HMAG

HYDRAULIC MAGNETS

OPERATION INSTRUCTIONS

HMAG 700-18-k	
HMAG 900-32-k	
HMAG 1200-48-k	
HMAG 1400-54-k	

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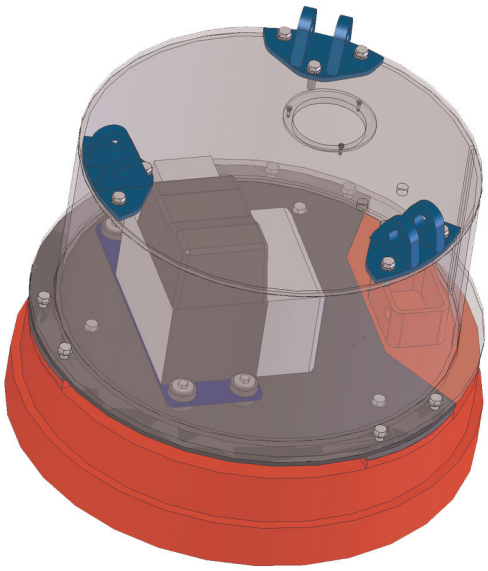
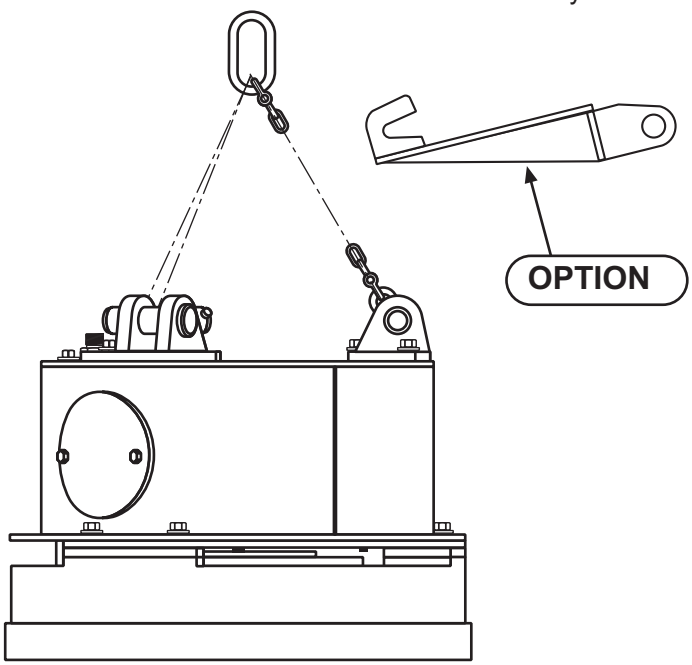
GENERAL NOTES

DYNASET hydraulic magnet of HMAG-range is a modern attachment for gathering and sorting ferrous scrap at demolition sites and recycling yards. HMAG hydraulic magnet is designed for an installation to material handling machines (hydraulic excavators, heavy trucks with hydraulic cranes etc.). The hydraulic power for HMAG-magnet is taken from any suitable service line attached to the machine boom (for instance, from a hydraulic breaker line). DYNASET hydraulic magnet transforms hydraulic power into a high quality electricity (DC), used for energising metal handling magnet which belongs to the unit's assembly. HMAG-magnet is controlled hydraulically switching ON and OFF the hydraulic flow. An automatic demagnetisation ensures fast disengagement of a picked and moved metal off from a magnet.

CONSTRUCTION

DYNASET HMAG hydraulic magnet comprises iron handling magnet and hydraulic magnet generator mounted onto magnet. A magnet generator is composed of an alternator and electric power unit with a rectifier block and control electronics. A generator assembly includes also flow limiting valve, pressure relief valve, check valve as well as a pressure relief valve to the return line. Generator is encased with a protective cover. High pressure hoses (L = 0,75 m) with standard threaded connections are included into an assembly as well as the lifting chains.
Quick couplings and quick attach plate are options.





Owing to the incorporated flow limiting valve HMAG-magnet can be used practically with any material handling machine. HMAG is provided only with a demanded hydraulic fluid flow, when the rest of hydraulic pump's capacity is available for all other functions / executors. The built-in pressure relief valve protects the unit against damage. Check valve closes out possibility of damaging hydraulic motor's shaft seal caused by the cross-connection of hydraulic hoses. Additionally hydraulic motor's shaft seal is protected against the overpressure in return line by return line pressure relief valve which opens when the pressure in unit's return line achieves the maximum allowed value.

For an information on used alternator/generator models (HG / HMG, CMG or HMGC) ref. to the corresponding manual and product data pages.

CLASSIFICATION

DYNASET hydraulic generators are manufactured in conformity with the 98/37, 73/23, 89/336 CEE directives and their amendments. They are also manufactured in compliance with the following regulations: CEI 2-3, EN 60034-1, IEC 34-1, VDE 0530, BS4999-5000, CAN/CSA-C22.2, NF 51.100 and N°14-95 - N°100-95. By request DYNASET hydraulic generators can be equipped with a radio interference protection to meet requirements of specifications MIL STD 461 A/B and VDE 0875 class N.

Iron handling magnets, included in HMAG's assemblies, are manufactured in conformity with the CEE directive 329/89 and amendments to it 91/368 - 93/44-93/68. They are also manufactured in compliance with the following harmonized standards: UNI EN 292/1, UNI EN 292/2, UNI EN 294, UNI EN 349, UNI EN 418, UNI EN 457, EN 1050 and CEI EN 60204/1. DYNASET iron handling magnets meet requirements of directive EEC-92/31 "ELECTROMAGNETIC COMPATIBILITY"

INSTALLATION

Equipped with lifting chains, HMAG hydraulic magnet is to be hooked either to the boom or attachment.

