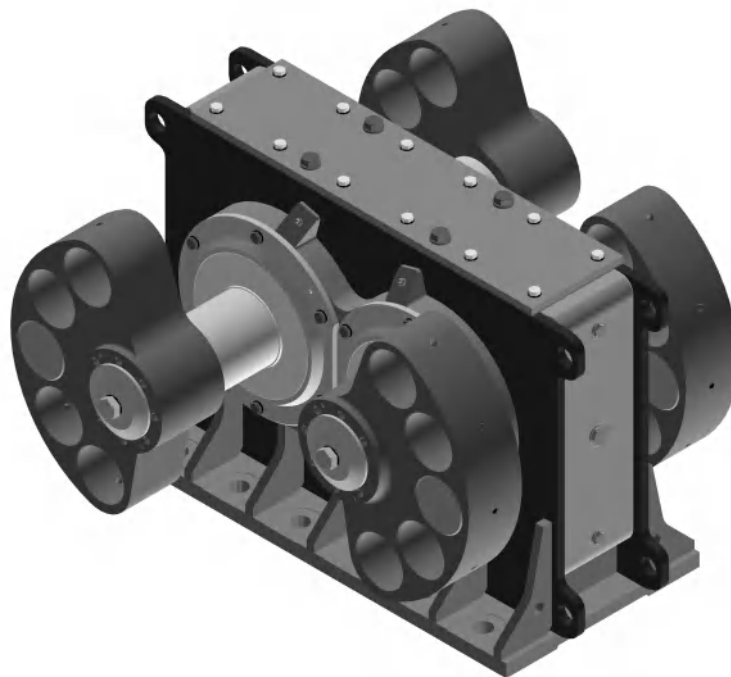


# Operating Instructions

## Maintenance Manual Gear Box Exciter

### Type HRE

Stand: December 2019



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## 1. Instructions for the use of this Technical Documentation



In order to improve the understanding of this technical documentation and, thus, to improve the use, please read the following pages.

**Please always observe the following rule:**

Before use, installation or commissioning, it is imperative to observe this technical documentation. Furthermore, adhere to the general and local accident prevention regulations (UVV).

### 1.1 Who must be Acquainted with the Technical Documentation



All persons working in the operation area of the exciter must read this technical documentation through and completely understand it, especially the safety regulations.

All tasks on the exciter must only be carried out by qualified specialists.

The electricians must be acquainted with the instructions for the electric connections.

The service personnel must be acquainted with the maintenance and repair instructions.

In general:

Every person who works on the exciter must be acquainted with the contents of this technical documentation. These personnel must be qualified and instructed. The operating company of this machine is obliged to instruct their staff accordingly.

This technical documentation is a part the scope of delivery of the exciter and must always be available to the qualified persons.

The qualified persons must be trained in accordance with the safety regulations and must be familiar with the safety instructions.

### 1.2 What should be Specially-Observed



Please note that this technical documentation ...

- in general, must not be separated or amended. Only **Hoppe Schwingtechnik GmbH** is permitted to amend the technical documentation.
- must be kept complete and near the exciter. Missing pages, or complete technical documentation, can be ordered at any time from **Hoppe Schwingtechnik GmbH**.
- must always be accessible to the operating personnel of the exciter / vibrating machine.
- must be read and fully understood by the service personnel before they start maintenance and repair tasks on the exciter.
- conforms to the latest technology at the time of delivery of the exciter. Subsequent modifications must be adequately documented and added to the technical documentation. This is also applicable to all other technical documentation delivered together with this exciter.



- is not part of any previous or existing covenant, agreement or legal relationship, or should amend this. All obligations of **Hoppe Schwingtechnik GmbH** towards the customer result from the purchase order, in which the full and sole valid warranty regulations are included. These contractual warranty provisions are neither extended nor limited by the technical documentation.

### 1.3 Explanation of the Pictograms used



The following pictograms are used to simplify using this technical documentation and to quickly find information.

Fundamentally, impart all warning instructions to other users of the vibrating device.



#### **Information**

General information and recommendations from **Hoppe Schwingtechnik GmbH**. The adjacent paragraph promotes understanding or simplifies your work. It is not necessary to read this paragraph. Non-observance will not result in an immediate risk or impairment.



