	Sicherungsring	Circlip
20A	Paßscheibe	Adjusting disc	85A	Stützscheibe	Supporting ring
20B	Paßscheibe	Adjusting disc	85B	Paßscheibe	Adjusting disc
21	Paßscheibe	Adjusting disc	88	Sprengring	Snap ring
21A	Paßscheibe	Adjusting disc	89B	Stützscheibe	Supporting ring
21B	Paßscheibe	Adjusting disc	99a	Drehmomentstütze	Torque arm
24	Zahnrad 1.Stufe	Gear wheel 1st stage	99b	Sechskantschraube	Hexagon head cap screw
25	Kegelritzelwelle	Bevel gear pinion shaft	100	Glycodur-Buchse	Glycodur bush
27	Kegelrollenlager	Taper roller bearing	170	Schrumpfscheibensatz	Shrink disc set
28	Kegelrollenlager	Taper roller bearing	171a	Hohlwellenabdeckkappe	Protection cap for hollow s.
29	Nilosring	Nilos-ring	171b	Zylinderschraube mit I6KT	Socket head cap screw
33	Kegelrad	Bevel gear wheel	171c	Rundschnur für O-Ring	O-ring seal
34	Ritzelwelle	Pinion shaft	180	Gummipufferset	Rubber buffer set
43	Distanzring	Distance sleeve	181	Sechskantschraube	Hexagon head cap screw
45	Abtriebsrad	Gear wheel end stage	182	Sechskantmutter	Hexagon nut
46	Einsteckwelle	Insert shaft	200	Feststoffdichtung	Gasket
46A-H	Hohlwelle	Hollow shaft	201	Feststoffdichtung	Gasket
46A-S	Schrumpfscheibenhohlw.	Shrink disc hollow shaft			

6.6 Prinzipieller Aufbau – Kegelflachgetriebe C / Basic design principles angle parallel shaft gear unit C



1U	Getriebegehäuse – UNIB.	Gear case - UNIBLOCK®	46A-V	Abtriebswelle	Output shaft
1S	Getriebegehäuse – SUP.	Gear case - SUPPORT	46A-D	Beidseitige Abtriebswelle	Output shaft on both sides
1B	Getriebegehäuse	Gear case	47	Zylinderstift	Cylindrical pin
2	Eingangsdeckel	Case cover	48	Rillenkugellager	Deep groove ball bearing
3F	Abtriebsflansch	Output flange	50a	Schrumpfscheibenabdeckk.	Protection cap for shrink d.
4	Spannstift	Dowel pin	50b	Zylinderschraube mit I6KT	Socket head cap screw
5	Zylinderschraube mit I6KT	Socket head cap screw	51	Verschlußdeckel	Cover
6	Wellendichtring	Shaft seal	54	Verschlußdeckel	Cover
8	Entlüftungsschraube	Vent plug	55	Paßscheibe	Adjusting disc
9	Sicherungsblech	Locking shim	55A	Paßscheibe	Adjusting disc
10	Lagerträger	Bearing carrier	58	Paßscheibe	Adjusting disc
11	Stiftschraube	Stud bolt	61	Zylinderschraube mit I6KT	Socket head cap screw
12	Federring	Spring washer	62	Vorsatzgetriebeehäuse	Primary gear case
13	Sechskantmutter	Hexagon nut	70a	Sicherungsring	Circlip
14	Verschlußschraube	Plug	70b	Spannscheibe	Tension disc
14A	Dichtring	Gasket	70c	Zylinderschraube mit I6KT	Socket head cap screw
16	Sicherungsring	Circlip	81	Zylinderschraube mit I6KT	Socket head cap screw
17	Modulritzel	Modul-pinion	84	Paßfeder	Key
17B	Ritzelbuchse	Pinion shaft	84A	Paßfeder	Key
19	Nutmutter	Groove nut	84B	Paßfeder	Key
21	Paßscheibe	Adjusting disc	85	Sicherungsring	Circlip
21A	Paßscheibe	Adjusting disc	85A	Paßscheibe	Adjusting disc
21B	Paßscheibe	Adjusting disc	85B	Paßscheibe	Adjusting disc
24	Zahnrad 1.Stufe	Gear wheel 1st stage	87	Zylinderschraube mit I6KT	Socket head cap screw
25	Kegelritzelwelle	Bevel gear pinion shaft	100	Glykodur-Buchse	Glykodur bush
27	Kegelrollenlager	Taper roller bearing	170	Schrumpfscheibensatz	Shrink disc set
28	Kegelrollenlager	Taper roller bearing	171a	Hohlwellenabdeckkappe	Protection cap for hollow s.
28A	Nilosring	Nilos ring	171b	Zylinderschraube mit I6KT	Socket head cap screw
33	Kegelrad	Bevel gear wheel	171c	Rundschnur für O-Ring	O-ring seal
34	Ritzelwelle	Pinion shaft	180	Gummipufferset	Rubber buffer set
45	Abtriebsrad	Gear wheel end stage	181	Sechskantschraube	Hexagon head cap screw
46	Einsteckwelle	Insert shaft	182	Sechskantmutter	Hexagon nut
46A-H	Hohlwelle	Hollow shaft	200	Feststoffdichtung	Gasket
46A-S	Schrumpfscheibenhohlw.	Shrink disc hollow shaft	201	Feststoffdichtung	Gasket

7 Mechanische Installation / Mechanical installation

7.1 Vorarbeiten Getriebe / Preparatory work gear unit

7.1.1 Prüfung des Getriebes / Inspecting the gear unit

Das Getriebe darf nur dann in Betrieb genommen werden, wenn:

- keine Beschädigungen, z.B. durch Lagerung oder Transport erkennbar sind.
- Insbesondere die Wellendichtringe, Verschlusskappen und Abdeckhauben nicht beschädigt sind.
- keine Undichtigkeit bzw. kein Ölverlust sichtbar ist.
- keine Korrosion oder andere Hinweise auf eine unsachgemäße oder feuchte Lagerung hinweisen.
- das Verpackungsmaterial restlos entfernt wurde.
- Ölablassschrauben sowie Entlüftungsventile müssen frei zugänglich sein!

ATEX !

- Die Angaben auf dem Leistungsschild des Getriebes mit dem zulässigen Ex-Einsatzbereich vor Ort übereinstimmen (Gerätegruppe, Kategorie, Zone, Temperaturklasse, maximale Oberflächentemperatur).
- keine explosionsfähige Atmosphäre bei der Montage, vorhanden ist.
- angebaute Antriebselemente, wie Kupplungen, Riemenscheiben u.s.w sowie Antriebsmotoren müssen ATEX- konform sind.

Grundsätzlich sind Abtriebswellen und Flanschflächen gründlich von Korrosionsschutzmittel oder Verschmutzungen zu befreien, dabei können handeslübliche Lösungsmittel verwendet werden.

VORSICHT !

Die Dichtlippen der Wellendichtringe dürfen nicht mit dem Lösungsmittel in Kontakt treten → **Materialschäden möglich!**

The gear unit must not be put into operation unless:

- Nno damage caused, for example, by storage or transport, is apparent.
- In particular, the shaft seals, cover caps, and guard hoods are not damaged.
- No leaks or loss of oil are visible.
- No corrosion or other indication of improper storage or storage under damp conditions is present.
- All of the packaging materials were removed.
- Oil drain plugs and vent plugs must be fully accessible!

ATEX !

- The information on the gear unit specifications plate matches the permissible local Ex usage area (Device group, category, zone, temperature class, maximum surface temperature).
- No potentially explosive atmosphere is present upon installation,
- Attached drive elements, like couplings, pulleys and so on, as well as drive motors, must be ATEX compliant.

As a general rule, drive shafts and flange surfaces must have all corrosion protection products and dirt cleaned from them, standard commercial solvents can be used.

ATTENTION !

The sealing lips on the shaft seals must not be allowed to come in contact with the solvent. → **Material can be damaged!**

7.1.2 Bauform / Mounting position

Das Getriebe darf nur in der angegebenen Bauform betrieben werden, welche dem Typenschild zu entnehmen ist. Die Einbaulage darf sich im Betrieb nicht verändern.

The gear unit may only be operated in the specified mounting position, which may be found on the nameplate. The mounting position must not changed during operation.

7.1.3 Drehmomentabstützung mittels Gummipuffer / Torque support by means of rubber buffer

Jede Urelastfeder muß mit einer Vorspannung von 3mm montiert werden.

Every Urelast spring must be mounted with a pre-stressing of 3mm.

7.1.4 Lackieren des Getriebes / Painting the gear unit

Wenn der Antrieb überlackiert bzw. teilweise nachlackiert wird, so ist darauf zu achten, dass das Entlüftungsventil und die Wellendichtringe sorgfältig abgeklebt werden. Nach Fertigstellung der Lackierarbeiten sind die Klebestreifen zu entfernen.

If the gear unit will be painted or partially repainted, make certain that the vent plug and the shaft seals are carefully masked. Remove the masking tape after the painting work is completed.

7.1.5 Umgebungstemperatur / Ambient temperature

ATEX !

Die Getriebe in Kategorie IM2, II2G und II2D dürfen nur bei Umgebungstemperaturen von -20°C (-4°F) bis +40°C (104°F) verwendet werden.

Bei abweichenden Umgebungstemperaturen halten Sie unbedingt Rücksprache mit dem Hersteller.

Temperaturklasse:
Die Getriebe gemäß ATEX 95 sind in die Temperaturklasse T4 (Gas) bzw. 120°C (Staub) eingruppiert.

ATEX !

The gear units of categories IM2, II2G, and II2D may only be used at ambient temperatures from -20°C (-4°F) to +40°C (104°F).

In the event of deviating ambient temperatures, you must contact the producer.

Temperature class:
The drives are classified according to ATEX 95 into temperature class T4 (gas) or 120°C (dust)

7.1.6 Gehäuseoberflächentemperatur / Housing surface temperature

Um unzulässige Erwärmung des Getriebes zu verhindern ist folgendes zu beachten:

- Um das Getriebe muss ausreichend Freiraum vorhanden sein.
- Die Kühlluft bei Getriebemotoren muss das Getriebe ungehindert umströmen können.
- Das Getriebe darf nicht vollkommen eingehaust werden.
- Die Getriebe dürfen nicht von anderen Aggregaten mit warmer Abluft beströmt werden.

Es darf keine Wärme in das Getriebe eingeleitet werden.

In order to prevent excessive heating of the gear unit, the following must be observed:

- Sufficient clearance must be provided around the gear unit.
- The cooling air for gear unit motors must be able to flow unhindered around the gear unit.
- The gear unit must not be completely boxed in with a housing.
- The gear units must not be exposed to hot exhaust air from other units.

No heat must be transferred into the gear unit.

7.2 Vorarbeiten Motor / Preparatory work motor

7.2.1 Anschlusskasten / Terminal box

Im Anschlusskasten dürfen sich keine Fremdkörper, Schmutz sowie Feuchtigkeit befinden. Weitere offene Einführungen sind mit O-Ring oder geeigneter Flachdichtung, der Anschlusskasten selbst mit der Originaldichtung staub- und wasserdicht zu verschließen.

Anschlusskasten, Klemmenbrett, Kabelanschlüsse, etc. im Innenraum des Anschlusskastens dürfen nicht beschädigt werden!

⚠ GEFAHR !

Der Anschlusskasten muss staub- und wasserdicht verschlossen sein!

It must be ensured that there are no foreign bodies, dirt or moisture in the terminal box. Open entries are to be sealed with an O ring or a suitable flat gasket so that dust and water cannot enter, whereas the terminal box itself is to be sealed against dust and water with the original seal.

It must be ensured that the terminal box, terminal board and cable connections etc. inside the terminal box are not damaged.

⚠ WARNING !

The terminal box must be sealed so that dust and water cannot enter.

7.2.2 Isolationswiderstand überprüfen / Checking the insulation resistance

Eine Prüfung des Isolationswiderstandes ist vor Inbetriebnahme sowie nach längerer Lagerung oder Stillstandszeit erforderlich!

Beachten Sie vor Beginn der Messung des Isolationswiderstandes die Bedienungsanleitung des verwendeten Isolationsmessgerätes. Zur Isolationsmessung sind bereits angeschlossene Kabel des Hauptstromkreises wieder von den Klemmen zu entfernen.

⚠ GEFAHR !

Die Klemmen haben bei der Messung, sowie unmittelbar nach der Messung, teilweise gefährliche Spannungen und dürfen nicht berührt werden. Stellen Sie bei angeschlossenen Netzleitungen sicher, dass keine Spannung angelegt werden kann.

Messen Sie den Mindestisolationswiderstand der Wicklung gegen das Maschinengehäuse möglichst bei einer Wicklungstemperatur von +20 °C bis +30 °C. Für andere Temperaturen gelten andere Werte für den Isolationswiderstand. Bei der Messung muss abgewartet werden, bis der Endwert des Widerstandes erreicht ist (ca. 1 Minute).

⚠ VORSICHT !

Wird der kritische Isolationswiderstand erreicht oder unterschritten, müssen die Wicklungen getrocknet bzw. bei ausgebautem Läufer gründlich gereinigt und getrocknet werden. Beachten Sie nach dem Trocknen gereinigter Wicklungen, dass der Isolationswiderstand bei warmer Wicklung kleiner ist. Der Isolationswiderstand lässt sich nur nach Umrechnung auf die Referenztemperatur +25 °C richtig beurteilen. Liegt der gemessene Wert nahe am kritischen Wert, den Isolationswiderstand in der Folgezeit in entsprechend kurzen Intervallen kontrollieren.

Die folgende Tabelle 2 gibt die Messspannung sowie den Mindest-Isolationswiderstand und den kritischen Isolationswiderstand an. Werte gelten für eine Wicklungstemperatur von +25 °C.

Tabelle 2: Isolationswiderstand

	Bemessungsspannung U_N < 2 kV
Messspannung	500 V
Mindest-Isolationswiderstand bei neuen, gereinigten oder instand gesetzten Wicklungen	10 MΩ
Kritischer spezifischer Isolationswiderstand nach langer Betriebszeit	0,5 MΩ/kV

The insulation resistance needs to be checked prior to start-up and again after any extended periods of storage or periods during which the equipment is not in operation.

Before you begin measuring the insulation resistance, please read the manual for the insulation resistance meter you are going to use. Any cables of the main circuit which are already connected should be disconnected from the terminals in order to carry out the insulation measurements.

⚠ WARNING !

During the measurement, and immediately afterwards, some of the terminals are at hazardous voltage levels and must not be touched. Carry out a check with the power cables connected that no voltage can be applied.

Where possible, measure the minimum insulation resistance of the winding to the motor enclosure when the winding temperature is between +20 °C and +30 °C. For other temperatures, different values apply to the insulation resistance. When taking the measurement, you must wait until the final resistance value is reached (approximately 1 minute).

⚠ ATTENTION !

If the critical insulation resistance is less than or equal to this value, the windings must be dried or, if the fan is removed, cleaned thoroughly and dried. Note that the insulation resistance of dried, clean windings is lower than that of warm windings. The insulation resistance can only be properly assessed after conversion to the reference temperature of +25 °C. If the measured value is close to the critical value, you must subsequently check the insulation resistance at appropriately frequent intervals.

The following Table 2 indicates the measuring circuit voltage together with the minimum insulation resistance and the critical insulation resistance.
Values apply at a winding temperature of +25 °C.

Table 2: Insulation resistance

	Rated voltage U_{rated} < 2 kV
Measuring circuit voltage	500 V
Minimum insulation resistance with new, cleaned or repaired windings	10 MΩ
Critical specific insulation resistance after a long operating time	0.5 MΩ/kV

Folgende Punkte sind hierbei noch zu beachten:

- Bei Messung mit anderen Wicklungstemperaturen als +25 °C muss der gemessene Wert auf die Referenztemperatur +25 °C umgerechnet werden. Pro 10 K Temperaturanstieg halbiert sich der Isolationswiderstand, pro 10 K Temperaturabfall verdoppelt sich der Widerstand.
- Trockene, neuwertige Wicklungen haben Isolationswiderstände zwischen 100 bis 2.000 MΩ, gegebenenfalls auch höhere Werte. Liegt der Isolationswiderstandswert in der Nähe oder unterhalb des Mindestwertes, so können Feuchtigkeit und/oder Verschmutzung die Ursache sein. Die Wicklungen sind dann zu trocknen.
- Während der Betriebszeit kann der Isolationswiderstand der Wicklungen durch Umwelt- und Betriebseinflüsse auf den kritischen Isolationswiderstand sinken. Der kritische Wert des Isolationswiderstandes bei einer Wicklungstemperatur von +25 °C ist je nach Bemessungsspannung durch Multiplikation der Bemessungsspannung (kV) mit dem spezifischen kritischen Widerstandswert (0,5 MΩ/kV) zu errechnen; z.B. kritischer Widerstand für Bemessungsspannung (UN) 690 V : 1000 V x 0,5 MΩ/kV = 0,345 MΩ

Also note the following points:

- When measuring at winding temperatures other than +25 °C, the measured value must be converted to the reference temperature of +25 °C. The insulation resistance is reduced by a factor of a half for every 10 K increase in temperature, and it is increased by a factor of two for every 10 K decrease in temperature.
- New, dry windings have an insulation resistance of between 100 and 2,000 MΩ, or even higher values in some cases. If the insulation resistance is close to or below the minimum value, the cause could be humidity and/or dirt accumulation. The windings must then be dried.
- During operation, the insulation resistance of the windings can fall to the critical insulation resistance due to ambient and operational influences. Depending on the rated voltage, the critical insulation resistance for a +25 °C winding temperature can be calculated by multiplying the rated voltage (kV) by the specific critical resistance value (0.5 MΩ/kV); e.g. critical resistance for a rated voltage (UN) 690 V : 1000 V x 0.5 MΩ/kV = 0.345 MΩ

7.2.3 Anschluss des Erdungsleiters / Connecting the ground conductor

Die Erdung muß mit dem Anschluss im Anschlusskasten an der dafür vorgesehenen und entsprechend gekennzeichneten Stelle durchgeführt werden.

Der Erdungsleiterquerschnitt der Maschine muss mit den Errichtungsbestimmungen, z.B. nach DIN EN IEC 60204-1 übereinstimmen.

Beim Anschließen ist zu beachten, dass:

- Die Anschlussfläche kontaktblank und mit geeignetem Mittel gegen Korrosion geschützt ist, z.B. mit säurefreier Vaseline.

The grounding has to be connected in the terminal box at the place intended for this purpose and marked accordingly.

The cross-section of the ground conductor of the machine must comply with the regulations for electrical installations, e.g. DIN EN IEC 60204-1.

Please note the following when connecting-up:

- The contact surface must be clean and bright, and protected with a suitable anti-corrosion agent, e. g. acid-free Vaseline.

Tabelle 3: Mindestquerschnittsfläche

Table 3: Minimum surface area

Mindestquerschnittsfläche „S" des Phasenleiters (L1, L2, L3) Minimum surface area „S" of phase conductor (L1, L2, L3)	Mindestquerschnittsfläche des zugehörigen Erdungsanschlusses Minimum surface area of corresponding ground connection
mm^2	mm^2
S ≤ 16	S
16 < S ≤ 35	16
S > 35	0,5 x S

7.3 Aufstellen des Getriebes, Getriebemotors / Setting up the gear unit, geared motor

- Die Aufstellung soll so erfolgen, daß der Antrieb keinen Schwingungen oder Erschütterungen ausgesetzt ist, um dadurch bedingte Geräuschentwicklung zu vermeiden.
- When installing please ensure that the unit is not exposed to any shocks or vibrations in order to avoid noise during operation.

- Die Befestigungsfläche muß eben und verwindungssteif sein.
- Gehäuseverspannungen sind unbedingt zu vermeiden.
- Das Reaktionsmoment ist mit einer Drehmomentstütze oder einem Gummipufferset abzufangen (keine starren Verschraubungen).
- An- und Abtriebselemente müssen mit einem Berührschutz ausgestattet werden.
- Die Aufstellung hat so zu erfolgen, daß der Zutritt von Frischluft und das Abströmen der Warmluft ungehindert erfolgen kann. Es ist verboten den Lüfterflügel und die Lüfterhaube zu entfernen bzw. den Motor in ein Gehäuse einzuschließen, da in beiden Fällen die Kühlluftzufuhr verringert wird. Dadurch würde der Motor überhitzt werden.

- The mounting surface should be even and torsionally rigid.
- Distortion of the gear case should also be avoided.
- Reduce reaction torque with a torque arm or a rubber buffer kit (no rigid joints).
- Input and output elements have to be equipped with a contact protection.
- When installing the motor, ensure that the intake is not obstructed and air can circulate freely. Do not remove the fan blade or cowl, or enclose the motor with a casing because in both cases there would not be enough air for cooling and the motor could overheat.

7.3.1 Getriebeentlüftung / Gear unit ventilation

Getriebe mit Entlüftungsschraube:

Ölablassschrauben sowie Entlüftungsschraube müssen frei zugänglich sein!