Available as an option, quick attach plate is an alternative to the lifting chains.

HMAG hydraulic magnet is to be connected to an available service line, attached to the machine's boom, for instance, breaker or tilt bucket line.

ATTENTION !!! Pressure in HMAG's return line should not exceed 5 bar !

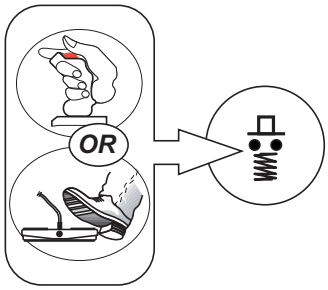
Prior to connecting HMAG to the tilt bucket's circuit, connect the return line of the present circuit directly to the hydraulic reservoir.

Overpressure in return line may cause continuous functioning of return line pressure relief valve as well as damage of hydraulic motor's shaft seal.

Pressure hose of a HMAG magnet is to be provided with a female quick coupling, whereas the return hose is to be provided with a male quick coupling (according to the DYNASET-standard the pressure must be brought to the DYNASET-unit with a male coupling).
Ensure that the hydraulic fluid flow is sufficient to run the unit, i.e. at least the minimal flow must be available.
At the hydraulic flow less that demanded nominal rate, the generator will not work properly at all.

OPERATION

HMAG hydraulic magnet is controlled by opening and shutting off the hydraulic flow in the actuating circuit with the assigned switch - either a push-button switch placed on top of a boom's control stick (breaker circuit) or foot switch (tilt bucket circuit).



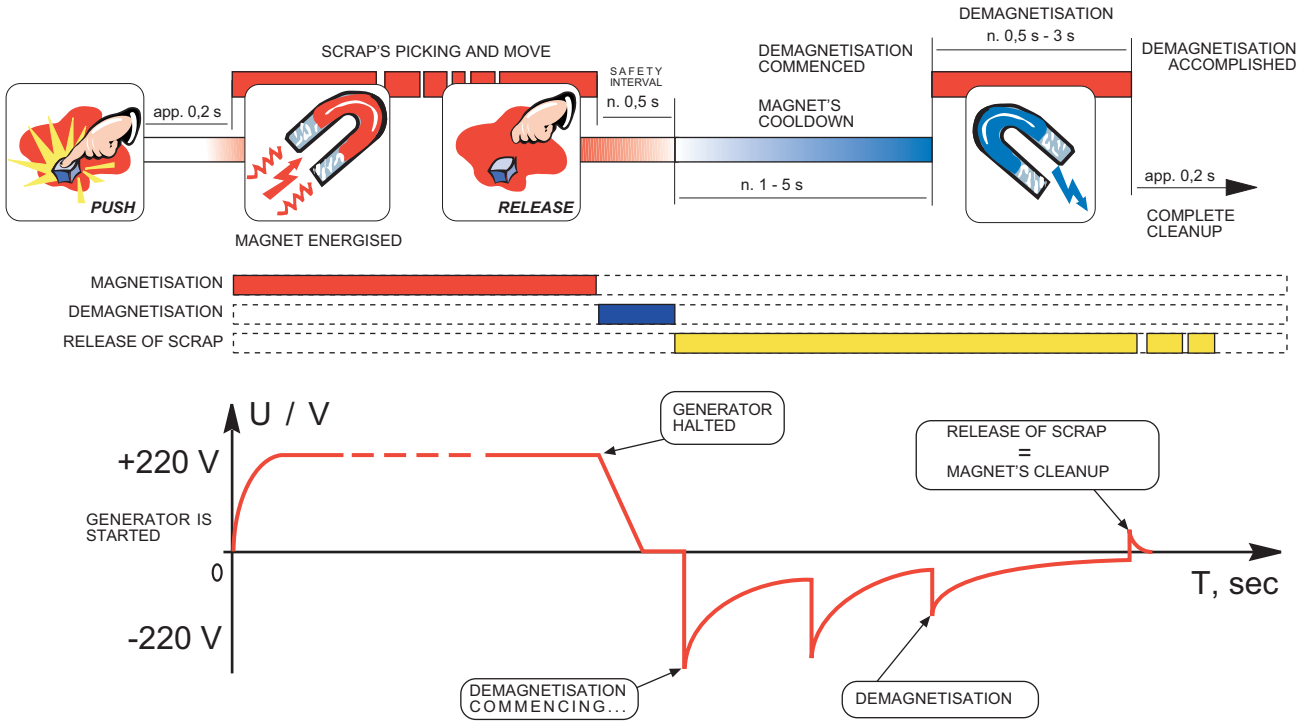
After having installed the HMAG and connected it to the chosen/available service circuit, start machine's engine and move the unit to the working area. Start the HMAG with an assigned switch. Now the iron scrap can be sorted and picked. Having picked a sufficient amount of scrap, move it to dump site (for instance, scrap trailer). HMAG's control switch must be kept pressed down during this procedure.

To halt the HMAG, cut off the hydraulic flow by releasing the control switch when the unit stops and control electronics executes the demagnesation with a discharge current of high voltage batteries. Due to demagnetisation all material being kept by a magnet drops down.
After release of a material, magnet is returned to an iron picking point and the job continues in above sequence.