#### **Testing and checking**

Information for the necessity of regular checks relating to the connection cable and bolted connections. Non-observance of this symbol can cause a hazard or damage can occur.



#### **Prevent material damage**

Reference to the increased risk of damage to the vibration motor, e.g. by using the incorrect tools, incorrect grease, penetration of debris into the drive units, incorrect assembly sequence, inappropriate transportation. The adjacent paragraph must be read and understood. Non-observance of this symbol can cause a hazard or damage can occur.



#### **Special tools**

Reference to the necessity of using a special tool.



#### **Please read**

Reference to standards and documents which should be read and understood.



#### **General warning**

This pictogram depicts a general warning. This indicates hazards, possible malfunctions, non-intended use or other things that concern occupational safety. It is imperative to read and understand the adjacent paragraph. Non-observance of this symbol can cause a hazard or damage can occur.



#### **Warning of risk of injury**

This pictogram warns of a possible risk of injury. This indicates hazards, non-intended use or other things that concern occupational safety. Special attention should be paid to this topic and the appropriate precautionary measures taken. It is imperative to read and understand the adjacent paragraph. Non-observance of this symbol can cause a hazard or damage can occur.



### Warning during transportation

This pictogram warns of the increased hazards that could occur during transportation of the vibration motor. It is imperative to read and understand the adjacent paragraph. Non-observance of this symbol can cause a hazard or damage can occur.



### Important recommendation

This pictogram indicates an important recommendation or explanation. The adjacent paragraph should be read and understood. Non-observance will not result in an immediate risk, but it can impair the function of the machine.

## 2. Assembly and Transport



Attach cables, shackles, etc., only at the lift holes provided in the housing for that purpose. Never suspend exciter at segments. **Avoid** knocks on the segments.

Use only special bolts of strength quality 8.8 supplied by us to fasten exciter on its bearer. Nuts must be secured.

Tighten nuts with torque wrench with the torque given in the table below.

In case a torque wrench cannot be used for lack of space, suitable measures must be taken to make sure that the required torque is attained. A wrench hammer may be sufficient for experienced fitters. Otherwise, to be on the safe side, use more sophisticated wrenches, such as hydraulic nut-runners.



Dimension	Required Torque M a	
	in Nm	in mkp
M 10	46,0	4,6
M 12	80,0	7,9
M 16	210,0	20,0
M 20	410,0	40,0
M 24	710,0	68,0
M 30	1350,0	140,0

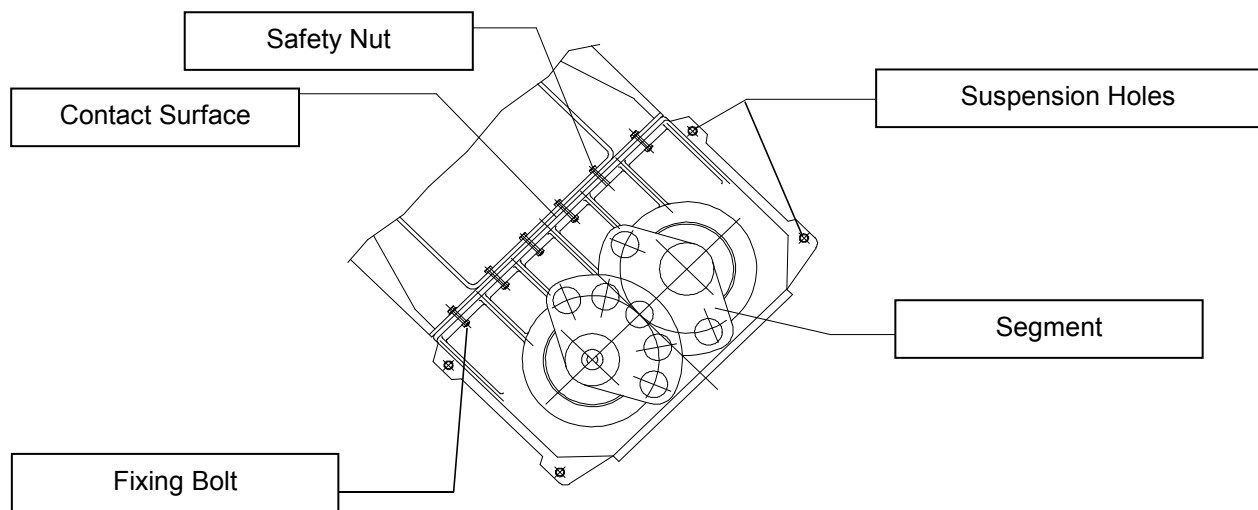


Check bolts for tight fit before production and after the first 50 hours of operation, then after every 1000 hours.

