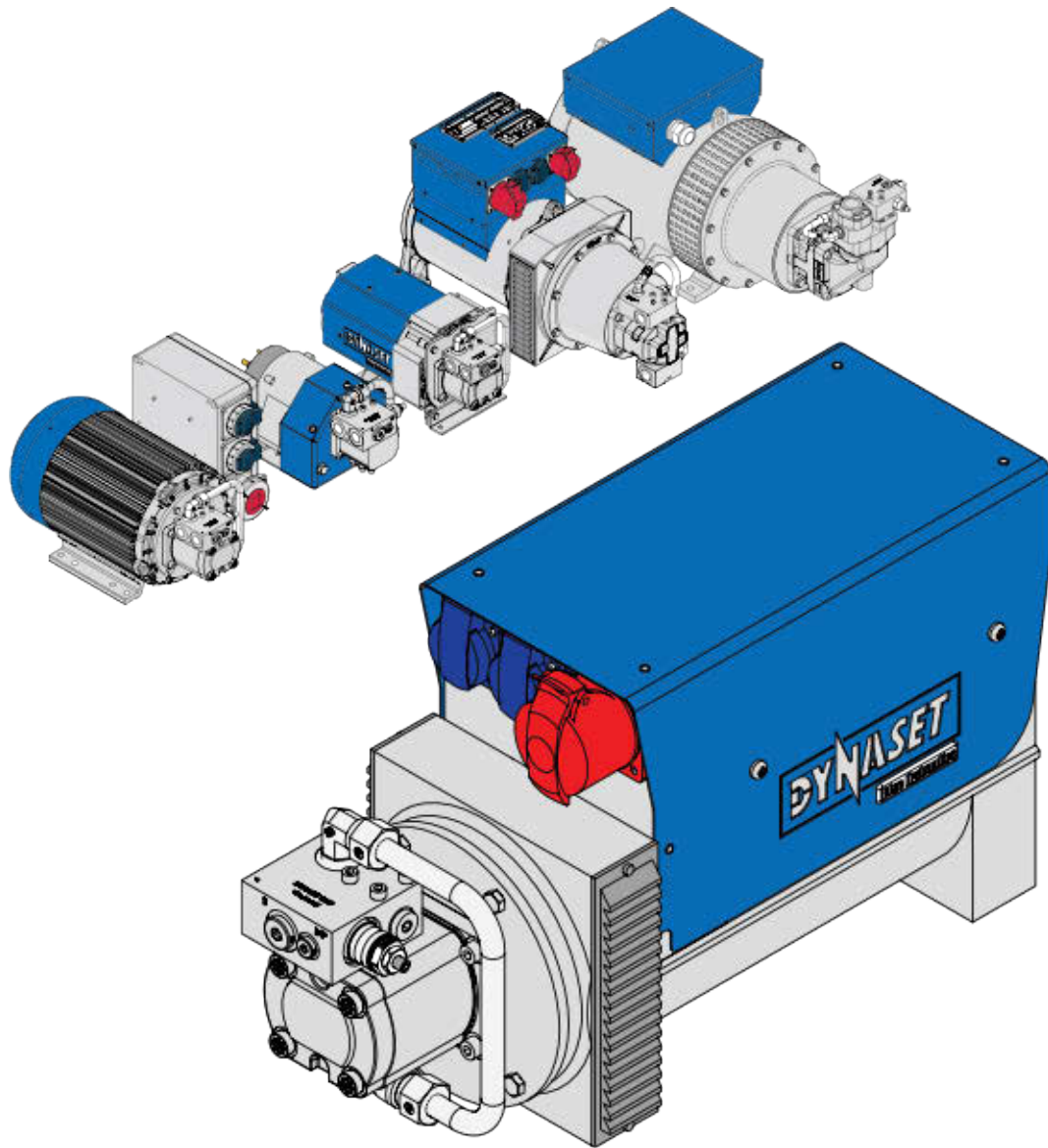




MEEA
MOBILE ENERGY AUSTRALIA



USER MANUAL

HYDRAULIC GENERATORS

HG 1	HG 3,5	HG 5	HG 6,6	HG 10,1	HG 15	HG 20	HG 30	HG 50
HG 2	HG 3,7	HG 6	HG 9	HG 12	HG 15,1	HG 20,1	HG 30,1	HG 60
	HG 4,1	HG 6,5	HG 10	HG 12,1	HG 18	HG 25	HG 40	HG 70

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1. GENERAL

This manual contains general information about assembly, installation, operation and maintenance of DYNASET HG hydraulic generators.

ATTENTION!

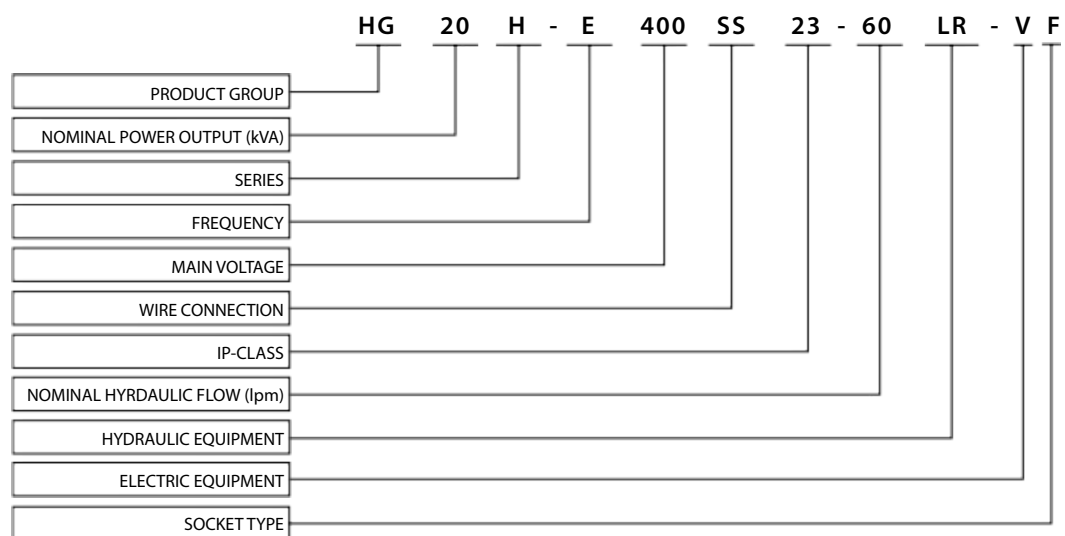
Read this user manual before installation, use or maintenance of the HG hydraulic generator to ensure proper handling, operation and maintenance right from the beginning. Pay attention to warnings and safety instructions. READ CHAPTER "2. SAFETY" for more information.

1.1. PRODUCT INFORMATION

HG hydraulic generators are compact and integrated all-in-one units, especially designed for mobile installations. The generators use hydraulic power source to operate and produce high quality electricity. The generators can be used to power a wide variety of tools, appliances and electric machinery.

1.2. PRODUCT IDENTIFICATION KEY

The product identification key describes the characteristics of the DYNASET product. The product identification key is on the product type plate which is attached on to every DYNASET product.



Picture 1: Identification key for HG hydraulic generators

PRODUCT GROUP

Presents the product category in this case HG hydraulic generators.

NOMINAL POWER OUTPUT

Generator's theoretical power output in kVA.

SERIES

The product series that the generator model belongs to.

FREQUENCY

AC frequency, 50/60 Hz, which the generator is build for.

MAIN VOLTAGE

The main output voltage of the generator.

WIRING MODEL

Generator's wiring model.

IP CLASS

Products ingress protection class.

NOMINAL HYDRAULIC FLOW

Theoretical hydraulic flow of the base machine needed to operate the product.

HYDRAULIC EQUIPMENT

Describes the hydraulic output equipment attached to the product. READ CHAPTER "1.8. Hydraulic equipment" for more information.

ELECTRIC EQUIPMENT

Describes the electric output equipment attached to the product. READ CHAPTER "1.9. Electric equipment" for more information.

SOCKET TYPE¹

Describes the single phase power output socket type on the HG hydraulic generator. READ CHAPTER "1.9.1. Single phase socket plug type" for more information.

1.3. TYPE PLATE



Picture 2: Type plate

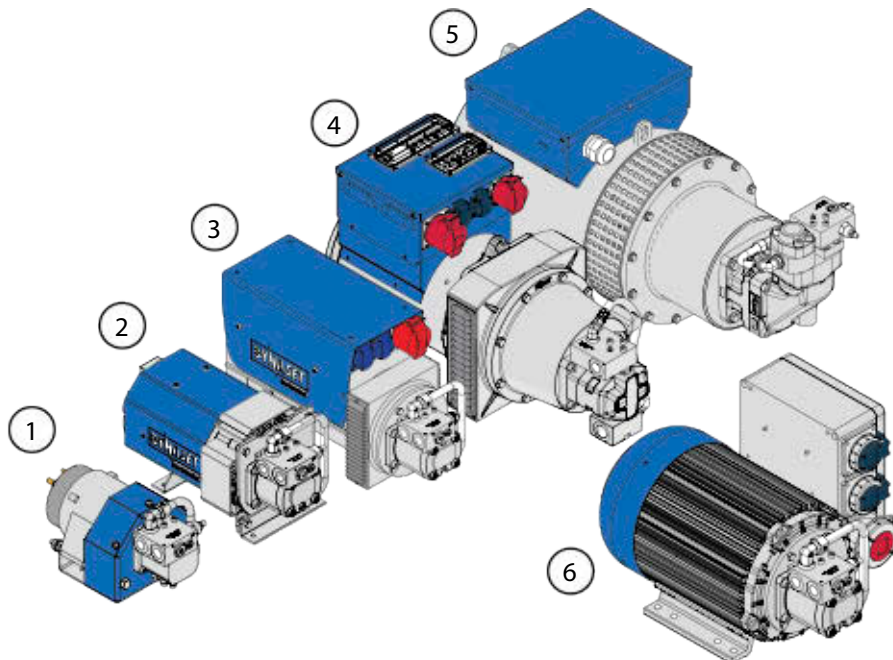
1. Product identification key
2. Product code
3. Serial number
4. Minimum hydraulic flow
5. Maximum hydraulic pressure
6. Production month / year
7. Three Phase: Main voltage / current, frequency, IP classification.
8. Single Phase: Main voltage/ current.
9. Manufacturer's contact information

1.4. HG'S LINE-UP

Standard DYNASET HG hydraulic generators are divided into six groups. All groups are divided based on their basic structure and IP classification.

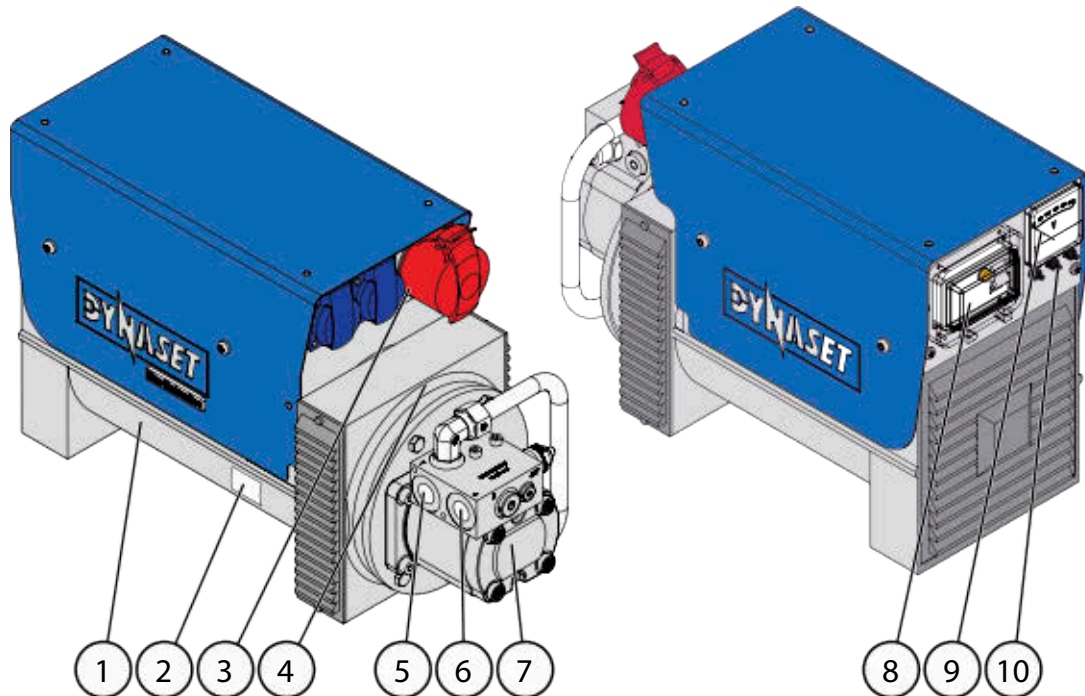
1. HG 1 kW - 2 kW
2. HG 3,5 kVA - 5,0 kVA
3. HG 6,5 kVA - 12 kVA
4. HG 15 kVA - 20 kVA
5. HG 30 kVA - 70 kVA
6. HG P54 generators

Models are presented in picture 3 below.



Picture 3: HG hydraulic generator line-up

1.5. HG'S MAIN COMPONENTS



Picture 4: Main assembly of the HG hydraulic generators

- | | |
|----------------------------------|---------------------------------|
| 1. Alternator | 6. Hydraulic pressure line (P) |
| 2. Type plate ¹ | 7. Hydraulic motor |
| 3. Electric sockets ¹ | 8. Residual current device |
| 4. Serial number ¹ | 9. Voltage meter ^{1,2} |
| 5. Hydraulic return line (T) | 10. Fuses ¹ |

¹ Place may vary between models






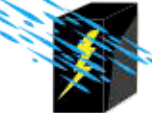









² Optional

1.6. IP (Ingress Protection) CLASSIFICATION

HG hydraulic generators are IP classified according to the IEC standard 60529 for the degrees of protection of electrical equipment. The protection class of standard HG hydraulic generator complies the specifications IP23 or IP54. Also other IP class generators are available by request.

HG hydraulic generator's IP class is marked into the products identification key. From the following chart you can check your IP class information.

IP Ingress Protection Classification guide

SOLIDS		WATER	
1	 Protected against a solid object greater than 50 mm ³ such as a hand.	1	 Protected against vertically falling drops of water.
2	 Protected against a solid object with greater than 12.5 mm diameter, such as a finger.	2	 Protected against direct sprays of water with up to 15 degrees from vertical.
3	 Protected against a solid object with greater than 2.5 mm diameter such as a screwdriver.	3	 Protected against direct sprays of water up to 60 degrees from vertical.
4	 Protected against a solid object with greater than 1 mm diameter such as a wire.	4	 Protected against water sprayed from all directions. Limited ingress permitted.
5	 Dust protected. Limited ingress of dust permitted i.e. no harmful deposit.	5	 Protected against low pressure jets of water from all directions. Limited ingress permitted.
6	 Totally dust protected. No ingress of dust.	6	 Protected against strong jets of water from all directions. Limited ingress permitted.
		7	 Protected against the effects of immersion in water between 15 cm and 1 m for 30 min.
		8	 Protection against the effects of immersion in water under pressure for long periods.
		9	 Protection against high pressure, high temperature jets of water from multiple directions.

Rating example:



1.7. VOLTAGE AND FREQUENCY

HG hydraulic generators are manufactured to output 110V-690V voltage and 50 or 60 Hz frequency. Exception to this are HG 1 and HG 2 models that are VDC generators. Their output voltage is 14 - 28 VDC.

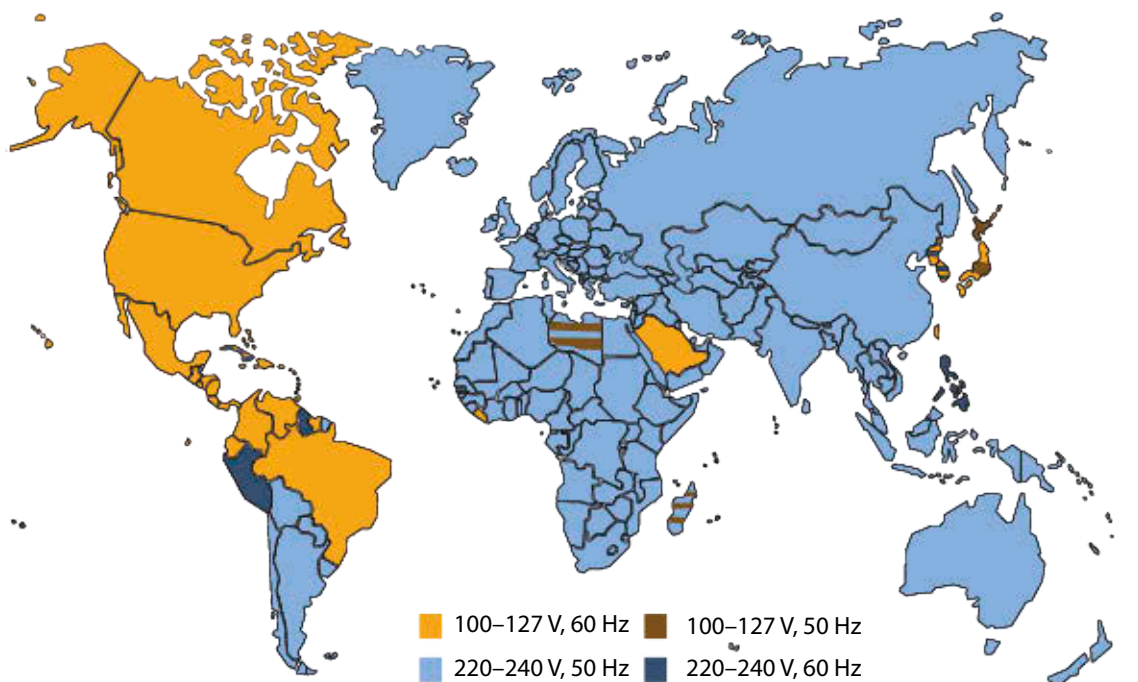
Picture 5 represents different single phase and picture 6 represents different three phase voltage and frequency areas in the world.

