

# K.LUND Offshore .as

## **USER MANUAL**

### **FOR**

## **HYDRAULIC FOLDING CRANE**

### **HMC 250 a4.**



K.LUND Offshore .as

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## Preface

Your crane represents a high investment and should only be operated by trained personal to ensure a trouble-free operation at all times.

This manual contains directions in regards to the performance of the crane as well as safety at work, correct operation and maintenance. You shall receive the best performance of your crane if you follow these instructions carefully.

All descriptions and illustrations are without any obligation and we reserve the right to alter or amend any data or illustration without further notice.

This manual is considered for your particular crane only and will not be changed and/or extended in case of any technical modification on this model.





## **Chapter 1                      Accident prevention**

This operation manual should have been studied carefully before starting to operate the crane.

The crane operator must be acquainted with all controls of the crane as well as all functions and safety devices.

Any precaution sticks must be placed at well sighted locations at the crane. The national rules for prevention of accidents must be followed strictly.

Attachments: winch etc.

When crane is equipped with an attachment then the operation manual of the particular manufacturer is valid.



## **Directions for prevention of accidents!**

### **ATTENTION!**

It is strictly forbidden to stay within the slewing range of the crane, regardless whether the crane is slewing with or without load. Prohibitive fences should be arranged to prevent anybody to enter the slewing range of the crane.

Bulk goods may only be handled by the crane if secured by nets or any other suitable means of protection.

Bulk goods handled by fork lift attachment on the crane hook should be secured very carefully and may only be off-loaded after the crane has come to a complete stop.

### **ATTENTION!**

Never use any damaged slings or ropes to secure the load as this may lead to serious accidents.

### **ATTENTION!**

It is necessary to switch off the hydraulic pump. Otherwise an excessive amount of oil will build-up a high pressure by too high motor speeds.

### **ATTENTION!**

The loading capacity is not allowed to be increased by any measures as for instance the hanging up and subsequent release of bad measurable loads. The crane vehicle could tilt over or unusual uncontrolled movements and deformations can be appear.

### **ATTENTION!**

In case of damaged seals at overpressure valves and/or overload protection devices only authorised persons may start the crane after having set the correct pressures.

The crane operator signs responsible for untouched seals on the safety systems of the crane.



## Distances to power transmission lines

At many operational areas there are more difficult conditions because of power transmission lines. Their exist mean a heightened danger for the whole crane operation. When lines will be touched or when the crane or the load come near to the lines, then electric power will pass over. Due to this the crane operator and the auxiliary personnel will get in danger to life.

### Attention!

In this case you have to induce to stop the power supply.

If it is not possible to stop the power supply you have to keep a sufficient safety distance to the electrical lines.

Concerning power plants and their overhead transmission lines you have to keep following safety distances to the parts which are energized:

rated circuit voltage	safety distances
up to 1000 volts	1,00 m
more than 1000 ----110000 volts	3,00 m
more than 110000--220000 volts	4,00 m
more than 220000--380000 volts	5,00 m
at unknown voltage	5,00 m

For contact lines of electric tracks the following datas are valid:

up to 1000 volts alternating current	1,00 m
more than 1000 volts alternating current	1,50 m
up to 1500 volts direct current	1,00 m
more than 1500 volts direct current	1,50 m

### Danger to life!

If the current power passed over for all that please observe following instructions:

- Keep cool, do not leave the driver's cabin.
- Warn outside observers and urge them that they shall not touch the crane, the vehicle or the load in any case.
- If it is possible try to bring the crane out of danger by slewing it out and then retract the extensions. If the crane is not working anymore, please do not leave the vehicle before the power supply is stopped.



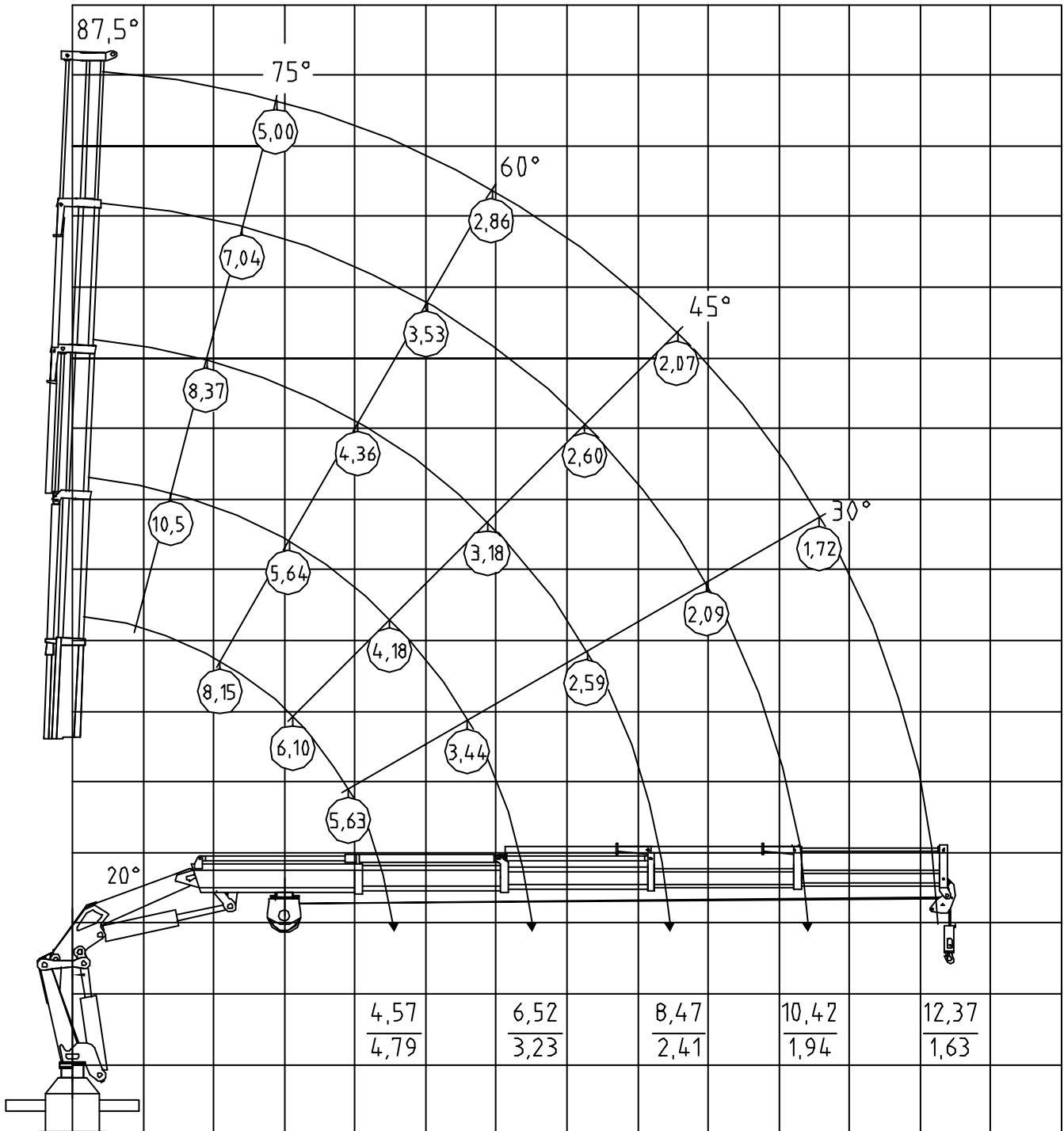
## **Directions to product liability**

In regard to the liability of a manufacturer for his products we like to point out:

Every manufacturer is liable for his product.

MKG Maschinen- und Kranbau GmbH excludes any liability for damages caused by subsequent modifications of their product and/or unauthorised use of components supplied by other manufacturers which have not been approved by MKG.

MKG is not responsible for damages caused by incorrect installation of their cranes including unsuitable foundations and/or fixing materials. Any claims must be rejected in case the general rules of international engineering standard have not been followed.