Die Entlüftungsschraube mit Transportsicherung ist an der der Bauform entsprechenden Position angebracht.

VORSICHT !

Aktivierung des Entlüftungsventil:

Das Entlüftungsventil ist vor Inbetriebnahme zu aktivieren, indem die Transportsicherung (Gummilasche) wie folgend beschrieben komplett entfernt werden muß.

Bild 2: Hinweisschild (rot) am Getriebe

Gear unit with vent plug:

Oil drain plugs and vent plugs must be fully accessible!

The vent plug with transport locking device is installed at the proper position for the mounting position.

ATTENTION !

Activating the vent valve:

The vent valve is to be activated before the unit is put into operation by completely demounting the transport protection (rubber clip) as described below.

Fig. 2: Information label (red) on the gear unit

Vor Inbetriebnahme Gummilasche komplett abreißen!

Remove the rubber clip completely before start up!

Getriebe ohne Entlüftungsschraube:

Getriebe in geschlossener Ausführung werden ohne Entlüftungsventil geliefert.

Dies gilt für folgende Getriebetypen:

- H. 40A,S, H. 41E; H. 50A,S,C, H. 51E; H. 55A,S,C;
- H. 60E,A,S,C; H. 65A,C
- A.. 46A; A.. 56A,S,C; A.. 66A,S,C
- K.. 40A; K.. 50A,C; K.. 60A,C

Gear drives lacking a vent plug:

Sealed-design gear drives are supplied without a vent plug.

This applies to the following gear unit types:

- H. 40A,S, H. 41E; H. 50A,S,C, H. 51E; H. 55A,S,C;
- H. 60E,A,S,C; H. 65A,C
- A.. 46A; A.. 56A,S,C; A.. 66A,S,C
- K.. 40A; K.. 50A,C; K.. 60A,C

7.3.2 Ölausgleichsbehälter / Lubricant expansion unit

VORSICHT !

Vor Inbetriebnahme muß der Ölausgleichsbehälter am Motorflansch mittels flexiblem Schlauch angeschlossen werden.
Dichtheit ist zu überprüfen!

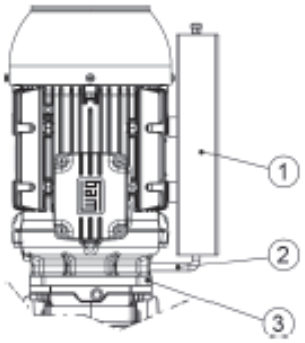
ATTENTION !

Before starting the gear unit the expansion unit must be connected to the motor flange with the flexible pipe.

Leakage test of the expansion unit!

Bild 3: Motor mit Ölausgleichsbehälter

Fig. 3: Motor with lubricant expansion unit



(1) Ölausgleichbehälter
(2) Flexibler Schlauch
(3) Motorflansch

(1) Lubricant expansion unit
(2) Flexible pipe
(3) Motor flange

7.3.3 Getriebe, Getriebemotor mit Rücklaufsperre / Gear unit, geared motor with backstop

Die Rücklaufsperre erlaubt den Betrieb in nur eine Drehrichtung. Die freie Drehrichtung ist durch einen Drehrichtungspfeil am Abtrieb des Getriebes bzw. auf der Lüfterhaube des Motors gekennzeichnet.

The backstop allows the operating in only one rotating direction. The free rotating direction is marked with a rotating direction arrow at the output of the gear or on the ventilation cover of the motor.

VORSICHT !

Ein Anlauf des Motors mit voller Leistungsaufnahme, entgegen der Sperrrichtung des Getriebes, führt zur Zerstörung oder Beschädigung der Rücklaufsperre.

Die freie Drehrichutng muß vor der Inbetriebnahme geprüft werden.

ATTENTION !

A start-up of the motor with full power consumption against the locking direction of the gear will lead to destruction or damage of the backstop.

The free rotating direction has to be checked before the start-up.

Getriebe mit Antriebswelleneinheit (WN) und integrierter Rücklaufsperre:

In der Antriebswelleneinheit WN (8), WN (11) und WN (13) kann optional eine Rücklaufsperre eingebaut werden.

Getriebemotor mit Rücklaufsperre am Motor:

Bei Getrieben mit Rücklaufsperre ist die Drehrichtung des E-Motors und des Netzes mit einem Messgerät zu ermitteln. Drehrichtungspfeil auf dem Gehäuse beachten! Bei Motoren, die 400/690 Volt gewickelt sind, kann die Drehrichtung durch kurzzeitigen Anlauf in Sternschaltung ermittelt werden.

Gear units with a input shaft unit (WN) and integrated back stop:

A backstop can be implemented optionally in the drive shaft unit WN (8), WN (11) and WN (13).

Geared motor with a backstop at the motor:

Using gears with backstop the rotating direction of the e-motor and the mains is to be detected with a meter. Mind the rotating direction arrow on the housing! On motors, which are winded 400/690 Volt, the rotating direction can be detected through a short-time start-up in star connection.

7.3.4 Getriebe mit Vollwelle / Gear unit with solid shaft

Die Abtriebswellen sind bis zu einem Durchmesser von 50mm nach Toleranzfeld ISO k6 und ab 55mm nach Toleranzfeld ISO m6 gefertigt.

Alle Abtriebswellen sind mit Zentriergewinden nach DIN 332 versehen, die zum Aufziehen von Übertragungselementen benutzt werden sollten.

Alle Abtriebswellen sind bei Lieferung mit einem Konservierungsmittel versehen, der mit einem üblichen Lösungsmittel zu entfernen ist.

VORSICHT !

- Das Lösungsmittel darf nicht an die Dichtlippen der Wellendichtringe kommen!
- Schläge und Stöße auf das Wellenende unbedingt vermeiden, da die Abtriebslagerung dadurch beschädigt werden kann.
- Mech. Antriebselemente die Radialkräfte auf die Abtriebswelle ausüben sind möglichst nah dem Abtriebslagern zu montieren!
- Aufgesetzte Übertragungselemente sollten gewuchtet sein und dürfen keine unzulässigen Radial- oder Axialkräfte hervorrufen (zulässige Werte siehe Katalog).

The output shafts are manufactured with a diameter of 50 mm in ISO k6 tolerance class and beginning at a diameter 55 mm in ISO m6 tolerance class.

All output shafts are equipped with DIN 332 tapped center holes that are used to tighten the transfer elements.

All output shafts are provided with a corrosion protection product upon delivery. This product must be removed with a conventional solvent.

ATTENTION !

- The solvent must not be allowed to come into contact with the shaft seals!
- Make certain to prevent all impacts and mechanical shocks on the end of the shaft since the output bearing system can be damaged.
- Mechaincal drive elements that apply radial forces to the output shaft must be installed as close as possible to the output shaft bearings!
- Add-on power transfer elements should balance and must not cause any unacceptable radial or axial forces (see Catalogue for acceptable values).

7.3.5 Montage und Demontage von Getrieben mit Hohlwelle / Installation and demounting of hollow-shaft gear units

VORSICHT !

Bitte beachten Sie bezüglich der Gestaltung der Kundenwelle die Konstruktionshinweise im aktuellen Getriebemotorenkatalog.

ATTENTION !

Concerning the design of the customer's shaft please mind the construction references in the latest geared motor catalogue.

Montage: (siehe Bild 4 bis 6, Seite 25)

Die Montage von Hohlwellengetrieben hat grundsätzlich so zu erfolgen, dass keine axialen Kräfte auf die Abtriebswellenlagerung entstehen.

1. Überprüfen Sie die Maschinewelle (3) auf eventuelle Schäden wie z.B. Kerben oder Aufstauchungen.
2. Reinigen Sie vor der Montage die kundenseitige Maschinenwelle (3) sorgfältig.
3. Vor dem Aufziehen des Hohlwellengetriebes auf die Maschinenwelle tragen Sie auf die Oberfläche der Maschinenwelle eine Schmierpaste (3) wie z.B. Klüber-Paste 46MR401 auf.
4. Ziehen Sie das Getriebe auf die Maschinenwelle auf (4, 5). Bei einer Kundenwelle ohne Anlageschulter wird ein Distanzrohr (7) benötigt
5. Setzen Sie das optional erhältliche Befestigungsset in die Hohlwelle ein und sichern Sie die Kundenwelle mittels der Befestigungsschraube (4) axial. Schrauben-Anzugsmoment siehe Seite 59.

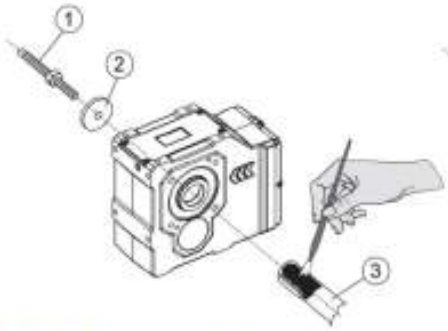
Assembling: (see Fig. 4 up to Fig. 6 on page 25)

The hollow-shaft gear units must always be installed in such a way that no axial forces are applied to the output shaft bearing system.

6. Check the machine shaft (3) on possible damages like e.g. notches or upsettings.
7. Clean the customer's machine shaft (3) thoroughly before the mounting.
8. Before tightening the hollow-shaft gear unit onto the machine shaft, paint the surface of the machine shaft with lubricating paste (3) such as Klüber Paste 46MR401.
9. Mount the drive onto the machine shaft (4, 5). A distance tube (7) is required for a customer's shaft without contact shoulder.
10. Implement the optional obtainable fixing set into the hollow shaft and secure the customer's shaft axial with the locking bolt (4). Screw tightening torque see page 59.

Bild 4:Aufziehen der Kundenwelle ohne oder mit Anlageschulter

Fig. 4: Tightening the customer shaft with or without contact shoulder



(1) Gewindestange + Sechskantmutter
(2) Druckscheibe
(3) Kundenseitige Maschinenwelle
(4) Befestigungsschraube DIN6912
(5) Spannscheibe
(6) Sicherungsring DIN472
(7) Distanzrohr (nicht im Lieferumfang)

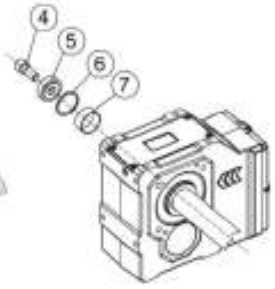
Teil (4), (5) und (6) sind sind im optional erhältlichen Befestigungsset GMBSBSD... enthalten.

Demontage:

1. Lösen Sie die Befestigungschraube (4). Entfernen Sie das komplette Befestigungsset und falls vorhanden das Distanzrohr (7).
2. Geben Sie die Druckscheibe (11), Abdrückmutter (10) und Sicherungsring (6) in die Hohlwelle.
3. Schrauben Sie die Befestigungsschraube (9) ein. Durch Anziehen der Schraube dücken Sie das Getriebe von der Maschinenwelle (3) ab.

Bild 5: Kundenwelle-Befestigung mittels Befestigungsset ohne Anlageschulter

Fig. 5: Mounting the customer shaft using a mounting set without a contact shoulder



(1) Threaded rod + hex nut
(2) Thrust washer
(3) Customer-side machine shaft
(4) Retaining screw DIN6912
(5) Tension disc
(6) Circlip DIN472
(7) Space tube (not included in items supplied)

Parts (4), (5) and (6) are included in the optional fixing kit GMBSBSD... .

Demounting:

1. Loosen the fixing bolt (4). Remove the complete fixing set and, if existing, the distance tube (7).
2. Put the pressure disc (11), jack nut (10) and circlip (6) into the hollow shaft.
3. Screw in the fixing bolt (9). Through tightening of the screw you are pressing the gear off the machine shaft (3).

Bild 6: Kundenwelle-Befestigung mittels Befestigungsset mit Anlageschulter

Fig. 6: Mounting the customer shaft using a mounting set with a contact shoulder

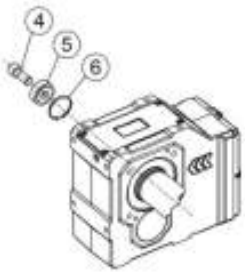
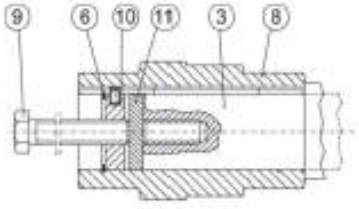


Bild 7:
Demontage der Kundenwelle mit oder ohne Anlageschulter

Fig. 7:
Demounting the customer shaft with or without contact shoulder



(3) Kundenwelle mit Zentriergewinde nach DIN332, Bl.2 Form DR
(6) Sicherungsring DIN 472
(8) Hohlwelle
(9) Befestigungsschraube (kundenbezogen, Länge der Schraube entsprechend der Maschinenwellenlänge)
(10) Abdrückmutter
(11) Druckscheibe

(3) Customer's shaft with tapped centre hole as per DIN332, sh.1
(6) Circlip DIN 472
(8) Hollow shaft
(9) Retaining screw DIN 933 (to customer specification, length according to machine shaft length)
(10) Jack nut
(11) Thrust washer

7.3.6 Montage und Demontage von Schrumpfscheiben / Installation and demounting of shrink disks

VORSICHT !

Die Schrumpfscheiben werden einbaufertig geliefert. Diese dürfen nicht vor dem erstmaligen Einbau zerlegt werden.
Das Anziehen der Spannschrauben ohne eingebaute Kundenwelle kann zu Verformung der Hohlwelle führen.

Montage (siehe Bild 8, Seite 27):

1. Entfernen Sie die eventuell vorhandene Abdeckkappe.
2. Lösen Sie die Spannschrauben (3) um einige Gewindegänge. Nicht ganze herausdrehen!
3. Entfetten Sie sorgfältig die komplette Hohlwellenbohrung (2, graue Fläche). Diese muß ABSOLUT fettfrei sein!
4. Entfetten Sie sorgfältig die Maschinenwelle (1, graue Fläche) im Klemmbereich der Schrumpfscheibe. Diese muß ABSOLUT fettfrei sein!
5. Schieben Sie die Schrumpfscheibe auf die Hohlwelle (2) bis der Aussenring der Schrumpfscheibe mit der Hohlwelle (2) bündig abschließt. Im Bereich des Schrumpfscheiben-Sitzes kann die Außenfläche der Hohlwelle (2) gefettet werden.
6. Führen Sie die entfettete Maschinenwelle (1) in die Hohlwelle (2) ein, so dass der Bereich der Schrumpfverbindung vollständig ausgenutzt wird.
7. Ziehen Sie die Spannschrauben (3) der Reihe nach im Uhrzeigersinn über mehrere Umläufe leicht an, damit die beiden Aussenringe (5) parallel zueinander gespannt werden. Die Spannschraubenanzahl hängt von der Schrumpfscheibenbaugröße ab.

VORSICHT !

Spannschrauben (3) nicht „ÜBER KREUZ" anziehen.

8. Ziehen Sie die Spannschrauben (3) mit einem Drehmomentschlüssel bis zu dem auf der Schrumpfscheibe angegebenen Anzugsdrehmoment (6) an. Nach dem Festziehen der Spannschrauben (3) muss zwischen den Aussenringen (5) ein gleichmäßiger Spalt vorhanden sein. Falls dies nicht gegeben ist, muss die Schrumpfscheibe nochmals neu montiert werden.

VORSICHT !

Nach erfolgter Montage ist die Hohlwelle bzw. die Maschinenwelle stirnseitig mit einem Strich (Stift) zu kennzeichnen, um ein Durchrutschen während der Inbetriebnahme (unter Last) zu erkennen.

ATTENTION !

The shrink discs are supplied ready to install. They must not be taken apart prior to the first installation. The tightening of the locking bolts without an implemented customer's shaft can lead to a deformation of the hollow shaft.

Assembling (see Fig. 8, page 27):

1. Remove the possibly existing cover cap.
2. Loosen the locking bolts (3) with just a few threads. Do not screw them out completely!
3. Thoroughly degrease the entire hollow shaft boring (2, grey area). It must be ABSOLUTELY free of grease!
4. Thoroughly degrease the machine shaft (1, grey area) in the clamping area of the shrink disc. It must be ABSOLUTELY free of grease!
5. Push the shrink disc onto the hollow shaft (2) until the outer ring of the shrink disc is flush with the hollow shaft (2). The outer part of the hollow shaft (2) can be greased in the area where the shrink disc is fitted.
6. Insert the degreased machine shaft (1) into the hollow shaft (2) so that the area of the shrink connection is fully used.
7. Slightly tighten the locking bolts (3) in sequence clockwise with several turns, so that both outer rings (5) are clamped parallel towards each other. The number of locking bolts depends on the size of the shrink disc.

ATTENTION !

Do not tighten the locking bolts (3) „CROSSED".

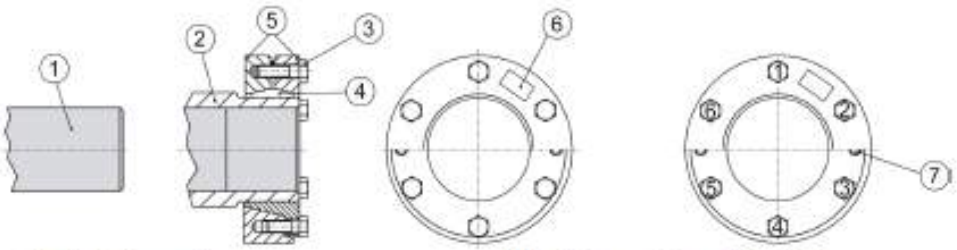
8. Tighten the locking bolts (3) with a torque key up to the indicated screwing torque (6) on the shrink disc. After the tightening of the locking bolts (3) there has to be an even gap between the outer rings (5). If it is not the case the shrink disc has to be mounted anew.

ATTENTION !

After installation you can sign the hollow shaft respectively the machine shaft with a marking (use a pencil) to detect a slipping during the initial operation (under load).

Bild 8: Hohlwelle mit Schrumpfscheibe

Fig. 8: Hollow shaft with shrink disc



(1) Kundenseitige Maschinenwelle
(2) Hohlwelle
(3) Spannschraube
(4) Innenring
(5) Außenring
(6) Anzugsdrehmoment der Spannschraube
(7) Abdrückgewinde

(1) Customer-side machine shaft
(2) Hollow shaft
(3) Locking screw
(4) Inner ring
(5) Outer ring
(6) Tightening torque of the locking screws
(7) Jack nut

Demontage:

1. Lösen Sie die Spannschrauben (3), gleichmäßig und der Reihe nach. Jede Spannschraube darf anfangs pro Umlauf nur etwa eine Viertel-Umdrehung gelöst werden. Die Spannschrauben nie ganz herausdrehen.
2. Drücken Sie mit Hilfe des Abdrückgewindes (7) den Innenring (4) ab. Rostansatz, der sich auf der Maschinenwelle vor der Hohlwelle gebildet haben könnte, muß zuvor entfernt werden.
3. Ziehen Sie die Schrumpfscheibe von der Hohlwelle (2) ab.

Schritt 2 ist nur bei der zweiteiliger Schrumpfscheiben-ausführung möglich !

Demounting:

1. Undo the locking screws (3) uniformly and in sequence. Only undo each locking bolt about a quarter turn initially. Do not remove the locking bolts completely.
2. Press the inner ring (4) off using the jack nut (7). Remove any rust beforehand that may have formed on the machine shaft in front of the hollow shaft.
3. Remove the shrink disc from the hollow shaft (2)

Step 2 only required for two-part shrink disk execution!

7.3.7 Montage von Abdeckkappe / Installation and demounting of protection cap

Abdeckkappen sind vor der Montage auf Transportschäden zu untersuchen. Beschädigte Abdeckkappen dürfen nicht verbaut werden, da sie möglicherweise schleifen können.

Alle Befestigungsschrauben sind zu verwenden und durch Benetzung mit Sicherungsklebstoff (mittelfest), zu sichern. Schrauben-Anzugsmoment siehe Seite 59.

Before being installed, the protection caps must be inspected for any damage that might have occurred during transport. Damaged protection caps must not be installed, since they can possibly cause abrasion.

All of the fixing bolts are to be used and secured by wetting them with a thread-locking adhesive (medium strength). See on page 59 for the bolt tightening torque.

Bild 9: Getriebe mit Hohlwellen-Abdeckkappe

Fig. 9: Protection cap for hollow shaft

(1) O-Ring bei den Getriebetypen
K.. 40. – K.. 110.
S.. 454. – S.. 609.

Bild 10: Getriebe mit Schrumpfscheiben-Abdeckkappe

Fig. 10: Protection cap for shrink disc hollow shaft

(1) O-ring at gear unit types
K.. 40. – K.. 110.
S.. 454. – S.. 609.

7.3.8 Montage von Normmotoren B5 (IEC 60072, DIN EN 50347) an den IEC-Adapter / Installation of standard motors B5 (IEC 60072, DIN EN 50347) on the IEC adapters

ATEX !