NOTE!

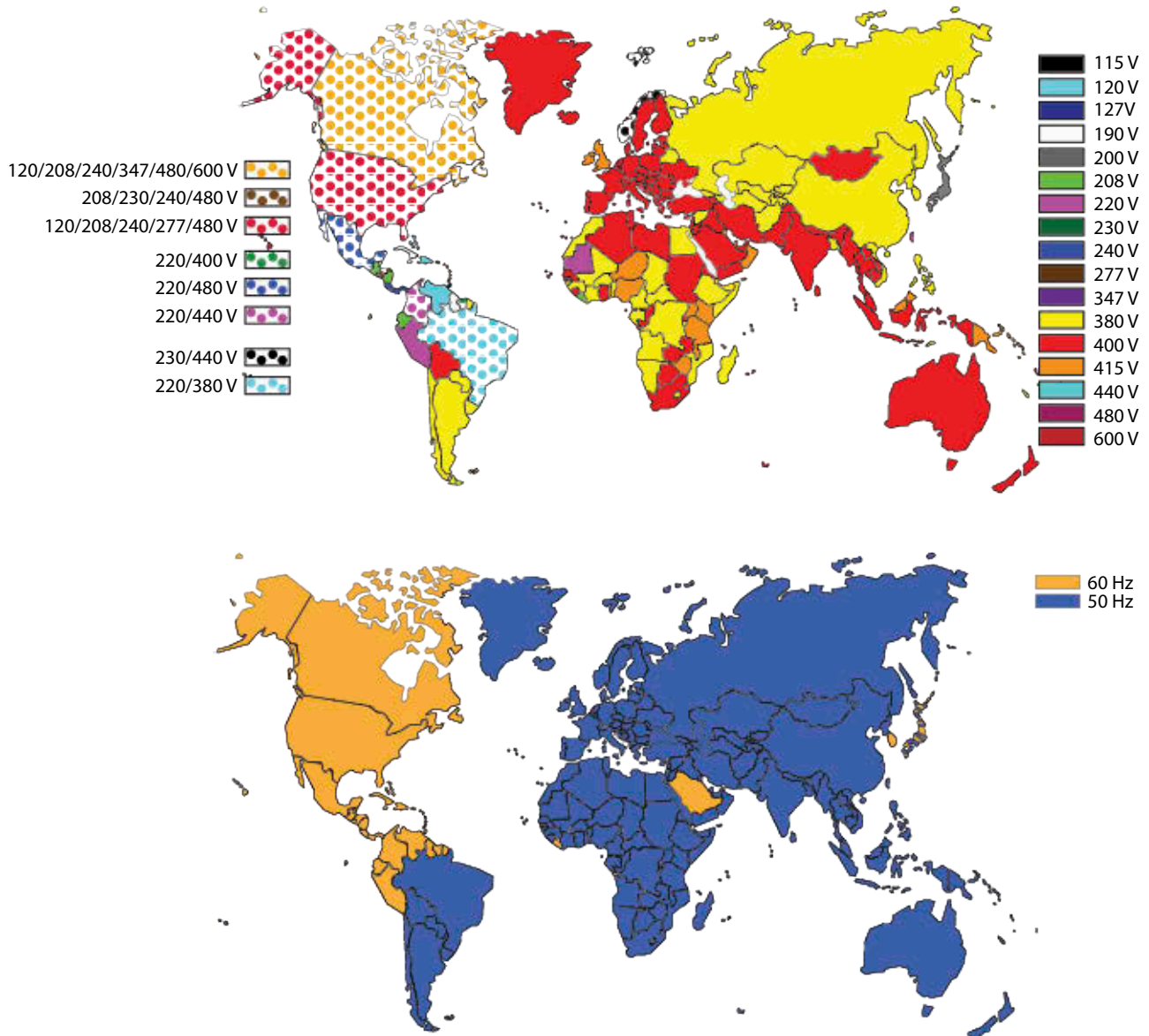
Always check that the HG hydraulic generators output frequency, voltage and socket are suitable for your work location.

More information about different countries single and three phase electric power usage can be found e.g. from the website <http://www.worldstandards.eu/electricity/>

The pictures are based on information on the internet page: <http://www.worldstandards.eu/electricity/plugs-and-sockets>.



Picture 5: Single phase voltage and frequency map



Picture 6: Three phase voltage and frequency world map

1.8. HYDRAULIC EQUIPMENT

This product identification key describes which hydraulic options are included to the HG hydraulic generator's structure.

Drain line (L)

An additional drain line can be installed on the HG hydraulic generator if the pressure in tank line is too high.

! NOTE!

The maximum pressure in tank line is 5 bar.

Pressure relief valve (P)

An additional pressure relief valve can be installed on the generators RPM-block. Pressure release valve prevents oil pressure raising too high.

Rubber cushions (R)

Rubber cushions are attachments between HG hydraulic generator and its base machine. If HG hydraulic generator comes with rubber cushions, grounding of the generator have to be ensured.

NOTE!

READ CHAPTER "4.4. Grounding" for more information to see proper grounding for the HG hydraulic generators.

Without automatic frequency regulation (S)

Without automatic frequency regulation generator does not have any automatic rotation or frequency control.

NOTE!

Customer is responsible of controlling the suitable oil flow and rotation speed of the hydraulic motor, if an automatic frequency regulation isn't provided.

Silence-Motor (E)

An additional hydraulic motor option which noise level is reduced. Silence-motors are used when low noise level is required.

1.9. ELECTRIC EQUIPMENT

The product identification key describes which electric equipments are included in HG hydraulic generator's structure.

All DYNASET HG hydraulic generators except the cable model (K), include fuses and either a residual current device (V) or a residual current circuit breaker device (Y). Other electric equipment are optional.

Cable connection (K)

Generators with cable connection come only with cable output. These models don't have any electrical safety devices such as fuses and residual current device circuit breakers on them.

Residual current device (V)

A residual current device (RCD) responds to current leakages by switching the current off if the current difference between phase and neutral is more than 30 mA.

RCD has a test button to test its proper operation in fault condition. When the test button is pressed it safely creates a small leakage condition which releases the

switch. RCD is to be tested monthly. READ CHAPTER “6.4. Test Safety devices” for more information.

The RCD (V) includes a residual current circuit breaker device (RCCBD) which functions are presented in the equipment (Y).

Residual current device circuit breaker (Y)

The Residual current device circuit breaker (RCCBD) is installed in the distribution box. Each socket in distribution box has its own RCCBD with a reset switch. Automatic circuit breakers protects the unit from a current overload.

RCCBD also includes a test button. When the button is pressed, it safely creates a small leakage condition and releases the switch. RCCBD (Y) is integrated into the RCD which functions are presented in the equipment (V).

Insulation monitoring device (I)

An insulation monitoring device is located in the distribution box. The insulation monitoring device monitors the ungrounded system between an active phase conductor and earth. It is intended to give an alert (light) or disconnect the power supply when the resistance drops below the limit value. The first limit value switches on the red light. The second limit value disconnects the power supply.

Rotation speed sensor (S)

An additional rotation speed sensor can be included on the HG hydraulic generator when purchasing the generator. The rotation speed sensor is a Hall sensor with NPN and it is located in the rotors rear axle. Ordering the HG hydraulic generator with the rotation speed sensor is agreed separately.

Centre grounding transformer (T)

A centre grounding transformer is located in the distribution box. Grounding transformers allow three wire (delta) polyphase system supplies to accommodate phase to neutral loads by providing a return path for current to a neutral.

Other Electric Equipment

If you have a need for other electrical equipment for your generator please contact us for more information about the possibilities of upgrading your product.

1.9.1. SINGLE PHASE SOCKET PLUG TYPE

Picture 7 below shows all the single-phase electricity socket types. In the following chart are their specification. The pictures are without lids to demonstrate the type of socket. All delivered sockets come with lids. IP54 models have lockable lids.



NOTE!

Ungrounded plugs and sockets A,C and I are not available.



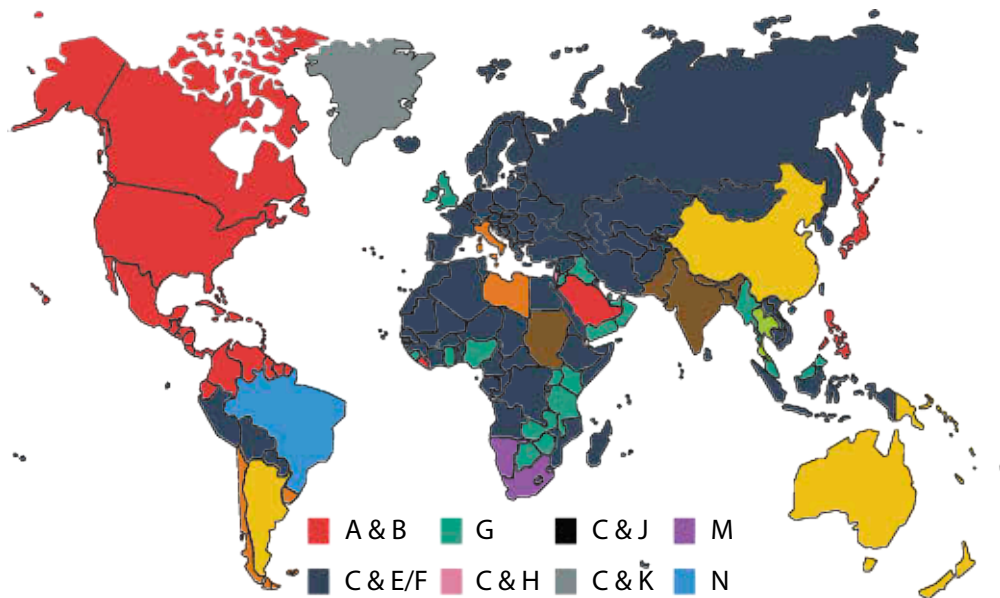
Picture 7: Single phase sockets and plugs

The pictures are from: <http://www.worldstandards.eu/electricity/plugs-and-sockets>.

Type	Grounding	Current (A)	Voltage (V)	Socket compatibility with plug(s)
A	Not grounded	15	100-127	A
B	Grounded	15	100-127	A&B
C	Not grounded	2,5	220-240	C
D	Grounded	5	220-240	C & D, (Unsafe with E & F)
E	Grounded	16	220-240	C, E & F
F	Grounded	16	220-240	C, E & F
G	Grounded	13	220-240	G
H	Grounded	16	220-240	C & H (Unsafe with E & F)
I	2 pins: not grounded 3pins:grounded	10	220-240	I
J	Grounded	10	220-240	C & J
K	Grounded	16	220-240	C & K (Unsafe with E & F)
L	Grounded	10 16	220-240	10 A socket: C & L. 16 A socket: L
M	Grounded	15	220-240	M
N	Grounded	10 20	220-240	C & N
O	Grounded	16	220-240	C & O (Unsafe with E & F)

The single-phase plugs are also presented in the following map in picture 8 by their usage in different parts of the world. Note that the map is for general use only and the plug & socket types might vary from it.

The pictures are from: <http://www.worldstandards.eu/electricity/plugs-and-sockets>.



Picture 8: Single phase plug and socket map

1.9.2. THREE PHASE SOCKET PLUG TYPE

Three-phase socket plugs are delivered according to the IEC60309 and NEMA standards. Few common models are presented in the pictures 9 and 10.

Pictures are from: <http://www.abb.com/>, <http://www.mennekes.com/> and <http://www.hubbellcatalog.com/>.



Picture 9: IEC60309 three phase sockets and plugs



Picture 10: NEMA three phase sockets and plugs

Delivered sockets or plugs might have different color or exterior than in the pictures 9 and 10. Ask for suitable three-phase plug, socket, IP class configuration when ordering HG hydraulic generator.

Nr.	Voltage	Rated current	IP class	HZ	Number of poles	Earthing sleeve position
1	380 - 415 V	16 A	44	50-60	3p + n + e	6h
2	380 - 415 V	16 A	44	50-60	3p + n + e	6h
3	346- 415 V	32 A	44	50-60	3p + n + e	6h
4	346 - 415 V	32 A	44	50-60	3p + n + e	6h
5	346 - 415 V	63 A	44	50-60	3p + n + e	6h
6	346 - 415 V	63 A	44	50-60	3p + n + e	6h
7	400 V	16 A	67	50-60	3p + n + e	6h
8	400 V	32 A	67	50-60	3p + n + e	6h
9	125/250V	30 A	66	50-60	3p+e	6h
10	120/208V	30 A	66	50-60	4p+e	6h

2. SAFETY


2.1. SAFETY PRECAUTIONS

 **ATTENTION!**

Operator and maintenance personnel must act in compliance with the laws, regulations and recommendations issued by the local electricity and work safety authorities.


 **ATTENTION!**

All installations and maintenance must be performed according to this manual. All electrical installations and maintenance that is not shown in this manual should only be performed by a qualified electrician.

 **WARNING**

RISK OF ELECTRIC SHOCK!

Risk of electric shock. Do not remove any covers when operating. All the repairs must be done by a qualified electrician.



RISK OF ELECTRIC SHOCK.

Operating voltage of HG hydraulic generator varies 110 - 690V depending on the generator type.

 **WARNING**

HIGH PRESSURE OIL!

Can cause severe injuries. Always wear appropriate clothing and safety equipment.

The hydraulic system is pressurized up to 420bar.

The pressure in hydraulic circuits is considerably high. Therefore the condition of your equipment are to be kept under constant observation. All couplings, valves and hoses are to be kept tight and clean. Leaks in the hydraulic system must be repaired immediately to avoid injuries caused by high pressure and oil blowouts.

 **ATTENTION!**

All installations and maintenance must be performed according to this manual. All electrical installations and maintenance that is not mentioned in this manual should only be performed by qualified electrician.

 **NOTE!**

Technical condition of your machinery and equipment must be subjected to constant surveillance.

The base machine must be stopped and the hydraulic circuit be depressurized prior to maintenance, detaching or disassembling the HG hydraulic generator.

2.2. SAFETY EQUIPMENT


When working with HG hydraulic generator or accessories, wear appropriate protective clothing, safety goggles, gloves, ear protection.



2.3. OPERATING SAFETY

 **ATTENTION!**


Do not exceed the maximum load.

 **WARNING**

RISK OF BURNS!


Parts of the unit, oil, and oil filler cap can be hotter than 80 °C!

Wear personal safety equipment!



2.4. MAINTENANCE SAFETY


Hydraulic system of the base machine should be maintained according to the machines own service program.

 **WARNING**

RISK OF ELECTRIC SHOCK!

Wait until the charge of the electric parts is completely discharged before removing any covers.

Stop and wait at least 10 minutes for proper discharge.



RISK OF ELECTRIC SHOCK.

 **ATTENTION!**

All installation and maintenance of electric equipment must be performed by qualified electrician only.

 **ATTENTION!**

Before beginning any maintenance or repair, ensure that the system is stopped and depressurized. Make sure that the system can not start accidentally.

 **NOTE!**

When carrying out any maintenance to HG hydraulic generator keep the components of the system clean. This is to ensure safe, reliable and long life operation of your equipment.

2.5. WARNING LABELS

Warning labels are included with each main product.

Product recipient is obligated to place warning labels on the DYNASET product. Attach labels to visible and appropriate place onto or close to DYNASET product where it's easily seen. Clean surface with solvent detergent before attaching labels.



READ OPERATING
INSTRUCTIONS.



RISK OF ELECTRIC
SHOCK.