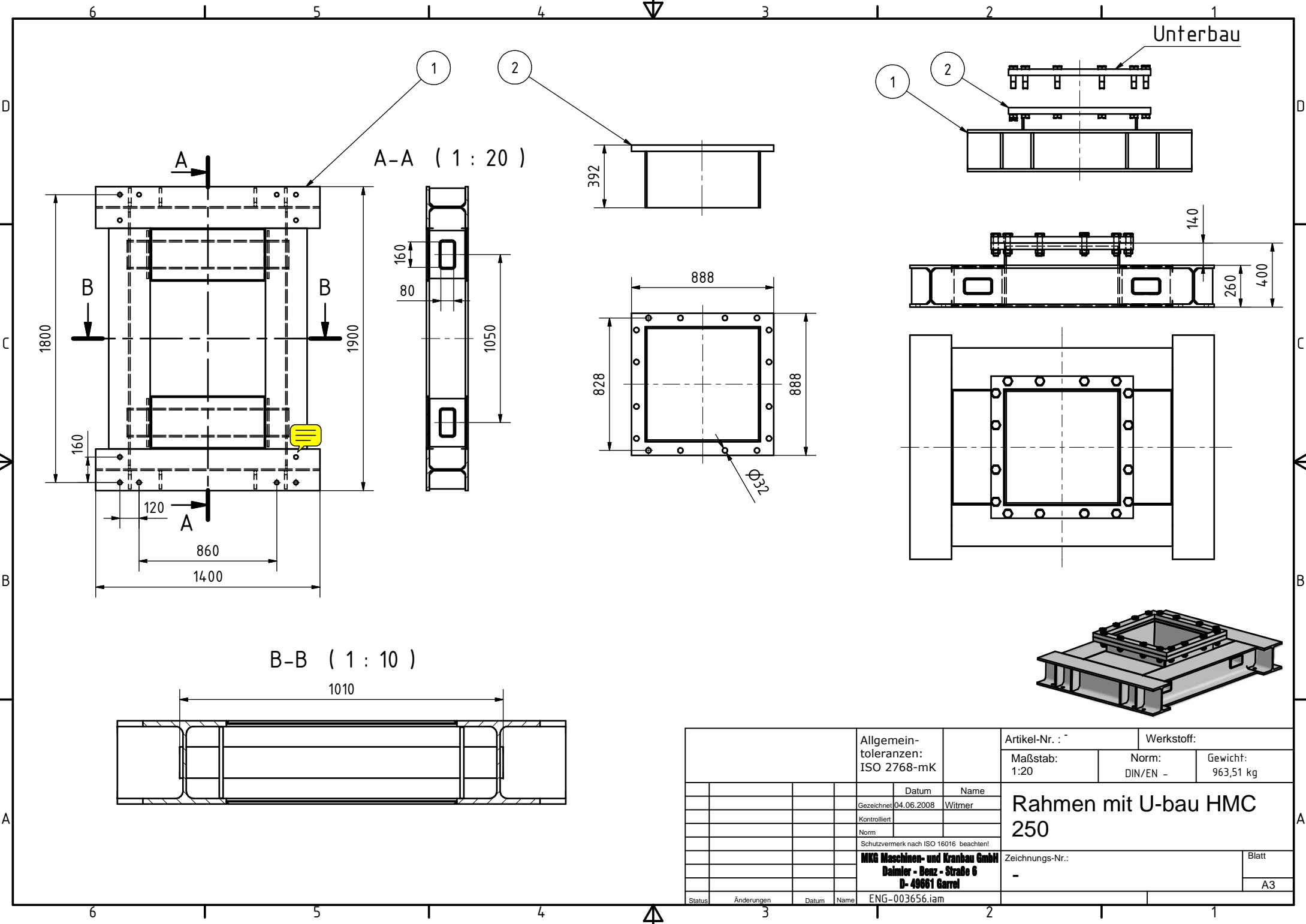


**Traglastdiagramm / load diagram**  
**HMC 250 a4**

Sämtliche Angaben gewissenhaft, jedoch unverbindlich!  
 Konstruktionsänderungen vorbehalten!

Tafel : **725 - B1 - 10**  
 table : **21.01.04 GE**





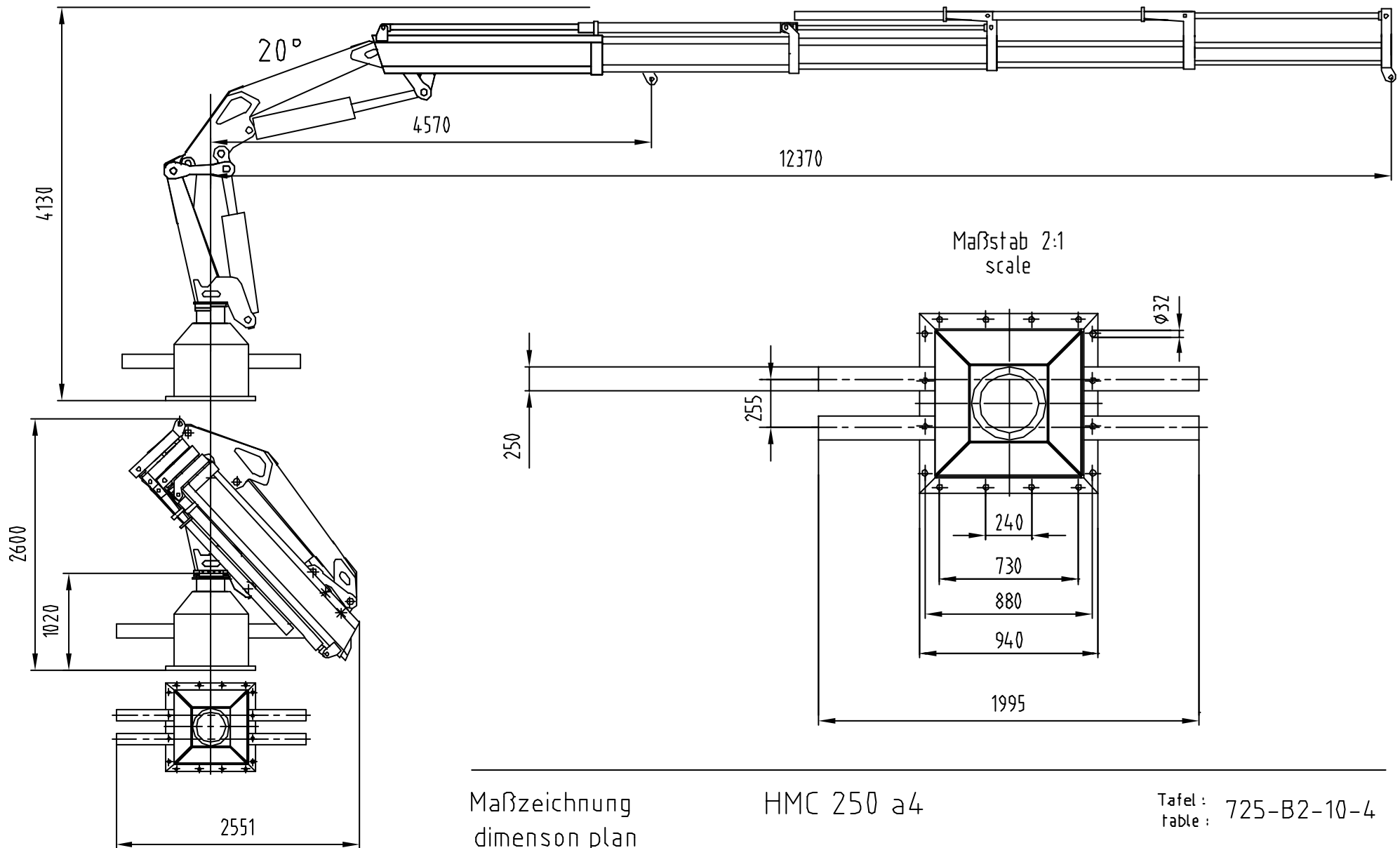
A-A ( 1 : 20 )

B-B ( 1 : 10 )

Unterbau



Allgemeintoleranzen: ISO 2768-mK		Artikel-Nr. : -		Werkstoff:	
Datum: 04.06.2008 Name: Witmer		Maßstab: 1:20	Norm: DIN/EN -	Gewicht: 963,51 kg	
Gezeichnet: 04.06.2008 Kontrolliert:		<b>Rahmen mit U-bau HMC 250</b>			
Norm:					
Schutzvermerk nach ISO 16016 beachten!		Zeichnungs-Nr.:		Blatt	
MKG Maschinen- und Kranbau GmbH Daimler - Benz - Straße 6 D- 49661 Garrel		-		A3	
Status	Änderungen	Datum	Name	ENG-003656.i.iam	