Es dürfen nur IEC - Motoren aufgebaut werden, die eine für die ATEX Zone ausreichende Kategorie gemäß Motortypenschild aufweisen. Bei Getrieben der ATEX - Kategorie 2D muss der Motor mindestens die Schutzart IP6x haben.

Wir liefern IEC Adapter der Baugrößen 100/112 und 132 auch mit einer integrierten spielfreien Klauenkupplung (IAK) aus (siehe Bild 12, Seite 29). Die IEC – Adapter sind öldicht ausgeführt, die Abdichtung der Schnittstelle erfolgt zwischen Getriebe und Adapter.

Montageablauf eines IEC-Normmotors (B5) an den IEC-Adapter IA63 bis IA132:

1. Reinigen Sie die Motorwelle und die Flanschflächen von Motor und Adapter und überprüfen Sie diese auf Beschädigungen.
2. Benetzen Sie die Motorwelle vor der Montage mit Schmierpaste wie z.B. Klüberpaste 46 MR 401.
3. Benetzen Sie die Befestigungsschrauben (1) mit Sicherungsklebstoff (mittelfest).
4. Setzen Sie danach den Motor auf den Adapter und ziehen Sie die Schrauben (1) (nicht im Lieferumfang) mit dem entsprechenden Moment an. Schrauben mit einer Mindestfestigkeit 8.8 verwenden. Schrauben-Anzugsmoment siehe Seite 59.

ATEX !

Only IEC motors that have a sufficient rating for the ATEX zone per the motor nameplate may be installed. With ATEX category 2D gear units, the motor must be at least protection type IP6x.

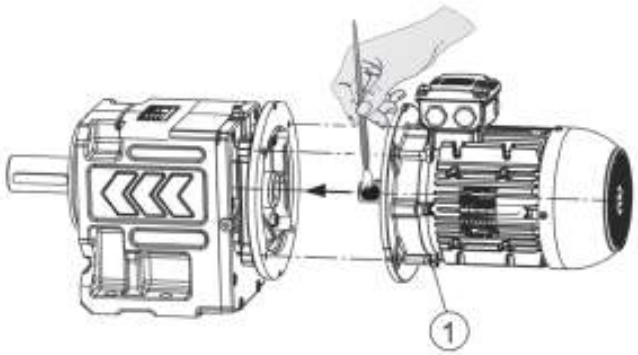
We supply also IEC adapters in sizes 100/112 and 132 with an integrated, play-free claw coupling (IAK, see Fig. 12, page 29). The IEC adapters have an oil-tight design, with the interface being sealed between the gears and the adapter.

Assembly procedure for IEC standard motor (B5) on the IEC Adapter IA63 up to IA132:

1. Clean the motor shaft and the flange surfaces of the motor and adapter and check for damage.
2. Before installing, wet the motor shaft with lubrication paste, such as Klüber Paste 46 MR 401.
3. Wet the retaining screws (1) with thread-locking adhesive (medium strength).
4. Then place the motor on the adapter and tighten the bolts (1) (not included) to the specified torque.Use bolts with minimum property class 8.8. See on page 59 for the bolt tightening torque.

Bild 11:
Prinzipdarstellung Montage Normmotor an IEC-Adapter

Fig. 11:
Exposition for assembling standard motors on an IEC adapter



(1) Befestigungsschraube

(1) Retaining screw

watt drive WEG Group

Montageanleitung für MAS® - Getriebe und Getriebemotoren
Mounting Instruction for MAS® - Gear units and geared motors

Montageablauf eines IEC - Normmotors (B5) an den IEC – Adapter mit Klauenkupplung IAK100, IAK112, IAK132, IAK160, IAK180, IAK200 und IAK225:

Bei der Montage der mitgelieferten Kupplungshälfte auf die Motorwelle ist auf die richtige Einbaulage zu achten. Die Kupplungshälfte ist dabei bündig auf die Motorwelle zu montieren (siehe Bild 12 auf der Seite 29).

1. Entfernen Sie die Abdeckung des Adapters (1) und entnehmen Sie die beiliegende Kupplungshälfte (3).
2. Reinigen Sie die Motorwelle (2) und die Flanschflächen von Motor und Adapter.
3. Erwärmen sie die Kupplungshälfte (3) auf ca. 80°C (176°F) und montieren Sie diese auf die Motorwelle.
4. Montieren Sie die Kupplungshälfte dabei bündig Wellenspiegel mit Ende der Bohrung (siehe Bild!).
5. Sichern Sie die Passfeder (4) und die montierte Kupplungshälfte mittels Gewindestift (5) mit dem angegebenen Anzugsdrehmoment TA (M5 → ca. 2,5Nm, M8 → ca. 10Nm). Verwenden Sie dazu Schraubensicherungsmittel „mittelfest".
6. Kontrollieren Sie den korrekten Sitz der Kupplungshälfte.
7. Die Kontaktfläche zwischen Motor und Adapter ist mit geeignetem Dichtmittel (anaerobe Flächendichtung wie z.B. Loctite 510 oder Silikon wie z.B. Terostat 9140 abzudichten. Dies gilt nur bei Anbau von Motoren nach ATEX.
8. Montieren Sie den Motor an den Adapter, die Kupplungsklauen müssen beidseitig in den Kupplungsstern (6) eingreifen.
9. Befestigen Sie den Motor mit den geeigneten Befestigungsschrauben (nicht im Lieferumfang) am Adapter. Schrauben-Anzugsmoment siehe Seite 59. Festigkeitsklasse mindestens 8.8.

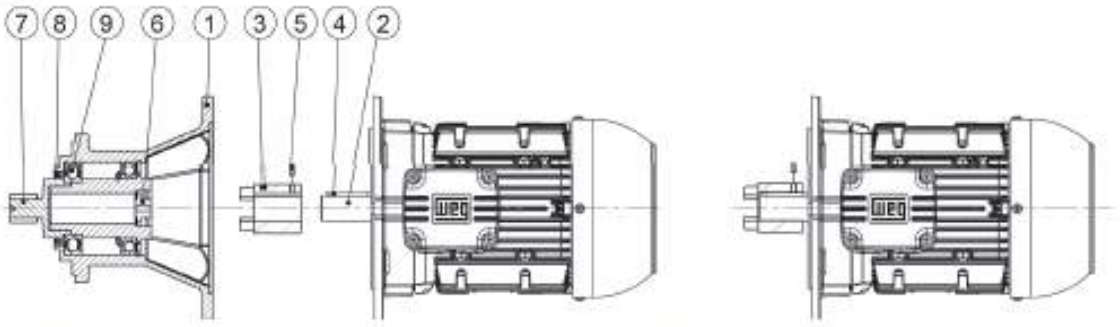
Assembly procedure for IEC standard motor (B5) on the IEC adapter with claw coupling IAK100, IAK112, IAK132, IAK160, IAK180, IAK200 and IAK225:

The correct assembly position must be observed when fitting the half coupling supplied onto the motor shaft. The half coupling should be fitted flush to the motor shaft (see figure 12 on page 29).

1. Remove the adapter cover (1) and remove the half coupling provided (3).
2. Clean the motor shaft (2) and the flange surfaces on the motor and adapter.
3. Heat the half coupling (3) to approx. 80°C (176°F) and fit onto the motor shaft.
4. The half coupling is fitted flush to the shaft panel with the end of the bore hole (see diagram!).
5. Secure the key (4) and the fitted half coupling using a set pin (5) using the specified tightening torque TA (M5 → approx. 2.5Nm, M8 → approx. 10Nm). Use a "medium-tight" screw locking adhesive for this purpose.
6. Check that the half coupling is seated correctly.
7. The contact surface between the motor and adapter must be sealed with anaerobic sealant e. g. Loctite 510 or silicone e. g. Terostat 9140. This assembling step is only valid for ATEX applications.
8. Fit the motor onto the adapter; the coupling claws must engage with the coupling star (6) on both sides.
9. Fasten the motor onto the adapter using the appropriate fastening screws (observe screw tightening torques on page 59, minimum strength class 8.8).

Bild 12:
Montage eines IEC – Motors an einen Kupplungsadapter (IAK)

Fig. 12:
Installing an IEC motor on the coupling adapter (IAK)



(1) Adapter
(2) Motorwelle
(3) Kupplungshälfte
(4) Passfeder
(5) Gewindestift
(6) Kupplungsstern
(7) Ritzel
(8) Wellendichtring
(9) Lager

(1) Adapter
(2) Motor shaft
(3) Half coupling
(4) Key
(5) Set pin
(6) Coupling star
(7) Pinion
(8) Seal ring
(9) Bearing

7.3.9 Montage von Servo-Motoren an den Servo-Adapter / Installation of servo motors on the SERVO adapter

Bei Motoren mit Passfeder wird durch Klemmung das für die Montage notwendige Spiel auf 0 reduziert. Je nach Motorwellendurchmesser wird eine entsprechende Adapterwelle (6) verwendet.

Bei Motoren mit glatter Welle wird durch einen Klemmring (3) die notwendige Kraft zum Übertragen des Motordrehmoments erzeugt, wobei der Anbau verschiedener Motorwellendurchmesser mittels geschlitzten Klemmbuchsen (5) realisiert wird.

Rundlauf der Wellenenden, Koaxialität und Planlauf der Befestigungsflansche „N" (normal) entsprechend DIN 42955.

Zentrierdurchmesser der Motorflansche nach DIN EN 50347, Motorwelle nach DIN 748.

If motors with key are used, the necessary gap for the motor assembling, is reduced to 0, if the screw on the adapter input is fixed. According to the motor shaft diameter a suitable adapter shaft (6) is used.

For motors with smooth motor shaft the necessary circular force between the motor and the adapter shaft (6), which transmits the motor torque, is generated by a clamping ring (3). The assembling of different motor shaft diameters is made by slotted clamping bushes (5).

Normal shaft run- out and concentricity according to DIN 42955 for motor shafts and flanges are sufficient. The centering diameter of the motor flanges according to DIN EN 50347, the motor shaft according to DIN 748.

Bild 13: Ansicht Servoadapter mit Passfeder.

Fig. 13: View servo adapter with key

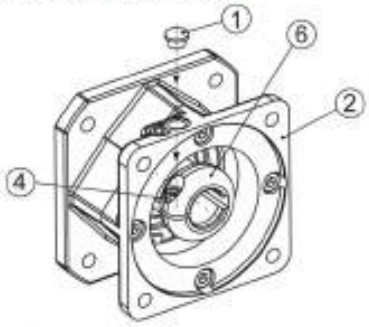
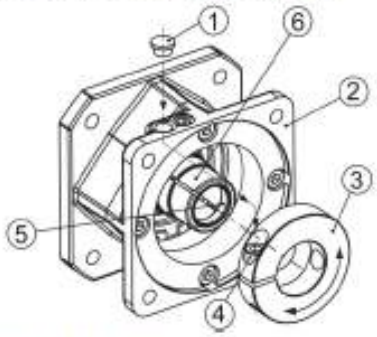


Bild 14: Ansicht Servoadapter mit glatter Welle.

Fig. 14: View servo adapter with smooth shaft.



Anbau des Motors:

1. Reinigen Sie die Motorwelle mit einem fettlösenden Mittel. Diese muß absolut FETTFREI sein.
2. Entfernen Sie den Kunststoffstopfen (1) aus der Montagebohrung des Adaptergehäuses (2).
3. Richten Sie die Adapterwelle (6) bzw. Klemmring (3) so aus, dass das Verlängerungsstück des Drehmomentschlüssels in der Klemmschraube (4) einrastet.
4. Setzen Sie den Motor auf das Adaptergehäuse (2). Die vertikale Montage sollte wegen ungünstigen Verlagerungen bevorzugt werden. Achtung: Die Motorwelle nicht verkanten !
5. Schraube Sie den Motor am Adaptergehäuse (2) fest.
6. Ziehen Sie die Klemmschraube (4) des Servoadapters mittels Drehmomentschlüssel mit dem entsprechenden Anzugsmoment M_A nach Tabelle 4 an.
7. Verschließen Sie die Montagebohrung mittels Kunststoffstopfen (1).

Assembling of the motor:

1. Clean the motor shaft, it has to be absolutely grease - free.
2. Remove the plastic plug (1) out of the mounting hole of the adapter housing (2).
3. Align the adapter shaft (6) respectively the clamping ring (3), the extension of the torque spanner has to click into place in the clamping screw (4).
4. Fix the motor to the adapter housing (2). Prefer the vertical assembling. Attention: Don't tilt the motor shaft !
5. Screw the motor in place.
6. Tighten the clamping screw (4) with the torque spanner, tightening torque M_A Table 4.
7. Close the mounting hole of the adapter housing with the plastic plug (1).

⚠ VORSICHT !

Die Motordemontage ist nur in einer Rotorwellenposition des Motors möglich!

⚠ ATTENTION !

The motor disassembling can only be done in one rotor position!

Tabelle 4:
Erforderliche Anzugsmoment M_a der Klemmschraube für Servoadapter mit und ohne Paßfeder:

Table 4:
Requried tightening torque M_a for the clamping screw of the servo adapter with key and with smooth shaft:

Klemmschraube Clamping screw	„s"	M_a [Nm]
M6	5	9,5
M8	6	20
M10	8	48
M12	10	94

7.3.10 Montage von Drehmomentstützen / Installation of torque arms

VORSICHT !

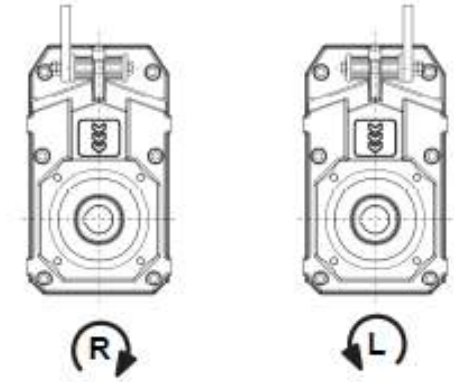
Drehrichtung der Hohlwelle beachten!

Die Urelastfedern des Gummipuffersets sind in der Hauptarbeitsdrehrichtung auf Druck zu beanspruchen!

Empfohlene Vorspannung der Urlelastfeder 3mm pro Puffer.

Bild 15: Aufsteckgetriebe

Fig. 15: Shaft mounted gear unit



R ... Rechtslauf / Clockwise

L ... Linkslauf / Counterclockwise

ATTENTION !

Pay attention to the direction of rotation of the hollow shaft!

The Urelast springs in the rubber buffer set are to be loaded under compression in the main working direction of rotation!

Recommended pre loading 3mm per Urelast spring.

Bild 16: Stirnradschneckengetriebe

Fig. 16: Helical worm gear unit

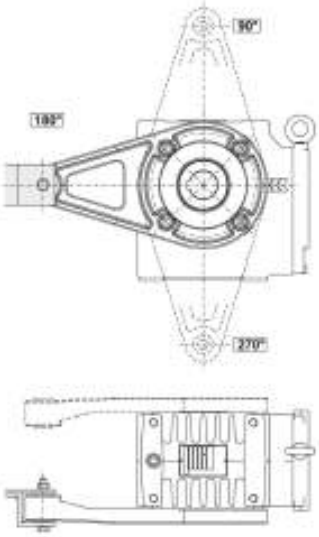


Bild 17: Kegelstirnradgetriebe
(*) . . . Buchse muß beidseitg gelagert werden.
K.. 40. - K.. 77.

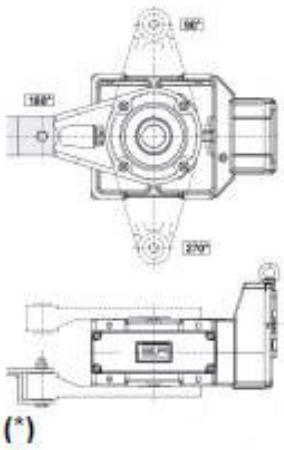
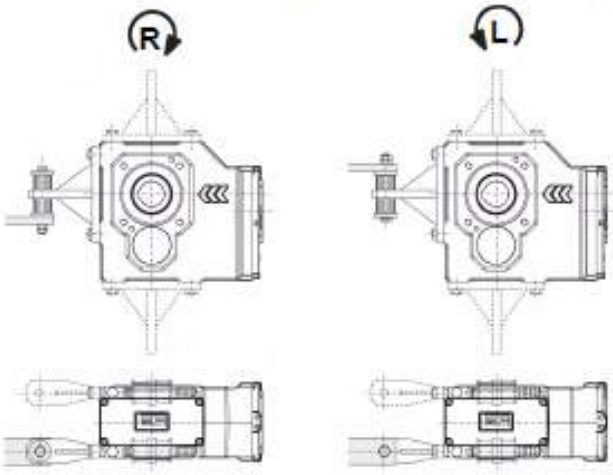


Fig. 17: Helical bevel gear unit
(*) . . . Bushing must have bearings on both sides.
K.. 80. - K.. 139.



8 Checkliste – Getriebe / Check list – Gear unit

Vor Inbetriebnahme des Getriebes ist zu überprüfen:

		Informationen siehe Kapitel	Geprüft
	Untersuchen Sie die Lieferung sofort nach Erhalt auf etwaige Transportschäden. Die Inbetriebnahme ist ggf. nicht durchzuführen.		
	Entspricht die Bauform auf dem Typenschild der tatsächlichen Einbaulage?	3.1, 15	
	Ist das Entlüftungsventil an der richtigen Stelle (der Bauform entsprechend) montiert und frei zugänglich?	15	
	Ist das Entlüftungsventil aktiviert (Gummilasche entfernt)?	7.3.1	
	Wurde bei einer Schrumpfscheibenausführung die Verbindung geprüft?	7.3.6	
	Wurde die freie Drehrichtung bei Verwendung einer Rücklaufsperre überprüft?	7.3.3	
	Ist bei drehenden Teilen der Berührschutz angebracht?		
⟨Ex⟩	Stimmen die folgenden Angaben auf dem Typenschild des Getriebes mit dem zulässigen Ex-Einsatzbereich vor Ort überein? – Gerätegruppe, - Ex-Kategorie, - Atmosphäre, - Temperaturklasse, - maximale Oberflächentemperatur	3.1	
⟨Ex⟩	Ist sichergestellt, dass bei der Montage des Getriebes keine explosionsfähige Atmosphäre, Öle, Säuren,Gase, Dämpfe oder Strahlungen vorhanden sind?	7.1	
⟨Ex⟩	Ist sichergestellt, dass die Getriebe ausreichend belüftet werden und kein externer Wärmeeintrag (z. B. über Kupplungen) vorhanden ist? Die Kühlluft darf eine Temperatur von 40°C nicht überschreiten.	7.1	
⟨Ex⟩	Haben alle An- und Abtriebselemente eine ATEX - Zulassung?	7.1	
⟨Ex⟩	Hat der Motor eine entsprechende ATEX- Zulassung?	7.3.8	

Check the following before starting up the gear unit:

		Informations see chapter	checked
	Inspect the shipment immediately after reception for any transport damages. In some cases, it may not be advisable to start up the unit.		
	Does the mounting position on the nameplate correspond to the actual mounting position ?	3.1, 15	
	Is the vent plug located at the correct location (in compliance with the installation position) and freely accessible?	15	
	Is the vent plug activated (rubber flap removed)?	7.3.1	
	In the case of a shrink disc version: has the expansion been checked?	7.3.6	
	Has the free rotating direction been checked when using a backstop?	7.3.3	
	Is protection provided around rotating parts to prevent personnel from coming into contact with them?		
⟨Ex⟩	Do the data on the nameplate of the drive unit agree with the local explosion usage area on the drive unit nameplate? - Instrument group, - Ex-category, - Atmosphere, - Temperature class, -Maximum surface tension	3.1	
⟨Ex⟩	Has it been ascertained that no atmosphere is capable of exploding, oils, acid, gases, vapors, or radiation are present when the gear unit is being installed?	7.1	
⟨Ex⟩	Has it been ascertained that the gear unit is adequately ventilated and that no outside source of heat can be transferred into the unit (for example via clutches)? The cooling air must not exceed a temperature of 40°C.	7.1	
⟨Ex⟩	Do all input and output elements have an ATEX approval?	7.1	
⟨Ex⟩	Does the motor have a corresponding ATEX approval?	7.3.8	

9 Checkliste – Motor / Check list – Motor

Vor Inbetriebnahme des Motors ist zu überprüfen:

	Informationen siehe Kapitel	Geprüft
Stimmt die Netzspannung und Frequenz mit den angeführten Daten am Motorleistungsschild überein?		
Wurden alle Anschlüsse ordnungsgemäß ausgeführt (Motoranschluss, Erdungsleiter,...)? Ist der Motoranschluss ident mit dem beiliegendem Schaltbild?	7.2.3	
Stimmt die Drehrichtung des Motors/Getriebemotors?	10.2	
Wurde die freie Drehrichtung bei Verwendung einer Rücklaufsperre überprüft?	7.3.3	
Anschlusskasten staub- und wasserdicht verschlossen?	7.2.1	
Motorschutzschalter installiert?	10.1	
Sind alle Motorschutzeinrichtungen aktiv und auf den Bemessungsstrom des Motors eingestellt ?		
Isolationswiderstand überprüft?	7.2.2	
Optionale Stillstandsheizung ausgeschalten?	17.1	
Optionale Fremdlüftung an eine externe Stromversorgung angeschlossen?	17.3	

Check the following before starting up the motor:

	Informations see chapter	checked
Check that the mains voltage and frequency correspond to the data on the motor rating plate?		
All connections have been made properly (motor connection, ground conductor,...)?	7.2.3	
Is the direction of rotation of the motor/geared motor correct?	10.2	
Has the free rotating direction been checked when using a backstop?	7.3.3	
Is the terminal box dust and watertight?	7.2.1	
Is a motor circuit breaker installed?	10.1	
Is all motor protection equipment active and set for the rated motor current?		
Has the insulation resistance been checked?	7.2.2	
Optional anti-condensation heating is switched off?	17.1	
Optional forced cooling is connected to an external power supply?	17.3	

10 Inbetriebnahme / Startup

10.1 Elektrischer Anschluss des Motor / Electrical connecting the motor

Netzspannung und -frequenz müssen mit den Daten auf dem Tpyenschild übereinstimmen. Spannungsabweichungen von ± 5% und/oder Frequenzabweichungen von ± 2% sind zulässig.

