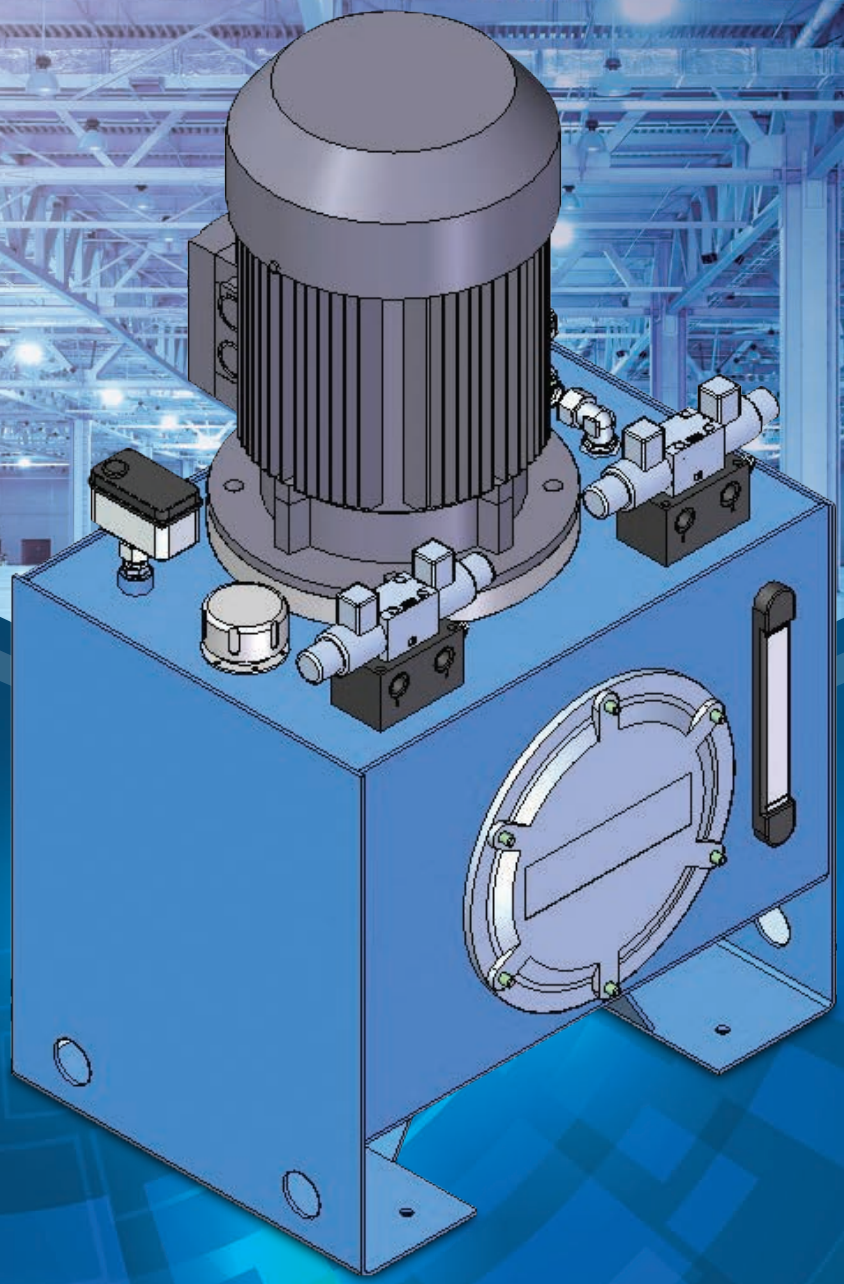
SMART **HEATING**
TECHNOLOGY



INSTRUCTION MANUAL

HYDRAULIC POWER UNIT
HA-7576-06-001

TABLE OF CONTENTS

1. INTRODUCTION

Hydraulic mechanisms are integral parts of most modern machines and equipment. When operated properly, they are able to reach their optimum operating parameters, high efficiency and operating reliability.