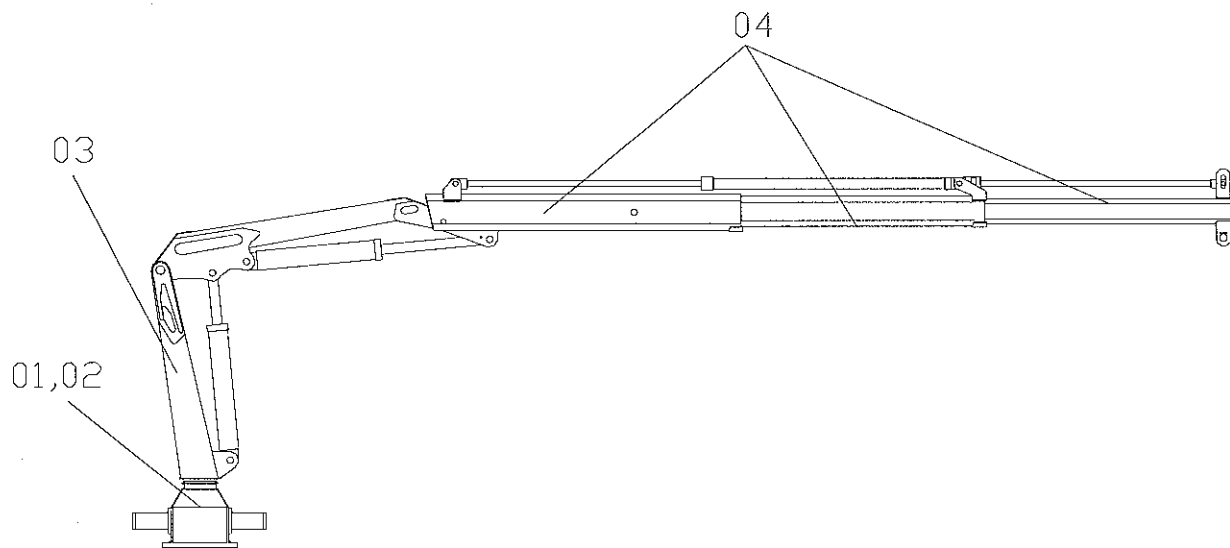
Maßzeichnung  
dimension plan

HMC 250 a4

Tafel : 725-B2-10-4  
table :

## Chapter 2

## Description of components



**The crane can be combined to following six main groups:**

1. Valve system
2. Substructure and slewing movement
3. Column
4. Jib system

## **1. Valve System**

All cylinders are double acting, that means pressure can be given to both sides of the piston. Directional control valves in longitudinal bar construction allow a stepless, sensitive regulation of working speed which is obtained by a special separation - independent of pressure - of the feed flow of the pump in a consumer-useful flow and a remaining oil flow led into the return. Heavy and bulky loads can be moved precisely. Additionally the lowering speed of the lifting and buckling cylinders in the valve blocks is limited.

The way control block consists of a terminal block, the single valve segments and a limit plate. These parts are held together by tension rod and sealed with O-rings.

In the terminal block there are connections for pressure and return pipes, manometer connection as well as the main pressure relief valve which controls the complete hydraulic plant of the crane concerning the allowed pressure.

The segments of lifting-, jib-, slewing-, extension and possible by-pass valves are equipped secondary with fixed adjusted pressure limiting valves. These ones grant the particular assured pressures and are working as shock valves, that means that the pressure tops will be absorbed, which are caused by sudden shocks.

A checking of the pressures can be made in such a way that the single working cylinders will be driven to the stop and the pressure is readable on a manometer. The main relief valve will be checked while the stabilizer legs will be completely retracted.

For prevention of a falling down of the boom when a pipe is fractured a pipe fracture valve is installed at the connections between lifting cylinder and hydraulic pipes.

Load holding valves at the extension cylinders prevent a undisireable retraction of the extensions. The overcentre valves at lifting and jib arm take over a similar function. They grant that the lifting and jib arm can only be lowered when the control valve will start the process of lowering. Moreover these overcentre valves are a safe overload protection.

## **2. Substructure and slewing movement**

The substructure of crane is manufactured out of a solid steel construction. For receiving the column the substructure contains an upper and a lower radial common bearing as well as a deep groove ball thrust bearing.

At the substructure of crane cylinder pipes are fixed in which a rack is situated as piston rod with piston. This transfers the straight movement into the turning movement of column by a toothed wheel.

**Attention!** The end stops of the slewing gear must be started up very carefully. In principle this is to avoid in the load operating condition.



### **3. Column**

The column consists of a column body as well as a welded column tube with toothed wheel of slewing gear. Lifting cylinder and lifting arm are placed at strong mounting points.

### **4. Jib System**

The jib system consists of main elements, lifting and jib arm with pipes manually or hydraulically extendable.

Movement of lifting arm is being effected by lifting cylinders which are fixed at the column. They are double-acting - like all cylinders - and can therefore for example effectively support operation of a grab.

The jib cylinder is placed between lifting arm and jib arm. The jib arm can be extended in its outreach by hydr. or manual extensions which are sliding on special plates.



## 8. Operation of Rope Winch

The rope always has to be unspooled so far that it will not be damaged during the extension of the hydr. extensions.

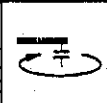
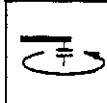

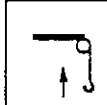

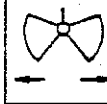
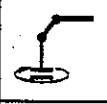





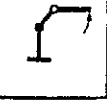

- a) Intermediate rolls have to be mounted at manual extensions
- b) Jerky control movements without any load have to be avoided (loops formation)
- c) The indicated load capacity datas of the manual extensions have to be kept **strictly**
- d) When crane is in operation the vehicle has to be stabilized absolutely horizontal
- e) If possible the rope should be reeled up under load
- f) The rope has to be reeled up completely new every 4 weeks
- g) Rope, rope hook and fastenings have to be checked or if necessary renewed regularly
- h) The oil level of the winch has to be checked weekly

During lifting the load you have to pay attention that the pull is vertical (angular pull).

## Chapter 3

## Control units

The control of the crane happens by the hand lever at the control valve, at the radio remote control or at the cable remote control. In the following the motion symbols with the corresponding motion directions are showed.

		Rotator turn right/ turn left (extra equipment)
		winch up/ down (extra equipment)
		clamshell bucket shut/ open (extra equipment)
		slewing right/ left (standard)
		extension pull out/ retract (standard)
		lifting arm lift/ lower (standard)
		jib arm lift/ lower (standard)



## Safety Devices

**MKG-cranes are equipped in series with the following safety devices:**

### **Overload protection**

According to § 24 the accident prevention rule “outrigger cranes” (BVG D6), overload protection for all cranes are necessary. In general, test books are to be made for the named cranes.

The system of the overload protection proceeds on the assumption that the pressure in the lifting cylinder will increase inadmissibly when the load moment is too high. The overload system controlled by a sequential valve, blocks all functions, which increase the load moment, if pressure gets to a certain limit of the system.

1. Pulling out of extension cylinder
2. Retraction and pulling out of jib cylinder

This arrangement prevents that the system is overloaded and that the load decrease without influence, i. e. the crane is overloaded and the pressure relief valves react due to a pressure which is too high.

### **Emergency stop on the control elements:**

**Press immediately emergency stop, if there are uncontrolled movements or dangerous situations!**

Reactivate the crane by pulling and clicking the emergency stop into the upper position. By this means the electric plant will be switched on, the emergency valve will close and the hydraulic system will be supplied with pressure.

**Attention! Cranes, which are equipped with radio remote control , the key button is to be set into the Zero-Position!**





## **Chapter 4**                      **Putting into Operation**

In order to start operation of crane you have to act as follows:

1. Before starting auxiliary drive the parking brake has to be set; when working at slopes a block has to be placed under wheels.
2. Start auxiliary drive for hydraulic pump and increase speed of engine to rotations which are necessary for the pump.
3. Put control valve of lifting cylinder to position "Lifting" and extend lifting arm completely.
4. Put control valve of extension cylinder to position "Pulling out" and ascend extension approx. 200 mm in order to unlock buckling arm.
5. After that pull out jib cylinders in order to bring the buckling arm to the desired position.
6. Pull out the extension to the desired working position.
7. If the crane is equipped with an additional jib and winch you have to proceed as described in itm 1 to 5.