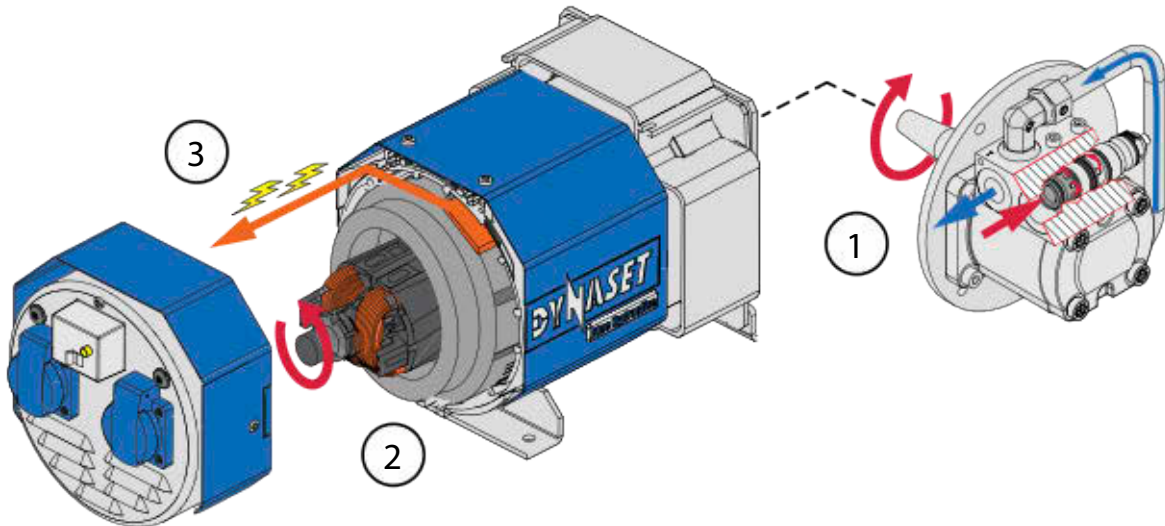
BEWARE OF HOT
SURFACE.



USE EAR PROTECTION
AND SAFETY GOGGLES.

3. OPERATING PRINCIPLE

3.1. OPERATING DESCRIPTION



Picture 11: HG hydraulic generators operating principle

1. When the hydraulic flow is directed through RPM-valve block to the hydraulic motor. The RPM-valve keeps the flow constant with a RMP-cartridge and controls the speed of the hydraulic motor.
2. Hydraulic motor actuates the alternator's rotor through a direct connection to the rotor. When the rotor spins it produces a changing magnetic flux that generates electricity.
3. The electricity is directed through the distribution box and on to the selected output, socket or cable.

3.2. VOLTAGE CONTROL

Voltage regulator adjusts rotors excitation power, maintaining constant output voltage at fluctuating electric load.

SINGLE PHASE GENERATORS

Voltage control of single phase generator is affected with a capacitor circuit, connected to an auxiliary windings. Voltage control keeps the voltage constant through the whole load range with accuracy of $\pm 6\%$. The response time of the voltage control is less than 1 second.

THREE PHASE GENERATORS

3-phase generators are equipped either with compound or electronic voltage regulator.

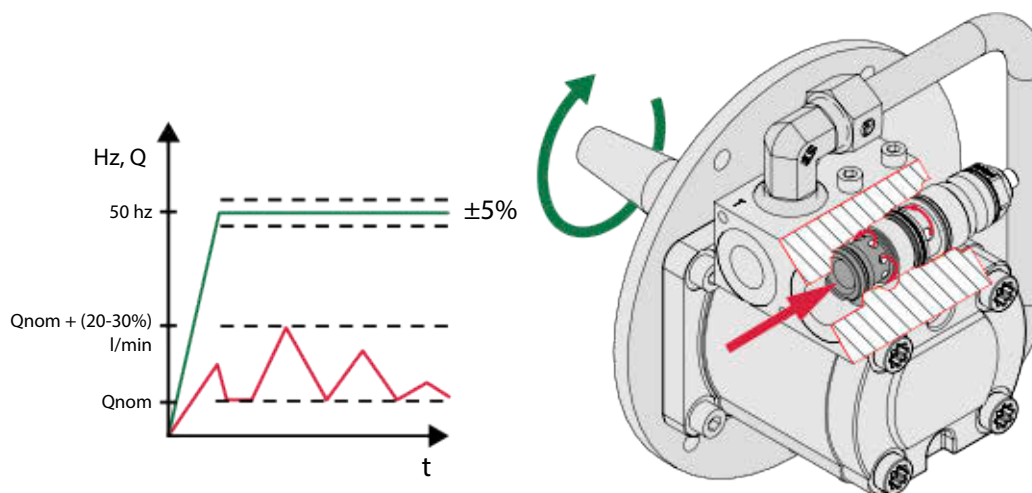
Compound regulator is connected to the auxiliary windings. The regulator maintains the output voltage constant through the entire load range with accuracy of $\pm 5\%$. Compound regulator sets the excitation current according to electric load of each phase individually with its separate current windings.

Electronic voltage regulator is connected to the stators windings and achieves an accuracy of $\pm 3\%$. Electronic voltage regulator constantly compares output voltage to the pre-adjusted reference value and sets the excitation current according to the load.

The response time of the voltage control is less than 1 second.

3.3. PERFORMANCE OF AUTOMATIC FREQUENCY CONTROL

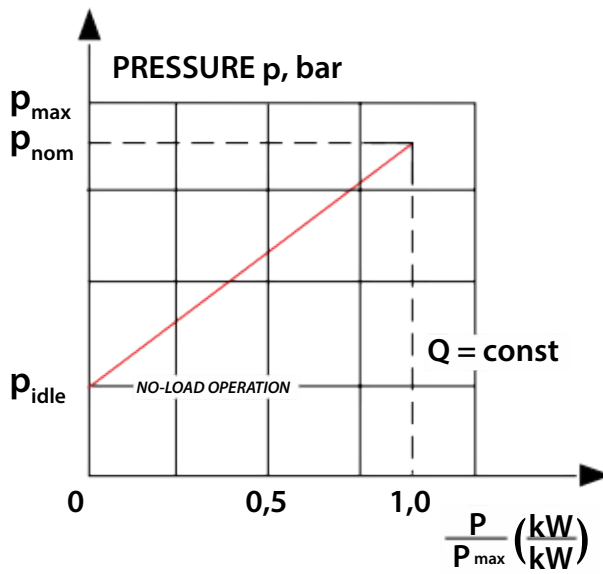
RPM-cartridge maintains rotation speed of the hydraulic motor so that the frequency is constant ($\pm 5\%$). The output power remains stable ($\pm 5\%$) even when the hydraulic flow (Q) exceeds the nominal flow (Q_{nom}) up to 20-30% l/min, depending on HG hydraulic generator size.



Picture 12: Automatic frequency control

3.4. PRESSURE POWER RATIO

Following chart in picture 13 describes the power to pressure ratio. The chart shows output powers relation to the pressure, when the hydraulic flow Q is kept constant. The best power to pressure ratio is achieved when the pressure is at nominal level, little under the maximum value. READ CHAPTER "10. Technical Specifications" for more information.



Picture 13: Pressure/Power chart

4. INSTALLATION

4.1. BEFORE INSTALLATION

 **ATTENTION!**

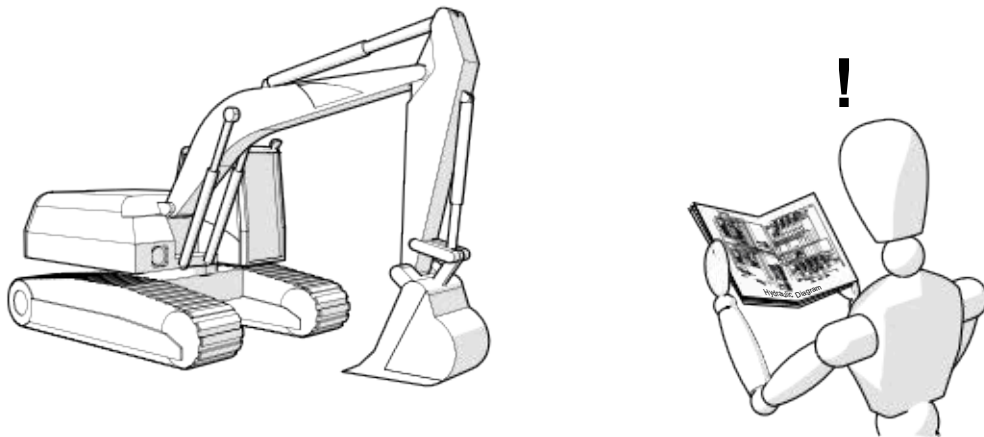
Read the instructions before installation of the DYNASET product!

4.1.1. HYDRAULIC SYSTEM OF A BASE MACHINE

Base machine's have different type of hydraulic systems. Most common hydraulic systems in mobile machinery are:

- Open centre hydraulic system with Load Sensing variable displacement pump
- Closed centre hydraulic system with Load Sensing variable displacement pump
- Hydraulic system with fixed displacement pump
- Hydraulic system with fixed displacement pump at fixed rotation speed

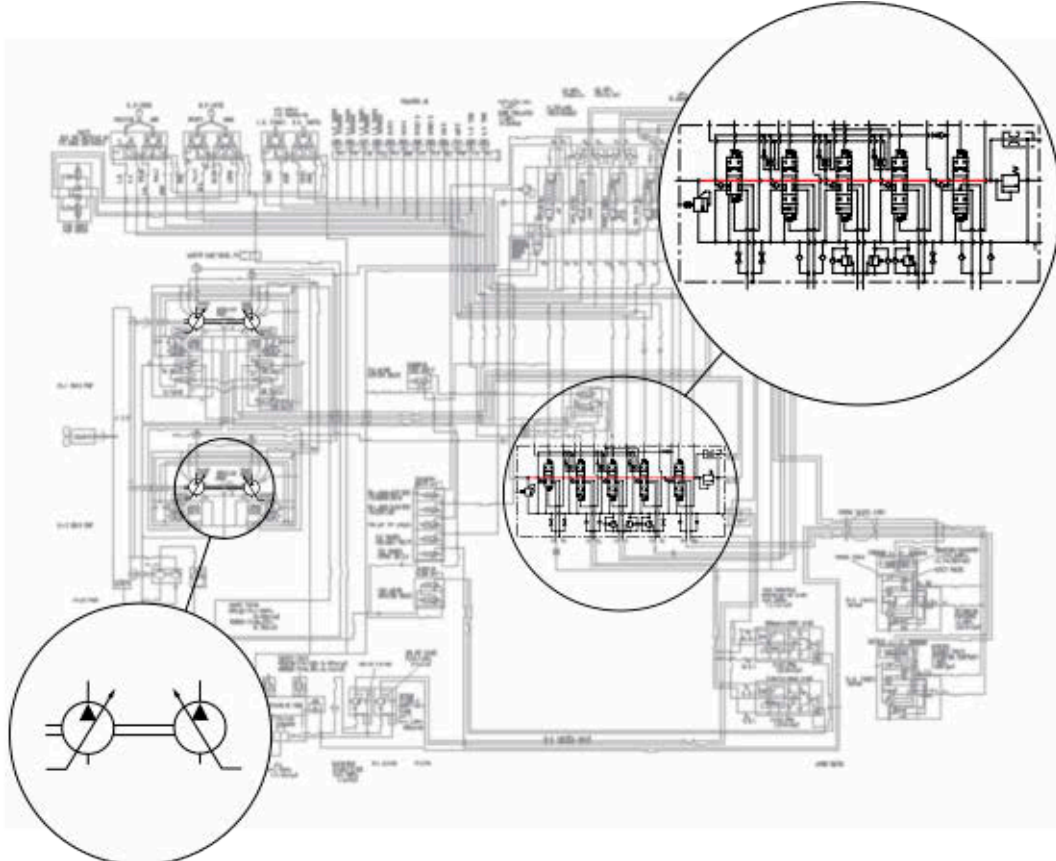
Before installing the DYNASET product, find out the type of the hydraulic system of your machine.



If you are unsure of the hydraulic system, please contact the manufacturer of your base machine.

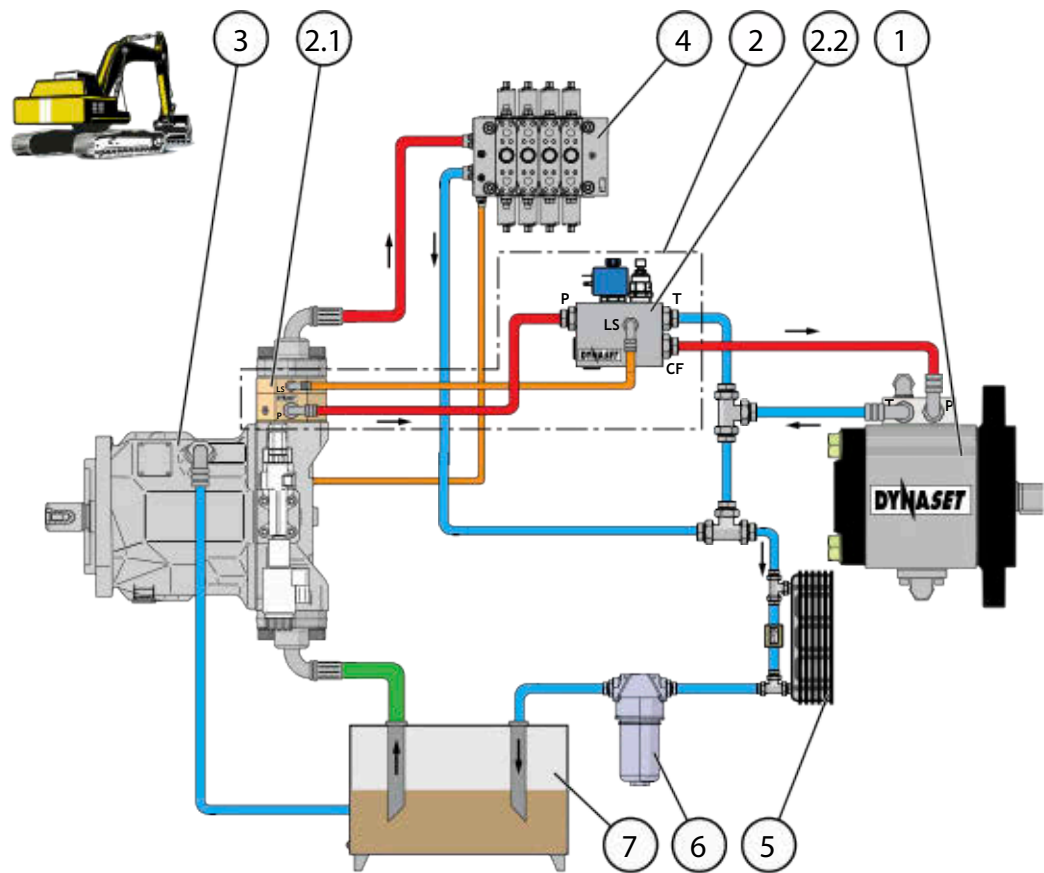
Next four paragraphs describe the hydraulic systems in more detail.

OPEN CENTRE HYDRAULIC SYSTEM WITH LOAD SENSING VARIABLE DISPLACEMENT PUMP



Picture 14: Open centre hydraulic system with load sensing variable displacement pump

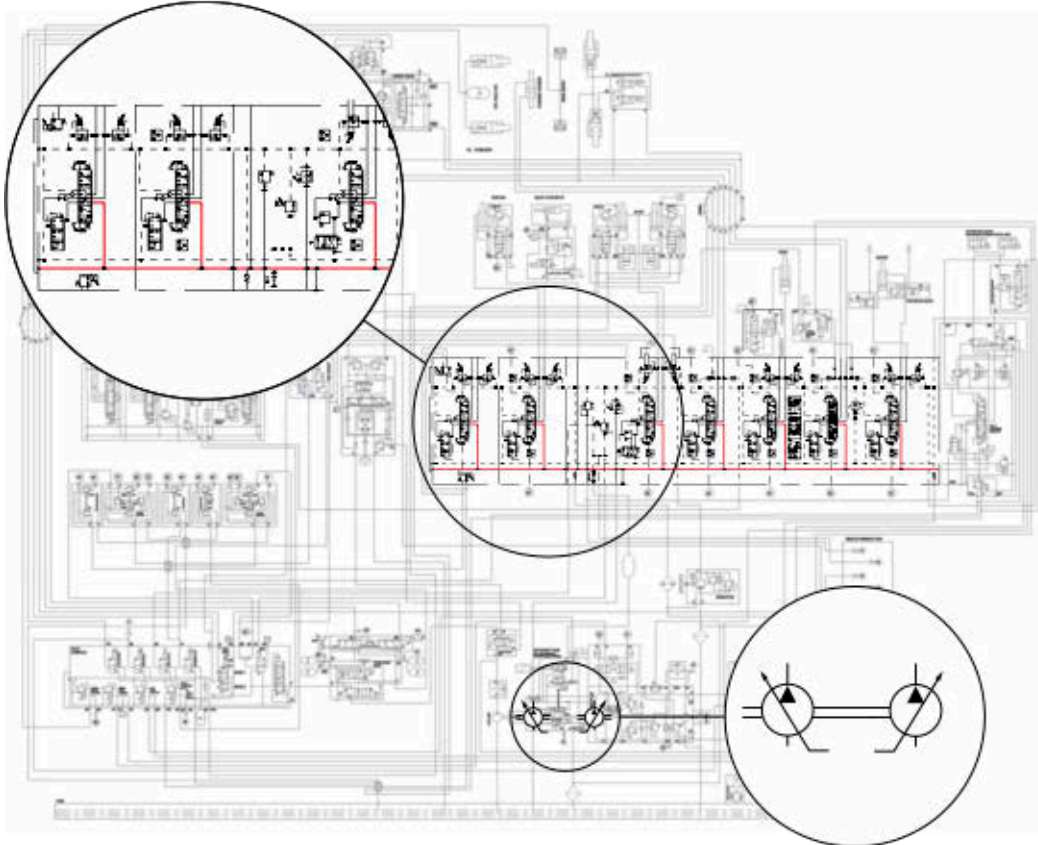
In open centre hydraulic system the flow is returned to tank through the control valves open centre; that is, when the control valve is centered. It provides an open return path to tank and the fluid is not pumped into a high pressure. In Load Sensing variable-displacement pump, the flow rate and output pressure adjusts automatically based on the load of the hydraulic system.