If large scrap items (for instance steel plates with a thickness over 50 mm) do not come off easily, demagnetisation can be boosted by switching on the generator for 2-3 sec after first hydraulic flow cut-off. While the demagnetisation is in progress, generator, being switched on, charges batteries and boosts the demagnetisation. Please note, that prior to re-starting the generator a sufficient interval of time should be allowed to commence the demagnetisation, otherwise the unit passes back to the magnetisation mode.

ATTENTION !
HMAG's generator is equipped with two temperature switches: one located in generator's winding and the other in control unit's box. When generator's winding is getting overheated (for instance, due to the overload) the corresponding temperature switch cuts off magnet's current and demagnetisation is being performed as the hydraulic flow would be closed. **THE IRON COMES OFF CAUSING DANGEROUS SITUATION !**
Control unit's temperature switch cuts off magnet's current without demagnetisation when control unit's temperature exceeds maximum allowed value. **HOWEVER, THE IRON COMES OFF FOR A LONG WHILE CAUSING DANGEROUS SITUATION.**
In both cases generator is to be left running in order to cool it as fast as possible. The unit being cooled enough, temperature switch turns on the magnet's current automatically, when an operator can proceed with his job.
ATTENTION ! MAGNET'S LOAD DUTY IS 60%. EXCEEDING OF ED-VALUE CAUSES MAGNET'S OVERHEATING !

HYDRAULIC MAGNET'S CONTROL/OPERATION SEQUENCE



OPERATION SAFETY PRECAUTIONS

Do not allow any person or animal approach the operating HMAG closer than 20 m.

Do not start the HMAG left lain on the ferrous materials - prior to starting the unit move it apart from the iron.

Prior to starting HMAG ensure that the unit is properly attached and connected to the carrier.

Do not overload the HMAG in any circumstances.

Do not use the HMAG to drag scrap along the ground.

Keep the HMAG as close as possible to the horizontal when picking the scrap.

Do not release the scrap from HMAG by swinging the unit, hooked to the machine's boom.

Do not lift and move any items attached to the HMAG with rope, slings or chains.

When picking and moving scrap, twitches as well as abrupt moves and reversals must be avoided.

Prior to starting to operate HMAG ensure fair visibility and sufficient illumination.

To avoid burns, do not touch HMAG without protective gloves immediately after having stopped it.

Do not cool the HMAG with water.

TO AVOID BEING EXPOSED TO THE DANGEROUS MAGNETIC FIELD GENERATED BY THE HYDRAULIC MAGNET, PERSONS WITH AN ARTIFICIAL PACEMAKER OR CARDIAC VALVE MUST NOT ENTER INTO A WORKING AREA OF AN OPERATING UNIT OR STAY WITHIN IT. AS THE MENTIONED MAGNETIC FIELD MAY DAMAGE WATCHES, CREDIT CARDS, SENSITIVE ELECTRONICS ETC., KEEPING SUCH ITEMS/DEVICES EXPOSED TO THE MAGNET'S INFLUENCE IS AT THEIR OWNER'S RESPONSIBILITY.

MAINTENANCE

DYNASET hydraulic generators are low-maintenance units. Only normally wearing parts such as sealings in hydraulics, brush collector and bearings should be replaced when necessary. Refer also to the TROUBLESHOOTING section.

ATTN. !

Capacitors in control unit keep the charge for a long time after stopping a generator.

Prior to commence any service:

* stop both magnet generator and the carrier;
* wait at least 10 minutes;
* ensure with a gauge that capacitors have no charge.

HYDRAULIC FLUIDS

Wide range of standard hydraulic fluids can be used with the DYNASET hydraulic equipment.

Subject to the operating temperature, following mineral hydraulic oils are recommended:

ISO VG 32S for oil's operation temperature up to 70 °C;
ISO VG 46S for oil's operation temperature up to 80 °C;
ISO VG 68S for oil's operation temperature up to 90 °C.

Synthetic and bio-oils can be used as well if their viscosity characteristics and lubricating efficiency are corresponding to above mineral oils. Automatic transmission fluids and even engine oils can be used, provided that they are allowed to be used in hydraulic system of your carrier machine.

Prior to use special hydraulic fluids a with DYNASET equipment, please be kindly requested to contact nearest DYNASET representative for an advice.

SAFETY

The HMAG generator's output voltage is as high as 230/400 V. Operators and maintenance personnel must always comply with local safety regulations and precautions in order to close out the possibility of damages and accidents. Prior to detaching a magnet from a carrier, unplug it from a generator's socket ! Capacitors of control unit can discharge developing voltage over 200V even the equipment stands still.

The hydraulic system is usually pressurised up to 250 (420) bar. Follow all your local safety instructions related to the high pressure hydraulics.

TECHNICAL CONDITION OF YOUR MACHINERY AND EQUIPMENT MUST BE SUBJECTED TO CONSTANT SURVEILLANCE. Hydraulic system of a carrier machine should be maintained according to the service program. All couplings, valves and hoses of the system should be leak-proof and kept clean in order to follow their technical condition.

Hydraulic leakages must be rectified immediately to avoid injuries caused by hot oil blowouts.

Prior to maintenance, detaching from a carrier or disassembling a DYNASET-unit, the hydraulic system of a machine should be stopped and DYNASET's hydraulic circuit depressurised.

When working with a DYNASET hydraulic equipment, appropriate protective clothing, safety goggles and gloves should be worn. Do not touch parts heated by hydraulic oil.

WHEN CARRYING OUT ANY SERVICE DISASSEMBLING OR REPAIR OF DYNA*SET* HYDRAULIC UNIT (AND/OR HYDRAULIC SYSTEM OF A CARRIER MACHINE)**, ABSOLUTE CLEANLINESS MUST BE MAINTAINED TO ENSURE RELIABLE AND TROUBLE-FREE OPERATION OF YOUR EQUIPMENT.**

All installation and service of both hydraulic and electric equipment must be performed by qualified and experienced personnel only.