## **Chapter 4                      Putting into Operation**

Put the crane into operation, as follows:

1. Put the control valve of the lifting cylinder in the following position “lifting” and extend the lifting arm to the top.
  
2. Extend extensions into working position.

### **Folding of the crane into transport position**

Before you fold the crane into transport position, switch off the pump and process in reverse order. The remaining overpressure in the hydraulic system can be let out by movement of valve operation.

## **Safety Devices**

**MKG-cranes are equipped in series with the following safety devices:**

### **Overload protection**

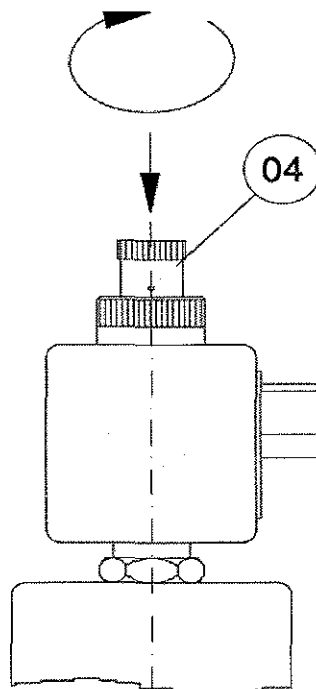
The system of the overload protection proceeds on the assumption that the pressure in the lifting cylinder will increase inadmissibly when the load moment is too high. The overload system controlled by a sequential valve, blocks all functions, which increase the load moment, if pressure gets to a certain limit of the system.

1. Pulling out of extension cylinder
  
2. Retraction and pulling out of jib cylinder

This arrangement prevents that the system is overloaded and that the load decrease without influence, i. e. the crane is overloaded and the pressure relief valves react due to a pressure which is too high.

## Bridging of the emergency stop valve

If the power supply is cut, press the knurled wheel (position 04) down and turn it to the right until the knurled wheel is locked in (bayonet lock).



### **ATTENTION!**

Please take a note that it is only allowed to bridge the emergency stop valve, when the crane is to be put into transport position.

It is also not allowed to execute further crane operations because the emergency stop is not efficient due to the bridging of the emergency stop.

**Inform immediately the workshop of contract!**

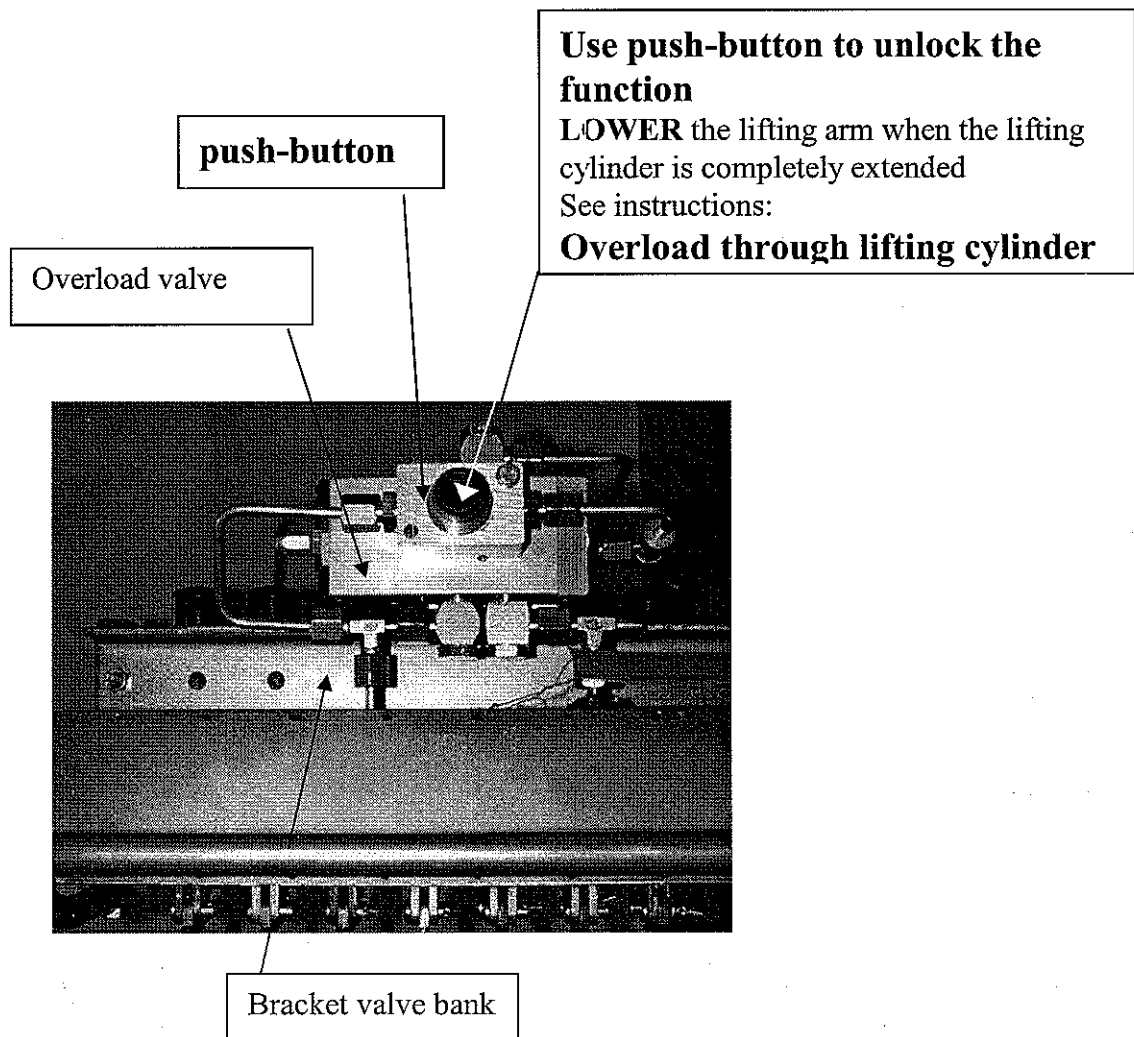
## Optical indication of load moment

This warning light illuminates if 90 % of the load moment are reached.  
Prevent overload and uncontrolled acting of the crane by putting the load on.  
Saving of time! An unnecessary packing is also be avoided.

## Overload through lifting ram

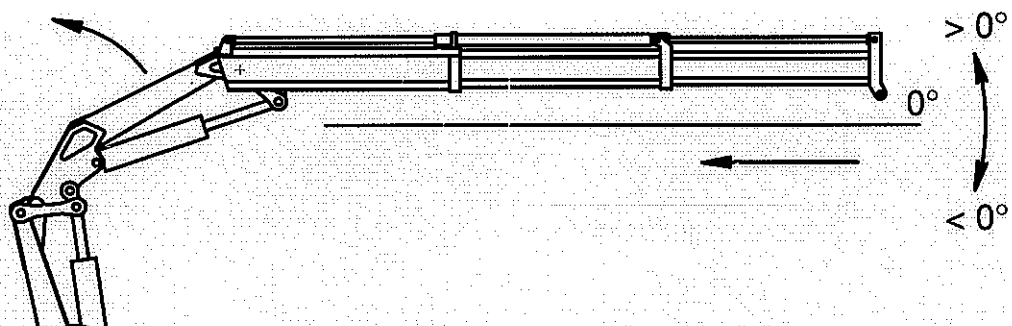
If the main boom is geared up to max. angle, overload might be simulated. Now the lifting cylinder cannot be lowered. This situation can be avoided by avoided the max. stroke of piston. However, if this has happened the crane operator has to reduce the hydraulic pressure by pressing the push-button. The crane operator has to press the push-button until the control valve of the lifting boom "Lower" is open. Having released the bush-button, the control valve for the lifting boom "Lower" will close. See drawing

Provided that a crane is equipped with a radio remote control, this push-button is installed on the lifting cylinder of the crane. When this lifting cylinder is positioned to its maximal extension condition, the roller button is activated. The roller button reduces the pressure inside the cylinder. Automatically the cylinder retracts and releases the limit switch.