Above mentioned features are conditioned by proper installation, maintenance and application. In the following chapters, we present you some information that will help you to maintain the hydraulic equipment.

HYDRAULIC FLUIDS

Quality, cleanness and operating viscosity of hydraulic medium are essential for safety of operation, equipment economy and service life. Single component catalogues contain recommendations for suitable oil and viscosity range.

1.1 Viscosity

For gear pumps, manufacturer's recommended viscosity ranges from 20 to 120 $mm^2.s^{-1}$ and oil temperature ranges from -15 to 80 °C. Maximum permissible viscosity equals to 700 $mm^2.s$-1. Viscosity depends on temperature, i. e. for this reason, maximum and minimum oil temperatures in the tank must be kept. To provide this, oil cooling or heating or both of them are necessary. In case of any problems, another oil with another viscosity class has to be used.

For other hydraulic components (directional control valves, pressure control valves, throttle valves etc.), recommended viscosity ranges from 10 to 500 $mm^2.s^{-1}$ and oil temperature ranges from 0 to 75 °C.

1.2 Sort of Oil

For all hydraulic components used, HLP mineral oil is suitable to DIN 51525 standard, section 2 - oils with additives for corrosion, oxidation and wear prevention. When choosing oil, the users are ecommended to find out, whether the oil supplier offers an opportunity to check condition of used oil as to the contamination, aging and additives reserves and whether conclusions on further oil serviceability can be drawn from the check results.

1.3 Oil Filtration

Generally, oil cleanness class 9 to NAS 1638 is necessary for the operating medium. This class can be attained by filtration with coefficient of $ß_{20} \geq 75$. To ensure high service life, it is possible to recommend cleanness class 8 to NAS 1638. This class can be attained by filtration with coefficient of $ß_{20}20 \geq 100$. Fresh, unused oils mostly do not meet cleanness requirements. Prior to filling the equipment, hey have to be filtered thoroughly, i. e. **it is not permissible to fill the hydraulic power unit tank with oil without filtering - this action will incur reason for termination of the guarantee for equipment troublefree operation.**

Filter elements and oil must be changed after 1000 working hours, max. after 1 year and always when indicator signalizes change.

2. HYDRAULIC POWER UNIT PARAMETERS

Hydraulic power unit type	HA-7576-06-001
Tank capacity	V = 100 dm^3
Volume delivered	Q = 2x13 $dm^3.min^{-1}$
Operating pressure	p = 200 bar
Main electric motor power demand	P = 11 kW
Main electric motor revolutions	n = 1480 min^{-1}
Electric motor voltage	3x400 V; 50Hz
Hydraulic fluid	mineral oil of HLP class, VG 32 - 46
Operating temperature	20 to 65 °C
Filtration	minimal class of purity 9 acc. to NAS1638
Hydraulic components coils voltage	24V, DC

3. CONNECTION OF THE HYDRAULIC UNIT

3.1 Hydraulic Connection of the Hydraulic Unit

The hydraulic unit can be connected to the junctions according to the hydraulic diagram.

3.2 Piping

Different kinds of tubes are used in hydraulic systems according to the inner diameter and working pressure. Generally, to a nominal inner diameter of 32 mm precision seamless tubes are used according to DIN 2391 C St 35.4 NBK. From an inner diameter of 40mm to a rated pressure of 160 bars seamless tubes are used according to DIN 2448 or DIN 2445, material St 37.0 or St 52.0 according to DIN 1629 with certification according to DIN 50049-3.1B. For higher pressures materials St 37.4 or St 52.4 N according to DIN 1630 are used. The use of different types of tubes can lead to a breakdown of the hydraulic circuit or to unit damage.