Be sure that contact surfaces of exciter and exciter bearer are clean before assembly.



Attach the safety guards. Never run exciters without safety guards. **EXTREME DANGER!**



### 3. Securing of Directed Force Exciters for Transport



Exciters types HRE are provided with transport jigs for delivery.

Remove such jigs only before bolting down the exciter on its bearer, i.e., leave it on for transport on site.



It is important that these jigs are re-attached after test-run on removal of exciter for fur transport.

If an exciter is returned to us for repairs, the transport jig is to be used. By mo segments during

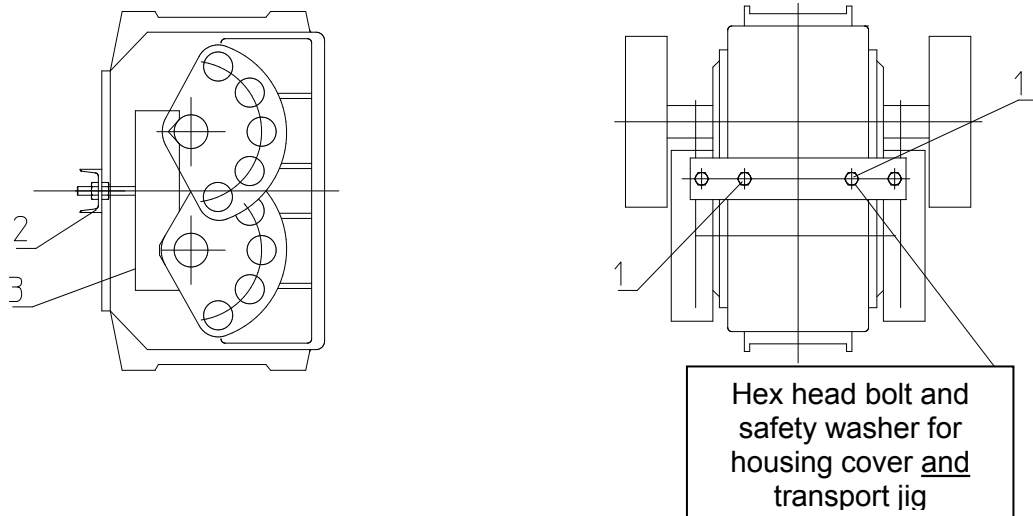
Transport high **DANGER!**

#### Removal

1. Take off hex head bolts (1) and safety washers.
2. Remove transport jig.
3. Put hex and head bolts (1) and safety washers back in place in the housing.

#### Assembly

1. Take off hex head bolts (1) and safety washers.
2. Put transport jig in place.
3. Fix by hex head bolts (1) and safety washers.
4. Press (pretension) holding bracket (3) at segment and shaft by adjusting hex nut (2).



#### 4. Commissioning and Lubrication, Directed Force Exciters Type HRE



**Note:**

1. Exciters are supplied without oil fill.  
Before commissioning put in oil as Pos. 3.
2. Exciters are treated with a corrosion-preventive agent before delivery. Rinsing of exciter before oil fill is not required. Store exciter in dry room. When stored dry - temperature climate assumed protection lasts about 12 months. In the tropics protection is shorter.

If conservation has to be repeated, proceed as indicated on page “**Conservation with Corrosion Preventive Oil**”.

3. Oil fill plugs are at the top of the housing.

Before any oil fill - breather plug must be removed and cleaned.

The required quantity depends on the angle of inclination  $\alpha$  of the exciter. The quantity indicated in the Oil Level Chart is to be considered as *standard* value only.

Always check oil level with dipstick included in our supply. Oil level is given as a function of angle of inclination  $\alpha$  (see fig. page 10).