## Load moment limiting (pendular switching)

Way of function of the load moment limiting. For avoiding an overstep of the load moment the crane is equipped with a load moment limiting. If the jib arm (independent of the position of main boom) has reached a working position of more than ( $>$ )  $0^\circ$  to the horizontal you will only be able to work if the load moment will be reduced. That means to lift the lifting arm, to lift the jib arm or to retract the hydr. extension tubes. If the jib arm reached a working position of less than ( $<$ )  $0^\circ$  to the horizontal you are also only able to work if the load moment will be reduced. That means to lift the lifting arm, to lower the jib arm or to retract the hydr. extension tubes.





## **Load holding valves**

MKG-cranes are equipped with load holding valves at the rams.

They are a good protection against undesirable or inadmissible drifting of the piston of a cylinder in load direction.

So the risk of accidents against lowering loads is excluded and a safety working is possible.



## Chapter 5

## Maintenance of crane

### Remarks in regard to maintenance works

Attention! Before starting any maintenance works at the crane make sure you have secured the crane booms against unintended lowering of same. The pressure on all pipes and hoses must be released before starting works on the hydraulic system, i.e. shutt-off pumps, retract all hydraulic cylinders and secure same. Make sure no hydraulic oil may disappear into the ground.

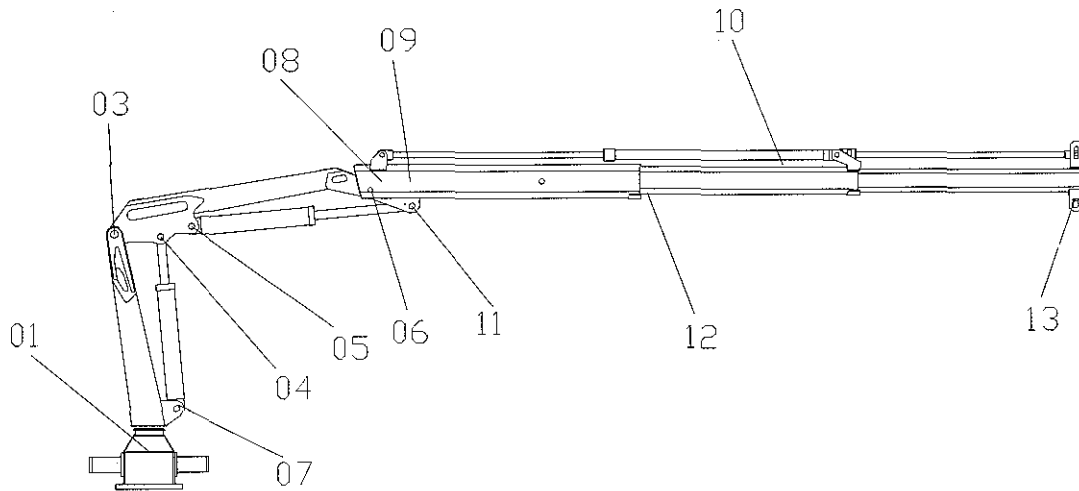
Oil binders are to be carried along.

Any damaged hoses must be replaced without delay.

### Important!

A careful and conscientious maintenance of the crane guarantees trouble-free operation and an extended life-time.

## Maintenance chart and lubrication points



pos.	description	space of time	
01	column base	every week	grease
02	hydraulic oil tank	every day	checking the oil level
		every year	oil and filter renewal
03	column/ lifting arm	every week	grease
04	lifting ram/ lifting arm	every week	grease
05	jib ram/ lifting arm	every week	grease
06	jib arm, lifting arm	every week	grease
07	colum/ lifting ram	every week	grease
08	lifting arm/ steering lever	every week	grease
09	jib arm/ steering lever	every week	grease
10	jib arm/ extension I	every week	grease
11	jib ram/ steering lever	every week	grease
12	jib arm, extension I	every week	spread with grease
13	load hook	every day	damage check
		every week	grease
14	winch		see instruction manual





## Lubricants

### Specification of hydraulic oil:

The utilisation of appropriate hydraulic oil is of fundamental importance in regard to the well-function and life-time of a crane.

High standards are set regarding frothing, viscosity, temperature gradient, point of emulsion, as well as neutral reaction toward metals and seals.

To facilitate the right choice different viscosity-classes have been introduced.

The characteristic-number corresponds to the average viscosity ( $\text{mm}^2/\text{s}$  at  $40^\circ\text{C}$ ).

We differentiate:

VG 22	arctic conditions or extreme long supply pipes
VG 32	winter condition in Central Europe
VG 46	summer conditions in Central Europe or closed buildings
VG 68	tropical conditions or closed buildings with high temperature
VG 100	extreme hot climate

### Ex works supplied oil Aviatric HLP ISO 46

#### Characteristics:

at $40^\circ\text{C}$	46 $\text{mm}^2/\text{s}$ (cST)
at $100^\circ\text{C}$	7,0 $\text{mm}^2/\text{s}$ (cST)
pour point	- $24^\circ\text{C}$
flashing point	$210^\circ\text{C}$
anti-corrosion agent:	sufficient



Maximum permissible oil temperature for limit of viscosity min. 10 mm<sup>2</sup>/s (cST) + 80°C

Minimum starting temperature for limit of viscosity max. 1500 mm<sup>2</sup>/s (cST) - 15°C

On marine cranes a higher rust prevention degree is used.

### Hydraulic Oil Comparison Chart

Other manufacturers and their oil types of parallel classifications of viscosity:

ARAL	SHELL	BP	ESSO	MOBIL	TEXACO
VITAM GF 46	TELLUS OIL 46	BARTRAN HV 46	Nuto H 46	MOBIL D.T. E. 25	RANDO Oil HD B-46

**The alternative! Biological decomposable hydraulic oil: KAJO HEES 46**

- Lubricating grease**
- Fuchs LZR 2 – bearing,bushing
  - grease with graphite - extensions
  - rolling bearing grease L 223-base

BP	ESSO	FINA	MOBIL
Energrease	Exxon		Mobilux
LS EP		EP	EP 2
9346			

**ATTENTION!** In principle oils have to be caught and disposed. If oil reaches the soil it will contaminate the drinking-water!

**Important!** The oil reservoirs for refilling oil have to be free of any residues. Control-, drain and drain off places have to be cleaned before opening.

### Control of Oil Level

The oil level is to be controlled daily with the aid of the dipstick at the air-drain valve of the oil reservoir.

If required oil has to be refilled.

## **Oil-change**

Hydraulic oil becomes polluted after a certain period of time and may lead to malfunction of the system.

**Hydraulic oil must be changed at least every 1000 operating hours or once a year whatever comes first!**

### **Remark!**

A clean hydraulic oil avoids malfunction. Cleanliness is a must at all times whilst working on a hydraulic system.

**Return-filters must be changed whenever the oil is changed!**

## **High pressure filter**

If the filter element of the high pressure filter is contaminated a „RED,, signal appears at the contamination indicator. In this case you have to stop working **immediately** to renew the filter element.





## Chapter 6      Failures and their causes

1. Working movements of the truck mounted cranes are too slowly or discontinuously.
  - control valve is contaminated (lifting resp. jib ram)
  - control valve is defect
  - hydraulic pump is defect or it has to be air-relieved
  - not enough oil in the oil reservoir
  - oil is unsuitable, it is foaming
2. The crane does not lift the indicated load.
  - working pressure is too slow
  - piston seals are defect
  - helical compression ring in the pressure relief valve is too weak, it opens before reaching the rated pressure
  - sequence valve switches on the overload protection when reaching the load moment
3. The crane drops down under load.
  - cylinder gasket
  - valves are contaminated
4. The slewing moment of the crane is too quick.
  - the performance of the pump is too high
  - throttle valve is not adjusted
5. Leg ram gives way of itself.
  - stopcocks are not closed
  - stopcocks are leaky
6. Crane lifts more as indicated on the loading diagram.
  - overload protection is defect
  - valves are contaminated

**ATTENTION! If there are any failures you have to inform first of all the contractual workshop.**

## electric symbols Sinnbilder ( elektrisch )

	<p>( Meldeleuchte rot ) 90% der Tragkraft (warning light red) 90% of lifting capacity</p>
<p>NOT-AUS Emergency stop</p> 	<p>Beim Drücken des Not-Aus-Schalters, wird das Not-Aus-Ventil abgeschaltet If the emergency cut-off button is activated, the emergency cut-off valve is switched off.</p>
 <p>START STOP</p>	<p>Motor Start (Doppeltaste) engine-on (dual push-button) Motor Stop engine-off</p>
	<p>( Meldeleuchte gelb ) Drucktaster Überbrückung für Seilendabsch. (yellow light) push-button to release cut-off of winch rope</p>
 <p>min<sup>-1</sup></p>	<p>Motordrehzahl hoch / niedrig ( Drehschalter ) engine rpm high/low (rotary switch)</p>
	<p>Arbeitsscheinwerfer ( Drehschalter ) working light (rotary switch)</p>
	<p>Hupe ( Drucktaster ) horn (push-button)</p>
	<p>Umschaltung Hand / Funk Drehschalter ( Hand/ Aus / Funk ) change-over manual/radio remote rotary switch (manual/off/radio remote)</p>
	<p>(Meldeleuchte grün) Geschwindigkeit schnell (green light) high speed</p>
	<p>(Meldeleuchte gelb) Geschwindigkeit langsam (yellow light) low speed + push-button high pressure (HP) on/off</p>
 <p>START</p>	<p>Motor Start ( Drucktaster ) engine start (push-button)</p>
 <p>STOP</p>	<p>Motor Stop ( Drucktaster ) engine off (push-button)</p>



## **Mounting instruction for crane of MKG**

As we assume, that skilled technicians will carry out the mounting, this instruction gives only general information.