3.3 Connecting Piping

Several sorts of demountable and non-demountable connections are used for connecting piping. From the point of view of the installation demand factor, availability and price of connecting elements it is more feasible to use screwed connections with a slot ring and shaped packing. This connection is done by means of a ring fixed to the tube. The end of the tube must be shaped adequately, i.e. it is a prerequisite to keep the perpendicularity of the end of the tube and chamfering. The slot ring must be tightened in a special fixture, it can never be tightened in the junction. It is always necessary to adhere to this technological procedure because when installed incorrectly the ring can become unfastened and pulled from the tube. Also the surfaces for screwing connections to the slots must be shaped adequately so that the shaped gland does not slit.

3.4 Anchoring Piping

Piping must be anchored by means of piping holders. It is necessary to use the correct type of holder according to the size of the piping, the surroundings and dynamic characteristics of the hydraulic system. The distance between the holders depends on the external diameter of the tube and is specified by the DIN 24346 standard.

3.5 Installation of Piping

First, the tubes must be cut to the required length. A cutting machine is preferred as it reduces the possibility of deformation of the ends of the tubes. Bending of the tubes prior to connection is preferred during installation as it inhibits bleeding; it is cleaner and cheaper. It is necessary to bend the tubes in bending jigs and the bending radius of the bends must be maximum so that it prevents tube buckling and thus pressure loss in the oil flow.

3.6 Cleaning of Piping

Precision steel tubes according to DIN 2391 and DIN 2445 are pickled and preserved by the supplier. When using these sorts of tubes, pickling is done only after thermal bending and welding. Piping should be rinsed using a circular pump before and after installation. At the same time, filtration and regular renewal of hydraulic oil is necessary. Then a clean non-fibrous fabric is pulled through the piping. According to the demand on the hydraulic unit a large flushing cycle is done using a flushing unit after installation. For that it is necessary to replace the hydraulic elements by connection boards so that the whole hydraulic circuit is thoroughly and correctly washed and without impurities. Unless all impurities are washed out of the circuit they can get into sensitive parts of hydraulic elements during its operation and this causes breakdown and damage of these elements. In the case that these defects are found this generally leads to huge repairs and to the expiry of hydraulic unit warranty.

3.7 Main Installation Principles

- maximum cleanliness and tidiness must be respected during installation because the hydraulic circuit is made of extremely precise elements and any contamination and its effects are very difficult and costly to remove
- in the case of unsuitable storage or not adhering to renewal of hydraulic elements preservation, movable inner parts of the elements become blocked and it is necessary to wash the elements with a suitable degreasing agent
- before installation it is necessary to become familiar with all supplier documentation where the data about the method of installation, screw tightening moments etc. are given
- installation of all components of the hydraulic circuit must be done without the use of force and hydraulic elements and slots must be protected from mechanical damage
- protective covers of hydraulic elements, transport boards on surfaces of contact and stops in tapped holes are removed only before installation
- wiring must conform to valid regulations and standards, especially ČSN 33 2200 and ČSN 34 5611
- the hydraulic unit must be transported carefully and can only be hung on binding loops
- the hydraulic unit must be anchored during installation to prevent from vibration and detachment of piping
- the environment for locating the hydraulic unit must be without aggressive additives - contact the manufacturer if necessary

3.8 Oil Filling of the Tank

- inspect the inner space of the tank
- fill it only with oil recommended by the manufacturer
- never fill the oil directly from barrels but by means of a filter unit through filters with a minimum filtration capacity of 25μm

3.9 Operation before Commissioning the Hydraulic Unit

Before commissioning it is necessary to check:

- filling of the tank with a specified oil to the maximum level set by the level indicator
- cleanness of piping, tightening all connecting elements
- connection according to the hydraulic diagram
- couplings between the electric motor and the pump, mainly due to keeping alignment and clearance delimitation
- electric motor wiring and keeping the sense of rotation, if the level, temperature and pressure sensors are working
- if filters are correctly installed and if they have the specified filtration capacity
- filling of the inner space of the pumps with oil
- setting of pressure valves to the minimum pressure