Picture 15: Connection figure for open centre hydraulic system with Load Sensing variable displacement pump

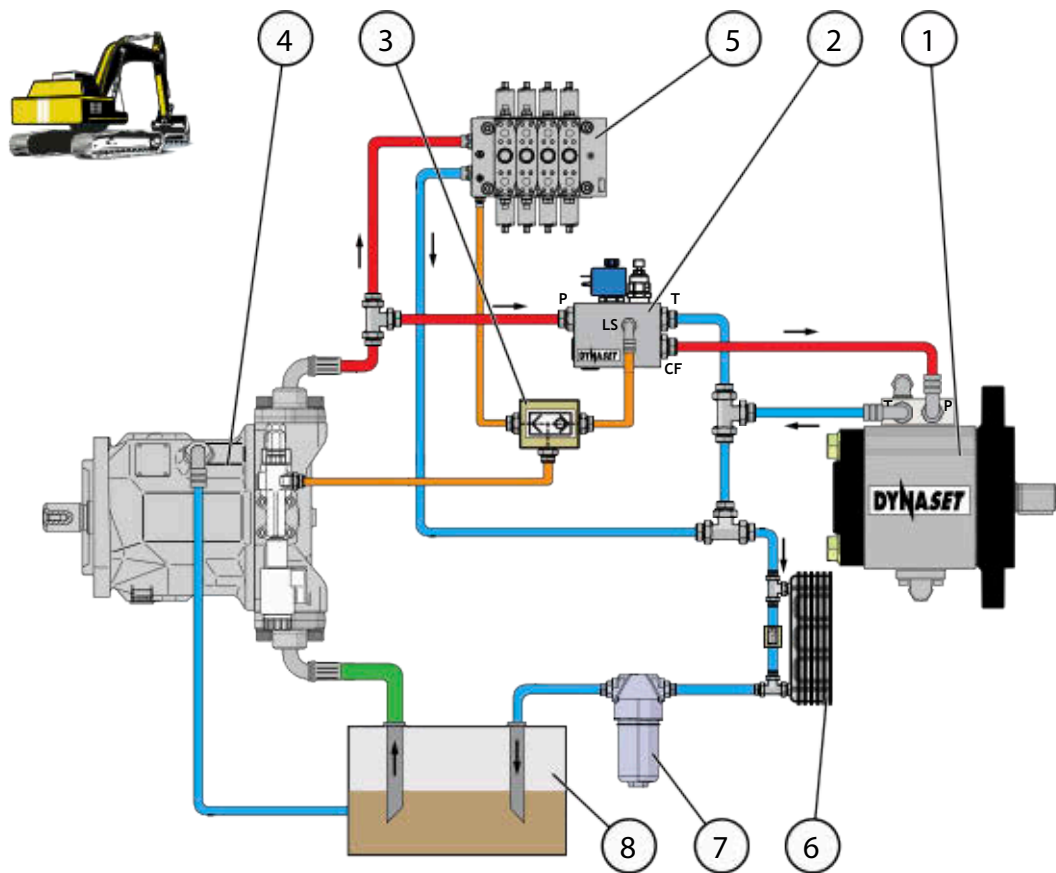
- | | |
|--|---|
| 1. DYNASET hydraulic equipment | 4. Open centre directional control valves |
| 2. DYNASET Priority valve PV-SAE | 5. Oil cooler |
| 2.1. DYNASET PC-SAE pressure compensator | 6. Oil filter |
| 2.2. DYNASET LSV Load Sensing valve | 7. Oil tank |
| 3. Base machine's variable displacement pump | |

CLOSED CENTRE HYDRAULIC SYSTEM WITH LOAD SENSING VARIABLE DISPLACEMENT PUMP



Picture 16: Closed centre hydraulic system with Load Sensing variable displacement pump

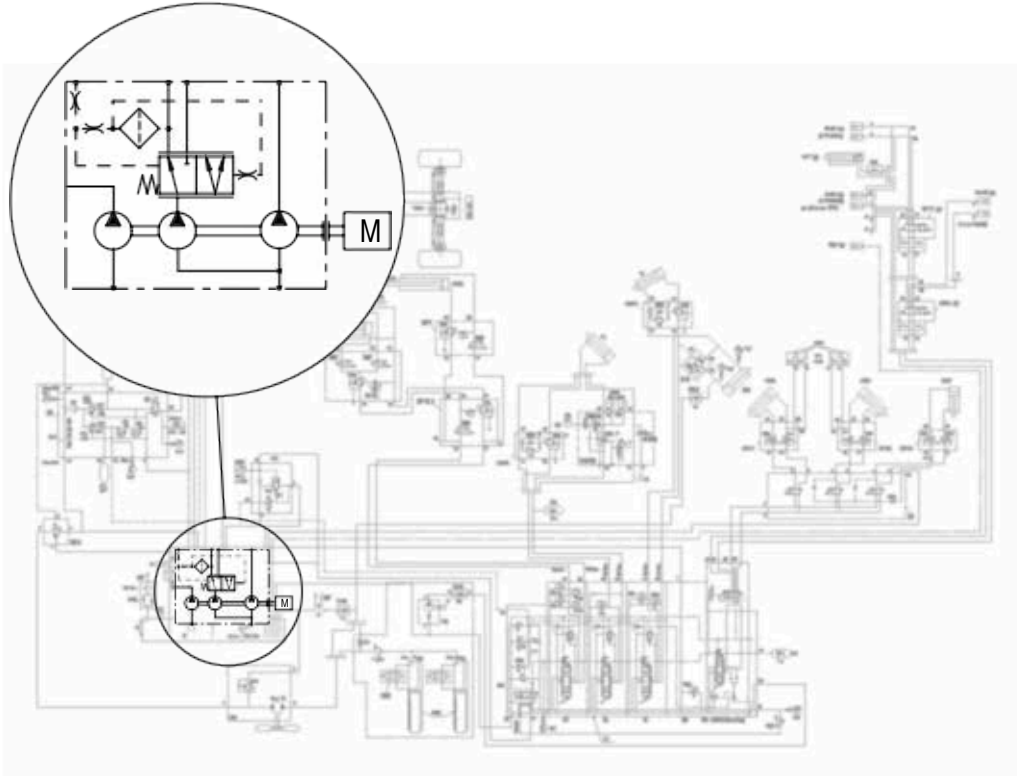
In a closed centre hydraulic system the oil flow is stopped from the pump when control valve is centered. The pump can rest when the oil is not required to operate a function. In Load Sensing variable-displacement pump, the flow rate and output pressure adjusts automatically based on the load of the hydraulic system.



Picture 17: Connection figure for closed centre hydraulic system with Load Sensing variable displacement pump

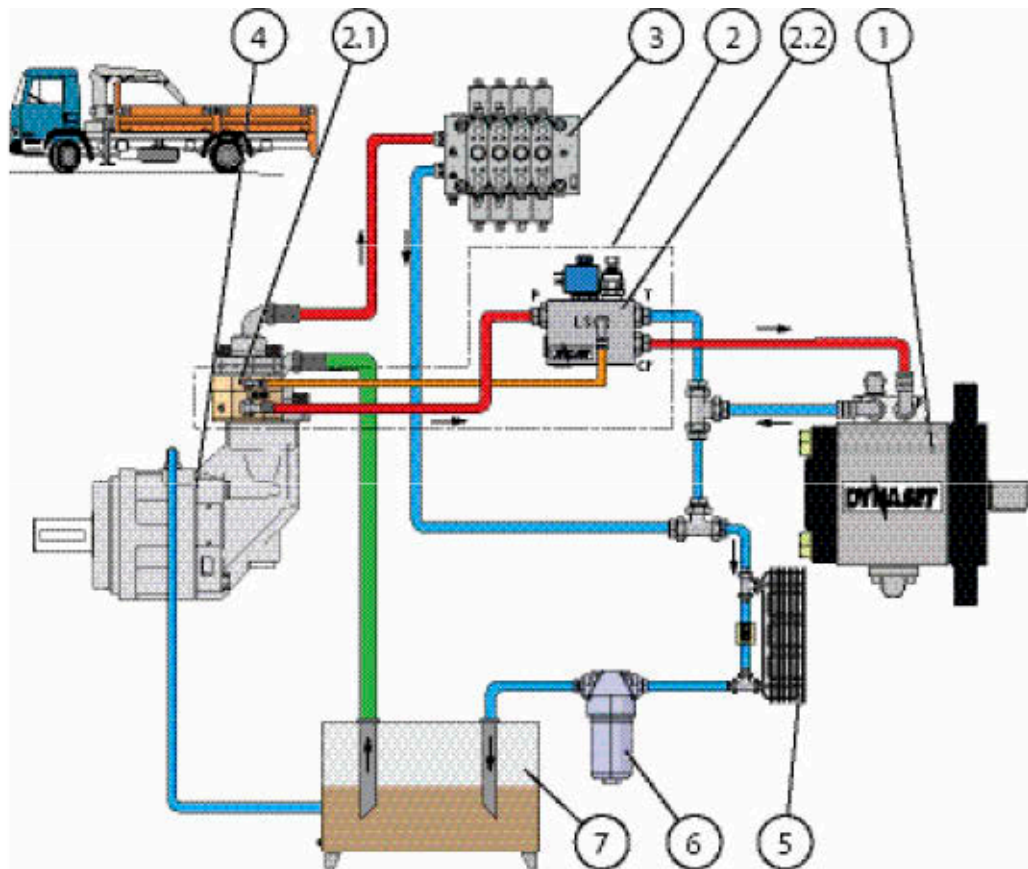
- | | |
|--|---|
| 1. DYNASET hydraulic equipment | 5. Closed centre directional control valves |
| 2. DYNASET LSV Load Sensing valve | 6. Oil cooler |
| 3. DYNASET Shuttle valve | 7. Oil filter |
| 4. Base machine's variable displacement pump | 8. Oil tank |

HYDRAULIC SYSTEM WITH FIXED DISPLACEMENT PUMP



Picture 18: Hydraulic system with fixed displacement pump

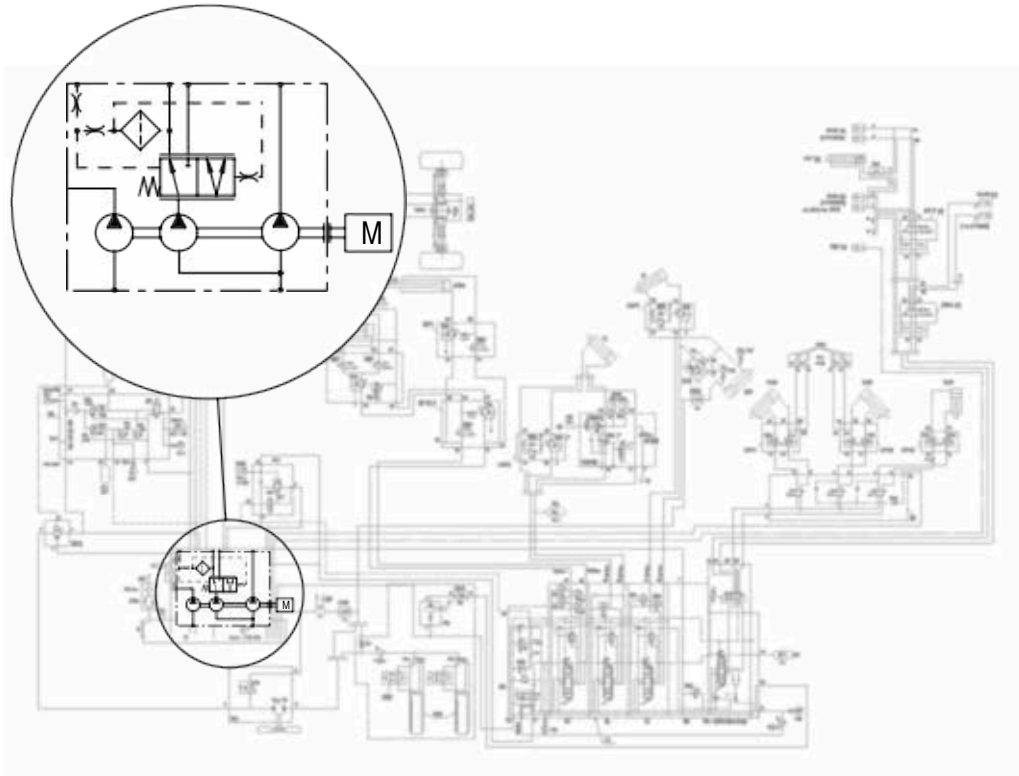
In hydraulic system which has the fixed displacement pump, the oil flow from the pump is fixed. Every stroke of the hydraulic motor moves the same amount of oil. The output flow is function of the motor's rpm and pump's displacement.



Picture 19: Connection figure for hydraulic system with fixed displacement pump

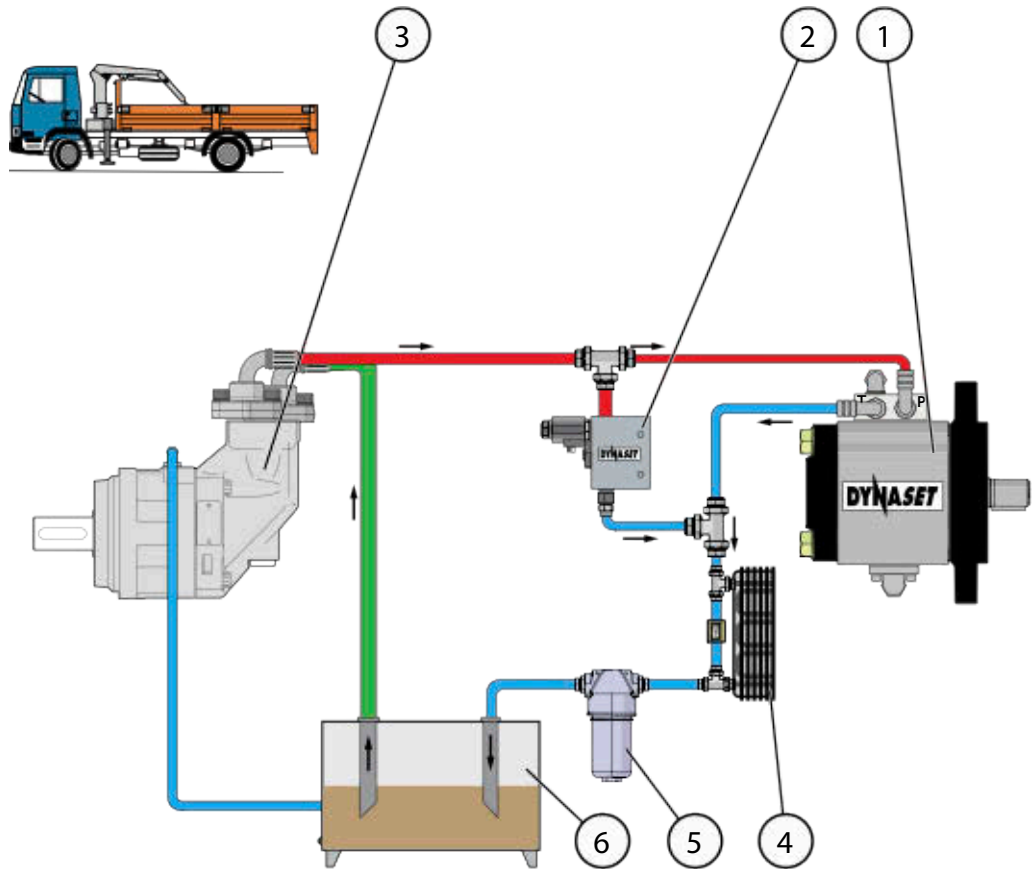
- | | |
|---|---|
| 1. DYNASET hydraulic equipment | 4. Base machine's fixed displacement pump |
| 2. DYNASET Priority valve PV-SAE | 5. Oil cooler |
| 2.1. DYNASET PC-SAE pressure compensator | 6. Oil filter |
| 2.2. DYNASET LSV Load Sensing valve | 7. Oil tank |
| 3. Open centre directional control valves | |

**OPEN CENTRE HYDRAULIC SYSTEM WITH FIXED DISPLACEMENT PUMP AT
FIXED ROTATION SPEED**



Picture 20: Open centre hydraulic system with fixed displacement pump

In hydraulic system which has the fixed displacement pump, the oil flow from the pump is fixed. Every stroke of the hydraulic motor moves the same amount of oil. The engine of the base machine is set to run at fixed rpm when pump is used.