The whole machine is to be checked by an expert or service worker. Only then you can put the crane into operation.

The following information about technical data, diagrams and dimensions of this instruction refer to the

### **Crane of MKG No.**

This instruction contains specifications, sketches and points, which have to be considered in order to guarantee excellent working.

One of the most important factors for the marine-crane mounting are to keep vibrations and noise as low as possible.

The noise should not exceed 75 DB (A) IN a distance of 1 m (according to DIN 4412).

Comply with or reach the following points as far as possible.

### **Important indications which are to be considered:**

1. Before mounting the crane check, fabricate or carry out first-off for the structure of the substructure.
2. Consider where the dead point of the crane with slewing gear of the gear rack is. Concerning this see the sticker containing the corresponding indication on the crane foot. If you need further information, please contact the responsible dealer or **MKG** located in Garrel.
3. Use only clamping bolts which are in perfect condition. These bolts must have the prescribed strength or quality. –(Regarding this see the technical data containing specifications)
4. All lines and flexible connections (hoses) or pumps between the crane and the hydraulic aggregate need to have the adequate diameter. Concerning this see the indications on the hydraulic plan of the manufacture.



5. angled screw coupling of 90° have to be avoided
6. If you can not bend the pipes, it is better to use pipe bend of 90° instead of angled screw coupling of 90°.
7. Use flexible bulkhead stuffing box which is to be attached by welding when tubes are assembled in bulkhead walls or similar places.
8. Fix hydraulic pipes by clamps with rubber elements instead of plastic elements. Clamps with rubber elements reduce noise and vibrations. Distance between the clamps must be according to the specification of the clamp manufacturer.
9. With separate standing power-pack the tank should be installed on flexible mounts. Never weld or screw it together with the substructure
10. The hydraulic aggregate or hydraulic tank is to be placed in that way, that a well circulation of air is possible and the aggregate can be cooled while working. If there is sufficient circulation of air but not enough cooling, it is necessary to install a fan-type air cooling or heat cooler. Concerning this consider the normal and maximum of oil temperature stated in the manual.
11. If required by the winch manufacturer an oil filter is to be installed in the leak oil pipe from the winch to the tank.
12. Please take a note that filter elements placed in the return and leak oil pipe of winch (if filter is installed) are to be changed after 20 service hours or after a repair.
13. Before installation and putting into operation all screwing and lines have to be in an absolutely clean condition Therefore, the whole system is to be cleaned by flushing. Only after this the hydraulic system can be filled with hydraulic oil which has a viscosity of 46 mm<sup>2</sup>/s (46 cSt) on 40°C corresponding to the ISO VG 46.

All cranes are tested carefully before they leave the factory. If the crane mounting is carried out carefully, a perfect working with the crane should be guaranteed. If you have further questions concerning the installation, please do not hesitate to contact the responsible dealer or the manufacturer **MKG** located in **Garrel**.

**Please keep always in mind the golden rule of hydraulic:**

**Cleanliness-Cleanliness-Cleanliness**

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Proj.rev.code	Issue date	Reason for issue	Made by	Chk'd by	Appr. by
P.O.Number		Package Title <b>HYDRAULIC POWER UNIT (HPU)</b>			
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<p>supplier logo</p> <p style="text-align: center;"><b>K.LUND Offshore as</b></p> <p style="text-align: center;">Stavanger department</p>			For project use		
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Project Code		Area/Location		System Code	
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## BRUKER MANUAL

### INNHold

1. **INTRODUKSJON**
  - 1.1 Generelt
  - 1.2 Personell
  - 1.3 Grunnleggende sikkerhets regler
  
2. **HPU**

Serie nr. 4989/5190

  - 2.1 Kort Beskrivelse
  - 2.2 Sikkerhet
  - 2.3 Start av HPU'en
  - 2.4 System valg og bruk
  - 2.5 Tilkoblinger.
  
3. **Akkumulator skid (ekstra utstyr)**
  - 3.1 Kort beskrivelse
  - 3.2 Sikkerhet
  - 3.3 Bruk av skiden og opplading

## BRUKER MANUAL

### 1. INTRODUKSJON

#### 1.1 Viktig Informasjon

Denne manual beskriver betjening av Hydraulisk power unit (HPU).

For mer detaljert teknisk informasjon på HPU'en, referes til the Datablad HPU, dokument nr. 270034-003

For informasjon om vedlikehold og feilsøking, henvises til Vedlikeholdsmanual , dokument nr. 270034-002

Følgende symboler er benyttet ved siden av teksten for å påkalle leserens oppmerksomhet på spesielt viktige deler av manualen.



Dette symbol indikerer viktig informasjon.



Dette symbol betyr at informasjonen omhandler sikkerhets aspekter ved en potensiell farlig situasjon.

#### 1.2 Personell

Det er en forutsetning at HPU'en betjenes av opplærd personell. På samme vis er det et krav at vedlikeholds personell har tilsvarende opplæring nødvendig for å betjene og teste HPU'en, og at de har grunnleggende kunnskaper for å kunne analysere mulige problemer, finne årsaker til disse og foreta nødvendige korrektive tiltak.

## BRUKER MANUAL

### 1.3 Grunnleggende sikkerhets regler



- Husk å alltid frakople forsyningskabler før service og vedlikehold.
- Ved service og reparasjon på hydraulikksystemet, er det av fundamental betydning at det tas forholdsregler for å forhindre at ikke forurensninger i form av partikler eller vann trenger inn i systemet.
- Ved sveising må tilliggende områder beskyttes for sveisesprut og slipe støv!
- Sveising må utføres i henhold til godkjente prosedyrer og kontroll rutiner.
- Det er ikke tillatt å bore huller i lastbærende deler eller i hule tett lukkede deler.

## BRUKER MANUAL

### 2. EX HPU 22 kW Utleie id. 4989/5190

#### 2.1 Kort beskrivelse

HPU'en er designet for drift av hydraulisk kran, vinsjer og diverse hydraulikk utstyr, eller for flushe formål.

Hydraulikksystemet er av åpen krets type.

Pumpe kan kun kjøres i Is mode. (pc mode er kun for fylling av akkumulator skid)

Enheten er utstyrt med  $\beta$ x200 filtrering på trykk og retur linjene, og

$\beta$ x200 sirkulasjonsfilter på kjølekretsen.

Hydraulisk tilkobling via hurtigkoblinger

#### 2.2 Sikkerhet

Elektromotorene er sikret mot overlast v.h.a PTC termistorer og motorvern med manuell reset.

Hydraulikksystemet er sikret mot overlast v.h.a. trykkbegrensings ventiler (sikkerhets ventil ).

#### 2.3 Start av HPU'en

Ved første gangs start av HPU's må rotasjonsretningen på elektro motorene kontrolleres. Dreieretning skal være medurs sett i vifteenden av motor. (Fig-1)

Starterskapet har halv automatisk omkobling fra D til Y (fra 400 til 690V).

Her må en vri om 2 velge brytere til den korrekte spenningen. (kontroller spenning og frekvens område i MDS 270034-003).



Disse 2 velge bryterne benyttes for og stille inn korrekt spenning.