VORSICHT !

Der Anschluss des Motors erfolgt nach dem Anschluss-Schaltbild, welche dem Motor im Anschlusskasten beigefügt sind.

Das Schaltbild der Motorserie 3A, 3B und 3C finden Sie auch in dieser Betriebsanleitung auf der Seite 52. Es muss eine dauerhaft sichere, elektrische Verbindung aufrecht erhalten werden (keine abstehenden Drahtenden); zugeordnete Kabelendbestückung verwenden.

VORSICHT !

Ein Motorschutzschalter bzw. ein Schutz mit Überstromrelais zum Schutz der Motorwicklungen sollte installiert werden. Schmelzsicherungen schützen den Motor nicht vor Überlastungen sondern lediglich die Netzzuleitungen oder Schaltanlagen gegen Schäden bei Kurzschluss.
Vor jedem Einschalten muss sichergestellt sein, dass die optionale Stillstandsheizung ausgeschaltet wird.

The mains voltage and the mains frequency must match the data on the nameplate. Voltage deviations of ± 5% and/or frequency deviations of ± 2% are allowable.

ATTENTION !

Connect the motor only as shown in the wiring diagram included in the terminal box of the motor.

The wiring diagram for the motor series 3A, 3B and 3C is available in this manual on page 52. Connections must be made in such a way as to ensure that a permanently safe electrical connection is maintained (no protruding wire ends); use the corresponding cable end pieces.

ATTENTION !

A motor circuit breaker or contactor with an overcurrent relay should be installed to prevent the motor winding from burning out. Fuses do not stop the motor overloading, but merely protect the power cables or switchgear from damage in the event of a short circuit. Before energizing the motor, always make sure that the optional anti-condensation heating is switched off.

10.2 Drehrichtung / Direction of rotation

Standardmäßig sind die Motoren für Rechts- und Linkslauf geeignet. Wenn die Netzleitungen mit der Phasenfolge L1, L2, L3 an U1, V1, W1 angeschlossen werden, ergibt sich Rechtslauf (Blick auf antriebsseitiges Wellenende).

Werden zwei Anschlüsse vertauscht, ergibt sich Linkslauf (z.B. L1, L2, L3 an V1, U1, W1).

The standard motors are suitable for clockwise and counter-clockwise rotation. Connection of the power cables in the phase sequence L1, L2, L3 to U1, V1, W1 results in clockwise rotation (looking at the shaft end on the drive side).

If two connections are interchanged, this results in counterclockwise rotation (e.g. L1, L2, L3 to V1, U1, W1).

10.3 Ölstand des gelieferten Getriebes / Oil level in the gear unit as delivered

VORSICHT !

Der bauformgerechte Ölstand wird werksseitig ausgeführt. Genaue Ölfüllmenge siehe Getriebe-Typenschild.

Antriebe, welche ohne Ölfüllung bestellt werden, kommen mit Innenkonservierung zur Auslieferung. Die Innenkonservierung der Getriebe erfolgt mit Korrosionsschutzöl. Das Konservierungsöl ist auf jeden Fall mit der am Typenschild angegebenen Öltype mischbar, sodass die Getriebe vor der Befüllung nicht ausgespült werden müssen.

ATTENTION !

The proper oil level for the mounting position is designed by the plant. See gear unit nameplate for the precise amount of oil to add.

Gear units that are ordered without oil filling are supplied with internal rust proofing consisting of anti-corrosion oil. The anti-corrosion oil can however be mixed with the recommended lubricant indicated on the nameplate. This means that the unit does not have to be flushed before filling with oil.

VORSICHT !

Ein Bauformenwechsel darf nur nach vorheriger Rücksprache mit dem Hersteller erfolgen.

Im Fall einer Öffnung des Getriebes z.B.: wegen einer Reparatur, ist es notwendig, dass das Getriebe vor der Inbetriebnahme wieder gemäß den Angaben auf dem Typenschild mit dem richtigen Schmierstoff, in der richtigen Menge befüllt wird. Schmierstoffe siehe Seite 41.

ATTENTION !

A change in the mounted position must not be made before consulting the producer.

If the gear unit is opened, for example: to make repairs, it must be filled with the correct lubricant in the correct amount as stated on the nameplate before being put back into service. For lubricants, see on page 41.

11 Betrieb / Operation

Während des Betriebs unter maximaler Belastung ist das Getriebe zu prüfen auf:

- ungewöhnliche Geräusche
- Vibrationen und ungewöhnliche Schwingungen
- Rauchbildung
- Undichtheit
- Bei Schrumpfscheibenausführungen: Nach dem Entfernen der Abdeckkappe ist zu prüfen, ob eine Relativbewegung zwischen Hohlwelle und Maschinenwelle stattgefunden hat. Anschließend ist die Abdeckhaube wieder zu montieren.
- Maximale Gehäuseoberflächentemperatur 90°C.

Gehäuseoberflächentemperatur:

Die Oberflächentemperatur ist während des Betriebs im maximalen Belastungszustand zu messen. Die max. Oberflächentemperatur ist nach ca. 3 Stunden erreicht und darf **90°C** nicht überschreiten.

Die Messung der Oberflächentemperatur ist mit handelsüblichen Temperaturmessgeräten durchzuführen.

VORSICHT !

Der Antrieb muss stillgesetzt werden, wenn bei der Kontrolle der Getriebe Auffälligkeiten hinsichtlich der oben angeführten Punkte festgestellt wurden. Es ist Rücksprache mit dem Hersteller zu halten.

During the operation, the gear unit must be tested under maximum load for:

- unusual noises
- vibrations and unusual oscillations
- smoke formation
- Leaks
- With shrink disc types: After demounting the cover cap, check whether any relative movement has occurred between the hollow shaft and the machine shaft. Then reinstall the cover guard.
- Maximum gear housing temoperature 90°.

Gear housing temperature:

During the operation, the surface temperature must be measured in the maximum operating condition. The max. surface temperature is reached in about 3 hours, and it must not exceed **90°C**.

The surface temperature shall be measured with standard commercially available temperature-measuring instruments.

ATTENTION !

The drive must be shut down if any abnormalities relative to the items listed above have been noted upon inspection. Contact the producer.

12 Betriebsstörungen / Malfunction

Bei benötigter Hilfe bitte folgende Angaben bereithalten:

- Typenschilddaten
- Art der Störung
- Zeitpunkt und Begleitumstände der Störung
- Mögliche Ursache

VORSICHT !

Unsachgemäße Arbeiten am Getriebe oder Motor können zu Schäden führen. Sollten Störungen am Getriebe bzw. Getriebemotor auftreten, muss der Antrieb sofort stillgesetzt werden !

Please provide the following information if help is needed:

- Data from the nameplate
- Type of problem
- Time the problem occurred and circumstances accompanying the problem
- Possible cause

ATTENTION !

Incorrect work on the gear or motor can lead to damages. Should errors emerge at the gear or gearbox, the drive has to be stopped immediately!

watt drive WEG Group	Montageanleitung für MAS® - Getriebe und Getriebemotoren Mounting Instruction for MAS® - Gear units and geared motors

Mögliche Störungen am Getriebe:

Störung	Mögliche Ursache	Beseitigung
Ungewöhnliche, gleichmäßige Laufgeräusche.	Lagerschaden, Verzahnungsschaden	Rücksprache mit dem Hersteller.
Ungewöhnliche, ungleichmäßige Laufgeräusche.	Fremdkörper im Öl.	Ölwechsel durchführen.
Bewegungen des Getriebes beim Einschalten.	Getriebebefestigung hat sich gelockert.	Befestigungsschrauben, - muttern mit vorgeschriebenem Drehmoment anziehen. Beschädigte Befestigungsschrauben, - muttern austauschen.
	Gummipufferset bei Drehmomentstütze nicht vorgespannt bzw. beschädigt.	Gummipufferset korrekt vorspannen bzw. beschädigtes Gummipufferset austauschen.
Getriebe wird zu warm (Getriebeoberflächentemp. > 90°C).	Zu viel Öl.	Ölfüllmenge korrigieren.
	Getriebeschaden (Verzahnung, Lagerung)	Rücksprache mit dem Hersteller.
	Entlüftungsventil defekt.	Entlüftungsventil austauschen.
Ölaustritt am Getriebe oder Motor.	Dichtung defekt.	Dichtungen kontrollieren, ggf. auswechseln.
	Getriebe nicht entlüftet.	Transportsicherung am Entlüftungsventil entfernen.
Ölaustritt am Entlüftungsventil.	Zu viel Öl.	Ölfüllmenge korrigieren.
	Getriebe wird in falscher Bauform betrieben.	Entlüftungsventil an die korrekte Position montieren. Ölfüllmenge der Bauform entsprechend anpassen.
	Entlüftungsventil defekt.	Entlüftungsventil austauschen.
Getriebeabtriebswelle dreht sich nicht obwohl Motor läuft bzw. Antriebswelle gedreht wird.	Bruch im Getriebe oder Wellen-Narbenverbindung unterbrochen.	Rücksprache mit dem Hersteller.
	Schrumpfscheibenverbindung rutscht durch.	Schrumpfscheibenverbindung kontrollieren.

Possible malfunctions on the gear unit:

Malfunction	Possible Cause	Settling
Unusual, even operating noise.	Bearing damage, gearing damage.	Consult the producer.
Unusual, uneven operating noise.	Foreign object in the oil.	Perform an oil change.
Movement of the gear unit during switch-on.	Gear unit fixation has loosened.	Tighten the fixing bolts, - nuts with prescribed screwing torque. Change damaged fixing bolts, - nuts.
	Rubber buffer set at the torque support is not pre-stressed or damaged.	Pre-stress the rubber buffer set correctly or change the damaged rubber buffer set.
Gear unit gets too warm (Gear surface temp. > 90°C).	Too much oil.	Correct the oil fill capacity.
	Gear unit damage (gearing, bearing).	Consult the producer.
	Vent plug is defective.	Change the vent plug.
Oil leakage at the gear unit or motor.	Gasket is damaged.	Check gaskets, change them if necessary.
	Gear unit is not ventilated.	Remove the transport lock at the vent plug.
Oil leakage at the vent plug.	Too much oil.	Correct the oil fill capacity.
	Gear unit is operated with the wrong type.	Mount the vent plug at the correct position. Adjust the oil fill capacity according to the type.
	Vent plug is defect.	Change the vent plug.
The gear unit output shaft does not turn though the motor runs or the drive shaft is being turned.	Breakage in the gear unit or shaft hub connection disrupted.	Consult the producer.
	Shrink disc connection slips through.	Check the shrink disc connection.

13 Inspektion und Wartung / Inspection and maintenance

Getriebe der Baureihen H, A, F, K in den Größen 40, 41, 50, 51, 55, 60, 65 werden **wartungsfrei** ausgeführt, es ist kein Wechsel des Schmiermittels erforderlich. Diese Antriebe werden **ohne Entlüftungsventil** ausgeführt, es gibt keine Ölablass-, Ölstands- bzw. Ölbefüllschrauben.

Gear units of the model range H, A, F, K, size 40, 41, 50, 51, 55, 60, 65 are **maintenance-free**, an oil change is not neoessary. The gear units are executed **without vent plug**, there are no oil drain-, oil level respectively oil filling screws.

watt drive WEG Group

Montageanleitung für MAS® - Getriebe und Getriebemotoren
Mounting Instruction for MAS® - Gear units and geared motors

Bei Getrieben der Baureihen H, A, F, K und C in den Größen 70, 75, 80, 86, 110, 111, 130, 131, 133, 136, 137, 139 und bei allen Stirnradschneckengetrieben Baureihe S ist entsprechend den **Wartungsintervallen ein Schmierstoffwechsel** durchzuführen. Diese Getriebe sind für die Hauptbauformen mit entsprechenden Ölablass- bzw. Ölbefüllschrauben ausgestattet.

Bei Sonderausführungen unter erschwerten/aggresiven Umgebungsbedingungen Öl öfters wechseln!

In the case of gear units of model range H, A, F, K and C size 70, 75, 80, 86, 110, 111, 130, 131, 133, 136, 137, 139 and all helical worm gear units, an **oil change** has to be executed corresponding to the **maintenance periods**. The gear units are executed with oil drain-, respectively oil filling screws for the main mounting positions.

For special applications under difficult/aggressive ambient conditions an oil change has to be done frequently!

13.1 Inspektions- und Wartungsintervalle / Inspection and maintenance intervals

Zeitintervall	Inspektions- und Wartungsarbeit
monatlich	▪ Getriebe auf Geräuschveränderungen (Laufgeräusche der Verzahnung und der Wälzlager) kontrollieren ▪ Gehäusetemperatur kontrollieren (max. 90°C, 194°F) ▪ Sichtkontrolle der Dichtungen auf Leckage (Ölaustritt) ▪ Sichkontrolle Ölschauglas im Rührwerksflansch ▪ Staubablagerungen entfernen
alle 3 Monate	Entlüftungsventil äußerlich reinigen
halbjährlich	▪ Gummipuffer überprüfen ▪ Befestigungsschrauben auf festen Sitz kontrollieren
jährlich	▪ Lagerung in Rührwerksflansch nachfetten
Alle 5.000 Betriebsstunden, spätestens alle 4 Jahre	▪ Sichtprüfung der Wellendichtringe auf Leckage; gegebenenfalls Wellendichtringe tauschen
alle 10.000 Betriebsstunden, spätestens alle 5 Jahre	▪ Ölwechsel: Stirnradgetriebe H. 70. - H. 136. Flachgetriebe F.. 111. - F.. 137. Aufsteckgetriebe A.. 76. - A.. 86. Kegelstirnradgetriebe K.. 70. - K.. 139. Kegelflachgetriebe C.. 70. - C.. 130.
alle 20.000 Betriebsstunden, spätestens alle 5 Jahre	▪ Ölwechsel: alle Stirnradschneckengetriebe
alle 10 Jahre	▪ Generalüberholung
regelmässig nach Bedarf (abhängig von äußeren Einflüssen)	▪ Bremsluftspalt überprüfen ▪ Lüfterrad des Motors reinigen

Time interval	Inspection and maintenance work
monthly	▪ gear units must be checked for noise changes (running noise of the gearing and rolling bearings) ▪ Check the housing temperature (max. 90°C, 194°F) ▪ Visible inspection of seals for leakage (Oil leakage) ▪ Visible inspection of oil level gauge in the agitator flange ▪ Remove dust deposits
every 3 months	▪ Clean the exterior of the vent plug
every half year	▪ Check the rubber buffer set ▪ Check the fixing bolts to make certain they are tight
annually	▪ Grease the bearing in the agitator flange
every 5.000 service hours, no later than every 4 years	▪ Visual check of the shaft seals; if applicable replace the shaft seals
every 10.000 service hours, no later than every 5 years	▪ Oil change: Helical gear unit H. 70. - H. 136. Parallel shaft gear unit F.. 111. - F.. 137. Shaft mounted gear unit A.. 76. - A.. 86. Helical bevel gear unit K.. 70. - K.. 139. Angle parallel shaft gear unit C.. 70. - C.. 130.
every 20.000 service hours, no later than every 5 years	▪ Oil change: All helical worm gear units
every 10 years	▪ General recovery
Regularly on demand (depending on outside influences)	▪ Check the air gap ▪ Clean the fan wheel of the motor

13.2 Inspektions- und Wartungsarbeiten Getriebe / Inspection and maintenance work on gear unit

⚠ GEFAHR !

Bei allen Wartungs- und Instandhaltungsarbeiten darf keine explosive Atmosphäre vorhanden sein. Wartungs- und Instandhaltungsarbeiten dürfen nur von qualifiziertem Fachpersonal ausgeführt werden.

Wartungs- und Instandhaltungsarbeiten sind nur bei stillstehendem, spannungsfreiem und gegen versehentliches Einschalten abgesichertem Antrieb durchzuführen.

⚠ GEFAHR !

Vor Beginn der Arbeiten Getriebe abkühlen lassen. → Verbrennungsgefahr !

Sichtkontrolle der Dichtungen auf Leckage:

Es ist auf austretendes Getriebeöl bzw. Ölspuren zu achten, wobei besonders Wellendichtringe und Verschlusskappen sowie Dichtflächen zu kontrollieren sind.

Sichkontrolle Ölschauglas im Rührwerksflansch:

Siehe Bild 18 Seite 40. Sollte Öl sichtbar sein, muß der Wellendichtring im Getriebegehäuse ausgetauscht werden.

Gummipuffer überprüfen:

Die Gummipuffer sind auf sichtbare Schäden wie Risse an der Oberfläche zu überprüfen und gegebenenfalls zu tauschen.

Staubablagerungen entfernen:

Auf dem Getriebe abgelagerte Staubschichten sind zu entfernen, bei Getriebeausführung mit Abdeckkappe, ist diese zu entfernen und ebenfalls zu reinigen. Danach muss die Abdeckkappe wieder montiert werden (siehe Seite 27).

Wellendichtringe wechseln:

Beim Wechsel des Dichtringes ist darauf zu achten, dass je nach Ausführung ein ausreichendes Fettdepot zwischen Staub- und Dichtlippe vorhanden ist.

Beim Einsatz von doppelten Dichtringen ist der Zwischenraum zu einem Drittel mit Fett zu füllen.

Ölwechsel:

Vor Beginn der Arbeiten Getriebe abkühlen lassen ! Öl muß jedoch noch warm sein damit eine vollständige Enleerung leichter durchgefürt werden kann (mangelnde Fließeigenschaft).

1. Stellen Sie ein passendes Gefäß unter die Ölablass- bzw. Verschlussschraube.
2. Entfernen Sie die Entlüftungs- und Ölablassschraube.
3. Lassen Sie das Öl vollständig ab.
4. Drehen Sie die Ölablass- bzw. Verschlussschraube wieder vollständig ein.

⚠ WARNING !

No explosive atmosphere may be prevented in any maintenance or repair work. Maintenance and repair work must only be performed by qualified specialists in the field.

Maintenance and repair work are only to be carried out on a drive, which is in standstill with zero potential and secured against accidental switch on.

⚠ WARNING !

Before beginning the work let the gear cool down. → Danger of burning!

Visible inspection of seals for leakage:

Make certain that no gear oil is leaking and that no oil traces can be found. In particular, the shaft seals and locking caps, as well as the sealing surface must be checked.

Visual control oil inspection glass in the agitator flange:

See fig. 19 page 40. Should Oil be visible the shaft seal in the gear housing has to be exchanged.

Check the rubber buffer set:

The rubber buffer set must be checked for visible damage, such as cracks on the surface, and they must be replaced in some cases.

Remove dust deposits:

Remove any layers of dust that have accumulated on the gear unit. If the gear unit design included a protection cap, remove it and clean it too. Then reinstall the protection cap (see on page 27).

Change the shaft seals:

When changing the shaft seal, make certain that, depending on the design, a sufficient deposit of grease is present between the dust lip and the sealing lip.

When using double seals, fill one-third of the space between them with grease.

Oil change:

Let the gear cool down before beginning with the work! The oil still has to be warm to make a complete emptying easier (poor flow characteristics).

1. Put an appropriate container under the air vent- and oil drain plug.
2. Remove the air vent- and oil drain plug.
3. Let the oil drain completely.
4. Turn in the plug completely again.

5. Füllen Sie die vorgeschriebene Ölfüllmenge über die Entlüftungsschraube ein (Ölfüllmenge siehe Getriebe-Typenschild, zugelassene Schmierstoffe siehe Seite 41). Bei Bauformen „Motor oben" muß beim Ölwechsel nach dem Füllen ein kurzer Probelauf durchgeführt werden, der Ölstand kontrolliert (siehe Seite 50) und gegebenenflass nachgefüllt werden.
6. Drehen Sie die Entlüftungsschraube wieder vollständig ein.
7. Entsorgen Sie das Altöl nach den geltenden Vorschriften.