TROUBLESHOOTING

1. **HMAG DOES NOT WORK (DOES NOT LIFT IRON)**	1.1 HMAG's hoses cross-connected. Pressure relief valve in return line does not allow to start the unit's generator.	1.1 Check HMAG's connection to the hydraulic circuit and rectify when necessary.
	1.2 Generator has not recovered after tripping of either temperature switch.	1.2 Allow sufficient time (> 15 min) for generator's cooldown and recovering.
	1.3 Magnet's coil damaged.	1.3 Check coil's resistance and compare the result to the value indicated in the table thereinafter (if possible, check also coil's inductance, which should be within 0 - 20 H).
	1.4 220 VDC voltage does not come from the control unit to magnet's terminals.	1.4 Magnet's cable or the control unit damaged.
	1.5 AC-voltage does not come from generator to the control unit.	1.5 Control unit's malfunction, ref. to the corresponding data pages. **Potential malfunction in hydraulic system.** Potential failure in AC-generator's windings, brush gear, excitation rectifier or voltage regulator. **Ref. to the attached troubleshooting for AC-generator.**

MODEL	GENERATOR	MAGNET	MAGNET'S ALLOWED RESISTANCE Ω (Ohm)
HMAG 700	CMG 3 kW	MAG 750 / 3 kW	15 - 50
HMAG 900	CMG 6 kW	MAG 960 / 4,9 kW	8,8 - 20
HMAG 1200	HMG-C 10 kW	MAG 1260 / 8 kW	5,4 - 15
HMAG 1500	HMG-C 12 kW	MAG 1450/ 10 kW	4,5 - 10

2. **IRON DOES NOT GET RELEASED FROM A MAGNET** (DEMAGNETISATION DOES NOT WORK)	2.1 High voltage batteries damaged. 2.2 Control unit damaged.	2.1 / 2.2 Ref. to the corresponding data pages.

3. MAGNET MALFUNCTIONS.	3.1 HMAG keeps working only a short time.	3.1.1 Partial short-circuit in magnet's cable. The temperature switch disconnects the magnet. Remove the protective cover, open magnet's terminal box and disconnect the cable from cable clamps; start the unit - if the temperature switch does not trip, the cable is defective. 3.1.2 The control unit overheated.
	3.2 Low magnet's power.	3.2 Magnet's voltage too low: Does DC-voltage come to magnet's terminals ? Does AC-voltage comes to the control unit ? Check AC-generator according the attached instructions; Check actuating hydraulics.
	3.3 Magnet's power consumption excessive, temperature switch disconnents the magnet.	3.3 Generator's output voltage too high causing overloading. Check AC-generator according the attached instructions; Check the flow limiting valve in generator's pressure line; adjust or replace when necessary. Adjust the output voltage to proper level. **ATTN ! High voltage is hazardous to both generator and magnet. Rectify a malfunction immediately !!!**

AC-GENERATOR'S TROUBLESHOOTING

1. **LOW OUTPUT VOLTAGE AT NO LOAD**	1.1 Too low rotation speed of generator.	1.1.1 Verify first the output frequency (48 ± 2 Hz). If the frequency is out of range, hydraulic system failure is concerned. 1.1.2 Check whether the hydraulic fluid flow and pressure are sufficient. Adjust when necessary. 1.1.3 Check the hydraulic motor for possible leakage. Replace motor if necessary.
	1.2 Excitation rectifier's failure.	1.2 Trace the failure and replace the rectifier.
	1.3 Poor contact in electric system.	1.3 Check all internal contacts and wiring of the generator. Check and clean brushes and slip ring (CMG6 kW — HMGC 12 kW).
	1.4 Voltage regulator's failure.	1.4.1 Replace the capacitor (CMG 3 kW). 1.4.2 Check the compound regulator. Replace if broken (CMG6 kW — HMGC 12 kW).
	1.5 Winding failure.	1.5 Check the condition of winding; verify winding's resistance with parameters shown in technical specification and replace if damaged. **ATTN !** **TO AVOID DAMAGING THE CONTROL UNIT, DISCONNECT GENERATOR'S CABLE FROM IT PRIOR TO MEASURING WINDING'S INSULATION RESISTANCE.**

2. **LOW OUTPUT VOLTAGE AT LOAD,** WHILE NO-LOAD VOLTAGE IS CORRECT	2.1 The generator is being overloaded.	2.1 Reduce the load and check the current I (A) to ensure that the proper load is being applied.
	2.2 Too low rotation speed of generator.	2.2.1 Hydraulic pressure insufficient. 2.2.2 Hydraulic system failure to be traced and cleared. 2.2.3 Hydraulic motor worn out. Replace hydraulic motor.
	2.3 Voltage regulator's failure.	2.3.1 Replace the capacitor (CMG 3 kW). 2.3.2 Check and adjust or replace the compound regulator. (CMG6 kW — HMGC 12 kW). Check resistors of rotor's current circuit (2 pcs).

AC-GENERATOR'S TROUBLESHOOTING

3. **EXCITATION FAILURE**	3.1 Rectifier's failure.	3.1 Trace the failure and replace the rectifier.
	3.2 Voltage regulator's failure.	3.2.1 Replace the capacitor (CMG3 kW). 3.2.2 Check and adjust or replace the compound regulator (CMG6 kW — HMGC 12 kW).
	3.3 Winding failure.	3.3 Verify the winding resistance with parameters shown in technical specification and replace if damaged.
	3.4 Poor contact in electric system.	3.4 Check all internal contacts and wiring of the generator. Check and clean brushes and slip ring (CMG6 kW — HMGC 12 kW).
	3.5 Insufficient residual magnetism.	3.5 Use external battery of 12 V for 1 - 2 sec to magnetise the rotor.