3.10 Operation during Commissioning

- run the pump in short intervals
- check pump noisiness and piping tightness
- deaerate the hydraulic circuit
- according to possibilities re-examine circuit function with minimum load
- gradually increase pressure to the specified operating value and set other regulation elements
- during operation monitor control and measuring instruments, noisiness, height and temperature of the oil in the tank
- follow instructions stated in service manual, it is necessary to proceed exactly especially when commissioning sliding-vane and piston regulation pumps and proportional hydraulic elements
- check the oil level on the visual level indicator – maximal oil level in the tank is marked by a red guideline in the upper part of the sight glass
- test all functions simultaneously and compare with design values
- check pressure drop signalling on filters

3.11 Wiring the Hydraulic Unit

Wiring, leads of electric motors and control elements must conform to valid regulations and standards, especially EN 60 204-1 and ČSN 34 5611. Before connection to the mains it is necessary to check label or data sheet values of the working voltage and frequency with respect to mains values. Protection against dangerous contact with voltage must conform to ČSN EN 33 2000-4-41. Regulations mentioned in ČSN 34 3100 must be adhered to when servicing or repairing.

4. SERVICING OF THE HYDRAULIC UNIT

Hydraulic unit servicing is done according to the plan and length of operation, during breaks and when necessary.

4.1 Refilling Service Media

In principle the system is refilled with the same service media used to initially fill it. This principle is respected also when refilling mineral oils that satisfy the provision of standards, however they can differ in additives and basic addition agents.
Service media of classes HFA, HFC and HFD can never be mixed. Quite often the producers offer hydraulic liquid additives to reduce mechanical friction – in this case it is necessary to seek approval of the manufacturer of the hydraulic system and the producer of hydraulic liquid.

4.2 Exchange of Service Media

Service media must be changed whenever it starts to change chemically – oxidise, become soapy, because of loss of additives, by a change of viscosity, if it shows such impurities that blocking of filter-beds is signalled on the filter blocking sensor. During exchange it is necessary to clean the hydraulic liquid tank and to flush the whole hydraulic system because there is a great amount of liquid in pumps, piping and hydraulic cylinders. New liquid must be pumped to the tank through filters with at least the same filtration capacity as working filters in the hydraulic circuit. At the same time it is necessary to exchange filter beds. There is no point in cleaning filter beds.

4.3 Setting Pressure

It is necessary to continuously check the pressure setting of pressure valves. At no cost can the pressure valves be set to a higher pressure than the unit was designed for and than is stated in the hydraulic diagram.

4.4 Checking Piping Leaks

Repairs to leaky places must be done without pressure in the piping and leaky parts must be exchanged.

4.5 Cleaning the Hydraulic Unit

The hydraulic unit must be kept clean so that no dirt gets into the hydraulic circuit - thus active surfaces of hydraulic elements are protected from damage. When a high-pressure cleaning device is used, it must be ensured that no mechanical damage to parts of the hydraulic unit will occur and that condensed water will not get into the oil.

4.6 Servicing of Accumulators

In case of any manipulation with the accumulator, it is necessary to depressurise the hydraulic accumulator and make sure that no liquid from the hydraulic circuit can get into the accumulator. It is always necessary to proceed according to the accumulator service manual. Hydraulic accumulators are only filled with nitrogen and only by means of a specified filling device.

4.7 Replacement of Worn Parts

Original parts according to the list of elements must replace worn parts. Where necessary it is possible to ask the manufacturer for specific conditions of replacement, possibly request the manufacturer for service response.