Generalüberholung:

Die Generalüberholung ist vom Hersteller bzw. einer vom Hersteller autorisierten Werkstätte durchzuführen.

Bremsluftspalt einstellen: Siehe Seite 55.

Wälzlager in Rührwerksflansch nachfetten:

1. Entfernen Sie die Verschlussschraube (1) und (2).
2. Befüllen Sie den Fettraum des Abtriebsflansches durch eine der beiden Öffnungen solange, bis auf der gegenüberliegenden Seite Fett austritt. Verwenden Sie Lager-, Dichtungsfett nach NLGI-Klasse 2 (z.B.: BP Energrease LS-EP 2.
3. Drehen Sie die beiden Verschlussschrauben (1) und (2) wieder vollständig ein.

5. Fill in the prescribed amount of oil over the vent plug (Oil fill capacity see gear nameplate, permitted lubricants see page 41). In case of mounting position "Motor on top" a short test run is necessary. After this test run check also the oil level (see page 50).
6. Tighten the vent plug completely again.
7. Dispose the used oil according to applicable regulations.

General overhaul:

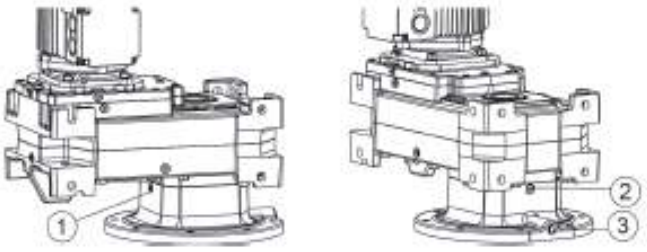
The general overhaul is to be performed by the producer or by a shop authorized by the producer.

Adjustment of air gap: See page 55.

Grease the bearing in the agitator flange:

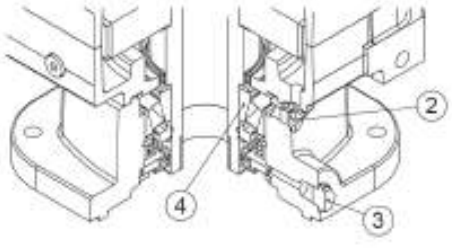
1. Remove the plug (1) and (2).
2. Fill the grease chamber of the output flange through one lubrication hole until the grease escapes on the opposite hole. Use bearing grease according to NLGI class 2 (e. g.: BP Energrease LS-EP 2.
3. Tighten the plug (1) and (2) completely again.

Bild 18: Rührwerksantrieb - Flachgetriebe



(1) Verschlussschraube
(2) Verschlussschraube
(3) Ölschauglas
(4) Wälzlager

Fig. 18: Agitator drive - Parallel shaft gear unit



(1) Plug
(2) Plug
(3) Oil level gauge
(4) Rolling bearing

14 Schmierstoffe / Lubricants

Wird keine Sonderregelung bezüglich des Schmierstoffes vereinbart, werden die Getriebe mit der Werksfüllung ausgeliefert. (siehe nachfolgende Tabelle grau markiert).

Die vorgeschriebene Schmierstoff-Füllmenge und Schmierstoffart ist am Getriebe-Typenschild vermerkt. Diese können auf Grund von spezifischen Anwendungsfällen vom Standard abweichen.

Die nachfolgende Schmierstofftabelle zeigt die zugelassenen Schmierstoffe für MAS-Getriebe.

If a special agreement regarding the lubricant is not reached, the gear units shall be delivered factory-filled (see table below marked grey.)

The specified gear fill amount and type is stated on the gear unit nameplate. The fill amount and oil type can be different at special applications.

The following lubricant table shows the lubricants that are approved for MAS gear units.

Für Stirnrad-, Aufsteck-, Flach-, Kegelstirnrad- und Kegelflachgetriebe bei einer Umgebungstemperatur:
-10°C bis +60°C (14°F bis 140°F)

For helical, shaft-mounted, parallel shaft, helical bevel and angle parallel shaft gear units at ambient temperatures:
-10°C up to +60°C (14°F up to 140°F)

	ALPHA SP 220		Klüberoil GEM 1-220 N
ARAL	DEGOL BG 220	Mobil	Mobilgear 600 XP 220
BP	Energol GR-XP 220		Omala S2 GX220
ADDINOL	Addinol CLP220		

Synthetisches Schmiermittel für Stirnradschnecken-getriebe bei einer Umgebungstemperatur:
-20°C bis +80°C (-4°F bis 176°F)

Synthetic lubricant for helical worm gear units at ambient temperatures:
-20°C up to +80°C (-4°F up to 176°F)

	Alpha SYN PG 460		Klübersynth GH6-460
ARAL	DEGOL GS 460	BP	Enersyn SG-XP 460
	Omala S4 WE460	Mobil	Glygoyle 460
ADDINOL	Polygear 460		

Keinesfalls verschiedene Schmierstoffe miteinander mischen!

Do not mix different types of lubricant.

Schmiermittel für abweichende Umgebungsbedingungen auf Anfrage. Lebensmittelverträgliche und biologische abbaubare Schmiermittel auf Anfrage.

Lubricants for other ambient conditions on request. Food proofed and biodegradable lubricants on request.

15 Bauformen und Schmierstoffmengen / Mounting positions and lubricant capacity

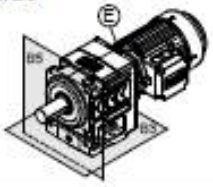
15.1 Stirnradgetriebe H / Helical gear units H

BAUFORMEN **MOUNTING POSITIONS**

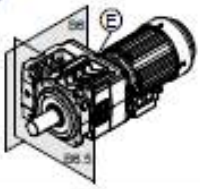
KLEMMKASTENLAGE (A,B,C,D) und KABELEINFÜHRUNG (I, II, III, IV)
POSITION of TERMINAL BOX (A,B,C,D) and CABLE ENTRY (I, II, III, IV)

Ⓔ... Position der Entlüftungsschraube
Position of the vent plug

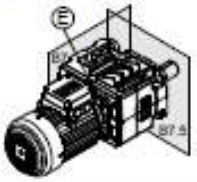
B3/B5



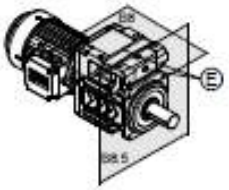
B6



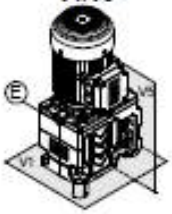
B7



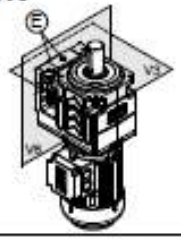
B8



V1/V5



V3/V6



Bei Getriebetypen H. 40., H. 50., H. 55., H. 60., H. 65. - werden bei jeder Einbaulage im Standard keine Entlüftungsschrauben verwendet.

Gear unit sizes H. 40., H. 50., H. 55., H. 60., H. 65. - no vent plugs used in any mounting position as standard.

SCHMIERSTOFFMENGEN **LUBRICANT CAPACITY**

	Type		Bauformen / Mounting positions					
			B3/B5	B6	B7	B8	V1/V5	V3/V6
2-stufig 2-stage	H. 40A,S			0,3 l		0,5 l *)	0,35 l	0,5 l *)
	H. 50A,S			0,5 l		0,7 l	0,6 l	0,7 l
	H. 55A			0,6 l		0,8 l	0,7 l	0,8 l
	H. 60A,S			0,7 l		1,0 l	0,9 l	1,0 l
	H. 65A	≤ Motor 112+IA+NA+SA+WN		0,9 l		1,2 l	1,3 l	1,2 l
		≥ Motor 132		1,2 l		1,7 l	1,3 l	1,7 l
	H. 70A,S	≤ Motor 112+IA+NA+SA+WN		1,3 l		1,8 l	1,8 l	1,8 l
		≥ Motor 132		1,6 l		2,3 l	1,8 l	2,3 l
	H. 80A	≤ Motor 112+IA+NA+SA+WN		1,9 l		2,6 l	2,6 l	2,6 l
		≥ Motor 132		2,2 l		3,0 l	2,6 l	3,0 l
	H. 85A,S	≤ Motor 112+IA+NA+SA+WN		2,2 l		3,0 l	3,0 l	3,0 l
		≥ Motor 132		2,5 l		3,4 l	3,0 l	3,4 l
	H. 110A,S		6,0 l	5,5 l	5,5 l	9,0 l	9,0 l *)	7,0 l
	H. 130A,S		8,5 l	7,5 l	7,5 l	12,0 l	12,0 l *)	12,0 l
	H. 133A,S		15,0 l	13,0 l	13,0 l	19,5 l	24,0 l *)	18,0 l
3-stufig 3-stage	H. 50C			0,75 l		1,05 l *)	0,95 l *)	1,05 l *)
	H. 55C			0,8 l		1,15 l	1,05 l *)	1,15 l
	H. 60C			1,05 l		1,3 l	1,3 l *)	1,3 l
	H. 65C			1,2 l		1,6 l	1,6 l *)	1,6 l
	H. 70C			1,7 l		2,2 l	2,35 l *)	2,2 l
	H. 80C			2,5 l		3,3 l	3,6 l *)	3,3 l
	H. 85C			2,6 l		3,6 l	4,0 l *)	3,8 l
	H. 110C		8,0 l	6,5 l	6,5 l	10,0 l	12,0 l *)	9,0 l
	H. 130C		11,5 l	9,0 l	9,0 l	15,0 l	17,0 l *)	13,5 l
	H. 133C		20,0 l	14,0 l	14,0 l	22,0 l	29,0 l *)	24,0 l
	H. 136C		26,0 l	22,0 l	28,0 l	31,0 l	42,5 l *)	36,0 l
4-stufig 4-stage	H. 70D			2,5 l			2,7 l *)	2,5 l
	H. 80D			3,6 l			3,8 l *)	3,6 l
	H. 85D			4,2 l			4,5 l *)	4,2 l
	H. 110D		9,5 l	7,0 l	7,0 l	10,5 l	13,0 l *)	9,5 l
	H. 130D		14,0 l	9,5 l	9,5 l	15,5 l	19,0 l *)	14,0 l
	H. 133D		22,5 l	14,5 l	14,5 l	22,5 l	30,0 l *)	24,5 l
	H. 136D		29,0 l	23,0 l	29,0 l	34,0 l	50,0 l *)	42,0 l
5-st. 5-st.	H. 110F		10,0 l	7,5 l	7,5 l	11,0 l	13,5 l *)	10,0 l
	H. 130F		14,5 l	10,0 l	10,0 l	16,0 l	18,5 l *)	14,5 l
	H. 133F		23,0 l	15,0 l	15,0 l	23,0 l	30,5 l *)	25,0 l
	H. 136F		32,0 l	24,0 l	30,0 l	35,0 l	50,5 l *)	42,5 l

*)... Richtwerte. Auf Ölstand füllen ! Siehe Seite 50.
*)... -0,1 l bei IA+NA+SA+WN

*) ... Orientative values. Fill on oil-level ! See page 50.
*) ... -0,1 l at IA+NA+SA+WN

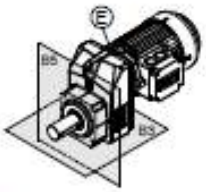
15.2 Einstufige Stirnradgetriebe H / Single stage helical gear units H

BAUFORMEN **MOUNTING POSITIONS**

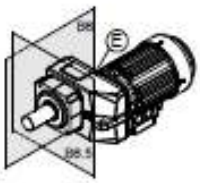
KLEMMKASTENLAGE (A,B,C,D) und KABELEINFÜHRUNG (I, II, III, IV)
POSITION of TERMINAL BOX (A,B,C,D) and CABLE ENTRY (I, II, III, IV)

Ⓔ ... Position der Entlüftungsschraube
Position of the vent plug

B3/B5

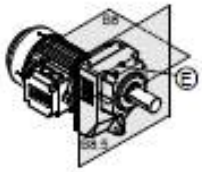


B6

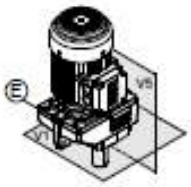


B7

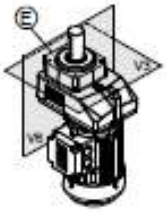
B8



V1/V5



V3/V6



Bei Getriebetypen H. 41E, H. 51E, H. 60E - werden bei jeder Einbaulage im Standard keine Entlüftungsschrauben verwendet.

Gear unit sizes H. 41E, H. 51E, H. 60E - no vent plugs used in any mounting position as standard.

SCHMIERSTOFFMENGEN **LUBRICANT CAPACITY**

Type			Bauformen					
			B3/B5	B6	B7	B8	V1/V5	V3/V6
1-stufig 1-stage	H. 41E		0,35 l *)					
	H. 51E		0,4 l *)					
	H. 60E	≤ Motor 112+IA+NA+SA+WN	0,5 l					
		≥ Motor 132	0,9 l					1,1 l
	H. 70E	≤ Motor 112+IA+NA+SA+WN	1,0 l					
		≥ Motor 132	1,3 l					1,5 l
	H. 80E	≤ Motor 112+IA+NA+SA+WN	1,5 l					
		≥ Motor 132	1,8 l					2,1 l
	H. 110E		4,5 l			5,5 l	4,5 l	5,5 l °)

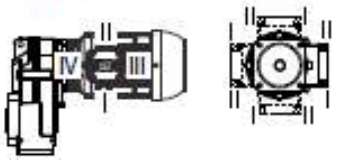
*)... Richtwerte. Auf Ölstand füllen ! Siehe Seite 50.
°)... -0,1 l bei IA+NA+SA+WN

*) ... Orientative values. Fill on oil-level ! See page 50.
°) ... -0,1 l at IA+NA+SA+WN

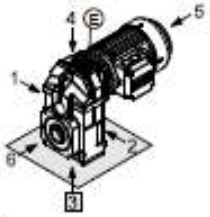
15.3 Aufsteckgetriebe A / Shaft mounted gear units A

BAUFORMEN **MOUNTING POSITIONS**

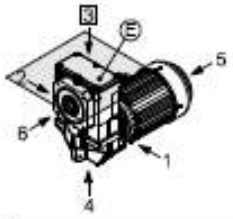
KLEMMKASTENLAGE (1,2,3,4) und KABEL-EINFÜHRUNG (I, II, III, IV)
POSITION of TERMINAL BOX (1,2,3,4) and CABLE ENTRY (I, II, III, IV)



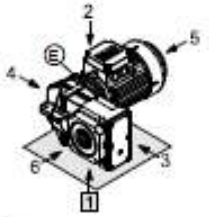
H3..



H4..

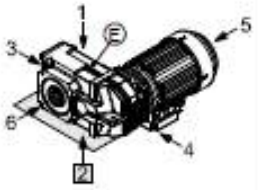


H1..

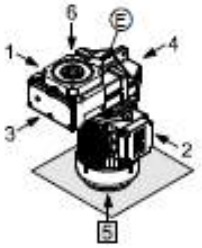


Ⓔ... Position der Entlüftungsschraube
Position of the vent plug

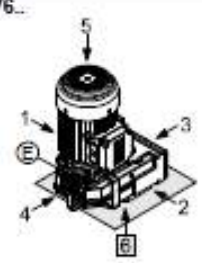
H2..



V5..



V6..



Bei Getriebetypen A.. 46., A.. 56., A.. 66. - werden bei jeder Einbaulage im Standard keine Entlüftungsschrauben verwendet.

Ausnahme A.. 66C bei der Bauform V6. Hier wird eine Entlüftungsschraube verwendet.

Gear unit sizes A.. 46., A.. 56., A.. 66.- no vent plugs used in any mounting position as standard.

Exception A.. 66C for the mounting position V6. For this gear unit a vent plug must be used.

SCHMIERSTOFFMENGEN **LUBRICANT CAPACITY**

	Type		Bauformen / Mounting positions					
			H1	H2	H3	V6	H4	V5
2-stufig 2-stage	A.. 46A,S		0,9 l			1,05 l	1,1 l	
	A.. 56A,S		0,9 l		1,3 l	1,5 l	1,3 l	
	A.. 66A,S	≤ Motor 112+IA+NA+SA+WN	1,8 l		2,7 l	3,3 l	2,7 l	
		≥ Motor 132	2,2 l		3,3 l	3,3 l	3,3 l	
	A.. 76A,S	≤ Motor 112+IA+NA+SA+WN	3,1 l		4,5 l	5,5 l	4,5 l	
		≥ Motor 132	3,4 l		5,1 l	5,5 l	5,1 l	
	A.. 86A,S	≤ Motor 112+IA+NA+SA+WN	6,0 l		9,0 l	10,9 l	9,0 l	
		≥ Motor 132	6,4 l		9,8 l	10,9 l	9,8 l	
3-st. 3-st.	A.. 56C		1,1 l		1,7 l	1,8 l *)	1,7 l	
	A.. 66C		2,0 l		3,4 l	3,8 l *)	3,4 l	
	A.. 76C		3,2 l		5,5 l	6,1 l *)	5,5 l	
	A.. 86C		6,0 l		10,0 l	11,9 l *)	10,0 l	
4-st. 4-st.	A.. 76D		3,5 l		6,2 l	6,5 l *)	6,2 l	
	A.. 86D		6,2 l		11,0 l	12,2 l *)	11,0 l	

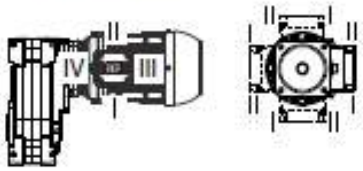
*)... Richtwerte. Auf Ölstand füllen ! Siehe Seite 50.

*) ... Orientative values. Fill on oil-level ! See page 50.

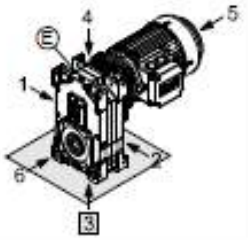
15.4 Flachgetriebe F / Parallel shaft gear units F

BAUFORMEN **MOUNTING POSITIONS**

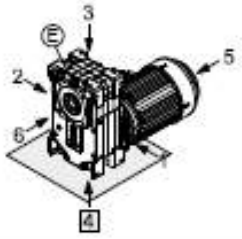
KLEMMKASTENLAGE (1,2,3,4) und KABEL-EINFÜHRUNG (I, II, III, IV)
POSITION of TERMINAL BOX (1,2,3,4) and CABLE ENTRY (I, II, III, IV)



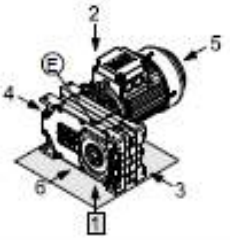
H3..



H4..

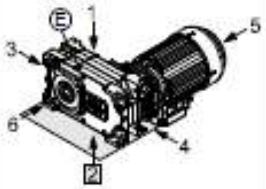


H1..

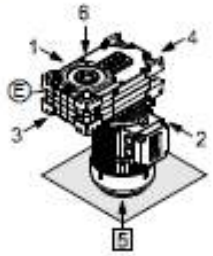


Ⓔ ... Position der Entlüftungsschraube
Position of the vent plug

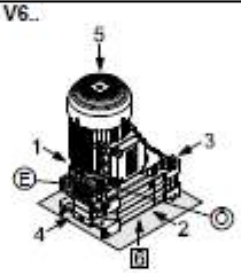
H2..



V5.



V6..



Bei allen Getriebetypen werden bei jeder Einbaulage im Standard Entlüftungsschrauben verwendet.

All parallel shaft gear units have vent plugs in all mounting positions as standard.

SCHMIERSTOFFMENGEN **LUBRICANT CAPACITY**

Type		Bauformen / mounting positions					
		H1	H2	H3	V5	H4	V6
i	F.. 111A,S	8,0 l		11,0 l		14,0 l	14,0 l *)
i	F.. 131A,S	12,0 l		17,0 l		21,0 l	21,0 l *)
i	F.. 137A	32,0 l		39,0 l			47,0 l *)
i	F.. 111C	9,0 l		14,0 l		15,0 l	17,0 l *)
i	F.. 131C	13,0 l		23,0 l		23,0 l	26,0 l *)
i	F.. 137C	33,0 l		46,0 l	41,0 l	41,0 l	51,5 l *)
i	F.. 111D	9,5 l		15,0 l	14,0 l	15,4 l	17,4 l *)
i	F.. 131D	13,5 l		25,0 l	23,5 l	24,0 l	27,0 l *)
i	F.. 137D	34,0 l		49,0 l	42,0 l		52,5 l *)
i	F.. 111F	10,0 l		15,5 l	14,5 l	16,0 l	18,0 l *)
i	F.. 131F	14,0 l		25,5 l	24,0 l	24,5 l	27,5 l *)

*)... Richtwerte. Auf Ölstand füllen ! Siehe Seite 50.