**Advarsel:**  
**Dersom installert spenning ikke er kompatible med hpuen må ikke spenning tilkobles.**

## BRUKER MANUAL

Starterskapet inneholder:

- Motor start knapper (pumpe motor)
- Motor stopp knapper (pumpe motor)
- Vender for oljekjøler  
AUTO / ON / OFF
- Nødstopp knapp
- Spenningsvelger ( inne i skap 2 stk)
- "Panel power" indikering
- Motor overlast indikering (Trip motor A /B)
- Høy oljetemperatur indikering
- Lavt oljenivå indikering



Fig. 1 –Dreieretning medurs



Fig. 2 –Starter skap

## BRUKER MANUAL

Før start skal følgende kontroller utføres:

- Hydraulikkolje nivå
- Kontroller at kjøleluft rister ikke er tildekket
- Kontroller den aktuelle nettspenningen.
- Nødstopp knapp må være ute

### 2.4 Systemvalg og bruk

Velg system med "mode" ventilen på instrumentpanelet

- For LS system (lastavkjenning), sett ventilen i pos. "LS on"  
**VIKTIG** Denne modusen skal brukes når kranen kjøres.

Bilde

- For PC system (konstant trykk) sett ventilen i pos. "LS off"  
Denne modusen skal kun brukes til og lade opp akkumulator skiden.

En gjør da som følger:

1. Koble slangene fra hpuen til akkumulator skiden
2. åpne ventil 1 på akkumulator skidden (ventil 2 skal være stengt)



3. Start hpuen (i ls mode) etter ca 45 sek vri velge ventilen (ventil 3) på hpuen over til ls off. Trykket vil da stige til 280 bar. Og akkumulator skiden fylles opp. Dette pågår til manometeret på akkumulator skiden viser 280 Bar (dette tar ca 2 min). Under denne prosessen kan hpuen gå tom for olje og gi shutt down. Bruk da fat pumpen til og fyller på hpuen igjen. (man fyller da fra tanken til akkumulator skiden til hpuen).
4. Når trykket på akkumulator skiden viser stabilt 280bar steng ventil 1
5. Vri hpuen tilbake til l son (ventil 3)

## BRUKER MANUAL

6. Stopp hpuen.
7. Trykk slangen fra hpuen til akkumulator skiden er nå trykksatt. For og drenere dette trykket åpnes ventil 2. Manometer 1 går til 0 bar  
Viktig ikke forsøk og koble fra trykksatte slanger.
8. koble fra slangene
9. Eventuelt etterfyllte olje til hpu tanken (fra akkumulator skiden)
10. kontroller at trykket på akkumulator skiden er 280 bar



Manometer 1 viser trykk i innløpet og slange (dersom denne er tilkoblet)  
Skal gå til null etter punkt 7.

Manometer 2 viser trykket i akkumulatorene.  
Når akkumulatoren er oppladet skal trykket her være 280 bar.

11. Dersom punkt 10 er ok (manometer 2 viser 280 bar) er skiden klar til bruk.

## BRUKER MANUAL

### 2.5 Tilkoblinger

Hpuen er utstyrt med 4 tilkoblings punket.

- Trykk
- Retur
- Drain
- Ls



Retur tilkobling

Drain tilkobling

LS tilkobling

Trykk tilkobling



## BRUKER MANUAL

### 3. Akkumulator skid. (ekstrautstyr).

#### 3.1 Kort beskrivelse

Akkumulator skiden har som hensikt og kunne nødlåse kranen ved utfall av hpu. Denne skiden må være oppladet til 280 bar trykk før kranen tas i bruk. For opplading av skiden se punkt 2.4.

#### 3.2 Sikkerhet

Av sikkerhetsmessige årsaker skal ikke akkumulator skiden transporteres oppladet. For og drene akkumulatorene åpne ventil 4 til trykket på manometer 2 går til 0 bar.



Design trykk på akkumulator skiden er 350 bar. Arbeids trykk er 280 bar.

#### 3.3 Bruk av skiden og opplading

For opplading se punkt 2.4

Når skiden skal brukes må slangene fra hpuen kobles av og (alle sammen) kobles til akkumulator skidden (Is slangen kobles ikke til akkumulator skidden).

Det er samme koblingene er på akkumulator skidden som hpuen har (med unntak av Is).

Når slangene er tilkoblet åpne ventil 1 ventil 2 skal være stengt (på akkumulator skiden). Kranen kan nå kjøres manuelt ved pidestallen. Estimert kjøretid er 1 min. Kjør lasten snarest i sikkerhet. Under kjøring vil trykket på akkumulator skiden (manometer 2) synke. Når trykket nærmer seg 90 bar er akkumulatorene snart tomme. Når akkumulatorene er tomme vil ikke videre kjøring være mulig.

## BRUKER MANUAL

Akkumulator skiden er utstyrt med en luft drevet fat pumpe. Denne brukes til og fylle olje fra tanken på akkumulator skiden til hpuen under fylling akkumulator skiden. Dette da hpuen sin tank ikke har kapasitet til og romme olje mengden som er i akkumulatorene. Derfor er det en egen mellom lagrings tank.

VIKTIG ved kjøring av kranen med akkumulator skiden må alle slangene fra hpuen kobels av og på akkumulator skiden. Dersom dette ikke overholdes vil olje flomme over i olje tanken på hpuen (i verste fall kan denne sprenges p.g.a trykk).



Luft drevet fat pumpe med fylletuss

Trykk tilkobling

Retur tilkobling

Drain tilkobling

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## **VEDLIKEHOLDSMANUAL**

### **INNHOLDSFORTEGNELSE**

- 1. INTRODUKSJON**
  - 1.1 Viktig informasjon**
  - 1.2 Generelt**
  - 1.3 Vedlikeholds filosofi**
  - 1.4 Sikkerhets hensyn**
  
- 2. VEDLIKEHOLD SJEKK LISTE**
  - 2.1 Generelt**
  - 2.2 Vedlikeholds interval**
  - 2.3 Vedlikeholds koder**
  - 2.4 Liste over smøremidler**
  - 2.5 Vedlikehold sjekk liste**
  - 2.6 Orientering**
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  - 2.9 Justerings punkter**
  
- 3. ELEKTRISK**
  - 3.1 Vedlikehold**

## VEDLIKEHOLDSMANUAL

### 1. INTRODUKSJON

#### 1.1 Viktig Informasjon

Følgende symboler er benyttet ved siden av teksten for å påkalle leserens oppmerksomhet på spesielt viktige deler av manualen.



Dette symbol indikerer viktig informasjon.



Dette symbol betyr at informasjonen omhandler sikkerhets aspekter ved en potensiell farlig situasjon.

#### 1.2 Generelt

Denne manual beskriver vedlikehold av Hydraulisk power unit (HPU).

Aktiviteter relatert til preservering, vedlikehold av preserveringen og de-preservering er også beskrevet.

Dessuten er behovet for periodisk inspeksjon dekket i denne manual.

Se også Mechanical Datablad HPU, dokument nr. 270034-003, og Brukermanual, dokument nr 270034-001, for detaljert beskrivelse av utstyret og hvordan det skal betjenes.



Hvis den spesifiserte inspeksjon og vedlikehold ikke blir utført i henhold til denne manual, eller en tilsvarende prosedyre, skal utstyret betraktes som usikkert, og skal ikke benyttes.

#### 1.3 Vedlikeholds Filosofi

Da dette utstyret har komponenter som kan betinge spesial verktøy for demontering, reparasjon og montering, må disse komponenter byttes ut med nye og de utbyttede enheter sendes til kvalifisert reparasjons verksted for reparasjon.

Dette dokument omfatter ikke vedlikehold av slike komponenter.

## VEDLIKEHOLDSMANUAL

### 1.4 Sikkerhets hensyn

Spesiell oppmerksomhet må utvises når det skal gjøres service på utstyret:



- Koble alltid fra strømtilførselen før det gjøres arbeider på HPU'en.
- Ved service og reparasjon på det hydrauliske system, er det av fundamental betydning at det tas forholdsregler for å forhindre at ikke forurensninger i form av partikler eller vann trenger inn i systemet.
- Ved sveising må tilliggende områder beskyttes for sveisesprut og slipe støv!
- Sveising må utføres i henhold til godkjente prosedyrer og kontroll rutiner.
- Det er ikke tillatt å bore huller i lastbærende deler eller i hule tett lukkede deler.