4. **OUTPUT VOLTAGE INSTABILITY**	4.1 Instable rotation speed of generator.	4.1.1 Check generator's hydraulics, including automatic frequency control valve. Make an adjustment, replace RPM-cartridge if necessary. 4.1.2 Check whether the hydraulic fluid flow and pressure are excessive. Adjust when necessary. 4.1.3 Check the hydraulic motor for possible leakage. Replace motor if necessary.
	4.2 Poor contact in electric system.	4.2 Check all internal contacts and wiring of the generator. Check and clean brushes and slip ring (CMG6 kW — HMGC 12 kW).

AC-GENERATOR'S TROUBLESHOOTING

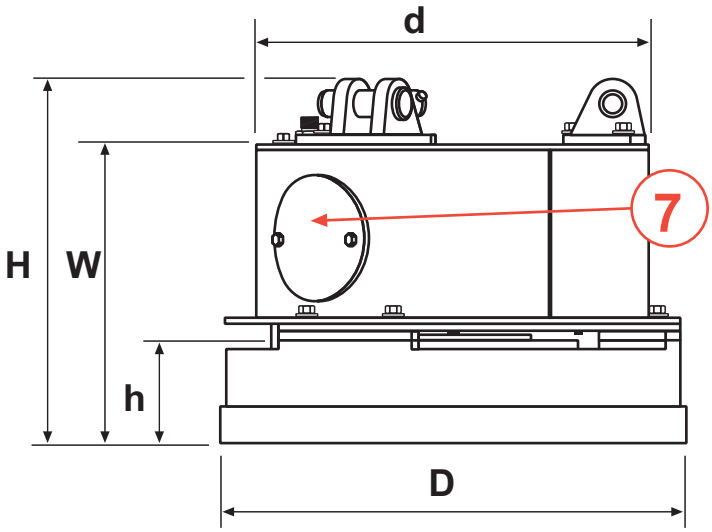
5. **ABNORMAL NOISE LEVEL**	5.1 Bearing failure. 5.2 Generator is being overloaded. 5.3 Short circuit in powered unit. 5.4 Foreign items in generator's casing. 5.5 Extremely fluctuating load.	5.1 Replace broken bearing. 5.2 Reduce the load to proper level. 5.3 Check powered unit. Rectify a defect. 5.4 Stop generator and hydraulic system. Remove foreign item from unit. 5.5 Can it be fixed ?

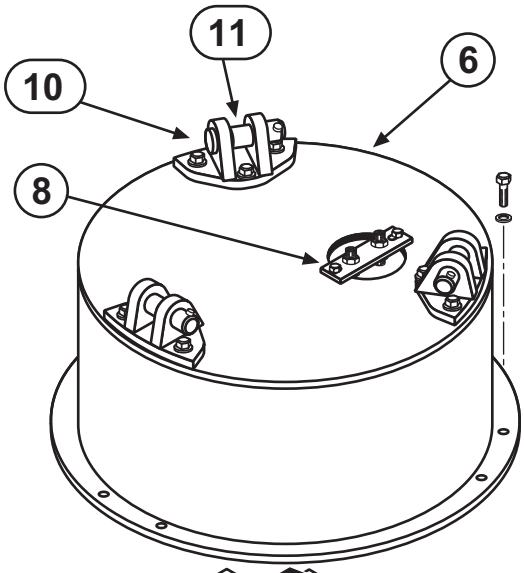
6. **OIL LEAKAGES**	6.1 Failure of axial sealing of generator's hydraulic motor. External indication— ydraulic oil outflow from ventilation grids. 6.2 Oil leakage from hydraulic motor.	6.1 Axial sealing of hydraulic motor broken by reason of EXCESSIVE PRESSURE IN RETURN LINE. Rebuild the return line. Maximum allowed pressure in return line is 5 bar. Replace axial sealing of generator's motor. 6.2 Hydraulic motor worn out and should be replaced.