**Option:** In case angle of inclination  $\alpha$  is larger than  $60^\circ$ , or if dip stick cannot be used, for instance, due to limited space, the exciter is equipped with an oil overflow pipe. The oil level required is attained when oil overflows.

**IMPORTANT:**

**At the highest position plug of the exciter there must be installed the breather! It's important for the exchange of air and heat – a wrong installation place will cause heat jam and following to damage of the exciter. Always check and clean the breather, when oil filling is checked.**



4. Use high quality gear oil (type C-LP, according to DIN 51 502).

The viscosity grade of the oil depends on ambient and service temperatures respectively and may be taken from the Oil Brand Chart, containing various brands of several suppliers.

5. Change oil after the first 500 hours of operation, later after every 1000 hours or after 3 months at the latest. If you find oil very dirty - due to extreme service conditions - renew fill at shorter intervals. The same applies if oil ages too rapidly due to high service temperatures. Frequent oil changes increase life of exciter.



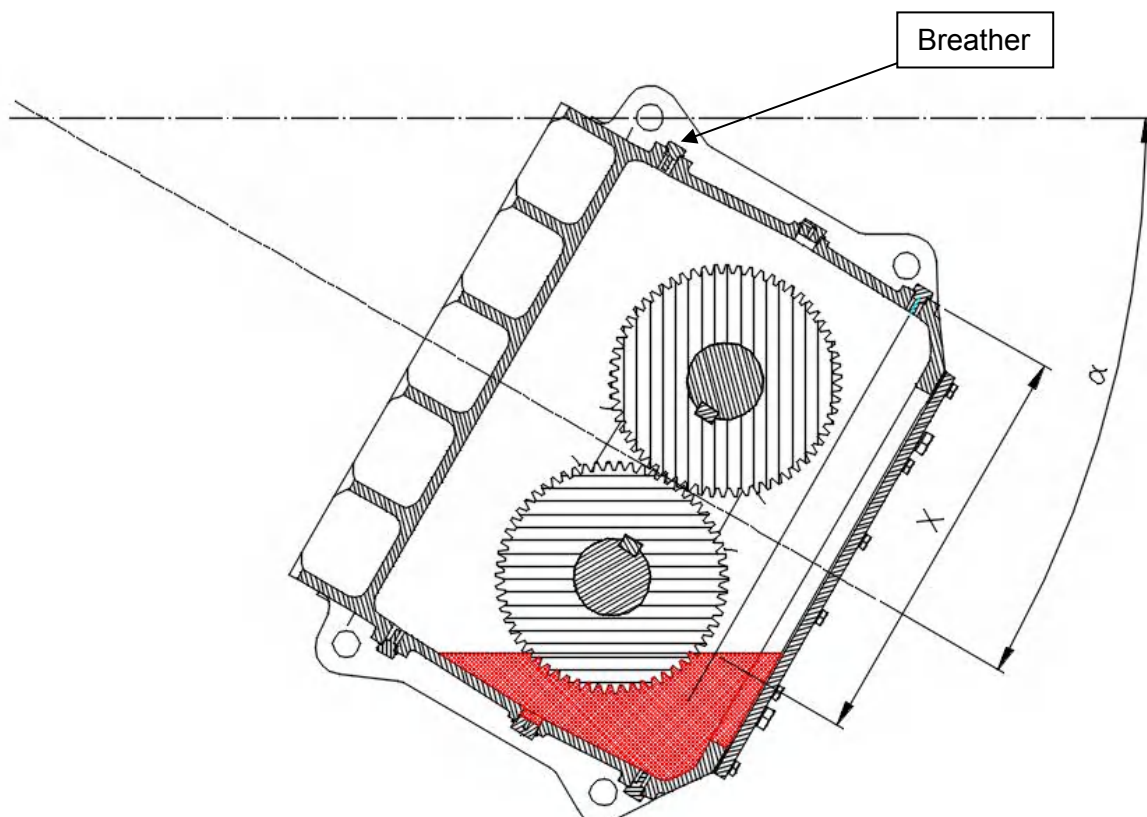
6. Check oil level after **every 100 hours of operation** at standstill. Otherwise **EXTREME DANGER!**



7. The exciter is equipped with a breather for air- and heat exchange. It always must be installed on the highest position of the device.