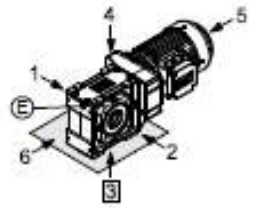
*) ... Orientative values. Fill on oil-level ! See page 50.

15.5 Kegelstirnradgetriebe K40 - K75 / Helical bevel gear units K40 - K75

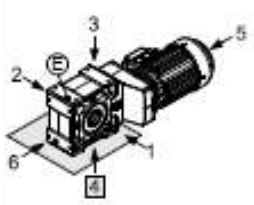
BAUFORMEN **MOUNTING POSITIONS**

KLEMMKASTENLAGE (1,2,3,4) und KABEL-EINFÜHRUNG (I, II, III, IV)
POSITION of TERMINAL BOX (1,2,3,4) and CABLE ENTRY (I, II, III, IV)

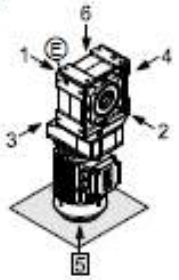
H3..



H4..



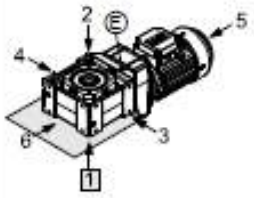
H5..



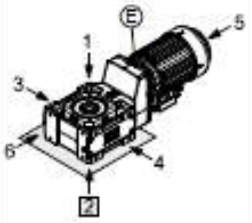
Ⓔ ... Position der Entlüftungsschraube
Position of the vent plug

H6..

V1..



V2..



Bei Getriebetypen K.. 40., K.. 50., K.. 60. - werden bei jeder Einbaulage im Standard keine Entlüftungsschrauben verwendet.

Gear unit sizes K.. 40., K.. 50., K.. 60. - no vent plugs used in any mounting position as standard.

SCHMIERSTOFFMENGEN **LUBRICANT CAPACITY**

	Type		Bauformen / Mounting positions H3	H4	V1	V2	H5	H6
2-stufig 2-stage	K.. 40A		0,7 l		1,0 l			
	K.. 50A		0,8 l		1,2 l			1,25 l
	K.. 60A	≤ Motor 112+IA+NA+SA+WN	1,3 l		2,0 l			2,1 l
		≥ Motor 132	1,6 l		2,3 l			2,1 l
	K.. 70A	≤ Motor 112+IA+NA+SA+WN	2,3 l			3,9 l	2,6 l	4,1 l
		≥ Motor 132	2,8 l			4,1 l	3,2 l	4,1 l
	K.. 75A	≤ Motor 112+IA+NA+SA+WN	3,0 l			5,0 l	3,0 l	5,5 l
		≥ Motor 132	3,4 l			5,3 l	3,6 l	5,5 l
3-st. 3-st.	K.. 50C		1,0 l		1,5 l			1,5 l *)
	K.. 60C		1,5 l		2,4 l			2,6 l *)
	K.. 70C		2,7 l			4,4 l	3,0 l	4,6 l *)
	K.. 75C		3,4 l			5,8 l	3,4 l	6,2 l *)
4-st. 4-st.	K.. 70D		3,0 l			4,8 l	3,3 l	5,0 l *)
	K.. 75D		3,7 l			6,2 l	3,7 l	6,4 l *)

*)... Richtwerte. Auf Ölstand füllen ! Siehe Seite 50.

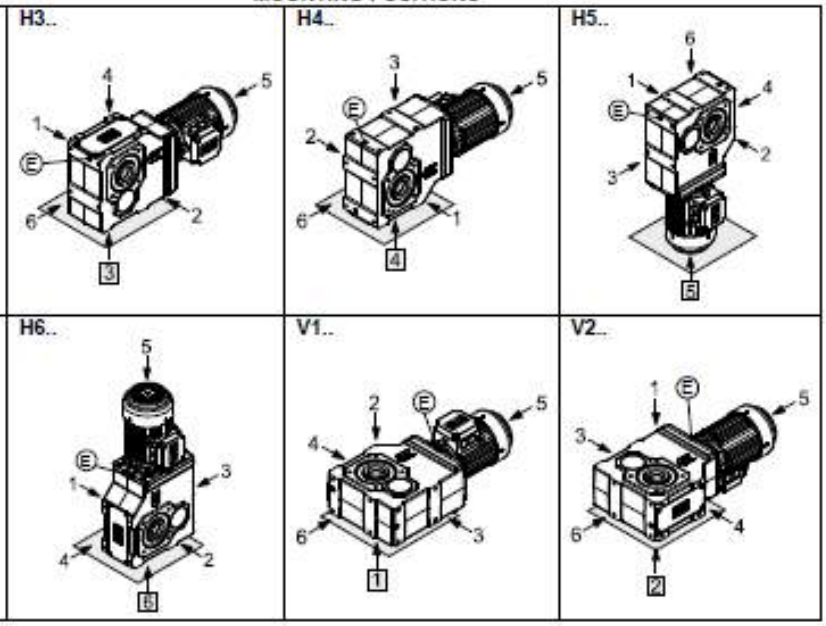
*) ... Orientative values. Fill on oil-level ! See page 50.

15.6 Kegelstirnradgetriebe K77 - K139 / Helical bevel gear units K77 - K139

BAUFORMEN **MOUNTING POSITIONS**

KLEMMKASTENLAGE (1,2,3,4) und KABEL-EINFÜHRUNG (I, II, III, IV)
POSITION of TERMINAL BOX (1,2,3,4) and CABLE ENTRY (I, II, III, IV)

Ⓔ ... Position der Entlüftungsschraube
Position of the vent plug



Bei allen Getriebetypen werden bei jeder Einbaulage im Standard Entlüftungsschrauben verwendet.

All parallel shaft gear units have vent plugs in all mounting positions as standard.

SCHMIERSTOFFMENGEN **LUBRICANT CAPACITY**

	Type		Bauformen / Mounting positions					
			H3	H4	V1	V2	H5	H6
3-stufig 3-stage	K.. 77A	≤ Motor 112+IA+NA+3A+WN	2,6 l	3,5 l	2,6 l		3,5 l	5,0 l
		≥ Motor 132	2,8 l	4,1 l	2,8 l		4,1 l	5,0 l
	K.. 80A	≤ Motor 112+IA+NA+3A+WN	4,5 l	6,4 l	4,5 l		5,8 l	8,8 l
		≥ Motor 132	4,7 l	7,0 l	4,7 l		6,4 l	8,8 l
	K.. 86A	≤ Motor 112+IA+NA+3A+WN	7,6 l	10,7 l	7,6 l		9,6 l	15,5 l *)
		≥ Motor 132	7,9 l	11,3 l	7,9 l		10,2 l	15,5 l *)
	K.. 110A		13,0 l	19,0 l	13,0 l		18,0 l	23,5 l *)
	K.. 136A		30,0 l	44,0 l	30,0 l		39,0 l	61,0 l *)
	K.. 139A		40,0 l	53,0 l	45,0 l		48,0 l	76,0 l *)
4-stufig 4-stage	K.. 77C		3,8 l		3,0 l		3,9 l	5,7 l *)
	K.. 80C		6,7 l		4,8 l		6,2 l	9,7 l *)
	K.. 86C		11,0 l		8,0 l		10,0 l	16,2 l *)
	K.. 110C		17,0 l	21,0 l	14,0 l		20,0 l	27,5 l *)
	K.. 136C		40,0 l	47,0 l	32,0 l		42,0 l	67,0 l *)
	K.. 139C		48,0 l	56,0 l	48,0 l		52,0 l	81,0 l *)
5-stufig 5-stage	K.. 77D		4,4 l		3,5 l		4,4 l	5,9 l *)
	K.. 80D		7,0 l		5,3 l		6,7 l	9,7 l *)
	K.. 86D		11,2 l		8,5 l		10,5 l	16,0 l *)
	K.. 110D		21,0 l	22,5 l	15,0 l		22,0 l	28,5 l *)
	K.. 136D		45,0 l	50,0 l	33,0 l		45,0 l	68,0 l *)
	K.. 139D		56,0 l	59,0 l	50,0 l		55,0 l	82,0 l *)

*)... Richtwerte. Auf Ölstand füllen ! Siehe Seite 50.

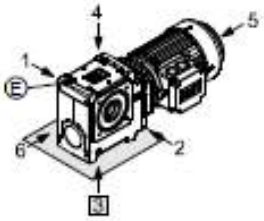
*) ... Orientative values. Fill on oil-level ! See page 50.

15.7 Stirnradschneckengetriebe S / Helical worm gear units S

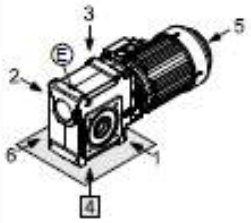
BAUFORMEN **MOUNTING POSITIONS**

KLEMMKASTENLAGE (1,2,3,4) und KABEL-EINFÜHRUNG (I, II, III, IV)
POSITION of TERMINAL BOX (1,2,3,4) and CABLE ENTRY (I, II, III, IV)

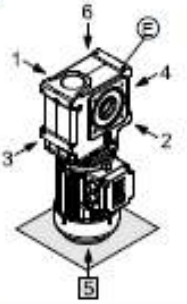
H3..



H4..



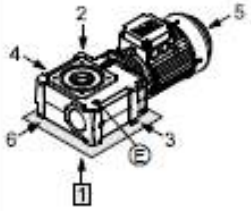
H5..



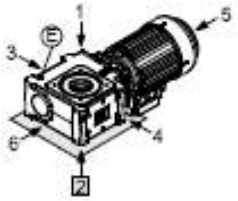
Ⓔ... Position der Entlüftungsschraube
Position of the vent plug

H6..

V1..



V2..



Bei allen Getriebetypen werden bei jeder Einbaulage im Standard Entlüftungsschrauben verwendet.

All helical worm gear units have vent plugs in all mounting positions as standard.

SCHMIERSTOFFMENGEN **LUBRICANT CAPACITY**

	Type	Bauformen / Mounting positions H3	V1	V2	H6	H5	H4
2-stufig 2-st	S.. 454A,B,C	0,5 l				0,55 l	
	S.. 455A,B,C	0,65 l			0,75 l	0,85 l	0,65 l
	S.. 506A,B,C	1,1 l			1,45 l		1,1 l
	S.. 507A,B,C	1,2 l			1,6 l		1,2 l
	S.. 608A,B	1,8 l			2,6 l	2,4 l	1,8 l
	S.. 609A,B ≤ Motor 112+IA+NA+GA+WN	2,1 l			3,0 l	2,7 l	2,1 l
	S.. 609A,B ≥ Motor 132	2,4 l			3,0 l	3,3 l	2,7 l
3-stufig 3-st	S.. 506C	1,35 l			1,8 l *)	1,8 l	1,35 l
	S.. 507C	1,45 l			1,9 l *)	1,9 l	1,45 l
	S.. 608C	2,1 l			3,0 l *)	2,3 l	2,1 l
	S.. 609C	2,4 l			3,5 l *)	3,1 l	2,4 l

*)... Richtwerte. Auf Ölstand füllen ! Siehe Seite 50.

*) ... Orientative values. Fill on oil-level ! See page 50.

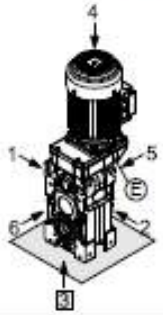
15.8 Kegelflachgetriebe C / Angle parallel shaft gear units C

BAUFORMEN **MOUNTING POSITIONS**

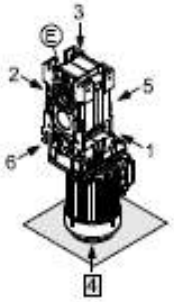
KLEMMKASTENLAGE (1,2,5,6) und KABELEINFÜHRUNG (I, II, III, IV)
POSITION of TERMINAL BOX (1,2,5,6) and CABLE ENTRY (I, II, III, IV)

Ⓔ ... Position der Entlüftungsschraube
Position of the vent plug

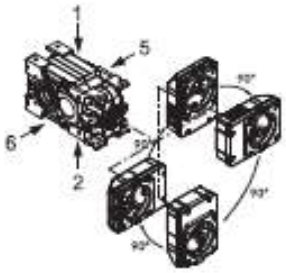
H3..



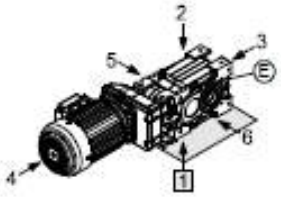
H4..



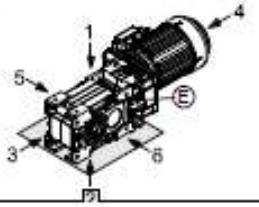
Vorsatzgetriebelage Seite 1, 2, 5 oder 6
Position of primary gear unit towards side 1, 2, 5 or 6



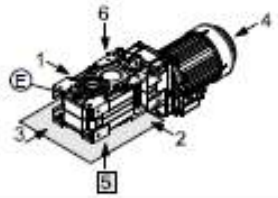
H1..



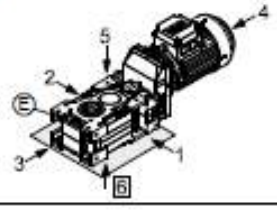
H2..



V5..



V6..



Bei allen Getriebetypen werden bei jeder Einbaulage im Standard Entlüftungsschrauben verwendet.

All angle parallel shaft gear units have vent plugs in all mounting positions as standard.

SCHMIERSTOFFMENGEN **LUBRICANT CAPACITY**

	Type		Bauformen / Mounting positions					
			H1	H2	V5	H3	H4	V6
3-stufig 3-stage	C.. 70A	Σ Motor 112+IA+NA+SA+WN	2,2 l			3,0 l	2,4 l	2,2 l
		Σ Motor 132	2,6 l			3,0 l	3,0 l	2,6 l
	C.. 80A	Σ Motor 112+IA+NA+SA+WN	3,7 l			5,6 l	4,0 l	3,7 l
		Σ Motor 132	4,2 l			5,6 l	4,6 l	4,2 l
	C.. 85A	Σ Motor 112+IA+NA+SA+WN	7,2 l			10,5 l	7,2 l	
		Σ Motor 132	7,7 l			10,5 l	7,7 l	
	C.. 110A		9,0 l		12,0 l	15,5 l *)	12,0 l	
	C.. 130A		12,5 l		15,0 l	23,0 l *)	15,0 l	
4-stufig 4-stage	C.. 70C		2,7 l			3,6 l *)	2,7 l	
	C.. 80C		5,6 l			6,5 l *)	5,6 l	
	C.. 85C		9,5 l			11,5 l *)	9,5 l	
	C.. 110C		15,0 l			19,5 l *)	15,0 l	
	C.. 130C		21,0 l			28,0 l *)	21,0 l	
5-stufig 5-stage	C.. 70D		3,6 l			3,9 l *)	3,6 l	
	C.. 80D		6,5 l			7,0 l *)	6,5 l	
	C.. 85D		10,5 l			11,9 l *)	10,5 l	
	C.. 110D		18,0 l			20,0 l *)	18,0 l	
	C.. 130D		25,0 l			29,0 l *)	25,0 l	

*)... Richtwerte. Auf Ölstand füllen ! Siehe Seite 50.

*) ... Orientative values. Fill on oil-level ! See page 50.

15.9 Ölstandskontrolle bei Getrieben mit Ölstandsschraube in vertikaler Bauform / Oil level control of gear units with oil level plug at vertical mounting position

⚠ GEFAHR !

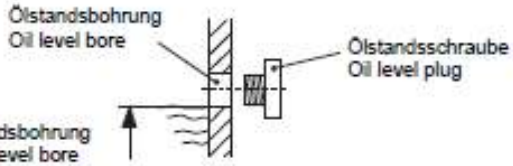
Getriebemotor spannungslos schalten!

- Ölstandsschraube entfernen.
- Ölstand überprüfen.

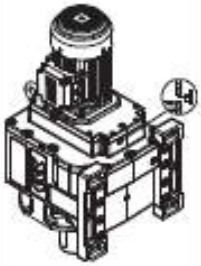
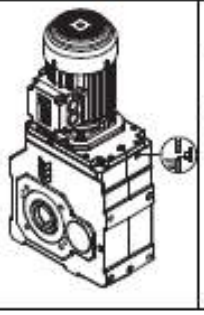
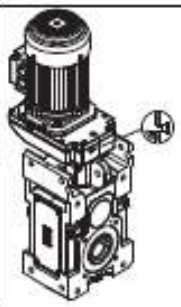
⚠ WARNING !

De-energized the geared motor!

- Remove the oil level plug.
- Check the oil level.

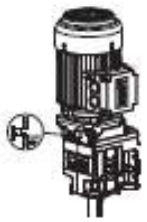
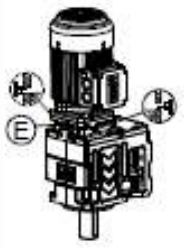
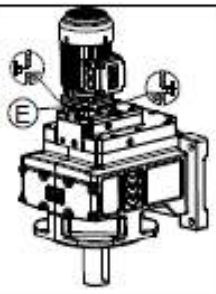
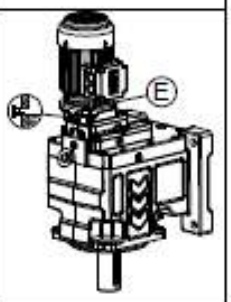


Korrekte Ölfüllhöhe = Unterkante der Ölstandsbohrung
Correct oil fill level = Bottom edge of the oil level bore

Getriebegröße Gear unit size	H. 110E H. 110A,S H. 130A,S H. 133A,S	H. 136C	F.. 111A,S F.. 131A,S F.. 136A	K.. 110A K.. 136A K.. 139A	C.. 110A C.. 130A
Bauform Mounting pos.	**V1/V5**	**V1/V5**	**V6**	**H6**	**H3**
Position der Ölstands-schraube Position of the oil level plug					

3-, 4- und 5-stufige Getriebe am Beispiel eines Stirnrad-getriebes.

3-, 4- and 5-stage gear units to exemplify on helical gear unit.

H. 50C – 65C A.. 56C, 66C K.. 50C, 60C S.. 506C – 609C	H. 70C – 133C, 136D A.. 76C, 86C F.. 111C – 136C K.. 70C – 139C C.. 70C – 130C	H. 70D – 85D A.. 76D, 86D K.. 75D – 86D C.. 70D – 85D	H. 110D – 133D, 136F F.. 111D – 136D K.. 110D, 136D, 139D C.. 110D, 130D	H. 111F – 133F F. 111F – 131F
				

Ⓔ ...Position der Entlüftungsschraube / Position of the vent plug

16 Klemmenanschluss / Terminal board connection

Bemessungsspannung Serien 3A, 3B, 3C (IEC Baugrößen 63 bis 100) Rated voltage series 3A, 3B, 3C (IEC frame sizes 63 to 100)					
Mögliche Schaltung Possible connection		Nennleistung P_N Rated power P_N	Erhöhte Leistung Increased rated power 1,2 x P_N	Frequenzumrichterbetrieb Frequency inverter operation	
△	Dreieck Delta	220 – **230** – 240 V bei/at 50 Hz 220 – **265** – 277 V bei/at 60 Hz	- 254 – 265 – 277 V bei/at 60 Hz	△	400 V, 87 Hz
△△	Doppeldreieck Delta - Delta	110 – **115** – 120 V bei/at 50 Hz 110 – **132** – 138 V bei/at 60 Hz	- 127 – 132 – 138 V bei/at 60 Hz	△△	230 V, 100 Hz
Y	Stern (Grundschaltung) Star (Basic connection)	380 – **400** – 420 V bei/at 50 Hz 380 – **460** – 480 V bei/at 60 Hz	- 440 – 460 – 480 V bei/at 60 Hz	Y	400 V, 100 Hz
YY	Doppelstern Star Star	190 – **200** – 210 V bei/at 50 Hz 190 – **230** – 240 V bei/at 60 Hz	- 220 – 230 – 240 V bei/at 60 Hz	YY	460 V, 120 Hz

Bemessungsspannungen Serien 3A, 3B, 3C (IEC Baugrößen 112 bis 315) Rated voltage series 3A, 3B, 3C (IEC frame sizes 112 to 315)					
Mögliche Schaltung Possible connection		Nennleistung P_N Rated power P_N	Erhöhte Leistung Increased rated power 1,2 x P_N	Frequenzumrichterbetrieb Frequency inverter operation	
△	Dreieck (Grundschaltung) Delta (Basic connection)	380 – **400** – 420 V bei/at 50 Hz 380 – **460** – 480 V bei/at 60 Hz	- 440 – 460 – 480 V bei/at 60 Hz	△△	400 V, 100 Hz
△△	Doppeldreieck Delta - Delta	190 – **200** – 210 V bei/at 50 Hz 190 – **230** – 240 V bei/at 60 Hz	- 220 – 230 – 240 V bei/at 60 Hz		
Y	Stern Star	660 – **690** – (730) V bei/at 50 Hz 660 – **(796)** – (830) V bei/at 60 Hz	- (760) – (796) V bei/at 60 Hz	△△	460 V, 120 Hz
YY	Doppelstern Star - Star	330 – **346** – 365 V bei/at 50 Hz 330 – **400** – 415 V bei/at 60 Hz	- 380 – 400 – 415 V bei/at 60 Hz		

watt drive WEG Group	Montageanleitung für MAS® - Getriebe und Getriebemotoren Mounting Instruction for MAS® - Gear units and geared motors

Das folgende Schaltbild gilt für Modulare Systemmotoren Baugröße 63 bis 315 der Serie 3A, 3B und 3C.