Picture 21: Connection figure for hydraulic system with fixed displacement pump at fixed rotation speed

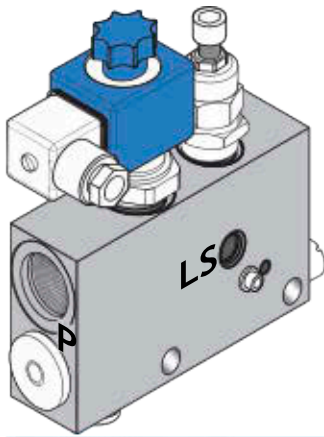
- | | |
|---|---------------|
| 1. DYNASET hydraulic equipment | 4. Oil cooler |
| 2. DYNASET VKV free flow valve | 5. Oil filter |
| 3. Base machine's fixed displacement pump | 6. Oil tank |

4.1.2. DYNASET VALVES

DYNASET valves are designed to enable easy installation of your DYNASET hydraulic product.

DYNASET LSV LOAD SENSING VALVE

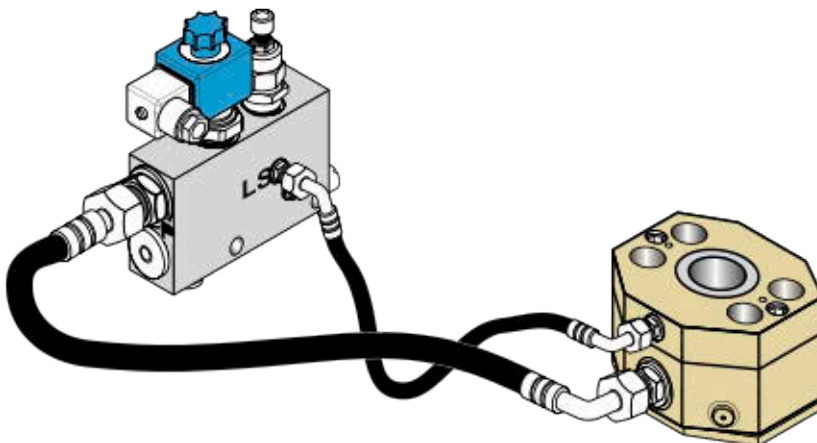
DYNASET LSV load sensing valves are made for installations in a closed centre hydraulic systems.



Picture 22: Load sensing valve LSV

DYNASET PV-SAE PRIORITY VALVE

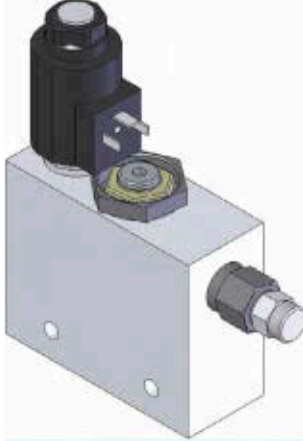
DYNASET PV- SAE priority valve enables the installations of the DYNASET products into any hydraulic system.



Picture 23: Priority valve PV-SAE



DYNASET FREE FLOW VALVE



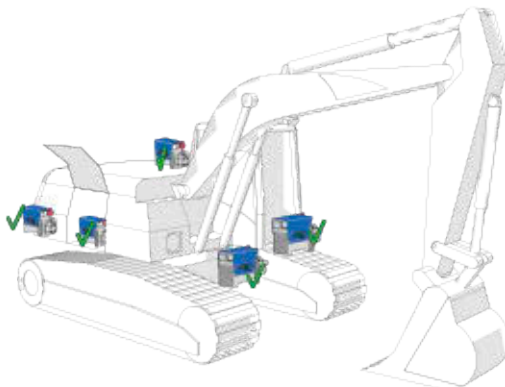
Picture 24: Free flow valve VKV

DYNASET VKV free flow valve enables the installations of the DYNASET products into a hydraulic system with fixed displacement at a fixed rotation speed.

4.2. INSTALLING A DYNASET HYDRAULIC PRODUCT

4.2.1. PLACING A DYNASET HYDRAULIC PRODUCT

Place DYNASET hydraulic product where there is an easy access to the unit. Ensure proper ventilation.



Picture 25: Location of the HG hydraulic generator

! NOTE!

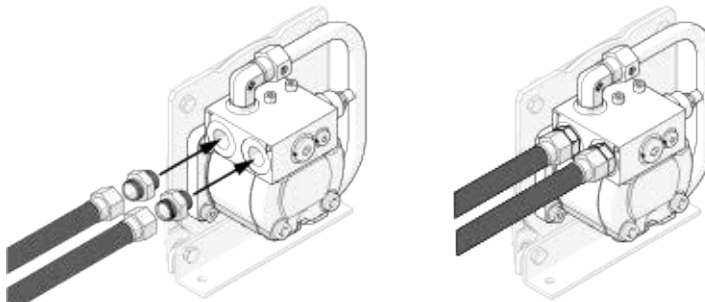
When positioning the HG hydraulic generator, ensure that the air venting is sufficient. READ CHAPTER "4.3. Installing HG hydraulic generator" for more information.

4.2.2. INSTALLING DYNASET VALVES

Installation instructions can be found in DYNASET LSV, DYNASET VKV or DYNASET PV SAE Instructions manual.

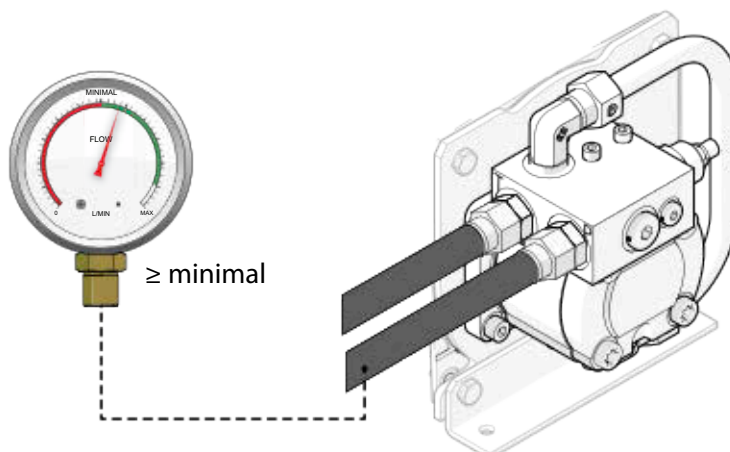
4.2.3. CONNECTING HYDRAULIC HOSES

Pressure (P) and return (T) lines of a hydraulic system are connected to the DYNASET units corresponding hydraulic ports.



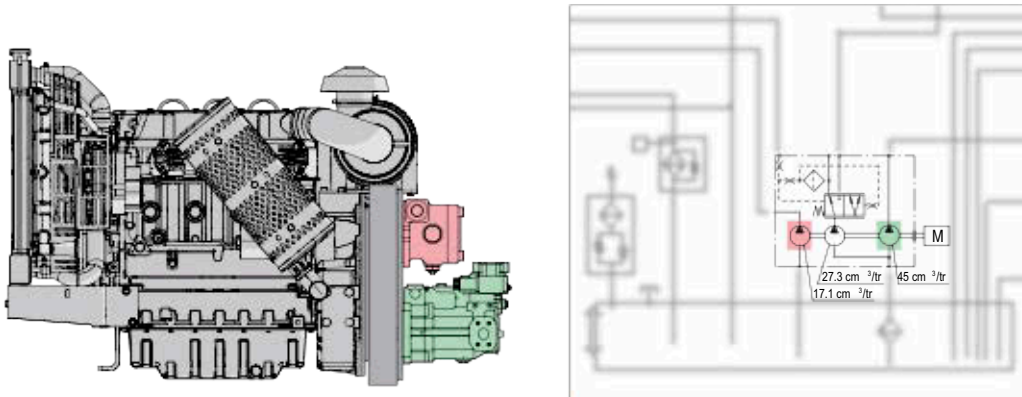
Picture 26: Installing hydraulic hoses

Ensure that the hydraulic flow of the base machine is sufficient to run the unit. At least the minimal flow must be available. READ CHAPTER "10. Technical Specifications" for more information.



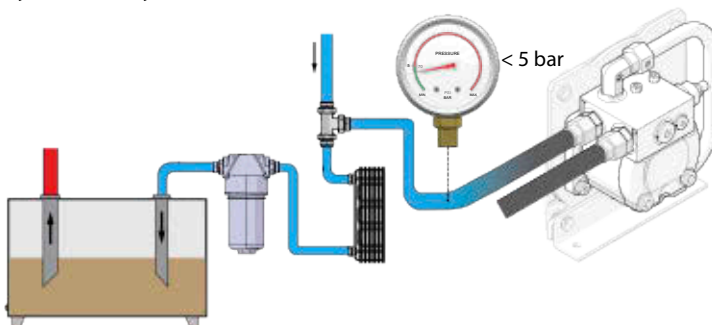
Picture 27: P-line operational hydraulic flow

In case of hydraulic flow being too high. The flow must be reduced either by dropping down the rotation speed of base machine's hydraulic pump or using flow limiter valve. DYNASET PV-SAE priority valve is recommended.



Picture 28: Base machine's pumps

Return line must be connected to a hydraulic oil tank in the shortest possible line in order to keep the return hydraulic pressure under 5 bar in the tank line. Generally DYNASET's return line is to be connected directly to the return line of a hydraulic system.



Picture 29: Return line (T) pressure must be under 5 bars.

⚠ ATTENTION!

Ensure that the filtering degree and cooling capacity of the hydraulic system are sufficient. READ CHAPTER "10. Technical Specifications" for more information.

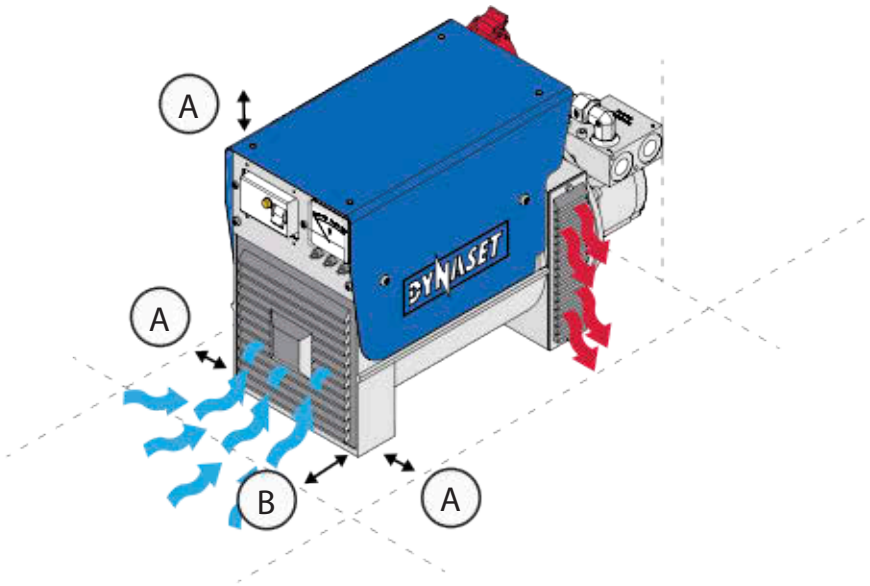
4.2.4. HYDRAULIC FLUIDS

To use proper hydraulic fluid READ CHAPTER "6.2. Hydraulic fluids" for more information.



4.3. INSTALLING HG HYDRAULIC GENERATOR

DYNASET HG hydraulic generator can be installed into the hydraulic system of any base machine. It can be installed to a place where sufficient venting and easy access to HG is ensured. The position of the generator must be horizontal.



Picture 30: Placement of the HG hydraulic generator with sufficient room and ventilation

A. Minimum 25 mm

B. Minimum 50 mm

NOTE!

Sufficient venting is important. Generators components heat up under use. Maintain the generator accordingly and keep the vents open and clean.

4.4. GROUNDING

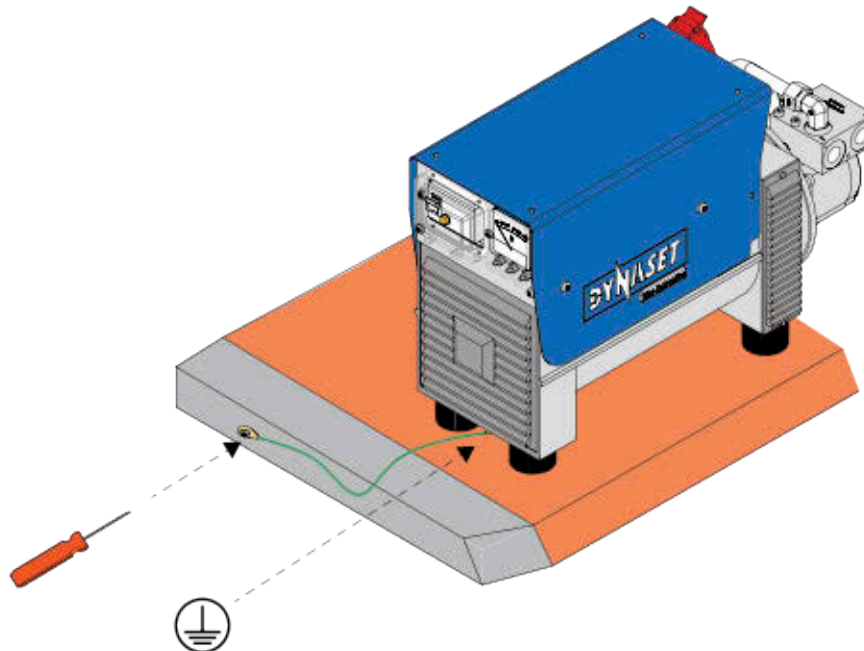
ATTENTION!

DYNASET HG hydraulic generator must be grounded when rubber cushions or plastic pads are installed to the generators framework. Grounding is also recommended when the generator is installed onto the base machine without rubber cushions or plastic pads.

Do not ground HG through hydraulic connections. Make the grounding only to the base machines frame. Use external galvanized wire to gain proper grounding as shown picture 32. The ground wire is recommended to be according to the following table.

Generator size S (kVA)	Ground wire cross-section area (mm ²)
S < 10 kVA	2.5 mm ² (13AWG)
10 < S < 20 kVA	4 mm ² (11AWG)
20 < S < 40 kVA	6 mm ² (9AWG)
S > 40 kVA	10 mm ² (7AWG)

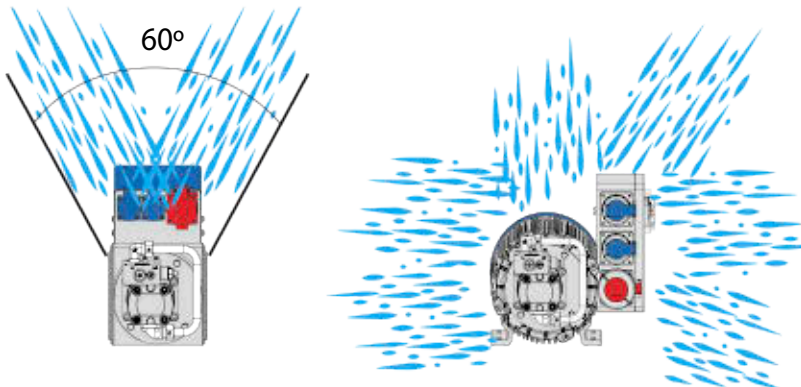
Ground the HG from the marked grounding spot in generators frame. The grounding spot varies between different generator models.



Picture 31: HG hydraulic generator grounding, in picture HG 6,5

4.5. IP CODE REQUIREMENTS

IP23 HG hydraulic generators must be installed in a location and position where water can not enter the generator from below or from the sides according to the IP23 classification. IP54 HG hydraulic generators can be installed outside of a base machine.

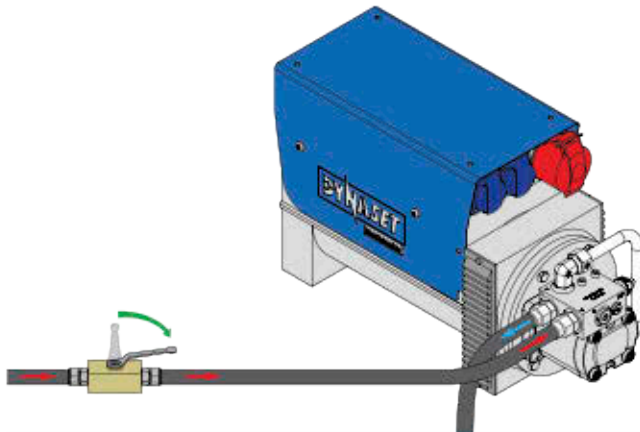


Picture 33: IP23 and IP54 positioning

4.6. OUTPUT FREQUENCY INSPECTION AT START-UP

HG hydraulic generators are tested and adjusted at factory but it is recommended to check the output frequency before taking HG hydraulic generator into operation.

1. Ensure that the generator is properly connected to the hydraulic system of your base machine and there are no oil leakages in system.
2. Start the engine of your base machine. Adjust the engine speed to demanded level if necessary.
3. Start the generator with a control valve.