**Use without breather or mounting the breather at the wrong position will cause damage to the exciter!**

## 5. Oil Levels





<b>Oil Levels for Gear Box Exciters Type HRE</b>				
<b>Exciter Type</b>	<b>HRE 4-4/6</b>		<b>HRE 5-4/6/8</b>	
<b>Inclination (<math>\alpha</math>) of Exciter</b>	<b>Oil Level mm [X]</b>	<b>Amount Liter</b>	<b>Oil Level in mm [X]</b>	<b>Amount in Liter</b>
15	548		600	
20	535		587	
25	522	3,2	574	3,2
30	509	bis	561	bis
35	495	3,5	449	3,8
40	481		535	
45	466		522	
50	449		507	
55	430		490	
60	407		471	

## 6. Oil Type Table



Surround Temperature in Deg. °C	Operating Temperature in Deg. °C	Requirement / Identification		ARAL	BP
		ISO Visk.-	DIN 51		
-40 to -25	-10 to +5	VG 5	HL 5	Sumurol CM5 Sulnit KT	BP Energol HP5
-30 to -10	+0 to +20	VG 10	HLP 10	Sumurol CM10 Vitam GF10	BP Energol HLP-HM10
-15 to +20	+15 to +50	VG 68	CLP 68	Degol BG 88	BP Energol GR_XP 68
+15 to +50	+45 to +80	VG 100	CLP 100	Degol BG100	BP Energol GR-XP 100
+45 to +70	+75 to +100	VG 220	CLP 220	Degol BG220	BP Energol SG-XP 220



in Deg. °C	in Deg. °C	ISO Visk.-	DIN 51	TOTAL	ESSO
-40 to -25	-10 to +5	VG 5	HL 5	-	Nutro H5
-30 to -10	+0 to +20	VG 10	HLP 10	-	Nutro H10
-15 to +20	+15 to +50	VG 68	CLP 68	CARTER EP 68	Mobilgear 600 XP 68
+15 to +50	+45 to +80	VG 100	CLP 100	CARTER EP 100	Mobilgear 600 XP 100
+45 to +70	+75 to +100	VG 220	CLP 220	CARTER SH 220	Glygoyle 30



in Deg. °C	in Deg. °C	ISO Visk.-	DIN 51	MOBIL	SHELL
-40 to -25	-10 to +5	VG 5	HL 5	Mobil DTE21	Shell Morlina Oil 5
-30 to -10	+0 to +20	VG 10	HLP 10	Mobil DTE 21	Shell Tellus 22
-15 to +20	+15 to +50	VG 68	CLP 68	Mobilgear 600 XP 320	Shell Omala 68
+15 to +50	+45 to +80	VG 100	CLP 100	Mobilgear XP 100	Shell Omala 100
+45 to +70	+75 to +100	VG 220	CLP 220	Glygoyle 22	Tivela S 150

## 7. Conservation with Corrosion Preventive Oil



The exciters are treated with a corrosion-preventive agent before delivery.

**Note!** Prior to start-up fill oil according to tables above !

Rinsing of exciter before oil fill is not required.

We use Shell Ensis Fluid 20 W or equivalent for conservation.

Store exciter in a dry room. When stored dry - in temperate climate assumed protection lasts 12 months. In the tropics protection is shorter.



**If conservation is to be repeated, proceed as follows:**

1. Remove fill and drain plugs so that possible residual oil can drain. Wait until oil no longer drips.
2. Close oil drain plug.  
Place unit 90° upright i.e., **not** on flange plate.
3. Fill exciter completely with conservation oil. In order to prevent dust particles to reach the exciter use funnel with fine meshed filter cloth.  
We would advise that the same corrosion-preventive oil is used as for the original fill, i.e., Shell Ensis Fluid 20 W. Oil must agree with lubricants to be used in service.
- 4.- Turn exciter segments and shafts by hand several times.
- 5.- Drain corrosion-preventive oil completely.
6. Close fill and drain plugs.  
**Do not forget seal between housing and plugs!**