## VEDLIKEHOLDSMANUAL

### 2. VEDLIKEHOLD SJEKK LISTE

#### 2.1 Generelt

For å lette planlegging og oppfølging av vedlikeholdet, er det utarbeidet en "Vedlikehold Sjekk Liste", se kapitel 2.5.

Vedlikehold og reparasjon av de forskjellige komponenter er beskrevet i vedleggene.

Denne informasjon er basert på produsentenes egne dokumenter og er bare inkludert som en hjelp til forståelse av komponentenes funksjon, og som en hjelp ved feilsøking.

#### 2.2 Vedlikeholds Intervall

Tre forskjellige vedlikeholds intervall anvendes, T1, T2, T3 and T4.

T1 er daglig

T2 er ukentlig

T3 er hver 6 måned

T4 er årlig

I tillegg kommer periodisk (årlig) inspeksjon / sertifisering av løfteramme / slings i følge gjeldende regelverk.

#### 2.3 Vedlikeholds Koder

Det er tre vedlikeholds koder identifisert med V, L(n) and M(n).

V indikerer en visuell inspeksjon av for eksempel nivå eller utseende på utstyret.

L(n) indikerer smøre-punkt, hvor (n) er et nummer som identifiserer type smøremiddel som skal anvendes.

Se kapitel 2.4 Liste over smøremidler.

M(n) indikerer en sjekk og justering av trykk på spesifisert nivå.

Punkt nummereringen korresponderer med målepunktene som angitt på tegningene.

Tillatt trykk område og justeringsnivå, er også angitt under hvert punkt.

## VEDLIKEHOLDSMANUAL

### 2.4 Liste over smøremidler



Flere forskjellige smøremidler kan anvendes.  
Man skal imidlertid passe på IKKE Å BLANDE forskjellige fabrikat hydraulikk olje, L1!

Shell produkter anvendes av leverandør ved innledende kjøring og testing av HPU'en.

Andre olje fabrikat/typer kan anvendes, forutsatt de tilsvarer eller overgår de listede spesifikasjoner.

L1    Hydraulisk olje, ca. 200 liter på HPU.  
      Viskositet min. 12 cSt ved 75° C, max 800 cSt ved kaldstart.

SHELL        : Tellus T32  
Q8            : Handel 32  
STATOIL     : HydraWay HVXA 32  
YX ENERGY : RANDO HDZ 32

L2 Grease

FAG            : Arcanol TEMP110  
SKF            : LGHQ 3  
MOBIL         : Mobilith SHC 100  
SHELL         : Abida EMS 2

### 2.5 Vedlikeholds Sjekk Liste

På følgende sider fines sjekklister for vedlikehold av de forskjellige deler.  
Listen kan gjerne re-arrangeres for å passe inn i et større program, men de angitte intervall bør opprettholdes.



**En logg bør etableres for dokumentasjon av alt utført vedlikehold.**

Estimert tid for å utføre vedlikeholdet er eksklusive tilkomst tid:



## VEDLIKEHOLDSMANUAL

T1 aktiviteter	: 10 min
T2 aktiviteter	: 30 min
T3 aktiviteter	: 15 min
T4 aktiviteter	: 2 man-timer

### VEDLIKEHOLD SJEKK LISTE

Hydraulisk Power Unit, Serie nr.: 4989 og 5190

Punkt	Kontroller	KODE	T1	T2	T3	T4	Anm.
1	Sjekke oljenivå Bytte olje	V, L1 L1	*	*		*	Etterfylle om nødv.
2	Sjekke olje filter Bytte olje filter	V	*	*		*	ΔP-indicator
3	Sjekke retur filter Bytte filter	V	*	*		*	ΔP-indicator
4	Sjekke sirkulasjons filter Bytte filter	V	*	*		*	ΔP-indicator
5	Bytte pustefilter lokk					*	
6	Megge elektro motorer	M			*		>10m ohm
7	Sjekke starterskap for vann intrengning	V		*	*		
8	Sjekk for oljelekkasjer	V		*	*		
9	Sjekke trykk	V		*	*		Manometer
10	Sjekk oljekjøler element for tilstopping	V		*	*		Oljekjøler

## VEDLIKEHOLDSMANUAL

### 2.6 Orientering

Dette er en kort forklaring av de forskjellige punkt i Vedlikeholds Sjekkliste.

#### Hydraulikk olje

Sjekk nivå ved nivå glass.

Sjekk for mulige lekkasjer i slanger, fittings og komponenter.

Oljebytte bør skje rett etter HPU'en har vært i bruk, med varm olje, for å lette tømning.

Sjekk brukt olje for forurensninger og vann innhold.

Ny olje bør fylles med en pumpe med et 10 my filter. I tilfelle en slik pumpe ikke er tilgjengelig, bruk kun rene beholdere/trakter ved påfylling av ny olje!

Ved langtids lagring skal tanken være helt full av olje.

#### Filter Bytte

##### *Trykkfilter*

Bruk et drypp kar under filter for å redusere olje søl.

Skru av filterbolle for å bytte element.

Undersøk oljen i bunnen av bolle. Ved spor av forurensning, studer denne nøye.

Metall partikler, stål eller bronse, indikerer slitasje på de roterende enheter.

En olje prøve bør tas fra tanken og analyseres.

##### *Retur / sirkulasjon filter*

Skru av filterlokket og trekk elementet forsiktig opp.

#### Smøring av Elektrisk Motor



Elektromotorene er utstyrt med permanent smurte lager, og trenger ikke vedlikehold.

#### Kontroll av oljetrykk.

Oljetrykket må sjekkes før HPU'en tas i bruk for å verifisere korrekt funksjon.

Hoved trykket er last avhengig og kan variere i det spesifiserte område. Når pumpene går på tomgang, skal trykket være ca. 40 bar.

#### Visuell kontroll

Visuell kontroll av HPU utføres for å forsikre om at "alt er OK".

Hydrauliske system er utsatt for lekkasjer, og elektriske panel for vann inntrengning.

Det er viktig å finne og fjerne årsakene så snart som mulig.

## VEDLIKEHOLDSMANUAL

### 2.7 Preservering

Ved lagring i kaldt vær må oljekjøler alltid tømmes for vann. Bortsett fra dette trenger ikke HPU'en noe spesiell preservering når den ikke er i bruk. Ved langtids lagring må følgende utføres:

- hydraulikk tanken må fylles med olje til max nivå
- alle kule-ventiler skal stenges
- synlige mekaniske skader skal repareres
- sår eller andre skader på overflate behandling skal repareres
- dekk til kjøleluft ristene for å beskytte mot vær og vind
- ved langtid lagring bør elektromotorene roteres for hånd hver 2 mnd.

### 2.8 Depreservering

Når utstyret tas ut fra lager skal det inspiseres grundig. Forurensninger eller fremmed partikler skal fjernes.

- sjekk hydraulikkolje for inntrengning av vann
- alle kule ventiler skal åpnes (untatt drenerings ventil )
- synlige mekaniske skader skal repareres
- sår eller andre skader på overflate behandling skal repareres
- fjerne tildekking av kjøleluft ristene

## VEDLIKEHOLDSMANUAL

### 2.9 Justerings Punkter

Det hydrauliske system har justerings punkter for

- hovedtrykk / trykkavskjæring
- sikkerhets ventil (**må ligge 20-30 barg over hovedtrykk**)



## VIKTIG

Disse justeringene er inn tanken og skal kun justeres av fagpersonell fra K.Lund Offshroe as. Dersom dette ikke overholdes er ikke lengre atex sertifiseringen gyldig.



**Vær også klar over at feilaktig justering av sikkerhets ventiler kan forårsake skade på HPU'en og tilsluttet utstyr. Det kan også representere en fare for alle tilstedeværende i HPU området, og ødelegger betingelsene for leverandørens garanti.**

### 3.1 Elektrisk vedlikehold

For vedlikeholdslister henviser til egne kontrollark.

- formularnr.9-12.7 (for generell elektrisk)
- formularnr.9-12.11 (for atex vedlikehold)

Dersom kontrollpunktene ikke er merket med noen \* (stjerner) kontrolleres disse før hver utsendelse.

Kontrollpunkter: \* utføres årlig

Kontrollpunkter: \*\* utføres på det som faller først. – 1,5år eller 3000 driftstimer.

Kontrollpunkter: \*\*\* utføres på det som forfaller først. – 5år eller 6000 driftstimer.