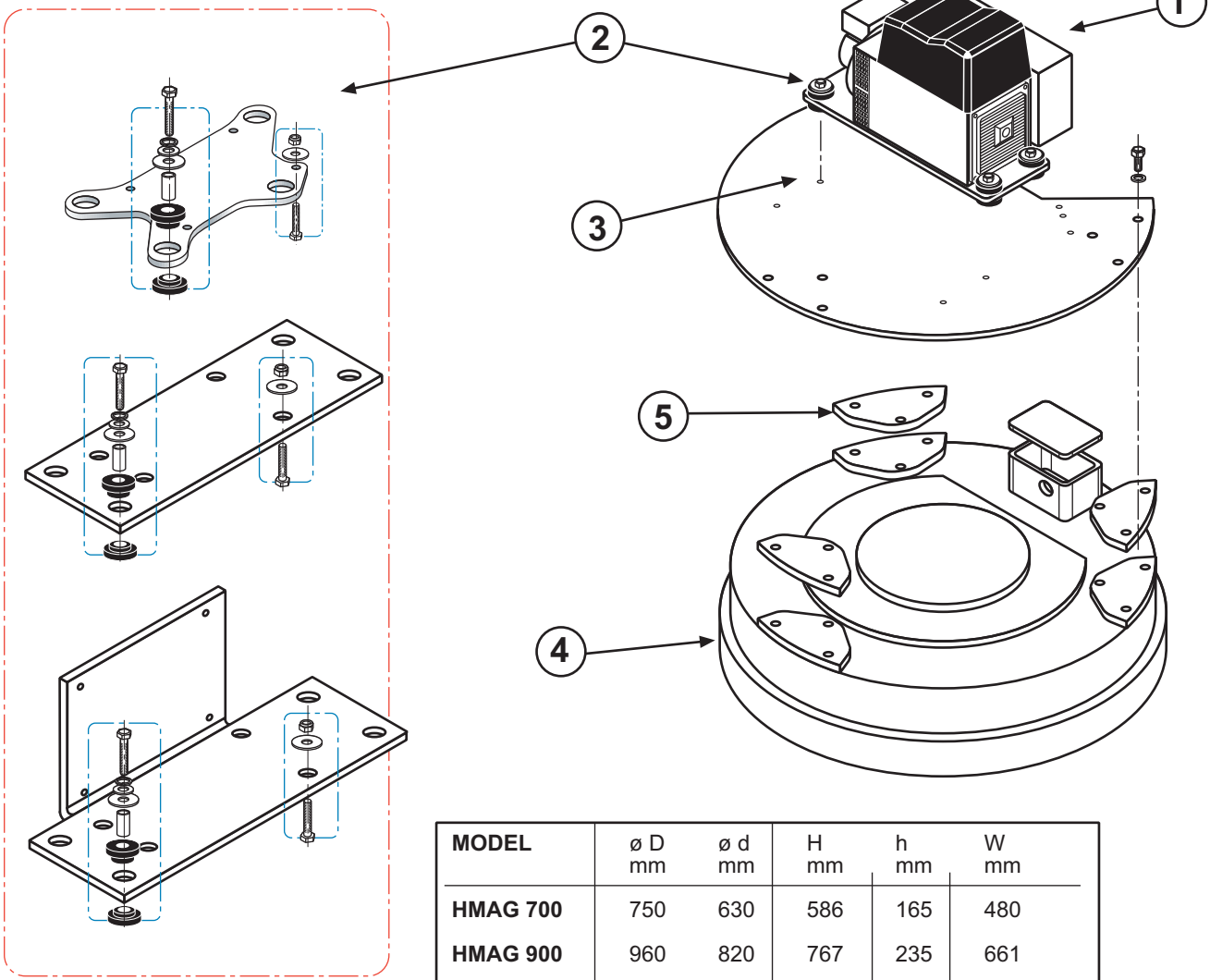
MODEL	GENERATOR	MAGNET
HMAG 700 9010324	CMG 3 kW 9010328	MAG 750 / 3 kW 9010319
HMAG 900 9010364	CMG 6 kW 9010363	MAG 960 / 4,9 kW 9010348
HMAG 1200 9010549	HMGC 10 kW 9010535	MAG 1260 / 8 kW 9010365
HMAG 1400 xxxxxxx	HMGC 12 kW xxxxxxx	MAG 1450/ 10 kW xxxxxxx