## 8. General Remarks

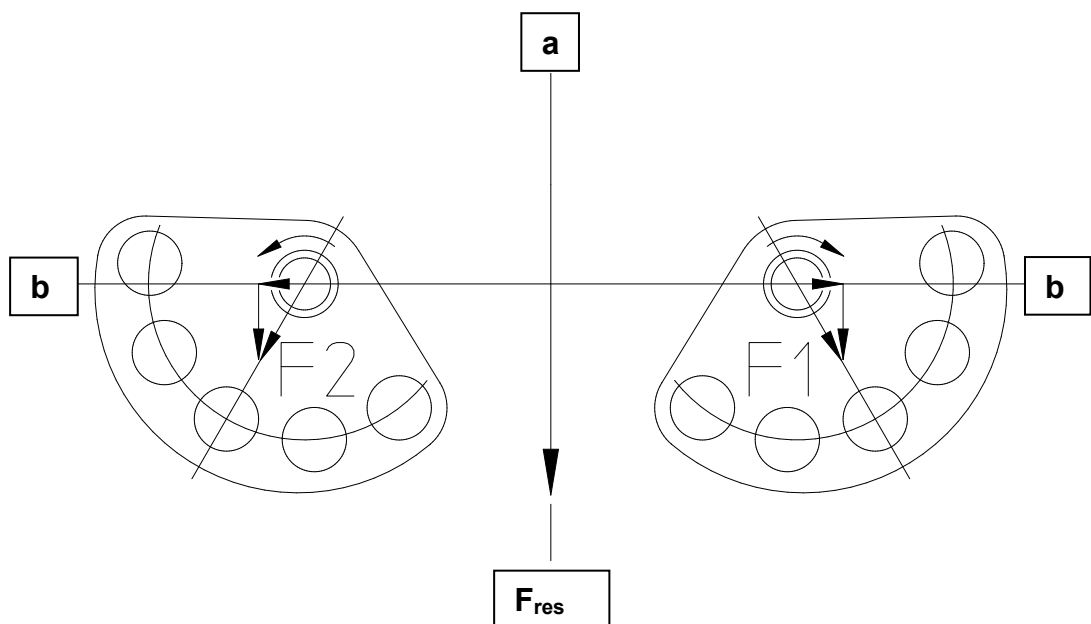


### Performance

The directed force exciter has two shafts equipped with unbalance masses, which, by means of a built-in gear unit, are brought to opposing rotation at the same speed.

The centrifugal force components  $F_1$  and  $F_2$  acting in direction a-a add up to the resulting centrifugal force  $F_{res}$ .

The components acting vertically to b-b cancel each other (see sketch).



## 9. Working Moment



An important characteristic of the exciter is the so-called working moment. The working moment is the result of the two times the weight of all unbalance masses multiplied by their radius of center of gravity; usually it is given in cmkg. The working moment and with it the centrifugal force generated by the exciter can be gradually adjusted by adding or removing of unbalance weights. (See page "Mounting of Unbalance Weights" for details)

The magnitude of the working moment - as a function of number and configuration of unbalance weights - can be taken from the chart "Working Moments of Directed Force Exciters"


Number and configuration of unbalance weights are marked by white and dark circles.

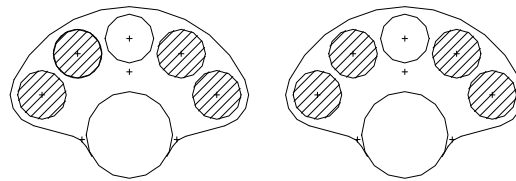
Directed Force Exciter as Drive Unit of Vibrating Equipment.



If exciter is used for vibrating feeders, screens and shaking tables, the following applies.



































Unbalanced Configuration **Hoppe Schwingtechnik GmbH** Exciter

this markings in below table Example:

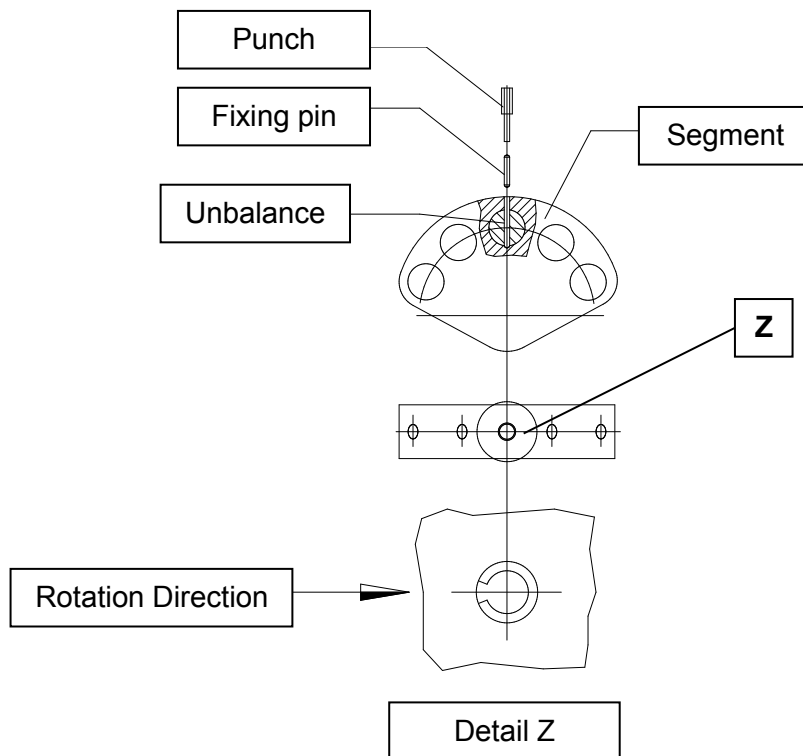

 means:



 means: unbalance NOT fitted  
 means: unbalance fitted

Working moment of Gear Box Exciters in kgcm										
Exciter			Arrangement of der unbalances							
Type	design	lining with:	   	-	    	    	    	    	    	    
<b>HRE 3</b>	6	Steel unbalances	-	-	-	-	-	-	-	-
<b>HRE 4</b>	6 4	Steel unbalances	1680 848	2120 1072	2104 1064	2528 1224	2408 1280	2840 1440	2824 1432	3248 1648
<b>HRE 5</b>	6 4 4 8	Steel unbalances	2816 1520 - 2320	3472 1720 - -	3600 1948 - 4008	4256 2148 - -	4136 2192 - 4528	4792 2392 - -	4920 2620 - 6216	5600 2820 - -
<b>HRE 6</b>	6 8	Steel unbalances	4592 7184	5832 9056	5744 9480	6984 11352	6608 11032	7120 12904	7760 13328	9000 15200
<b>The amplitude h is determined by dividing entire swinging weight by the work moment.</b>										

## 10. Mounting and Dismounting of Unbalance Weights



**Note:** If several exciters are mounted in series, arrange unbalances in all exciters in e pattern. Make sure that all exciter segments have the same position.