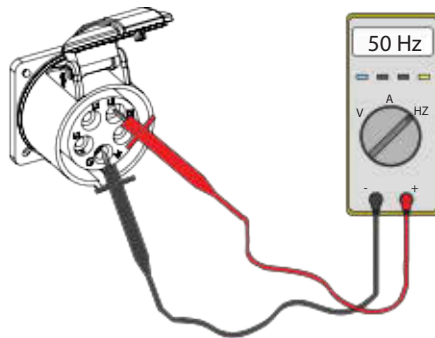


Picture 32: Starting the HG hydraulic generator

4. Check the output frequency. Use universal true RMS-multimeter. When the generator is running without load, switch the metering device to the Hz-position and check the frequency from each socket. Frequency value should be 50 Hz (60 Hz) \pm 5%.

NOTE!

You can't measure the frequency from HG 1 and HG2. Measure the output VDC voltage and compare it to the required value (\pm 5%).



Picture 34: Metering frequency from the socket

5. Adjust frequency if necessary. READ CHAPTER "6.5. Output frequency adjusting" for more information.

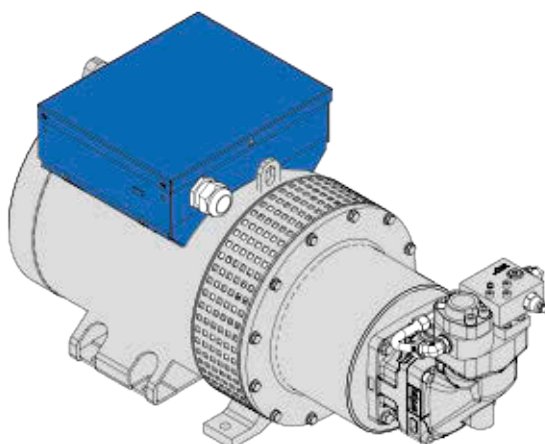
Generator can also be tested by measuring the output voltage.

4.7. K CABLE MODEL

Cable connection model K has a cable connection without the sockets and distribution box. Cable connection models don't have any electrical safety device such as fuses and residual current device circuit breakers.

! NOTE!

The customer is responsible of the connection of the cable and safety devices in accordance with the local laws, regulations and recommendations issued by local electricity and work safety authorities.



Picture 35: HG 40 cable model

5. OPERATION

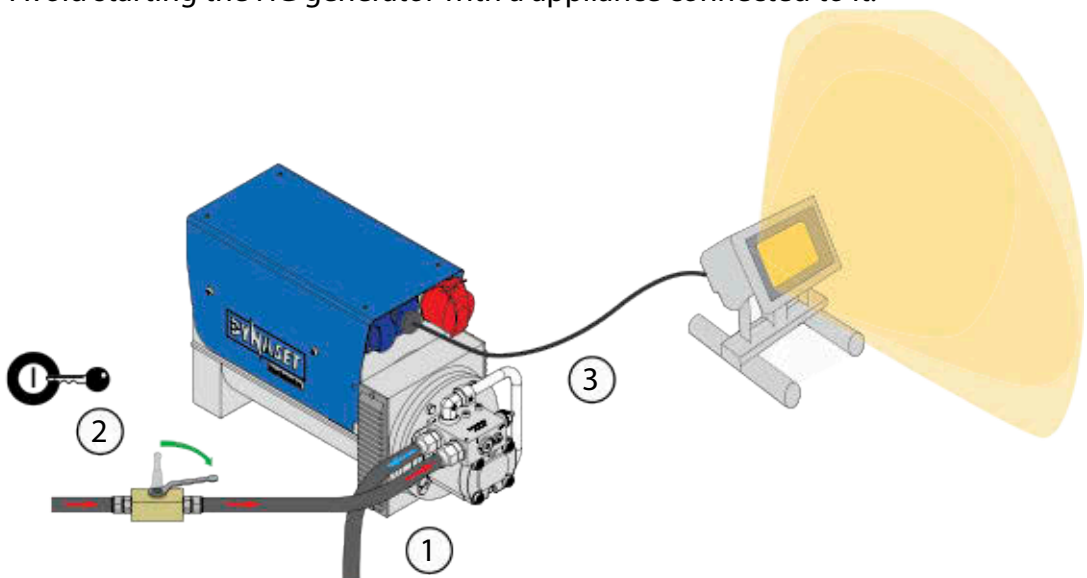
ATTENTION!

Always check the HG hydraulic generator and its hoses condition before use to ensure there are no leaks or damages.

5.1. CONNECTING THE APPLIANCE

After ensuring the proper operation of DYNASET HG hydraulic generator, appliances can be connected. Appliance can be any electrical device e.g. work lamp, grinder, welder etc.

Avoid starting the HG generator with a appliance connected to it.



Picture 36: Connecting load to the HG hydraulic generator

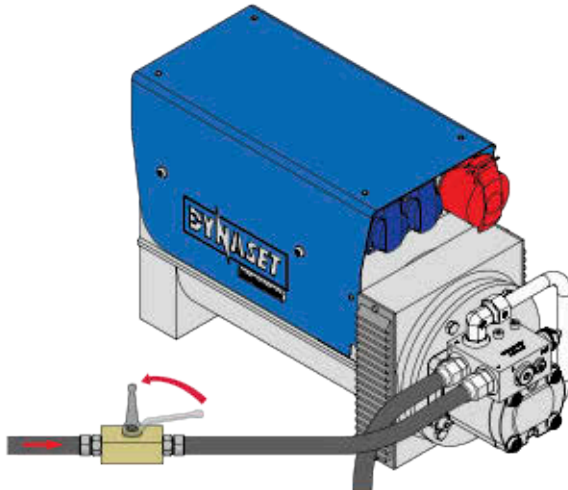
NOTE!

It is recommended to use a UPS(uninterruptable power source) with electrical equipment such as computers to protect them from power surges and spikes.

1. Connect the Hydraulic pressure line (P) and return line (T) to the HG hydraulic generator into their corresponding places.
2. Start your base machine. When the engine of the base machine is running and the hydraulic flow is available, the HG can be started by opening the hydraulic flow to it.
3. Connect your appliance to the generator.

5.2. STOPPING THE HG HYDRAULIC GENERATOR

1. Stop the HG by closing the hydraulic control valve.



Picture 37: Stopping the HG hydraulic generator

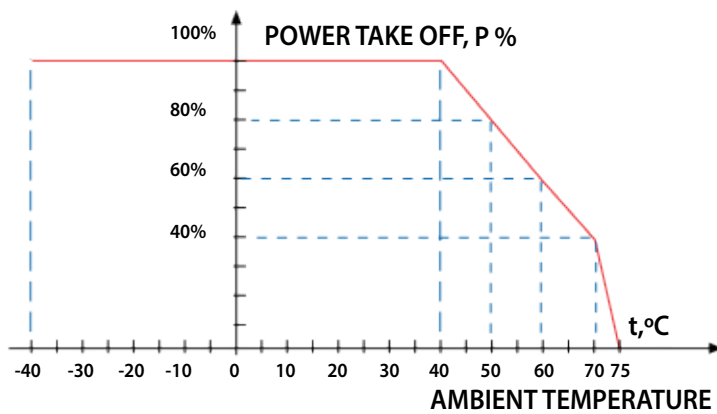
ATTENTION!

Exceeding the maximum hydraulic flow causes the generator to overspeed and may damage it as well as the connected appliance. READ CHAPTER "10. Technical Specifications" for the technical specifications.

5.3. AMBIENT TEMPERATURE

To avoid power loss, it is not recommended to use HG hydraulic generator when the ambient temperature exceeds +40 °C. When the ambient temperature exceeds +40 °C power takeoff should be limited in accordance with the attached diagram, e.g. for instance, at the ambient temperature of +50 °C the power takeoff should not be more than 80 % of the maximum.

If the ambient temperature reaches +40 °C, the HG's full output power can be maintained by adding an additional air ventilation.



Picture 38: Power take off in higher temperatures

6. MAINTENANCE

DYNASET HG hydraulic generators are low-maintenance units. Only normally wearing parts and materials should be replaced either when necessary or in accordance with a service program.

ATTENTION!

Before beginning any maintenance or repair, ensure that the system is stopped and depressurized. Make sure that the system can not start accidentally.

6.1. MAINTENANCE INTERVALS

All maintenance must be complied with as they are scheduled in this manual. The following table provides maintenance schedule for DYNASET HG hydraulic generator.

CHECK POINTS	NEW DEVICE AFTER INSTALLATION	AFTER DAILY USE	MONTHLY
Perform the needed actions after HG's installation according to the chapter 4. Installation.	x		
Check if the HG hydraulic generator needs cleaning and clean it according to the chapter 6.3.		x	
Test safety devices			x

6.2. HYDRAULIC FLUIDS

A wide range of standard hydraulic fluids can be used with the DYNASET hydraulic equipment. Depending on the operating temperature, the following mineral hydraulic oils are recommended:

MINERAL HYDRAULIC OIL	OPERATION TEMPERATURE UP TO
ISO VG 32S	60 °C
ISO VG 46S	70 °C
ISO VG 68S	80 °C

Synthetic and bio-oils can also be used if their viscosity characteristics and lubricating efficiency are similar to the 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 base machine.

For the hydraulic fluid change interval follow the base machine's maintenance instructions.

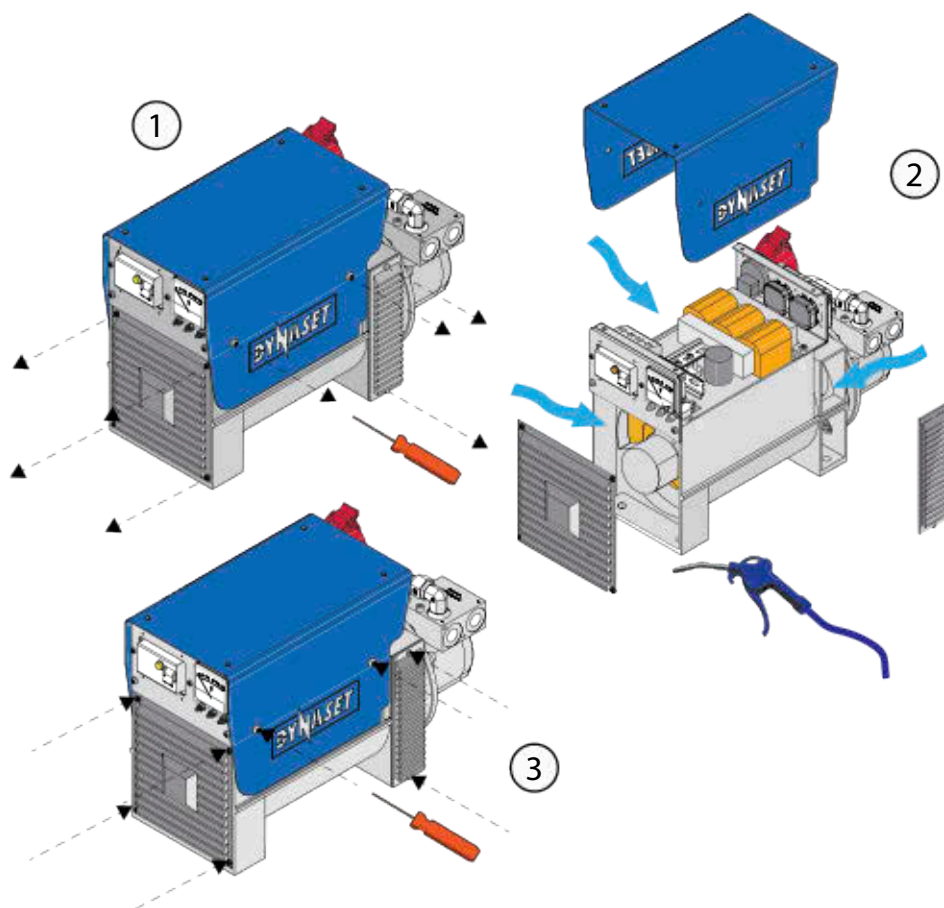
To use special hydraulic fluids with DYNASET equipment, please contact the nearest DYNASET representative for more information.

6.3. CLEANING THE HG

⚠ ATTENTION!

Maintain the generator accordingly and keep the vents open and clean. Check your equipment after every work shift. Depending on the operational environment, clean the HG hydraulic generator as frequently as necessary to keep it in perfect working condition.

1. Remove cover, side screens and air diffuser.
2. Clean fan, rotor, stator compartments and alternator's electric components with compressed air. Ensure that electric enclosure's drain holes are dirt free.
3. After cleaning the generator, place screens/covers back on and secure them with appropriate screws.



Picture 37: Cleaning the HG hydraulic generator

! NOTE!

Use compressed air to clean your equipment.

Remove all unnecessary grease and oil deposits from the HG hydraulic generator. Accumulated grease and oil can cause overheating, creating subsequent damage and present a potential fire hazard.

! ATTENTION!

Do not leave anything inside the generator case or control box which does not belong to the assembly.

Check the lids and covers as well as screw joints on regular basis, at least once a week and tighten them, if they are loose. If HG hydraulic generator is exposed to a noticeable vibration, inspection has to be done more frequently.

The condition of all oil seals/gaskets must be inspected and defective parts replaced.

After maintenance or cleaning, remember to install and tighten all covers!

! NOTE!

Ensure a clean ventilation of the HG hydraulic generator. Dusty conditions increase the wear of the components.

6.4. TEST SAFETY DEVICES

The HG hydraulic generators RCD (V) or RCCBD (Y) has to be tested monthly.

! NOTE!

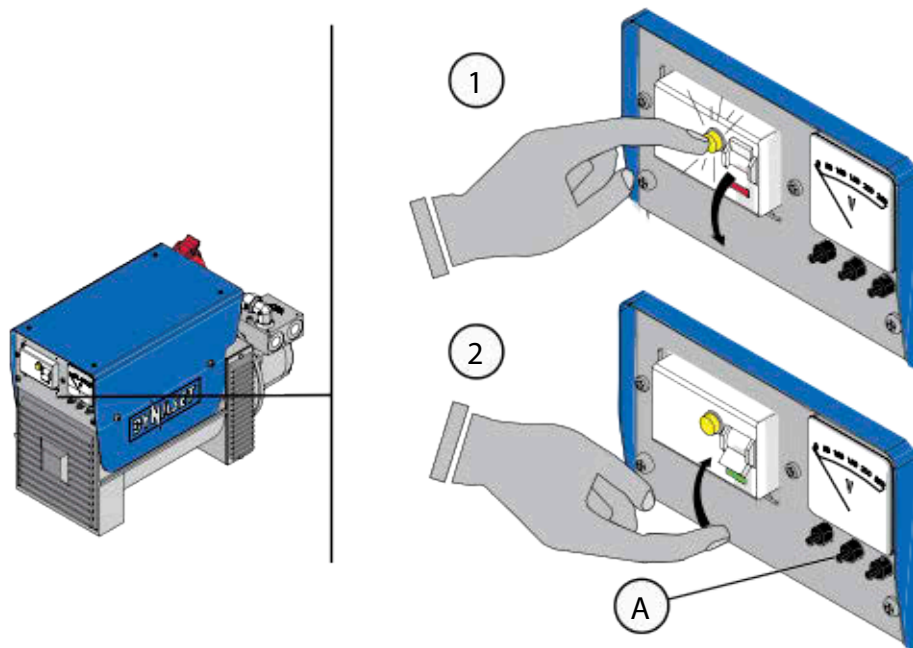
Safety devices can only be tested when the HG generator is on.

When the test button is pressed the switch must release immediately. Use of the HG hydraulic generator with faulty safety equipment is forbidden until they are replaced.

If a fault condition trips the safety device, the fault has to be cleared before the switch can be set back up. Bypassing or removing safety devices to clear the problem is strictly forbidden.

1. Push the RCD/RCCBD test button to check the functionality of the device. If everything is in order, the switch releases.
2. Switch the RCD/RCCBD reset switch back up to put the HG hydraulic generator operational.

A. Fuses



Picture 38: Testing the residual current device

6.5. OUTPUT FREQUENCY ADJUSTING

⚠ ATTENTION!

HG hydraulic generators are tested and adjusted at the factory. Do not adjust them without a real need. Adjust first the base machines hydraulic flow to demanded level.

⚠ ATTENTION!

When measuring output frequency, act in compliance with the laws, regulations and recommendations issued by local electricity, work safety authorities and universal multimeter manufacturer.

⚠ ATTENTION!

Do not adjust the generator when an appliance is connected to it.

! NOTE!

When doing adjustment, the hydraulic fluid should be at normal operating temperature!

! NOTE!