The following connection diagram is vaild for Modular System Motor frame size 63 up to 315. Motor series 3A, 3B and 3C.

Bild 19: Klemmenanschluss Motorserie 3A, 3B und 3C

Fig. 19: Term. board connection – Motor series 3A, 3B and 3C

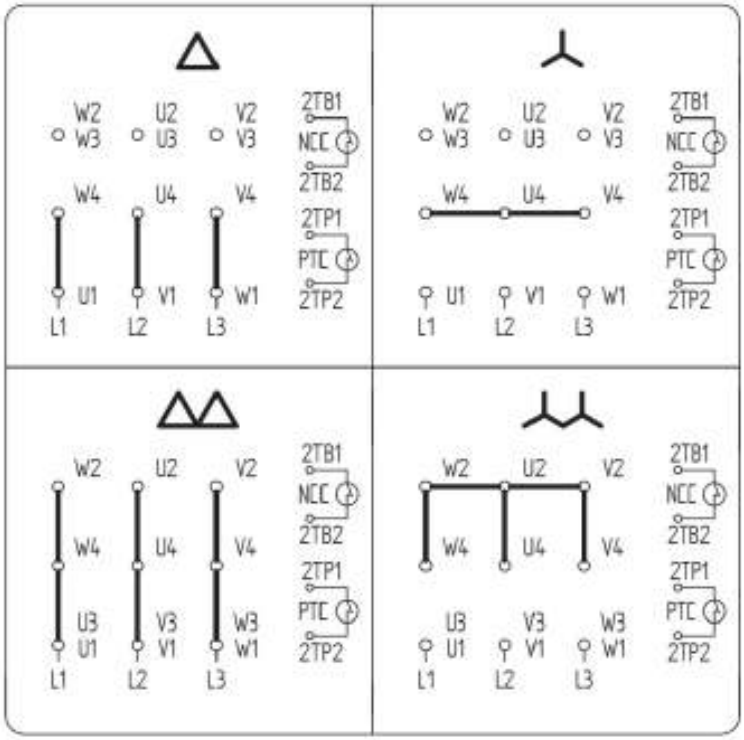


Tabelle 5: Anzugsmomente

Table 5: Tightening torque

Gewinde Thread	Anzugsmoment M_a [Nm] Tightening torque M_a [Nm]
M4	0,7 - 1,0
M5	1,6 - 2,2
M6	2,2 - 3,5
M8	6 - 8
M10	10 - 14

17 Optionale Motorzusatzeinrichtungen / Optional motor devices

Bremse, Inkrementalgeber, Temperaturwächter, Stillstandsheizung, Fremdlüftung,... sind nur auf besondere Bestellung vorhanden.

Zusatzeinrichtungen sind nach den beiliegenden Schaltbildern anzuschließen.

Brake, encoder, temperature controller, anti condensation heating, forced ventilation,... are present only on special order.

Additional devices are to be connected after the valid wiring diagrams.

17.1 Stillstandsheizung / Anti-condensation heating

Bei besonderen Klimaverhältnissen z.B. bei starken Temperaturschwankungen oder bei stillstehenden Motoren in feuchter Atmosphäre kann eine Stillstandsheizung vorgesehen werden.
Die Beschaltung des Heizelementes ist im Anschlusskasten des Motors ersichtlich.

⚠ GEFAHR !

Vor jedem Einschalten muss sichergestellt sein, dass die optionale Stillstandsheizung ausgeschaltet wird.

Under certain climatic conditions an anti- condensation heater may be required e.g. when there are great fluctuations in temperature or the motor is at rest in a humid atmosphere. For heater connection, see the motor terminal box.

⚠ WARNING !

Before energizing the motor, always make sure that the (optional) anti-condensation heating is switched off.

17.2 Kondenswasserbohrung / Drain

Bei Motoren, die starken Temperaturschwankungen oder extremen klimatischen Verhältnissen ausgesetzt sind, kann im Inneren Luftfeuchtigkeit kondensieren. In diesem Fall empfehlen wir eine optionale Kondeswasserbohrung.

⚠ VORSICHT !

- Öffnen Sie in Abhängigkeit von den Umgebungs- und Betriebsbedingungen den Kondenswasserstopfen zum Ablassen des Wassers. Stopfen anschließend wieder schließen.
- Bei Motoren mit Kondenswasserbohrungen ist auf die richtige Einbaulage zu achten!

If motors are subject to great fluctuations in temperature or extreme climatic conditions, humid air can condense inside the machine. We recommend using a drain.

⚠ ATTENTION !

- Open the drain in dependent of the environment and operating condiions. Afterwards, close the drain plug.
- Before installing motors with drain, check that the mounting position is correct.

Bild 20: Detail des Kondenswasserstopfens am Lagerschild.

Fig. 20: Detail of the drain plug position on drive endshield.

Kondenswasserstopfen geschlossen.
Rubber drain plug closed.

Kondenswasserstopfen geöffnet.
Rubber drain plug open.

17.3 Fremdlüfter / Forced cooling

VORSICHT !

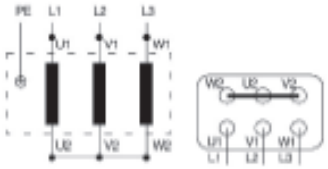
- Der Fremdlüfter muss nach beiliegendem Schaltbild (siehe Anschlusskasten Fremdlüfter) an eine externe Versorgungsspannung angeschlossen werden.
- Bei Betrieb des Motors an einem Frequenzumrichter darf der Fremdlüfter nicht an den Frequenzumrichter angeschlossen, sondern muss an eine EXTERNE Versorgungsspannung angeschlossen werden.

ATTENTION !

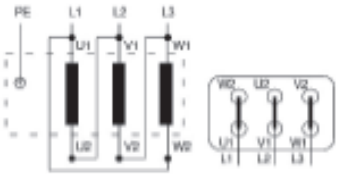
- The forced cooling must be connected according to wiring diagram (see in forced cooling terminal box).
- If the motor is operated with a frequency inverter, it's not allowed to connect the forced cooling on the frequency inverter. Connect the forced cooling to an EXTERNAL power supply.

IEC Baugröße IEC frame size	Phasen / Schaltung Phases / Connection	Spannungsbereich [V] Voltage range [V]	
		50 Hz	60 Hz
63 – 132	3~ / Stern	346 – 525	380 – 575
	3~ / Dreieck	200 – 303	220 – 332
	1~ / Delta Steinmetz	230 – 277	230 – 277
160 – 200	3~ / Stern	346 – 525	380 – 575
	3~ / Dreieck	200 – 303	220 - 332
	1~ / Delta Steinmetz	230 – 277	-
225 – 315	3~ / Stern	346 – 525	380 – 575
	3~ / Dreieck	200 – 400	220 – 400

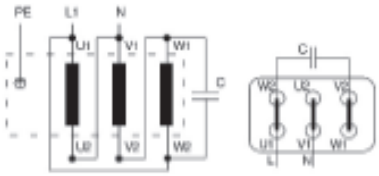
Sternschaltung
Star Connection



Dreieckschaltung
Delta Connection



Delta Steinmetz Schaltung
Delta Steinmetz Connection



U1 = schwarz / black
U2 = grün / green

V1 = hellblau / light-blue
V2 = weiß / white

W1 = braun/ / brown
W2 = gelb / yellow

17.4 Temperaturwächter Bimetallschalter "Öffner" (TH) / Temperature controller Bimetal switch "NC contact" (TH)

Temperaturwächter sind kleine Bimetallschalter, die beim Überschreiten der Ansprechtemperatur einen Kontakt öffnen oder schließen. Der Öffnungskontakt trennt den Erregerkreis des Motorschützes und die Spannungsversorgung des Motors wird damit getrennt.

Blockklemmenkennz. im Anschlusskasten: 2TB1 / 2TB2

Thermostats have small bimetallic strips that make or break a contact when the critical temperature is reached. The break contact opens the field circuit and disconnects the power supply to the motor.

Block terminal designation in the terminal box: 2TB1 / 2TB2

17.5 PTC Kaltleitertemperaturfühler (TF) / PTC Thermistor protection (TF)

Kaltleitertemperaturfühler sind Halbleiter, bei denen der ohmsche Widerstand bei Erreichen der Bemessungs-ansprechtemperatur extrem ansteigt.

Zusätzlich zu den Kaltleiterfühlern ist ein Auslösgerät notwendig. Das im Auslösegerät befindliche Relais mit einem Wechselkontakt kann nach Bedarf zum Unterbrechen des Erregerkreises des Motorschützers oder zum Auslösen eines Warnsignals verwendet werden.

Blockklemmenkennz. im Anschlusskasten: 2TP1 / 2TP2

PTC thermistors are semi-conductors whose electrical resistance increases dramatically when the critical temperature is reached. In addition to the PTC thermistor, a control unit is also required. The relay in the tripping unit has a changeover contact, which can either be used to open the excitation circuit in the motor contactor or trigger a warning signal.

Block terminal designation in the terminal box: 2TP1 / 2TP2

17.6 Bremse / Brake

Die Einscheiben-Federdruckbremse wird elektrisch gelüftet. Der Bremsvorgang erfolgt mechanisch nach Ausschalten der Spannung.

Die Bremsen sind bei der Lieferung auf das Bremsmoment eingestellt.

Anschluss der Bremse:

Bremsenansteuerung nach jeweils beiliegendem Schaltbild anschließen.

Wartung:

Die Federdruckbremsen sind nahezu wartungsfrei. Der Bremsluftspalt "a" ist in bestimmten Zeitabständen zu überprüfen, um ein sicheres Lüften der Bremse zu gewährleisten. Ein erforderliches Einstellen des Luftspaltes "a" muß nach Tabelle 6 erfolgen.

The single-disc brake is released electrically. The brake is applied mechanically when the voltage is switched off.

At delivering the brakes are adjusted to the brake torque.

Connecting the brake:

Connect the brake control system according to the circuit diagram supplied with the brake.

Maintenance:

The spring-loaded brakes hardly need any maintenance. The air gap "a" must be checked periodically to ensure safe brake release. Adjust air gap "a" to the figures given in Table 6 below if necessary.

Tabelle 6: Bremsenluftspalt

Table 6: Brake air gap

Bremsmoment / Brake torque	[Nm]	2	5	10	20	40	60	100	150	250	400	1000
a (normal)	[mm]	0,2	0,2	0,2	0,3	0,3	0,3	0,4	0,4	0,5	0,5	0,6
a (maximum)	[mm]	0,6	0,6	0,7	0,8	0,9	1	1,1	1,1	1,2	1,2	1,3

Nachstellen des Bremsluftspaltes (siehe Bild 21):

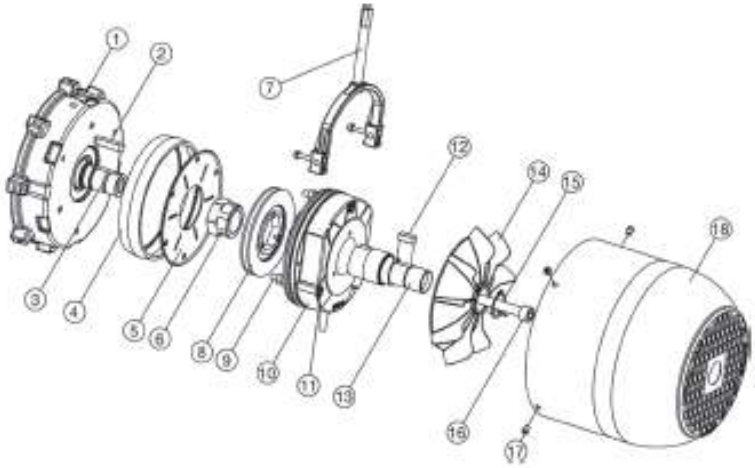
1. Lösen Sie die drei Befestigungsschrauben (9) eine halbe Umdrehung.
2. Drehen Sie gegen den Uhrzeigersinn die Hülsenschrauben (6) in den Magnetkörper (8) hinein.
3. Drehen Sie im Uhrzeigersinn die drei Befestigungsschrauben (9) soweit, bis der Nennluftspalt, (siehe Tabelle 6, Seite 55) zwischen dem Magnetkörper (8) und Ankerscheibe (7) erreicht ist.
4. Schrauben Sie die drei Hülsenschrauben (6) wieder im Uhrzeigersinn bis zur festen Anlage aus dem Magnetkörper (8) heraus und ziehen Sie die Befestigungsschrauben (9) nach. Kontrollieren Sie mit mit einer Fühlerlehre den Luftspalt "a" auf Gleichmäßigkeit und korrigieren Sie diesen gegebenenfalls.

Adjustment of the air gap (see Fig. 21):

1. Loosen the three fixing bolts (9) in a half turn.
2. Turn the screw sleeves (6) counter-clockwise into the magnetic case (8).
3. Turn the three fixing bolts (9) clockwise until the nominal air gap (see tab.6, page 55) between the magnetic case (8) and armature disc (7) is reached.
4. Turn the three sleeve screws (6) again clockwise out of the magnetic case (8) and retighten the fixing bolts (9). Control the air gap "a" with a feeler gauge on evenness and make a correction if necessary.

Bild 21: Explosionsdarstellung Bremsenanbau

Fig. 21: Exploded view brake



(1) Bremslagerschild
(2) Passfeder
(3) Welle
(4) Staubschutzring
(5) Reibblech
(6) Mitnehmer-Zahnnabe
(7) Handlüftbügel (optional)
(8) Ankerscheibe
(9) Hohlschrauben
(10) Magnetkörper
(11) Zylinderschrauben mit Innensechskant
(12) Passfeder
(13) Bremswellenverlängerung
(14) Lüfterflügel
(15) Sicherungsring
(16) Zylinderschrauben mit Innensechskant
(17) Befestigungsschrauben Lüfterhaube
(18) Lüfterhaube Bremsausführung

(1) Brake-endshield
(2) Key
(3) Shaft
(4) Dust guard ring
(5) Friction plate
(6) Gear hub
(7) Hand release bracket (optional)
(8) Armature disc
(9) Hollow screws
(10) Magnetic case
(11) Socket head cap screw
(12) Fan
(13) Brake shaft adapter
(14) Fan
(15) Retaining ring
(16) Socket head cap screw
(17) Fan cover screw
(18) Fan cover brake execution

17.6.1 Handlüftung / Manual brake release

Dient zum mechanischen Lüften der Bremse bei Stromausfall. Durch betätigen des Handlüftungshebels wird die Ankerscheibe angezogen und die Bremse entlüftet.

VORSICHT !

An der Einstellung der Handlüftung darf aus Sicherheitsgründen nichts verändert werden.

Is used to lift the brake when in case of a loss of power supply. By pressing the lever, the anchor plate is pulled to the magnet and the brake is lifted.

ATTENTION !

For safety reasons the adjustment of the manual release must not be changed.

17.6.2 Arretierungvorrichung des Handhebels / Locking device for the hand release bracket

Die Handlüftung kann im Servicefall mit einer Arretierung fixiert werden.

VORSICHT !

Der Motor darf erst nach Deaktivierung der Arretiervorrichtung in Betrieb genommen werden.

In case of service the manual brake release can be fixed with a locking device.

ATTENTION !

The motor only has to be taken into operation after having deactivated the locking device.

17.6.3 Gleichrichter / Rectifier

Serienmäßig werden Bremsmotoren mit angeschlossenem Gleichrichter für wechselstromseitiges Schalten geliefert.

Für gleichstromseitiges Schalten ist die Brücke zwischen den Klemmen 5 und 6 zu entfernen und ein Schaltkontakt anzuschließen.

VORSICHT !

Der Motor darf nur mit angeschlossener Bremse eingeschaltet werden. (Prüfen!)

Brake motors will be delivered as standard with connected rectifier for AC-side switching.

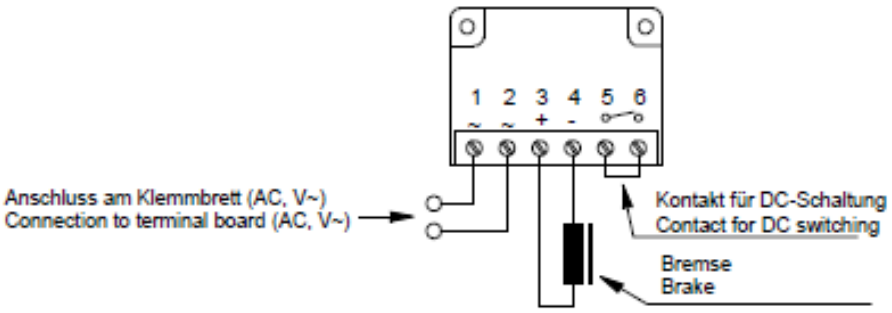
For DC-side switching the bridge between terminals 5 and 6 must be removed and a switching contact must be connected.

ATTENTION !

Start-up of motor only with connecting brake. (Check!)

Bild 22: Gleichrichter

Fig. 22: Rectifier



Stromversorgung:

Die Gleichstrom-Bremsspule wird normalerweise über einen im Motor-Klemmkasten eingebauten Gleichrichter gespeist. Zum Schutz gegen Überspannungen sind die Gleichrichter mit Varistoren beschaltet. Maximale Umgebungstemperatur +80°C.

Bei Schaltfrequenz über 1/s wegen Gleichrichter-Belastung rückfragen!

Der Anschluss des Bremssystems erfolgt über einen im Klemmenkasten eingebauten Gleichrichter entsprechend dem jeweils beigefügten Schaltbild.

Einweggleichrichter (Standard) - Anschluss:

- Wechselspannung 100% z.B. 400 V~
- Gleichspannung 45% z.B. 180 V=

Brückengleichrichter - Anschluss:

- Wechselspannung 100% z.B. 230 V~
- Gleichspannung 90% z.B. 205 V=

VORSICHT !

Bei Betrieb eines Bremsmotors mit Frequenzumrichter ist die Bremsspule an eine externe Spannungsversorgung anzuschließen.

Power supply:

The DC brake coil is normally supplied with power from a rectifier installed in the motor terminal box. The rectifiers are equipped with varistors to protect them against overvoltage. Max. ambient temperature for rectifiers is +80°C.

For starting frequency above 1/s, contact us for rectifier loading capacity!

The braking system is connected with a rectifier installed in the terminal box in accordance with the enclosed circuit diagram.

Half-wave rectifier (standard version) - Connection:

- AC voltage 100% e.g. 400 V a.c
- DC voltage 45% z.B. 180 V d.c.

Bridge rectifier - Connection:

- AC voltage 100% e.g. 230 V a.c
- DC voltage 90% z.B. 205 V d.c.

ATTENTION !

If a brake motor is operated with a frequency converter, connect the brake coil to an external power supply.

17.7 Drehgeber / Encoder

Dieser Geber ist ein Präzisionsmessgerät. Die Angaben und Hinweise in den Datenblättern sind zu beachten um eine problemlose Funktion des Gebers zu gewährleisten und die Garantieleistung aufrecht zu erhalten.

Bitte beachten sie unbedingt folgende Punkte:

- Der Drehgeber darf weder teilweise noch ganz zerlegt oder modifiziert werden.
- Die Welle darf nicht nachträglich bearbeitet (schleifen, bohren, sägen, usw) werden. Die Genauigkeit des Gebers und die Zuverlässigkeit von Lager und Dichtung nehmen sonst Schaden.
- Das Gerät niemals mit dem Hammer ausrichten.
- Schlagbelastungen unbedingt vermeiden.
- Drehgeberwelle nicht über die in den Datenblättern angegebenen Werte belasten.
- Drehgeber und Antriebsgerät nicht an Wellen und Flanschen starr miteinander verbinden.
- Angebaute Drehgeber keinesfalls als Hilfe zum Heben der Arbeitsmaschine benützen.
- Angebaute Drehgeber keinesfalls als Tritthilfe benützen.

This encoder is a precision measuring instrument. Always observe the information and instructions of the datasheet to nsure trouble-free function and to maintain warranty claims.