MODEL	WEIGHT, kg
HMAG 700	460
HMAG 900	860
HMAG 1200	1500
HMAG 1400	xxxx

MAIN ASSEMBLY AND OUTLINE DIMENSIONS



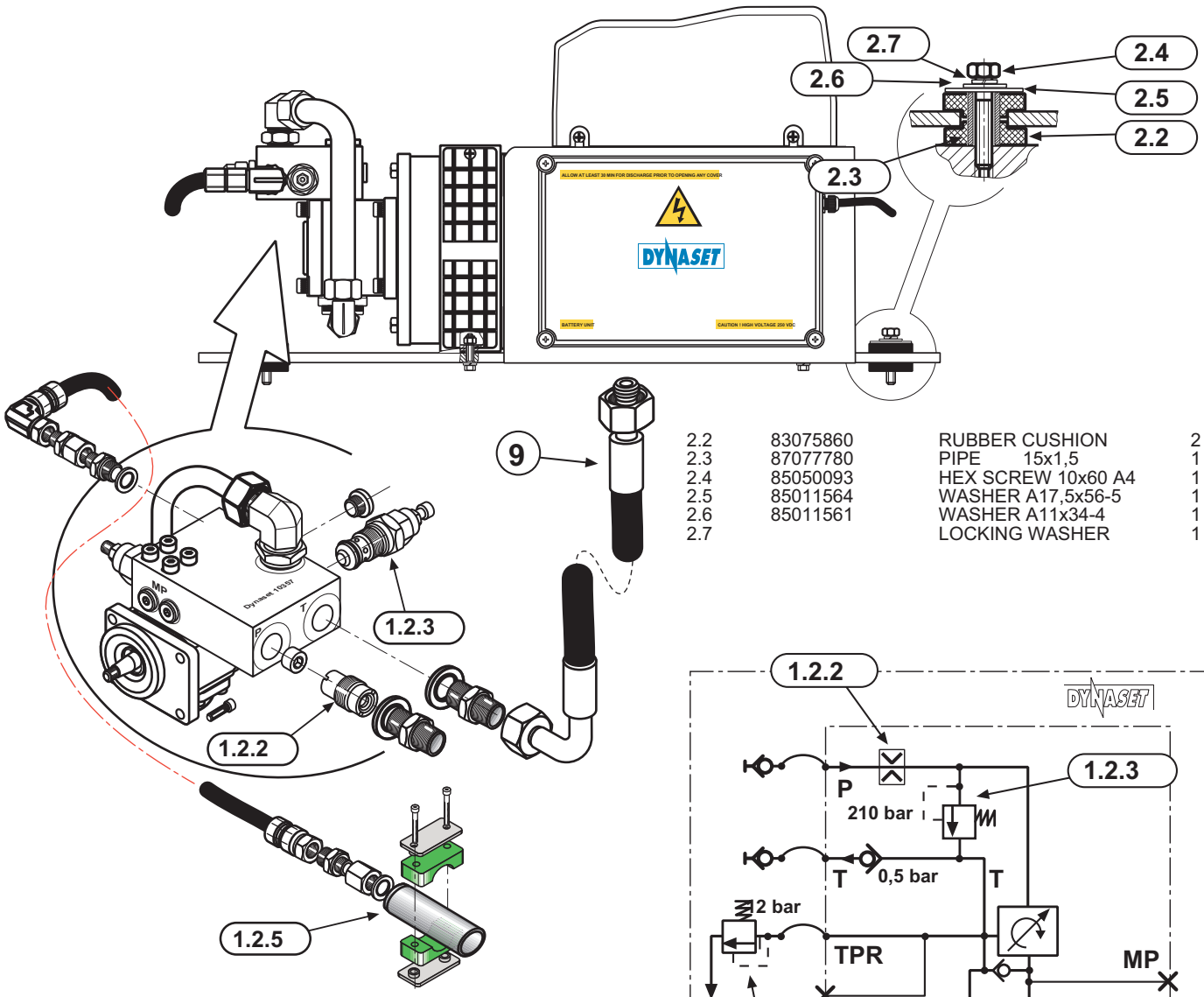




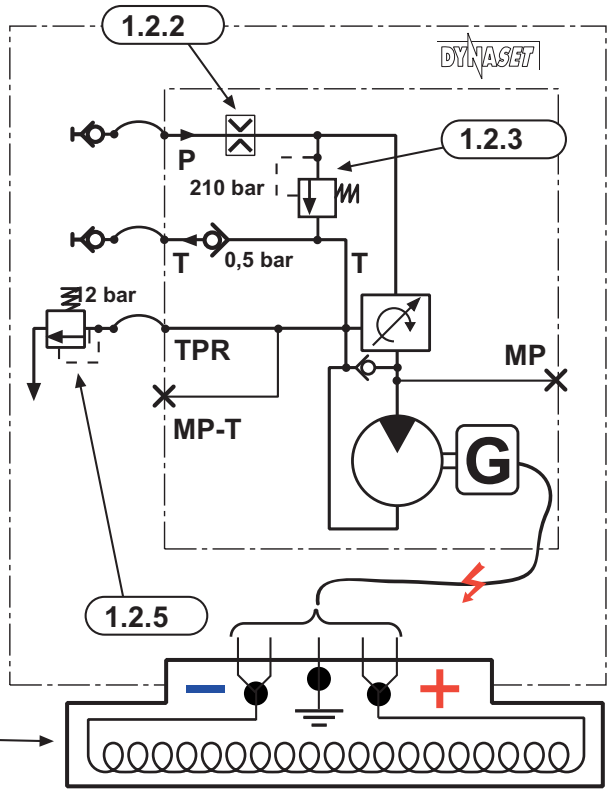
MODEL	ø D mm	ø d mm	H mm	h mm	W mm
HMAG 700	750	630	586	165	480
HMAG 900	960	820	767	235	661
HMAG 1200	1260	1106	826	283	320
HMAG 1400	1450	xxxx	xxx	xxx	xxx

ABOVE SKETCHES ARE FOR REFERENCE ONLY !

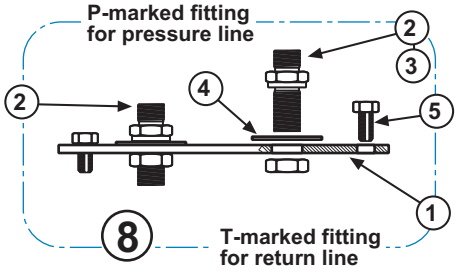
MAIN ASSEMBLY



2.2	83075860	RUBBER CUSHION	2 x 4
2.3	87077780	PIPE 15x1,5	1 x 4
2.4	85050093	HEX SCREW 10x60 A4	1 x 4
2.5	85011564	WASHER A17,5x56-5	1 x 4
2.6	85011561	WASHER A11x34-4	1 x 4
2.7		LOCKING WASHER	1 x 4



1.2.5. 1	9010383	VALVE SLEEVE		1
1.2.5. 2	17022950	MALE STUD CONNECTOR	R1/2-R3/8	1
1.2.5. 3	17021850	SEAL	USIT R3/8	2
1.2.5. 4	17024850	SWIVEL CONNECTOR	R3/4-R3/8	1
1.2.5. 5	18036296	HOSE		1
1.2.5. 6	17023040	MALE STUD CONNECTOR	R3/4-R3/8	1
1.2.5. 7	17025100	PIPE CONNECTOR	R3/8	1
1.2.5. 8	73069750	PRESSURE RELIEF VALVE	3/8 12 bar	1



8.1	CONNECTION STRIP	9010380	700-900	1	
		9010542	1200-1400	1	
8.2	CONNECTOR FITTING	17032400BSP 1/2-1/2	700-900	2	P- and T-connections
			1200-1400	1	P-connection
8.3	CONNECTOR FITTING	17023402BSP 3/4-3/4	1200-1400	1	T-connection
8.4	WASHER, WIDE		700-1400	2	P-and T-markings
8.5	HEX SCREW	85000653M10x16 SSi	700-1400	2	

ABOVE SKETCHES ARE FOR REFERENCE ONLY !