5. SAFETY OF OPERATION

The hydraulic circuits are safe and reliable even at high pressures, if all the components are dimensioned and operated suitably. Therefore, the following principles are to be observed:

- Hydraulic components designed for lower pressures than operating pressure in the circuit not to be used
- Power unit surroundings to be kept clean and leaked oil to be covered with sawdust or another suitable agent immediately
- Hydraulic power unit to be protected from external mechanical damage and a thermal source
- If the circuit is under pressure, it is not suitable to approach the piping and hoses
- In the vicinity of the hydraulic equipment not to smoke and not to use open fire
- For any modifications, the electrical equipment to be switched off and the accumulators to be pressure relieved
- All hydraulic circuits to be protected against overloading using a properly-set pressure relief valve
- For the accumulators, standard is effective
- Pressure piping should be welded by a welder having the test certificate.
- An appropriate person to be authorized for power unit maintenance and adjustment.
- Equivalent level of acoustic pressure A at the operator's working place when using weighted filter A does not exceed the value of 85dB (A), the level of sound power emitted by the hydraulic unit does not exceed 85dB (A)
- The hydraulic unit cannot be used for any other purpose and other materials than stated in the service manual
- When disposing of the hydraulic unit or its transport to be scrapped, it is first necessary to release the oil fillings and take care not to contaminating the ground
- When extinguishing a fire on the hydraulic unit when considering the wiring, a carbon dioxide-based extinguisher fire must be used
- The hydraulic unit and pressure distribution, especially if pressure hoses are used, should be covered in the direction of operator

These principles are not complete. There are different conditions for each hydraulic circuit and different dangers for its surroundings. But keeping these principles should improve user's working conditions.

6. SPARE PARTS

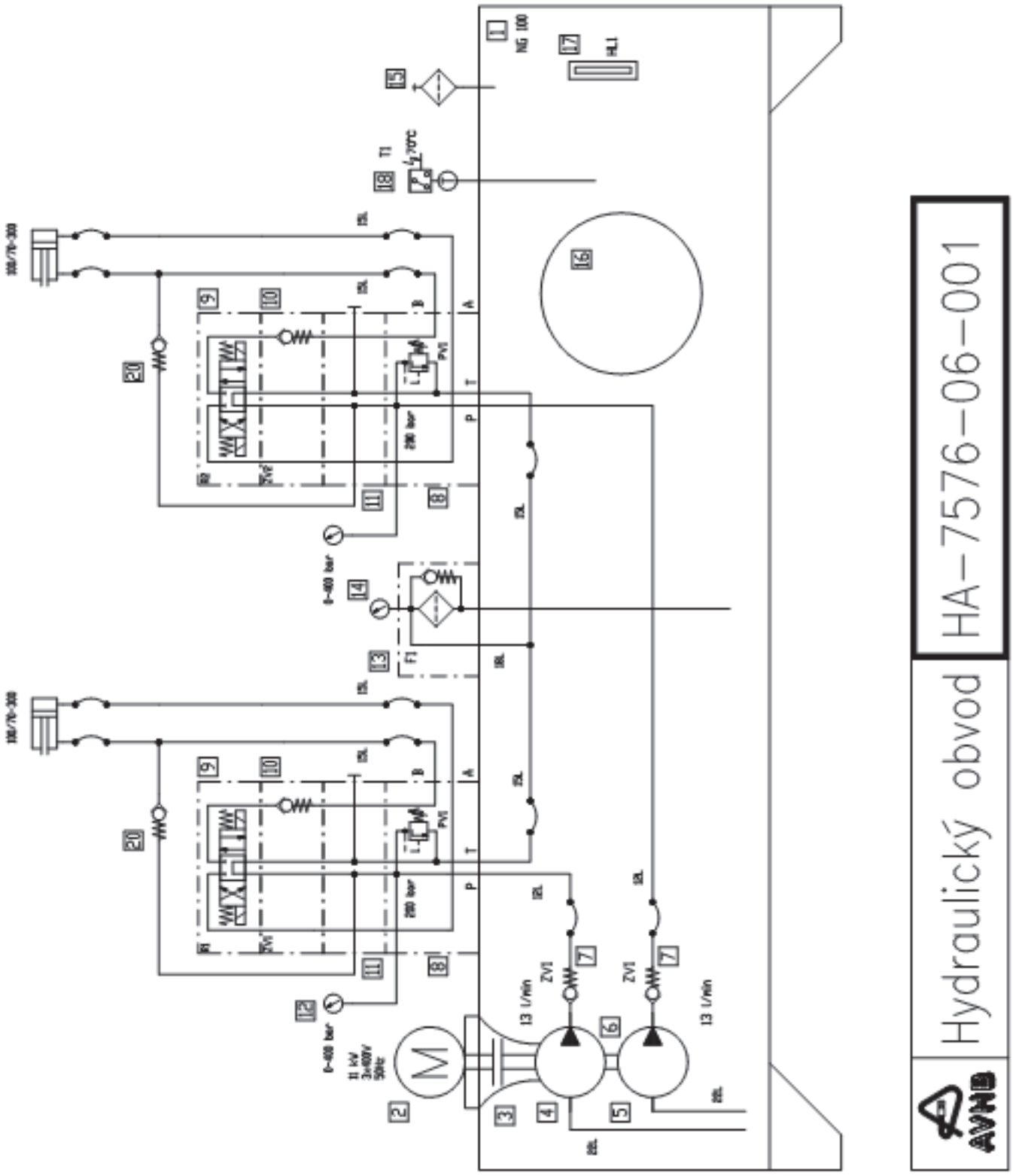
Any spare part can be ordered with the hydraulic power unit supplier. When ordering, the following data are to be specified:

- hydraulic component type acc. to the list of components
- hydraulic power unit type and number
- quantity

7. APPENDICES

- Hydraulic diagram
- Spare parts
- Guarantee Terms
- Declaration of Conformity

7.1 Hydraulic Diagram



7.2

Position	Registration number	Name	Amount
001	6210939	Nádrž ocelová NG 100 7576-06	1
002	6212431	Elektromotor 11 kW - Y3HE-160M4 B5 IE2	1
003	6210783	Držák čerpadla se spojkou AKA12FS200Z4S	1
004	6212623	Zubové čerpadlo ALPA2-D-13, Q=9,6 cm3, přední sekce	1
005	6212624	Zubové čerpadlo ALPP2-D-13, 9,6 ccm, zadní sekce	1
006	6211945	Spojka čerpadla ALP..2(GHP..2)+ALP..2(GHP..2)	1
007	6211045	Ventil zpětný VU 1/2" V0610	2
008	6212555	Deska připojovací ES3B12X3F	2
009	6211843	Rozvaděč RPE3-063C11/02400E1	2
009	6210639	Konektor G1TU2TL1, LED 24V - zhášecí dioda	4
010	6211380	Zpětný ventil AM3UDB1002	2
011	6212382	Blok EB33338	2
012	2700267	Manometr CMM 63,1/4, 0+400	2
013	6212628	Filtr MPF1003AG1+A25NBP01	1
014	6210102	Indikátor optický BVR14P01	1
015	6210088	Hrdlo plnicí TA80B10B001P01	1
016	6210760	Inspekční víko OB356DIN000	1
017	6210799	Hladinoměr LVA30T	1
018	6210461	Termostat stonkový TH143	1
019	6210462	Jímka termostatu TH143	1
020	2114624	RS12L / WAL066490	2

7.3 Guarantee Terms of AVHB Hydraulika s r.o.

AVHB Hydraulika guarantees its own products and distributed products are without material and production defects. 12 months warranty.

1. The Buyer has to examine the goods properly upon their acceptance and confirm their acceptance in the carrier's transport contract or delivery note and maintain controlled documentation with respect to the acceptance. If the Buyer fails to accept the goods properly and in time, the Buyer is fully liable for any defects arising therefrom.
2. Unless stated otherwise herein, provisions of S. 428 of the Commercial Code apply in order to claim defects from the Seller.
3. Through his acceptance of the goods, the Buyer confirms to be informed of the technical parameters of the goods and he has to provide for professional installation in accordance with the ÈSN and EU standards, including the safeguarding of competent operators and service workers. It is the Buyer's responsibility to determine whether the goods are suitable and to apply the goods.
4. All notifications of defects must be sent to the Seller in writing. Apparent defects must be claimed within 14 days from the acceptance of the goods at the latest and latent production defects (defects that can be found when professional care is exercised) within 12 months from the acceptance of the goods, however, not later than after 2,000 operating hours (unless stipulated otherwise). The termination of service life under conditions not corresponding to parameters set by the Seller, before guarantee expiration, is not considered production defect.**7.3 Guarantee Terms of AVHB Hydraulika s r.o.**