Please observe absolutely the following points:

- It is not permissible to dismantle the encoder entirely or in part or to modify it.
- Do not alter the shaft (by grinding, sawing, drilling, etc.), otherwise the accuracy of the encoder and the reliability of bearing and seal will suffer.
- Never align the instrument with a hammer.
- It is imperative to avoid impact loads.
- Observe maximal radial and axial loads to the encodershaft under any circumstances.
- Do not connect encoder and drive rigidly to one another at shafts and flanges.
- Never use the assembled encoder to lift the drive-unit.
- Never step onto the encoder.

Technische Daten Standardgeber: **Technical Data Standard Encoder:**

Type	*Versorgungsspannung Voltage*	*Impulszahl Pulses*	*Ausgangssignalpegel Output signal*
Kübler 5020	*10 – 30 V*	*1024*	*HTL*
Kübler A02H (Heavy Duty)	*10 – 30 V*	*1024*	*HTL*

Belegung Standardgeber: **Pin definition standard encoder:**

SIGNAL		GRD	B_{INV}	+UB Sens	0	0_{INV}	A	A_{INV}	-	B	-	0 V	0 V Sens	+UB	U_{AS}
KÜBLER	M23 X 1 Flanschdose / Can		1	2	3	4	5	6	7	8	9	10	11	12	-
	PVC-Kabel / cable	PH	PK	BU/ RD	BU	RD	GN	YE	-	GY	-	WH	GY/PK	BN	-
	PUR-Kabel /cable HT-Kabel / cable	PH	PK	BN*	BU	RD	GN	YE	-	GY	-	WH*	WH*	BN*	-

Code	Farbe / Colour	Code	Farbe / Colour	Code	Farbe / Colour	Code	Farbe / Colour	Code	Farbe / Colour
BK	Schwarz Black	GN	Grün Green	RD	Rot Red	YE	Gelb Yellow	PH	Schirm liegt am Steckergehäuse an Shield attached to connector housing
BN	Braun Brown	GY	Grau Grey	VT	Violett Violet	*	Dünnes Kabel Thin cable		
BU	Blau Blue	PK	Rosa Pink	WH	Weiß White	°	Dickes Kabel Thick cable		

18 Tabelle für Schraubenanzugsmomente / Table of Tightening Torques

Gilt für Schrauben-Festigkeitsklasse 8.8:

- Abtriebsflansche
- Drehmomentstützen
- Fußleisten
- Eingangsdeckeln
- Abdeckkappen
- Motorbefestigung

Valid for screw property class 8.8 :

- Output flange
- Torque arms
- Foot plates
- Input cover
- Protection caps
- Motor mounting

Tabelle 7: Schraubenanzugsmomente

Table 7: Tightening Torques

Anzugsmoment M_A [Nm] - Toleranz +10% Tightening torque M_A [Nm] - tolerance +10%			
Gewinde Thread	**Schrauben-Festigkeitsklasse Screw property class 8.8**	**Schrauben-Festigkeitsklasse Screw property class 10.9**	**Schrauben-Festigkeitsklasse Screw property class 12.9**
M5	5,5	8,0	10
M6	10	14	18
M8	25	33	43
M10	45	65	80
M12	75	105	135
M16	190	270	340
M20	380	530	670
M24	650	900	1150
M30	1300	1800	2300

19 Entsorgung / Disposal

Beachten Sie bei der Entsorgung die gültigen nationalen Vorschriften.

Öle und Fette bzw. öl- und fetthaltige Abfälle stellen ein hohes Gefahrenpotential für die Umwelt dar. Sorgen Sie deshalb für eine fachgerechte Entsorgung !

Mind the current national regulations for the disposal.

Oils and grease or oil- and grease containing wastes make up a high hazardous potential for the environment. Thus ensure a professional disposal!

Getriebemotorenteile	Material
Getriebegehäuse, Gehäuseteile (Eingangsdeckel, Adapter, Flansche,...)	Grauguss Ausnahme: K.. 40. Aluminium
Getriebeinnenteile (Zahnräder, Passfedern, Wellen,)	Stahl
Schneckenräder	Bronze
Wellendichtringe	Elastomer mit Stahl
Flachdichtungen	Asbestfrei
Getriebeöl	Additiviertes Mineralöl
Getriebeöl synthetisch	Polyglykolöl
Motorwicklung	Kupfer

Geared motors units	Material
Gear housing, housing parts (input cover, adapters, flanges...)	Grey cast iron Exception: K.. 40. Aluminium
Gear inner parts (tooth wheels, keys, shafts)	Steel
Worm gears	Bronze
Shaft sealing rings	Elastomer with steel
Flat seals	Asbestos-free
Gear oil	Additived mineral oil
Synthetic gear oil	Polyglycol oil
Motor winding	Copper

20 Einbauerklärung / Declaration of Incorporation

Einbauerklärung

im Sinne der EG-Richtlinie Maschinen 2006/42/EG, Anhang II B

Produkt: **Typenbezeichnung:**

- Stirnradgetriebemotoren H.
- Aufsteckgetriebemotoren A.
- Flachgetriebemotoren F.
- Stirnradschneckengetriebemotoren S.
- Kegelstirnradgetriebemotoren K.
- Kegelflachgetriebemotoren C.
- Schneckengetriebemotoren W.

Hersteller: WATT DRIVE Antriebstechnik GmbH, Wöllersdorfer Straße 68, 2753 Markt Piesting - Österreich

Die zur Zusammenstellung der technischen Unterlagen bevollmächtigte Person:

Norbert Reisner - Wöllersdorfer Straße 68 - 2753 Markt Piesting

Der Hersteller erklärt hiermit für die oben genannten unvollständigen Maschinen, dass diese:

- Den grundlegenden Anforderungen der Richtlinie 2006/42/EG soweit als möglich entsprechen.
- Die technischen Unterlagen gemäß Anhang VII Teil B erstellt wurden.
- Die speziellen technischen Unterlagen für unvollständige Maschinen wurden erstellt und können auf begründetes Verlangen einzelstaatlichen Stellen bereitgestellt werden.
- Dass deren Inbetriebnahme solange untersagt ist, bis diese gemäß Montageanleitung eingebaut wurden und bis eine EG-Konformitätserklärung für die gesamte Maschine gemäß Richtlinie 2006/42/EG vorliegt.

Angewandte einschlägige Bestimmungen:

- EG-Richtlinie für Maschinen 2006/42/EG
- Sicherheit für Maschinen EN ISO 12100:2010
- Elektrische Ausrüstung EN 60204 -1:2006 + A1:2009 + AC:2010
- Trennende Schutzeinrichtungen EN ISO 14120:2015
- Sicherheitsabstände EN ISO 13857:2008
- Drehende elektrische Maschinen
  EN 60034-1:2010 + AC:2010, EN 60034-2-1:2007, EN 60034-5:2001 + A1:2007, EN 60034-6:1993, EN 60034-7:1993 + A1:2001, EN 60034-8:2007 + A1:2014, EN 60034-9:2005 + A1:2007, EN 60034-11:2004, EN 60034-12:2002 + A1:2007, EN 60034-14:2004 + A1:2007, EN 60034-30:2009

Die zur unvollständigen Maschine gehörende Montageanleitung liegt vor in der Originalfassung deutsch.

Markt Piesting, 26.04.2017
Ort und Datum der Ausstellung

Klaus Sinnenberg – Geschäftsführer

watt drive WEG Group	Montageanleitung für MAS® - Getriebe und Getriebemotoren Mounting Instruction for MAS® - Gear units and geared motors

Declaration of Incorporation

in terms of the EC Machinery Directive 2006/42/EC, Annex II B

Product:	**Classification:**
▪ Helical geared motors	H.
▪ Shaft mounted geared motors	A.
▪ Parallel shaft geared motors	F.
▪ Helical worm geared motors	S.
▪ Helical bevel geared motors	K.
▪ Angle parallel shaft geared motors	C.
▪ Worm geared motors	W.

Producer: WATT DRIVE Antriebstechnik GmbH, Wöllersdorfer Straße 68, 2753 Markt Piesting - Austria

Authorized person for the compilation of the technical documents:

Norbert Reisner - Wöllersdorfer Straße 68 - 2753 Markt Piesting

The producer herewith declares referring to the above named incomplete machines that:

- They meet the basic requirements of the Direction 2006/42/EC as far as possible.
- The technical documents have been compiled according to Annex VII Chapter B.
- The special technical documents for partly completed machinery have been created and can be made available to the national authorities in response to a reasonable request.
- Their commissioning is prohibited until they have been implemented according to the mounting instruction and an EC Declaration of Conformity for the whole machine according to Direction 2006/42/EC is submitted.

Relevant applicable provisions:

▪ EC Machinery Direction	2006/42/EC
▪ Security for Machinery	EN ISO 12100:2010
▪ Electric Equipment	EN 60204 -1:2006 + A1:2009 + AC:2010
▪ Separating Safety Equipment	EN ISO 14120:2015
▪ Safety Distances	EN ISO 13857:2008
▪ Rotating Electrical Machines	EN 60034-1:2010 + AC:2010, EN 60034-2-1:2007, EN 60034-5:2001 + A1:2007, EN 60034-6:1993, EN 60034-7:1993 + A1:2001, EN 60034-8:2007 + A1:2014, EN 60034-9:2005 + A1:2007, EN 60034-11:2004, EN 60034-12:2002 + A1:2007, EN 60034-14:2004 + A1:2007, EN 60034-30:2009

The original version of the mounting instruction belonging to the incomplete machine is in German.

Markt Piesting, 26.04.2017

Place and Date of issue

Klaus Sirnsberg – Geschäftsführer

21 EU-Konformitätserklärung ATEX 2014/34/EU / EU Declaration of Conformity ATEX 2014/34/EU

EU - Konformitätserklärung

im Sinne der EU-Richtlinie Explosionsschutz 2014/34/EU

Produkte der Getriebeserie MAS:	**Typenbezeichnung:**
▪ Stirnradgetriebe mit Motor-Adapter oder Eintriebswellen-Modul	H.
▪ Aufsteckgetriebe mit Motor-Adapter oder Eintriebswellen-Modul	A.
▪ Flachgetriebe mit Motor-Adapter oder Eintriebswellen-Modul	F.
▪ Stirnradschneckengetriebe mit Motor-Adapter oder Eintriebswellen-Modul	S.
▪ Kegelstirnradgetriebe mit Motor-Adapter oder Eintriebswellen-Modul	K.
▪ Kegelflachgetriebe mit Motor-Adapter oder Eintriebswellen-Modul	C.

Hersteller: WATT DRIVE Antriebstechnik GmbH,
Wöllersdorfer Straße 68
2753 Markt Piesting - Österreich

Der Hersteller erklärt in alleiniger Verantwortung die Konformität der oben angeführten Produkte für:

- Zone 1 und 21, Gerätegruppe II, Kategorie 2G und 2D
- Zone 2 und 22, Gerätegruppe II, Kategorie 3G und 3D
- Gerätegruppe I, Kategorie M2

Kennzeichnung:

- II 2G Ex h IIC T4 Gb
- II 2D Ex h IIIC 125°C Db
- II 3G Ex h IIC T4 Gc
- II 3D Ex h IIIC 125°C Dc
- I M2 Ex h I Mb

Angewandte harmonisierte Normen:

- EN 80079-36:2016
- EN 80079-37:2016

WATT DRIVE Antriebstechnik GmbH hinterlegt die gemäß 2014/34/EU geforderten Unterlagen bei benannter Stelle:

TÜV Austria, Nr. 0408

Markt Piesting, 25.04.2018
Ort und Datum der Ausstellung

Klaus Sirnsberg - Geschäftsführer

EU - Konformitätserklärung

im Sinne der EU-Richtlinie Explosionsschutz 2014/34/EU

Produkte der Getriebeserien WG20/MAS:	**Typenbezeichnung:**
▪ Stirnradgetriebemotoren	C./H.
▪ Aufsteckgetriebemotoren	- /A.
▪ Flachgetriebemotoren	F./F.
▪ Stirnradschneckengetriebemotoren	- /S.
▪ Kegelstirnradgetriebemotoren	K./K.
▪ Kegelflachgetriebemotoren	- /C.

Hersteller: WATT DRIVE Antriebstechnik GmbH,
Wöllersdorfer Straße 68
2753 Markt Piesting - Österreich

Der Hersteller erklärt in alleiniger Verantwortung die Konformität der oben angeführten Produkte für:

- Zonen 2 und 22
- Gerätegruppe II
- Kategorie 3G und 3D

Kennzeichnung:

- II 3G Ex h IIC T4 Gc / II 3G Ex nA IIC T3 Gc
- II 3D Ex h IIIC 125°C Dc / II 3D Ex tc IIIC T125°C Dc

Angewandte harmonisierte Normen:

- EN 80079-36:2016
- EN 80079-37:2016
- EN 60079-0:2012
- EN 60079-15:2010
- EN 60079-31:2014

Markt Piesting, 12.04.2018
Ort und Datum der Ausstellung

Klaus Sirnsberg - Geschäftsführer

EU - Declaration of Conformity

in terms of the EU Directive on Explosion Protection 2014/34/EU

Products of the gear unit series MAS:	**Classification:**
▪ Helical gear unit with motor adapter or input shaft	H.
▪ Shaft mounted gear unit with motor adapter or input shaft	A.
▪ Parallel shaft gear unit with motor adapter or input shaft	F.
▪ Helical worm gear unit with motor adapter or input shaft	S.
▪ Helical bevel gear unit with motor adapter or input shaft	K.
▪ Angle parallel shaft gear unit with motor adapter or input shaft	C.

Producer: WATT DRIVE Antriebstechnik GmbH,
Wöllersdorfer Straße 68
2753 Markt Piesting - Austria

The manufacturer declares the sole responsibility for the above-mentioned products for:

- Zone 1 and 21, Device Group II, Category 2G and 2D
- Zone 2 and 22, Device Group II, Category 3G and 3D
- Device Group I, Category M2

Marking:

- II 2G Ex h IIC T4 Gb
- II 2D Ex h IIIC 125°C Db
- II 3G Ex h IIC T4 Gc
- II 3D Ex h IIIC 125°C Dc
- I M2 Ex h I Mb

Applied harmonized standards:

- EN 80079-36:2016
- EN 80079-37:2016

WATT DRIVE Antriebstechnik GmbH deposits the required documents according to 2014/34/EU at the notified body:

TÜV Austria, No. 0408

Markt Piesting, 25.04.2018
Place and date of issue

Klaus Sirregbauer – Managing Director

EU - Declaration of Conformity

in terms of the EU Directive on Explosion Protection 2014/34/EU

Products of the geared motor series WG20/MAS:	**Classification:**
▪ Helical geared motors	C./H.
▪ Shaft mounted geared motors	- /A.
▪ Parallel shaft geared motors	F./F.
▪ Helical worm geared motors	- /S.
▪ Helical bevel geared motors	K./K.
▪ Angle parallel shaft geared motors	- /C.

Producer: WATT DRIVE Antriebstechnik GmbH
Wöllersdorfer Straße 68
2753 Markt Piesting - Austria

The manufacturer declares the sole responsibility for the above-mentioned products for:

- Zone 2 and 22
- Device Group II
- Category 3G and 3D

Marking:

- II 3G Ex h IIC T4 Gc / II 3G Ex nA IIC T3 Gc
- II 3D Ex h IIIC 125°C Dc / II 3D Ex tc IIIC T125°C Dc

Applied harmonized standards:

- EN 80079-36:2016
- EN 80079-37:2016
- EN 60079-0:2012
- EN 60079-15:2010
- EN 60079-31:2014

Markt Piesting, 12.04.2018
Place and date of issue

Klaus Sirnsberg - Managing Director

watt drive WEG Group	Montageanleitung für MAS® - Getriebe und Getriebemotoren Mounting Instruction for MAS® - Gear units and geared motors

22 EU-Konformitätserklärung Niederspannungsrichtlinie 2014/35/EU / EU-Declaration of Conformity Low Voltage Directive 2014/35/EU

EU - Konformitätserklärung

im Sinne der Niederspannungsrichtlinie 2014/35/EU

Produkt:

- Asynchron-Drehstrommotoren mit Käfigläufer
- Einphasen-Induktionsmotoren mit Käfigläufer

IEC-Motorbaugröße: 56 - 355

Serie:

WA_	7WA_	70 WA_	7B WA_	2A WA_	2B WA_	3A WA_	3B WA_	3C WA_
WP_	7WP_	70 WP_	7B WP_	2A WP_	2B WP_	3A WP_	3B WP_	3C WP_
11N	11H	11P	M31_	M32_	M33_			

Hersteller: WATT DRIVE Antriebstechnik GmbH, Wöllersdorfer Straße 68, 2753 Markt Piesting - Österreich

Die alleinige Verantwortung für die Ausstellung dieser Konformitätserklärung trägt der Hersteller.

Der oben beschriebene Gegenstand der Erklärung erfüllt die einschlägigen Harmonisierungsrechtsvorschriften der Union:

- Niederspannungsrichtlinie 2014/35/EU
- ErP-Richtlinie 2009/125/EG [1)]
- EMV-Richtlinie 2014/30/EU
- Elektrische Ausrüstung EN60204-1:2006 + A1:2009 + AC:2010, EN 60204-11:2000 + AC:2010
- Drehende elektrische Maschinen
  EN 60034-1:2010 + AC:2010, EN 60034-2-1:2007, EN 60034-5:2001 + A1:2007, EN 60034-6:1993, EN 60034-7:1993 + A1:2001, EN 60034-8:2007 + A1:2014, EN 60034-9:2005 + A1:2007, EN 60034-11:2004, EN 60034-12:2002 + A1:2007, EN 60034-14:2004 + A1:2007, EN 60034-30:2009

[1)] Soweit die Produkte in den Anwendungsbereich der ErP-Richtlinie fallen, werden die Anforderungen der Verordnung (EG) Nr. 640/2009 vom 22. Juli 2009 bzw. Verordnung (EU) Nr. 4/2014 vom 06. Jänner 2014 erfüllt.

Markt Piesting, 26.04.2017

Ort und Datum der Ausstellung

Klaus Sirnsberg – Geschäftsführer

EU - Declaration of Conformity

In terms of the Low Voltage Directive 2014/35/EU

Product:

- Asynchronous Three Phase motors with cage rotor
- Single Phase Induction motors with cage rotor

IEC Motor Size: 56 - 355

Series:

WA_	7WA_	70 WA_	7B WA_	2A WA_	2B WA_	3A WA_	3B WA_	3C WA_
WP_	7WP_	70 WP_	7B WP_	2A WP_	2B WP_	3A WP_	3B WP_	3C WP_
11N	11H	11P	M31_	M32_	M33_			

Producer: WATT DRIVE Antriebstechnik GmbH, Wöllersdorfer Straße 68, 2753 Markt Piesting - Austria

This declaration of conformity is issued under the sole responsibility of the manufacturer.

The object of the declaration described above is in conformity with the relevant Union harmonisation legislation:

- Low Voltage Directive 2014/35/EU
- ErP Directive 2009/125/EC [1)]
- EMC Directive 2014/30/EU
- Electrical Equipment EN60204-1:2006 + A1:2009 + AC:2010, EN 60204-11:2000 + AC:2010
- Rotating Electrical Machines
  EN 60034-1:2010 + AC:2010, EN 60034-2-1:2007, EN 60034-5:2001 + A1:2007,
  EN 60034-6:1993, EN 60034-7:1993 + A1:2001, EN 60034-8:2007 + A1:2014,
  EN 60034-9:2005 + A1:2007, EN 60034-11:2004, EN 60034-12:2002 + A1:2007,
  EN 60034-14:2004 + A1:2007, EN 60034-30:2009

1) Products that are covered by this ErP Directive meet the requirements of Regulation (EC) No. 640/2009 from July 22, 2009 resp. Regulation (EU) No. 4/2014 from January 6, 2014.

Markt Piesting, 26.04.2017

Place and date of issue

Klaus Sirnsberg – Managing Director

WATT DRIVE ANTRIEBSTECHNIK GMBH
A-2753 Markt Piesting, Wöllersdorfer Straße 68, Austria
Tel.: +43 / 2633 / 404-0, Fax: +43 / 2633 / 404-220
Email: watt@wattdrive.com
Web: www.wattdrive.com

WATT DRIVE GMBH
D-59423 Unna, Heinrich-Hertz-Straße 14, Germany
Tel.: +49 / 2303 / 98 687-0, Fax: +49 / 2303 / 98 687-81
Email: info@wattdrive.de
Web: www.wattdrive.de

Eine Übersicht unserer Niederlassungen und Händler weltweit finden Sie unter www.weg.net oder www.wattdrive.com.

For an overview of our local distributors and WEG operations worlwide see www.weg.net or www.wattdrive.com.

BA.MA.GT.001.030.05.18
BM.WMBA.MAS.ATEX

For more information contact us at

support@topfibra.eu

or

visit our page

www.topfibra.eu

To learn more about EFW technology visit our blog

www.effectivefilamentwinding.com

www.facebook.com/effectivefilamentwinding

www.linkedin.com/company/topfibra-d-o-o-

www.twitter.com/topfibraefw