POS	BASIC COMPONENTS	STOCK NUMBER	DETAILS	HYDRAILIC MAGNET: QUANTITY / PARAMETER			
				HMAG 700	HMAG 900	HMAG 1200	HMAG 1400
1	MAGNET GENERATOR	9010328	CMG 3 kW	1			
		9010363	CMG 6 kW		1		
		9010535	HMGC 10 kW			1	
		xxxxxxx	HMGC 12 kW				1
1.2.2	FLOW LIMITER			18 l/min	32 l/min	48 l/min	54 l/min
1.2.3	PRESSURE LIMITER			210 bar	210 bar	210 bar	210 bar
1.2.5	PRESSURE RELIEF VALVE	9010287	RETURN LINE	12 bar	12 bar	12 bar	12 bar
2	GENERATOR MOUNT	9010342		1	1		
		03001023				1	
		03001818					1
		xxxxxxxx					
3	MOUNTING PLATE	9010325	700	1			
		9010369	900		1		
		9010547	1200			1	
		xxxxxxx	1400				1
4	FE-HANDLING MAGNET	0309010319	Magnet 750	1			
		0309010348	Magnet 960		1		
		0309010365	Magnet 1260			1	
		xxxxxxxxx	Magnet 1450				1
5	ADJUSTMENT PIECE	9010333	700-1400	3	3	6	6
6	PROTECTIVE COVER	9010322	700	1			
		9010370	900		1		
		9010548	1200			1	
		xxxxxxx					1
7	ACCESS HATCH	9010384	700	1			
		9010381	900		1		
		9010545	1200			1	
		xxxxxxx	1400				1
8	HOSE CONNECTOR	700-900		1	1		
		1200-1400				1	1
9	HYDRAULIC HOSE KIT	18035978	R1/2-750/2-R1/2	2 psc (P/T)	2 pcs (P/T)	1 pc (P)	1 pc (P)
	L = 0,75 m, BSP	xxxxxxxx	R3/4-750/2-R3/4			1 pc (T)	1 pc (T)
	(includes fittings and seals)						
10	LIFTING LUG			3	3	3	3
11	PIN	9010514		3	3	3	3
	QUICK COUPLINGS (STD)		M(p) + F (t)	OPTION	OPTION	OPTION	OPTION
	LIFTING CHAINS			4,25 ton	6,7 ton	11,2 ton	
	QUICK ATTACH PLATE		OPTION				

MANUFACTURER'S LIMITED WARRANTY

1. Warranty coverage
All hydraulic accessories manufactured by DYNASET OY are subject to the terms and conditions of this limited warranty. Products are warranted to the original purchaser to be free from defects in materials or workmanship. Exclusions from warranty are explained in item 8.

2. Beginning of warranty period
Warranty period begins from the delivery date of the product. Delivery is considered to be done on the date when installation has been accomplished or purchaser has taken the product in use. Product is considered as taken in use at the date when DYNASET OY has delivered the product to purchaser, unless separately agreed otherwise by written agreement.

3. Warranty period
Warranty period is twelve (12) months based on maximum of 2000 hours usage during this time period. In cases where the system is provided complete with certain special components (e.g. drive unit), those components are considered as a subject to their manufacturer's warranty.

4. Warranty procedures
Immediately upon identifying a problem which purchaser believes to be a failure subject to the product's limited warranty, purchaser must contact primary to the seller of the product. Contact must be made as soon as possible, latest thirty (30) days after the problem was identified. Seller and/or manufacturer technical staff determines the nature of the problem primarily by phone or e-mail. Purchaser commits to give necessary information and to perform routine diagnostic procedures in order to determine the nature of the problem and necessary procedures.

5. Warranty repairs
If the product is found to be defective during the warranty period, DYNASET OY will, at its option, either repair the product, author it to be repaired at its authorized workshop or exchange the defective product. If the product must be repaired elsewhere than premises of DYNASET OY or authorized workshop, all costs excluded from this warranty (traveling and waiting hours, daily allowance, traveling expenses and uninstallation/reinstallation costs) will be charged from the purchaser.

If the problem is not covered by this limited warranty, DYNASET OY has the right to charge purchaser of troubleshooting and repairing.

6. Delivery terms of warranty repair
If the product is found possible to be defective under this limited warranty and it needs to be repaired, DYNASET OY gives Warranty Return Number (WRN). Items being returned must be shipped, at the purchaser's cost, adequately packed for shipment, to the DYNASET OY or to other location authored by DYNASET OY.
Shipment documents must contain:
- Purchaser's name and contact information
- Receipt of original purchase
- WRN code
- Problem description

7. Warranty of repaired product
Warranty period of the product repaired under this limited warranty continues to the end of original warranty period.

8. Exclusions from warranty
This warranty shall not apply to:

a. Failures due to normal wear and tear, improper installation, misuse, abuse, negligence, purchaser selection of improper product to intended use, accident, improper filtration of hydraulic oil or intake water or lack of maintenance

b. Cost of maintenance, adjustments, installation or startup

c. Coating, hydraulic oil, quick couplings and interconnection hoses (internal or external to system assemblies)

d. Products altered or modified in a manner not authorized by DYNASET OY in writing

e. Products which have been repaired during warranty period by others than DYNASET OY or its authorized workshop

f. Costs of any other damage or loss, whether direct, indirect, incidental, special or consequential, arising out of the use of, or the inability to use, the product

g. Telephone or other communications expense
h. Product that is used in exceptional conditions, considered to cause excessive wear and tear

i. Faults caused by nature phenomenon's like flood, thunder, etc.