### Assembly

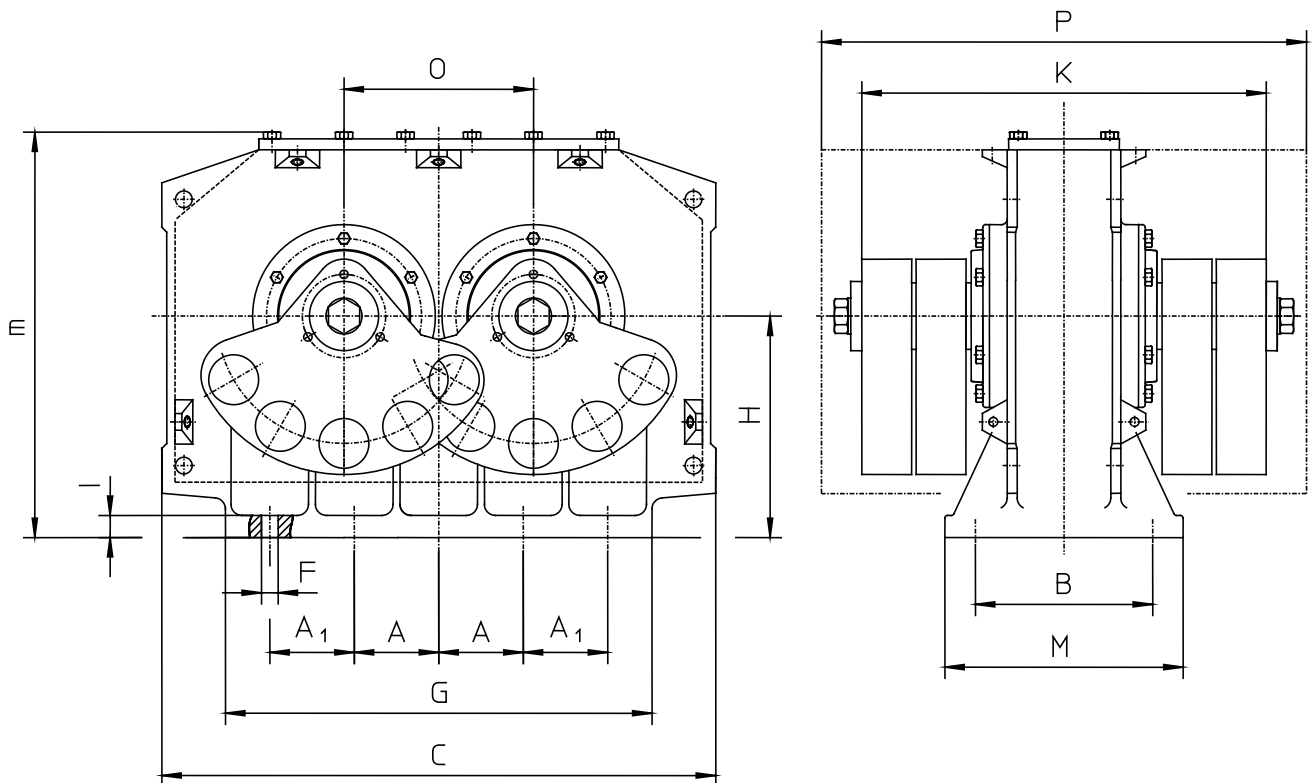
- Clean segment bores and unbalance weights of paint and dirt, then grease lightly.
- Before assembly, place unbalance weights in such a way that their bores are about in line with the segment bores for the fixing pins.
- Insert unbalance weights.
- Exactly align unbalance weights by means of punch.
- Align fixing pin so that gap is it direction on rotation and chamfer points towards exciter shaft.
- Drive in fixing pin with punch (about 1mm) to a point just below the segment surface.

### Dismounting

- Drive fixing pin into unbalance weight using punch.
- Jammed unbalance weights can be loosened by *lightly* tapping with a hammer.
- It is advisable, however, to use a rust solvent.



Remove unbalance weight and *immediately* drive out fixing pin. (In case an unbalance weight is erroneously mounted with fixing pin left in a second pin can be driven in, but the unbalance weight cannot be removed later).





Technical Datas		HRE 4-6	HRE 4-4	HRE 5-6	HRE 5-4	HRE 5-8	HRE 6-6	HRE 6-8
max. Speed in min -1		1000	1500	1000	1500	750	1000	750
Working Moment in kgcm	min.	1680	848	2816	1520	2320	4592	7184
	max.	3248	1684	5600	2820	6216	9000	15200
Power Motor in kW *)		7,5	7,5	15	15	15	22	30
Total weight in kg **)		455	410	695	570	748	1300	1580
Dimensions in mm	<b>A</b>	4 x 120	4 x 120	5 x 120	5 x 120	5 x 120	4 x 120	4 x 120
	<b>A1</b>	-	-	-	-	-	15	150
	<b>B</b>	260	260	300	300	300	390	390
	<b>C</b>	780	780	830	830	830	1040	1040
	<b>E</b>	568	568	566	566	566	660	675
	<b>F</b>	Ø 25	Ø 25	Ø 31	Ø 31	Ø 31	Ø 31	Ø 31
	<b>G</b>	600	600	730	730	730	910	910
	<b>H</b>	310	310	315	315	315	370	370
	<b>I</b>	35	35	25	25	25	25	25
	<b>K</b>	580	580	883	664	883	934	994
	<b>M</b>	340	340	380	380	380	470	470
	<b>O</b>	275	275	300	300	300	376	376
<b>P</b>	670	670	918	814	918	-	-	

\*) only for singles drive

\*\*) Dimensions may change

Dimensions may change

Stand: 10.2018