5. Buyer's claims resulting from defects of the goods shall not be recognized unless notified in time and unless the Buyer proves that the defects were not caused by external influences after the risk of damage to the goods passed to the Buyer. The guarantee period does not apply to components with short service life and consumer material.
6. If the complaint is not recognized by the Seller based on his own technical examination, the claim resulting from defects of the goods cannot be recognized.
7. In case there are conditions to recognize the claim resulting from defects of the goods and in case the contract was materially breached through the delivery of defected goods, the Seller has to do the following:
   a) deliver the lacking amount of goods;
   b) replace defected goods with perfect goods or put the goods to perfect state.
8. The Buyer does not incur the right for the supply of substitute goods or the reimbursement of cost related to the return of defected goods until he returns the defected goods to the Seller according to their previous agreement.
9. In case the supply of substitute or lacking amount of goods according to clause 7 is impossible, the Seller is entitled to withdraw from the Contract additionally. In such a case the Seller has to return the price of non-supplied goods immediately.
10. All Buyer's claims for damages from the Seller in relation to the contract are limited by the price paid for the goods supplied to the Buyer; the Seller is only liable for damage caused intentionally or by gross negligence.
11. AVHB offers a possibility to achieve extended guarantee for hydraulic sets and systems. However, this can only be achieved after a service contract is made.

7.3 Machine Accessory ES Declaration of Conformity

In harmony with the European Parliament and Council Directive No. 98/37/ES amended by the Directive of the European Parliament and Council No. 98/79/ES (and by Section 13 Par 2 of the Act No. 22/1997 Coll. in the wording of alter changes and amendments and the Government Order No. 176/2008 Coll. from April 21, 2008)

We: **AVHB Hydraulika, spol. s r.o.**
Podvihovská 375 / 12B, 747 70 Opava
IČO: 49610546

as the **Manufacturer – Importer** declare at our exclusive responsibility that the **product – works:**
Hydraulic aggregate **HY-7576-06-001**
comprises a compact whole and that it is designated to be a driving unit for machines and machinery equipment.

Description and designation:
The hydraulic aggregate consists of the following:
1. Tanks with removable or fixed lids
2. Drive
3. Filter circuit
4. Hydraulic element blocks
5. Sensors for temperature, pressure and oil-level state

Product – hydraulic aggregate is designed for connecting (incorporating into a different machinery system) to a machine or to a number of various machines and the product is not a spare part or tool.

It complies, under normal conditions or under conditions specified by us, with the basic requirements of the Government Order 176/2008 Coll., Government Order 17/2003 Coll. and Government Order 616/2006 Coll. and there have been adopted measures to assure conformity with technical documentation of those elements manufactured or imported by us. Concurrently we declare that the auxiliary machinery device complies with the requirements of the below-listed Czech technical standards and regulations valid for operation in the Czech Republic (EU) as of the date of this Declaration's issuance.

The following harmonized Czech technical standards were used to evaluate the conformity:
Conformity evaluation was performed in harmony with Section 5 of the Government Order No. 176/2008 Coll. and the following ones were used for the evaluation:

1. Machinery equipment safety – ČSN EN 982/1997, ČSN EN 60 204-1/2000, ČSN EN 61000-6-4/2002
2. General safety requirements – ČSN 11 9009/1985
3. Design and general requirements – ČSN 11 9007/1991
4. External containment – ČSN 11 9372/1987
5. Reliability – ČSN 11 9372/1987
6. Accompanying technical documentation – ČSN 11 9372/1987

Ing. Jaroslav Fojtek
Company Director