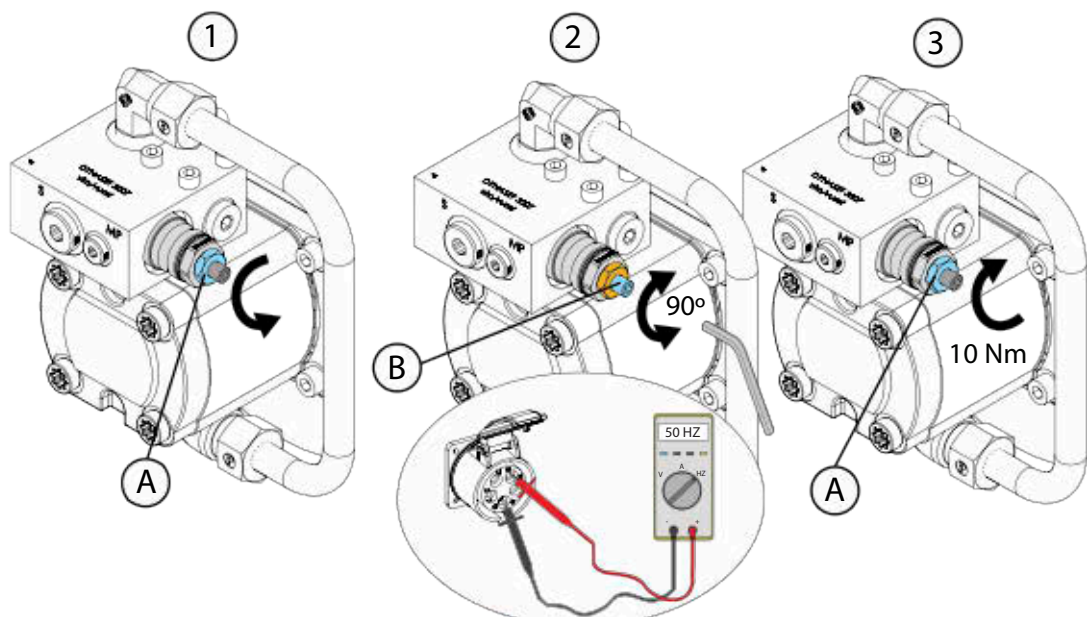
Only use a True RMS multimeter for measuring the frequency.

WHEN HG HYDRAULIC GENERATOR IS INSTALLED TO HYDRAULIC SYSTEM WITH DYNASET INSTALLATION VALVE

Turn the generator on and ensure that the hydraulic flow is at least at nominal level. When the hydraulic flow level is on the proper level, set the frequency by adjusting the RPM-cartridge with following instructions.

1. Loose the locknut A.
2. Make the adjustment by adjusting screw B according to the readings of frequency meter. Due to the response time make only small adjustments at a time and wait for the generator to level its speed before turning the screw B more. **Do not make more than quarter revolution turns at the time!**
3. When the frequency has reached the required level, tighten the locknut A to a moment of 10 Nm.

If a frequency measurement option is not available, adjustments can be made by measuring the output voltage.



Picture 39: Adjusting the RMP-cartridge

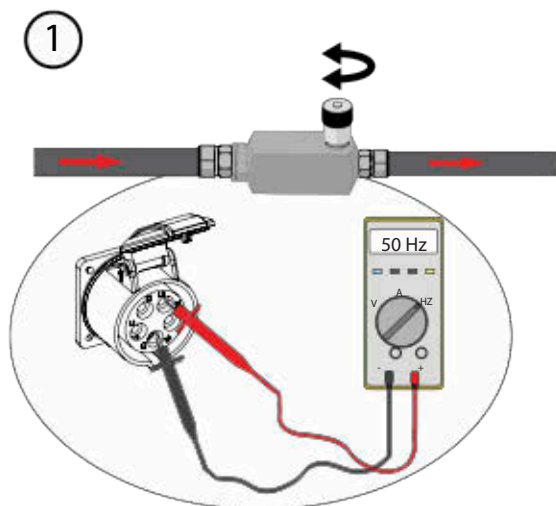
WHEN THE HG HYDRAULIC GENERATOR IS INSTALLED TO HYDRAULIC SYSTEM WITHOUT DYNASET INSTALLATION VALVE

⚠ ATTENTION!

Only adjust with these instructions when the HG hydraulic generator is installed to a hydraulic system without DYNASET installation valve. Otherwise you may damage your HG hydraulic generator doing the following procedure.

Primarily adjust the base machine's hydraulic flow to the required, nominal level before making any adjustment to the RPM-cartridge. If the voltage is still out of the range, adjust the RPM-cartridge with the following instructions.

1. Adjust the hydraulic flow until the frequency achieves the value of 50 Hz(60Hz). Follow the readings on the True RMS multimeter.

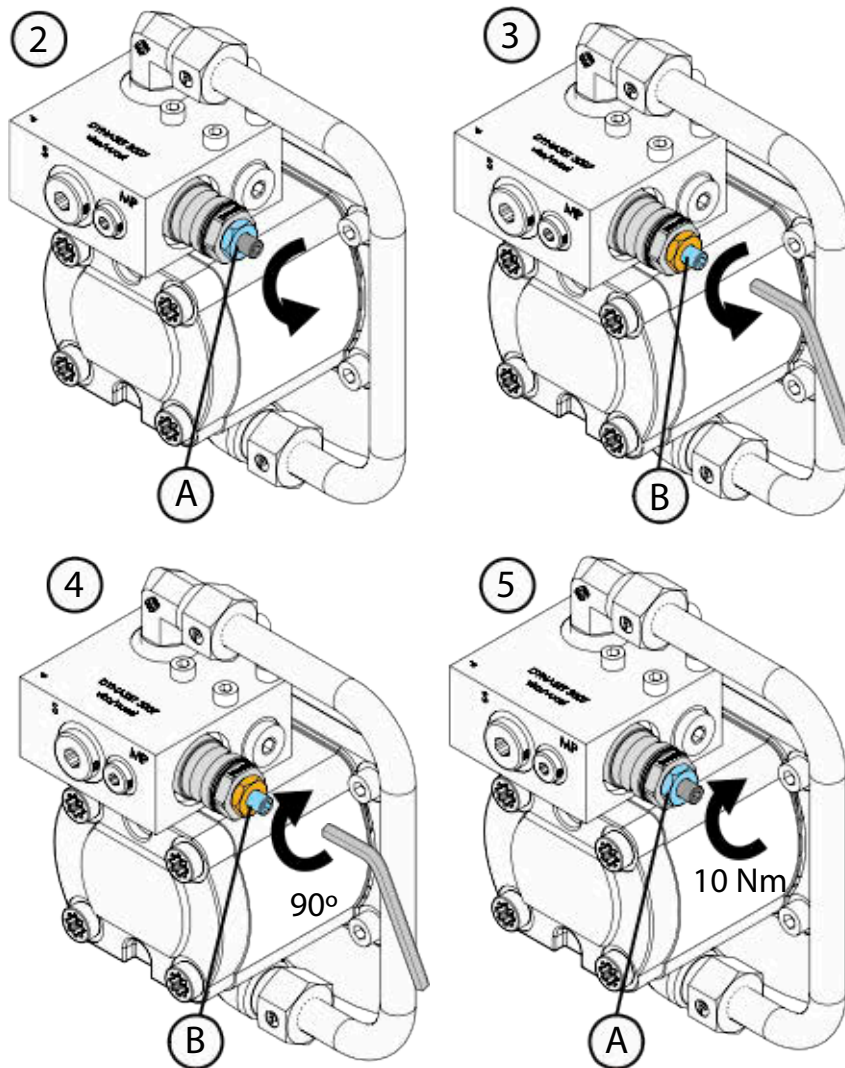


Picture 40: Adjusting the RPM-cartridge without installation valve 1

If the adjusting does not effect on the frequency, there is a feed problem in the base machine's hydraulic system that has be fixed before continuing the adjustments.

If the frequency does change when the adjustments are made to the hydraulic flow, continue with the following instructions.

2. Loose the locknut A.
3. Turn the adjusting screw B counter-clockwise until it starts to control the flow.
4. Then turn the screw B counter-clockwise for a another quarter of revolution.
5. Lock the setting with the locknut A tightening it to 10 Nm.



Picture 41: Adjusting the RPM-cartridge without installation valve 2

6.6. TROUBLESHOOTING

Performing the maintenance tasks requires a qualified hydraulic mechanic or/ and electrician. Please, contact DYNASET authorized workshop or dealer for more maintenance information.

FAILURE	REASON	CORRECTIVE ACTION
LOW OUTPUT VOLTAGE AT NO LOAD	Poor contact in electric system.	Check all internal contacts and wirings of the generator. Check and clean brushes and slip ring (HG6,5 ... HG 20)
OUTPUT VOLTAGE < 20Vac	Excitation rectifier's failure.	Trace the failure and replace the rectifier. (HG3,5 ... HG10 with Compound or Capasitor voltage regulator)
	Voltage regulator's failure.	Replace the capacitor (HG3,5 ... HG5,0).
		Check and adjust the air gap of the compound regulator. Replace if broken (HG6,5 ... HG10).
	Insufficient residual magnetism.	Check and adjust or replace the electronic regulator. HG with AVR Use external 12 V DC battery for 1 - 2 sec. to magnetise the rotor (HG3,5 ... HG5,0).
LOW OUTPUT VOLTAGE AND FREQUENCY AT LOAD	The generator is being overloaded.	Reduce the load and check the current I (A) to ensure that the proper load is being applied.
LOW FREQUENCY AT NO LOAD	Too low rotation speed.	If frequency is out of range, hydraulic system failure is concerned
		Check whether the hydraulic flow and pressure are sufficient. Adjust RPM-cartridge if necessary.
HIGH FREQUENCY AT LOAD	Too high rotation speed.	Check the hydraulic motor for possible leakage. Replace the motor if necessary.
		If frequency is out of range, hydraulic system failure is concerned Check whether the hydraulic flow and pressure are sufficient. Adjust RPM-cartridge if necessary.

FAILURE	REASON	CORRECTIVE ACTION
OUTPUT VOLTAGE INSTABILITY	Instable rotation speed of generator.	Check generators hydraulics including automatic frequency control valve. Make an adjustment if necessary.
		Check that the hydraulic oil flow is constant.
		Check whether the hydraulic fluid flow and pressure are not excessive. Adjust when necessary.
		Check the hydraulic motor for possible leakage. Replace the motor if necessary.
FAILURE	REASON	CORRECTIVE ACTION
LOW OUTPUT VOLTAGE AT LOAD	The generator is being overloaded.	Reduce the load and check the current I (A) to ensure that the proper load is being applied.
GENERATOR CONSUMES ABNORMAL AMOUNT OF HYDRAULIC FLUID	Failure of axial sealing of generators hydraulic motor. External indication - hydraulic oil outflow from ventilation grids.	Axial sealing of hydraulic motor broken by reason of excessive pressure in return line (T). Rebuild the return line (T). Maximum allowed pressure in return line is 5 bar. Replace axial sealing of generator's motor.
	Oil leakage from hydraulic motor.	Hydraulic motor worn out and have to be replaced.
GENERATOR CONSUMES ABNORMAL HYDRAULIC PRESSURE AT NO LOAD	Winding failure.	One ore more stator winding is in short circuit. Replace generator.
A MILD ELECTRIC SHOCK FROM HYDRAULIC GENERATOR	Poor hydraulic generator grounding.	Ensure proper grounding cable installation.
ABNORMAL NOISE FROM GENERATOR	Bearing failure.	Replace broken/worn bearing.
	Broken fan.	Replace broken/worn fan.

7. 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 Exclusions from warranty.

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 twenty four (24) 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:

- 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.
- Cost of maintenance, adjustments, installation or startup.
- Coating, hydraulic oil, quick couplings and interconnection hoses (internal or external to system assemblies).
- Products altered or modified in a manner not authorized by DYNASET OY in writing.
- Products which have been repaired during warranty period by others than DYNASET OY or its authorized workshop.
- 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.
- Telephone or other communications expense.
- Product that is used in exceptional conditions, considered to cause excessive wear and tear.
- Faults caused by nature phenomenon's like flood, thunder, etc.

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8. PRODUCT DISPOSAL

Dispose and recycle all DYNASET products and their packaging in an environmentally responsible way.

Do not dispose used oils, electrical components, batteries or any other hazardous waste with normal waste. They are harmful for the environment and can be recycled for re-use.

Contact your local waste recycling facility for more information about recycling hazardous waste.

! NOTE!

Always act according to the waste legislation, regulations and recommendations in waste disposal and waste recycling issued by your local authorities.

9. DECLARATION OF CONFORMITY

We hereby declare that the design and manufacture of the product stated below are in conformity with the provisions of the European Parliament and Councils on the harmonization of the laws of Member States on the safety of machines.

Machine directive 2006/42/EC

LVD directive 2006/95/EC

EMC directive 2004/108/EC

Applied conformity standards:

CEN EN ISO 4413: EN ISO 4413:2010 Hydraulic fluid power - General rules and safety requirements for systems and their components.

EN60204-1 Safety of machinery – Electrical equipment of machines.

Manufacturer: **DYNASET Oy**
Menotie 3, FI-33470 Ylöjärvi, Finland

Product group: **HYDRAULIC GENERATORS**

Product: **HG Hydraulic generator**

If the device has been modified by someone other than the manufacturer or without the manufacturer's permission, this declaration is not valid.



Timo Nieminen
R&D Manager
Ylöjärvi, Finland 01.12.2015

**HYDRAULIC GENERATORS
DECLARATION OF CONFORMITY**

10. TECHNICAL SPECIFICATIONS

STANDARD MODELS 50HZ		HG 1	HG 1	HG 2	HG 3,5	HG 3,5	HG 4,1			
OUTPUT CHARACTERISTICS										
Output Power max.	kVA	1,0	1,0	2,0	3,5	3,5	4,1			
Output Voltage	V	14 VDC	28 VDC	28 VDC	230 VAC	115 VAC	230 VAC			
Nominal Current * 1~phase / 3~phase	A	70/-	35/-	70/-	15,2/-	30,4/-	17,8/-			
Frequency	Hz	-	-	-	50	50	50			
Phase		-	-	-	1	1	1			
IP		23	23	23	23	23	54			
Voltage regulator		-	-	-	Capasitor	Capasitor	AVR			
Sockets (1 phase/3 phase/cable K)		- / - / K	- / - / K	- / - / K	2 / - / -	2 / - / -	2 / - / -			
HYDRAULIC CONNECTION										
Pressure line P	P	BSP 1/2"								
Return line T	T	BSP 1/2"								
Drain line D	D	-	-	-	06L - (M12x1,5 Male)					
HYDRAULIC POWER REQUIREMENTS										
Flow min.	l/min (gpm)	14 (3.7)	14 (3.7)	26 (6.86)	19 (5.02)	19 (5.02)	26 (6.86)			
Flow max.	l/min (gpm)	34 (8.98)	34 (8.98)	44 (11.6)	37 (9.77)	37 (9.77)	44 (11.62)			
Pressure at nominal power output	bar (psi)	120 (1740)	120 (1740)	120 (1740)	150 (2175)	150 (2175)	140 (2030)			
Pressure max.	bar (psi)	210 (3046)	210 (3046)	210 (3046)	210 (3046)	210 (3046)	210 (3046)			
Pressure when unloaded	bar (psi)	30 (435)	30 (435)	30 (435)	30 (435)	30 (435)	35 (508)			
HYDRAULIC FLUID REQUIREMENTS										
Viscosity	cSt	10-200 / optimum 25-35								
Temperature	°C(°F)	max. 70 (158) **								
Filter ratio, recommendation	µm	25≥								
Cooling capacity requirements ***	kW	0,5	0,5	0,5	1,4	1,4	1,6			
OVERALL DIMENSIONS (VF = VF-model, K = Cable)										
		K	K	K	K	VF	K	VF	K	VF
Length	mm (in)	335 (13.2)	335 (13.2)	335 (13.2)	432 (17)	428 (16.9)	432 (17)	428 (16.9)	469 (18.5)	469 (18.5)
Width	mm (in)	190 (7.5)	190 (7.5)	190 (7.5)	212 (8.3)	212 (8.3)	212 (8.3)	212 (8.3)	330 (13)	379 (14.9)
Height	mm (in)	195 (7.7)	195 (7.7)	195 (7.7)	227 (8.9)	227 (8.9)	227 (8.9)	227 (8.9)	260 (10.2)	352 (13.9)
Weight	kg (lbs)	10 (22)	10 (22)	11 (24)	26 (57)	26 (57)	26 (57)	26 (57)	43,5 (96)	43,5 (96)

STANDARD MODELS 50HZ		HG 5		HG 6,5		HG 6,6		HG 10	
OUTPUT CHARACTERISTICS									
Output power max.	kVA	5		6,5		6,6		10	
Output Voltage	V	230 VAC		230/400 VAC		230/400 VAC		230/400 VAC	
Nominal Current *	A	21,7/-		28,2 / 16,2		28,9 / 16,5		43,4 / 25	
1~phase / 3~phase									
Frequency	Hz	50		50		50		50	
Phase		1		1/3		1/3		1/3	
IP		23		23		54		23	
Voltage regulator		Capasitor		Compound		AVR		Compound	
Sockets (1 phase / 3 phase / cable K)		2 / - / -		2 / 1 / -		2 / 1 / -		2 / 1 / -	
HYDRAULIC CONNECTION									
Pressure line P	P	BSP 1/2"		BSP 1/2"		BSP 1/2"		BSP 1/2"	
Return line T	T	BSP 1/2"		BSP 1/2"		BSP 1/2"		BSP 1/2"	
Drain line D	D	06L - (M12x1,5 Male)		06L - (M12x1,5 Male)		06L - (M12x1,5 Male)		06L - (M12x1,5 Male)	
HYDRAULIC POWER REQUIREMENTS									
Flow min.	l/min (gpm)	26 (6.86)		35 (9.24)		35 (9.24)		50 (13.2)	
Flow max.	l/min (gpm)	44 (11.62)		53 (13.99)		53 (13.99)		68 (17.95)	
Pressure at nominal power output	bar (psi)	160 (2320)		180 (2610)		180 (2610)		180 (2610)	
Pressure max.	bar (psi)	210 (3046)		210 (3046)		210 (3046)		210 (3046)	
Pressure when unloaded	bar (psi)	30 (435)		35 (508)		35 (508)		40 (580)	
HYDRAULIC FLUID REQUIREMENTS									
Viscosity	cSt	10-200 / optimum 25-35							
Temperature	°C(°F)	max. 70 (158)**							
Filter ratio, recommendation	µm	25≥							
Cooling capacity requirements ***	kW	1,8		2,4		2,4		3,1	
OVERALL DIMENSIONS (VF = VF-model, K = Cable)									
		K	VF	K	VF	K	VF	K	VF
Length	mm (in)	451 (17.8)	455 (17.9)	500 (19.7)	504 (19.8)	475 (18.7)	475 (18.7)	547 (21.5)	559 (22)
Width	mm (in)	212 (8.3)	212 (8.3)	205 (8.1)	212 (8.3)	336 (13.2)	379 (15)	212 (8.3)	212 (8.3)
Height	mm (in)	227 (8.9)	227 (8.9)	314 (12.4)	325 (12.8)	261 (10.3)	350 (13.8)	314 (12.4)	314 (12.4)
Weight	kg (lbs)	29 (64)		43 (95)		56,5 (125)		57 (126)	



STANDARD MODELS 50HZ		HG 10,1		HG 12		HG 12,1		HG 15	
OUTPUT CHARACTERISTICS									
Output power max.	kVA	10,1		12		12,1		15	
Output Voltage	V	230/400 VAC		230/400 VAC		230/400 VAC		230/400 VAC	
Nominal Current *	A	43,9 / 25,2		52,1 / 30		52,6 / 30,25		65,2 / 37,5	
1~phase / 3~phase									
Frequency	Hz	50		50		50		50	
Phase		1/3		1/3		1/3		1/3	
IP		54		23		54		23	
Voltage regulator		AVR		AVR		AVR		AVR	
Sockets (1 phase / 3 phase / cable K)		2 / 1 / -		2 / 1 / -		2 / 1 / -		2 / 1 / -	
HYDRAULIC CONNECTION									
Pressure line P	P	BSP 1/2"		BSP 1/2"		BSP 1/2"		BSP 3/4"	
Return line T	T	BSP 1/2"		BSP 1/2"		BSP 1/2"		BSP 1"	
Drain line D	D	06L - (M12x1,5 Male)		06L - (M12x1,5 Male)		06L - (M12x1,5 Male)		BSP 1/4"	
HYDRAULIC POWER REQUIREMENTS									
Flow min.	l/min (gpm)	50 (13.2)		59 (15.58)		59 (15.58)		68 (17.95)	
Flow max.	l/min (gpm)	68 (17.95)		67 (17.69)		67 (17.69)		86 (22.7)	
Pressure at nominal power output	bar (psi)	180 (2610)		180 (2610)		180 (2610)		180 (2610)	
Pressure max.	bar (psi)	210 (3046)		210 (3046)		210 (3046)		210 (3046)	
Pressure when unloaded	bar (psi)	40 (580)		30 (435)		50 (725)		35 (508)	
HYDRAULIC FLUID REQUIREMENTS									
Viscosity	cSt	10-200 / optimum 25-35							
Temperature	°C(°F)	max. 70 (158)**							
Filter ratio, recommendation	µm	25≥							
Cooling capacity requirements ***	kW	3,1		3,5		3,5		3,9	
OVERALL DIMENSIONS (VF = VF-model, K = Cable)									
		K	VF	K	VF	K	VF	K	VF
Length	mm (in)	509 (20)	509 (20)	557 (21.9)	557 (21.9)	510 (20.1)	510 (20.1)	819 (32.2)	819 (32.2)
Width	mm (in)	332 (13.1)	379 (14.9)	290 (11.4)	290 (11.4)	332 (13.1)	379 (14.9)	350 (13.8)	350 (13.8)
Height	mm (in)	261 (10.3)	354 (13.9)	349 (13.7)	349 (13.7)	260 (10.2)	332 (13.1)	366 (14.4)	462 (18.2)
Weight	kg (lbs)	68 (150)		60 (132)		68 (150)		98 (216)	



STANDARD MODELS 50HZ		HG 15,1		HG 20		HG 20		HG 20,1	
OUTPUT CHARACTERISTICS									
Output power max.	kVA	15,1		20		20		20,1	
Output Voltage	V	230/400 VAC		230/400 VAC		230/400 VAC		230/400 VAC	
Nominal Current *	A	65,6 / 37,75		86,9 / 50		86,9 / 50		87,4 / 50,25	
1~phase / 3~phase									
Frequency	Hz	50		50		50		50	
Phase		1/3		1/3		1/3		1/3	
IP		54		23		23		54	
Voltage regulator		AVR		AVR		AVR		AVR	
Sockets (1 phase/3 phase/cable K)		2 / 1 / -		2 / 1 / -		2 / 1 / -		2 / 1 / -	
HYDRAULIC CONNECTION									
Pressure line P	P	BSP 3/4"		BSP 3/4"		BSP 3/4"		BSP 3/4"	
Return line T	T	BSP 1"		BSP 1"		BSP 1"		BSP 1"	
Drain line D	D	06L - (M12x1,5 Male)		BSP 1/4"		M22x1,5		BSP 1/4"	
HYDRAULIC POWER REQUIREMENTS									
Flow min.	l/min (gpm)	59 (15.57)		94 (24.82)		62 (16.37)		79 (20.86)	
Flow max.	l/min (gpm)	77 (20.3)		112 (29.57)		70 (18.48)		97 (25.61)	
Pressure at nominal power output	bar (psi)	180 (2610)		160 (2320)		220 (3190)		180 (2610)	
Pressure max.	bar (psi)	210 (3046)		210 (3046)		420 (6092)		210 (3046)	
Pressure when unloaded	bar (psi)	35 (508)		40 (580)		35 (508)		50 (725)	
HYDRAULIC FLUID REQUIREMENTS									
Viscosity	cSt	10-200 / optimum 25-35							
Temperature	°C(°F)	max. 70 (158)**							
Filter ratio, recommendation	µm	25≥							
Cooling capacity requirements ***	kW	3,9		4,5		4,5		4,5	
OVERALL DIMENSIONS (VF = VF-model, K = Cable)									
		K	VF	K	VF	K	VF	K	VF
Length	mm (in)	554 (21.8)	554 (21.8)	870 (34.3)	870 (34.3)	924 (36.4)	924 (36.4)	800 (31.5)	800 (31.5)
Width	mm (in)	334 (13.1)	449 (17.7)	350 (13.8)	350 (13.8)	350 (13.8)	350 (13.8)	334 (13.1)	449 (17.7)
Height	mm (in)	262 (10.3)	393 (15.5)	366 (14.4)	462 (18.2)	366 (14.4)	462 (18.2)	272 (10.7)	392 (15.4)
Weight	kg (lbs)	98 (216)		120 (265)		120 (265)		120 (265)	



STANDARD MODELS 50HZ		HG 30	HG 30	HG 30,1	HG 40	HG 40
OUTPUT CHARACTERISTICS						
Output power max.	kVA	30	30	30,1	40	40
Output Voltage	V	230/400 VAC	230/400 VAC	230/400 VAC	230/400 VAC	230/400 VAC
Nominal Current * 1~phase / 3~phase	A	130,8 / 75,25	130,8 / 75,25	130,8 / 75,25	173,9 / 100	173,9 / 100
Frequency	Hz	50	50	50	50	50
Phase		1/3	1/3	1/3	1/3	1/3
IP		23	23	54	23	23
Voltage regulator		AVR	AVR	AVR	AVR	AVR
Sockets (1 phase/3 phase/cable K)		- / - / K	- / - / K	- / - / K	- / - / K	- / - / K
HYDRAULIC CONNECTION						
Pressure line P	P	BSP 3/4"	BSP 3/4"	BSP 3/4"	BSP 3/4"	BSP 3/4"
Return line T	T	BSP 3/4"	BSP 3/4"	BSP 3/4"	BSP 1 1/4"	BSP 3/4"
Drain line D	D	M22x1,5	M22x1,5	M22x1,5	M22x1,5	M22x1,5
HYDRAULIC POWER REQUIREMENTS						
Flow min.	l/min (gpm)	122 (32.21)	92 (24.29)	95 (24.5)	167 (44.09)	92 (24.29)
Flow max.	l/min (gpm)	140 (36.96)	110 (29.04)	120 (31.6)	185 (48.84)	110 (29.04)
Pressure at nominal power output	bar (psi)	200 (2900)	280 (4060)	280 (4060)	200 (2900)	280 (4060)
Pressure max.	bar (psi)	250 (3626)	420 (6092)	420 (6092)	250 (3626)	420 (6092)
Pressure when unloaded	bar (psi)	40 (580)	30 (435)	50 (725)	40 (580)	30 (435)
HYDRAULIC FLUID REQUIREMENTS						
Viscosity	cSt	10-200 / optimum 25-35				
Temperature	°C(°F)	max. 70 (158)**				
Filter ratio, recommendation	µm	25≥				
Cooling capacity requirements ***	kW	7,8	7,8	7,8	8,5	8,5
OVERALL DIMENSIONS						
Length	mm (in)	933 (36.7)	908 (35.7)	1125 (44.3)	1003 (39.5)	996 (39.2)
Width	mm (in)	328 (12.9)	328 (12.9)	397 (15.6)	402 (15.8)	402 (15.8)
Height	mm (in)	433 (17)	433 (17)	340 (13.4)	478 (18.8)	478 (18.8)
Weight	kg (lbs)	175 (386)	173 (381)	185 (407)	198 (437)	198 (437)

STANDARD MODELS 50HZ		HG 50	HG 50	HG 60	HG 70
OUTPUT CHARACTERISTICS					
Output power max.	kVA	50	50	60	70
Output Voltage	V	230/400 VAC	230/400 VAC	230/400 VAC	230/400 VAC
Nominal Current * 1~phase / 3~phase	A	217,3 / 125	217,3 / 125	260,8 / 150	304,3 / 175
Frequency	Hz	50	50	50	50
Phase		1/3	1/3	1/3	1/3
IP		23	23	23	23
Voltage regulator		AVR	AVR	AVR	AVR
Sockets (1 phase / 3 phase / cable K)		- / - / K	- / - / K	- / - / K	- / - / K
HYDRAULIC CONNECTION					
Pressure line P	P	BSP 1"	BSP 1"	BSP 1"	BSP 1"
Return line T	T	BSP 1 1/4"	BSP 1 1/4"	BSP 1 1/4"	BSP 1 1/4"
Drain line D	D	M22x1,5	M22x1,5	M22x1,5	M22x1,5
HYDRAULIC POWER REQUIREMENTS					
Flow min.	l/min (gpm)	212 (55.97)	122 (32.21)	122 (32.21)	167 (44.09)
Flow max.	l/min (gpm)	230 (60.72)	140 (36.96)	140 (36.96)	185 (48.84)
Pressure at nominal power output	bar (psi)	160 (2320)	280 (4060)	320 (4640)	400 (5800)
Pressure max.	bar (psi)	250 (3626)	420 (6092)	420 (6092)	420 (6092)
Pressure when unloaded	bar (psi)	40 (580)	40 (580)	40 (580)	30 (435)
HYDRAULIC FLUID REQUIREMENTS					
Viscosity	cSt	10-200 / optimum 25-35			
Temperature	°C(°F)	max. 70 (158)**			
Filter ratio, recommendation	µm	25≥			
Cooling capacity requirements ***	kW	9,2	9,8	11,2	14
OVERALL DIMENSIONS					
Length	mm (in)	1250 (49.2)	1135 (44.7)	custom	custom
Width	mm (in)	402 (15.8)	402 (15.8)	custom	custom
Height	mm (in)	490 (19.3)	490 (19.3)	custom	custom
Weight	kg (lbs)	249 (549)	249 (549)	custom	custom

STANDARD MODELS 60HZ		HG 4,5	HG 6	HG 9	HG 12
OUTPUT CHARACTERISTICS					
Output power max.	kVA	4,5	6	9	12
Output Voltage	V	120 (240 VAC)	240 VAC	240 VAC	240/415 VAC
Nominal Current * 1~phase / 3~phase	A	37,5 (18,7)/-	25/-	37,5/-	50 / 28,9
Frequency	Hz	60	60	60	60
Phase		1/3	1	1	1/3
IP		23	23	23	23
Voltage regulator		Capasitor	Compound	Compound	AVR
Sockets (1 phase / 3 phase / cable K)		2 / - / -	2 / 1 / -	2 / 1 / -	2 / 1 / -
HYDRAULIC CONNECTION					
Pressure line P	P	BSP 1/2"	BSP 1/2"	BSP 1/2"	BSP 3/4"
Return line T	T	BSP 1/2"	BSP 1/2"	BSP 1/2"	BSP 1/2"
Drain line D	D	6L - (M12x1,5 Male)	6L - (M12x1,5 Male)	6L - (M12x1,5 Male)	6L - (M12x1,5 Male)
HYDRAULIC POWER REQUIREMENTS					
Flow min.	l/min (gpm)	22 (5.81)	31 (8.18)	42 (11.09)	60 (16.63)
Flow max.	l/min (gpm)	40 (10.56)	49 (12.94)	60 (15.84)	78 (21.65)
Pressure at nominal power output	bar (psi)	160 (2320)	160 (2320)	180 (2610)	180 (2610)
Pressure max.	bar (psi)	210 (3046)	210 (3046)	210 (3046)	210 (3046)
Pressure when unloaded	bar (psi)	40 (580)	40 (580)	30 (435)	30 (435)
HYDRAULIC FLUID REQUIREMENTS					
Viscosity	cSt	10-200 / optimum 25-35			
Temperature	°C(°F)	max. 70 (158)**			
Filter ratio, recommendation	µm	25≥			
Cooling capacity requirements ***	kW	1,5	2	2,7	3,7
OVERALL DIMENSIONS					
Length	mm (in)	453 (17.8)	455 (17.9)	578 (22.8)	555 (21.9)
Width	mm (in)	212 (8.3)	212 (8.3)	290 (11.4)	290 (11.4)
Height	mm (in)	227 (8.9)	227 (8.9)	368 (14.5)	351 (13.8)
Weight	kg (lbs)	29 (64)	29 (64)	104 (229)	60 (132)

STANDARD MODELS* 60HZ		HG 18	HG 25	HG 40
OUTPUT CHARACTERISTICS				
Output power max.	kVA	18	25	40
Output Voltage	V	240/415 VAC	240/415 VAC	240/415 VAC
Nominal Current * 1~phase / 3~phase	A	75 / 43,3	104,1 / 60,2	166,6 / 96,3
Frequency	Hz	60	60	60
Phase		1/3	1/3	1/3
IP		23	23	23
Voltage regulator		AVR	AVR	AVR
Sockets (1 phase / 3 phase / cable K)		2 / 1 /-	2 / 1 /-	2 / 1 /K
HYDRAULIC CONNECTION				
Pressure line P	P	BSP 3/4"	BSP 3/4"	BSP 3/4"
Return line T	T	BSP 1/2"	BSP 3/4"	BSP 3/4"
Drain line D	D	BSP 1/4"	BSP 1/4"	M22x1,5
HYDRAULIC POWER REQUIREMENTS				
Flow min.	l/min (gpm)	80 (21.12)	112 (29.57)	110 (29.04)
Flow max.	l/min (gpm)	98 (25.87)	130 (34.32)	128 (33.79)
Pressure at nominal power output	bar (psi)	180 (2610)	180 (2610)	280 (4060)
Pressure max.	bar (psi)	210 (3046)	210 (3046)	420 (6092)
Pressure when unloaded	bar (psi)	35 (508)	50 (725)	40 (580)
HYDRAULIC FLUID REQUIREMENTS				
Viscosity	cSt	10-200 / optimum 25-35		
Temperature	°C(°F)	max. 70 (158)**		
Filter ratio, recommendation	µm	25≥		
Cooling capacity requirements ***	kW	4,5	5,9	9,1
OVERALL DIMENSIONS				
Length	mm (in)	820 (32.3)	870 (34.3)	989 (38.9)
Width	mm (in)	350 (13.8)	350 (13.8)	384 (15.1)
Height	mm (in)	461 (18.1)	461 (18.1)	478 (18.8)
Weight	kg (lbs)	98 (216)	120 (265)	198 (437)

Gallons are U.S. liquid gallons.

* Nominall current (1~phase / 3~phase) /phase. Must not exceed maximum load.

** Ref. to the hydraulic fluid in chapter 6.2.

*** Minimum cooling capacity for HG hydraulic generator on base machine.