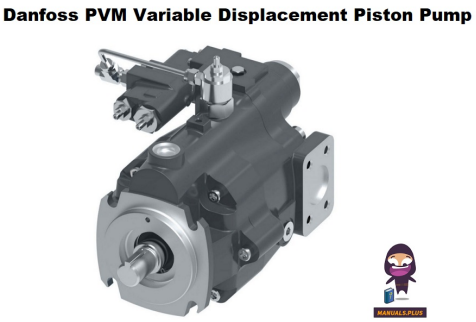
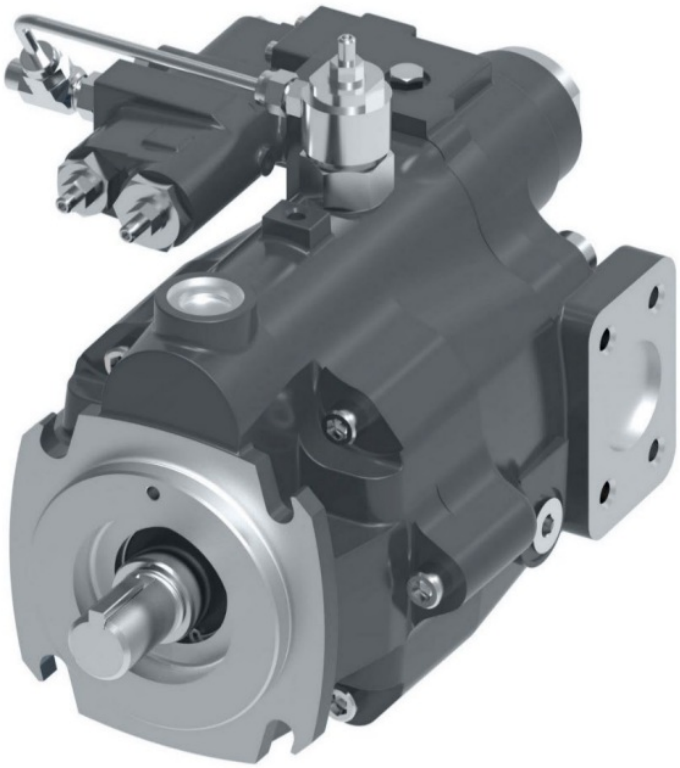


Danfoss PVM Variable Displacement Piston Pump User Manual

Contents

Danfoss PVM Variable Displacement Piston Pump



Specifications

- **Directive:** ATEX Directive 2014/34/EU
- **ATEX Certification:** II 3G Ex h IIC T4 Gc X II 3G Ex h IIC T3 Gc X
- **UKEX** SI: 2016 No. 1107
- **Manufacturer:** Vickers by Danfoss
- **Maximum Working Pressure:** 315 or 230 bar
- **Design:** Variable displacement, high-power open circuit pumps
- **Features:** Swashplate design, available in higher speed or quiet versions

Product Usage Instructions

General Information

- **Product Description:** The PVM pumps by Vickers are designed for industrial applications with a maximum working pressure of 315 or 230 bar. They feature a swashplate design and are available in different versions for speed and noise levels.
- **Manufacturer Responsibility:** The manufacturer bears no responsibility in case of misuse or non-compliance with the user manual instructions.

Intended Use

- **Marking:** The PVM pumps are marked for Group II, category 3 for gas environments with ignition protection and liquid immersion. The temperature class and maximum surface temperature vary based on operating conditions and duty cycles.
- **Production Place and Date:** The production location is indicated on the pump label, and the data can be

obtained by contacting Danfoss with the serial number.

Technical Information

- T-Codes and Maximum Surface Temperature:
- Gaseous Environment (G)
- Oil Types / Operating Fluids

FAQ

Q: What should I do if the pump exceeds the specified working pressure?

- **A:** It is crucial to strictly adhere to the maximum working pressure indicated by the manufacturer to avoid damage to the pump or potential safety hazards.

Q: How can I determine the production date of the pump?

- **A:** You can find the production location on the pump label, and for the production date, contact Danfoss with the serial number for assistance.

Revision History

Table of Revisions

Date	Changed	Rev
Feb 2024	First edition	0101

Introduction

General Information

Purpose of this Document

- This User Manual has been prepared by the manufacturer to provide important information regarding the safe installation, operation, and maintenance of ATEX / UKEX-certified pumps.
- The items set out within this document are mandatory unless stated otherwise.
- This User Manual is a supplement to existing product instruction as ATEX / UKEX components are subjected to some limitations compared to standard components.
- The limitations are described in this instruction. Items or limitations within this document override any contradictory information that may be found in the product catalog.
- It is intended for machine/system manufacturers, fitters, and service technicians. Please read this User Manual carefully before you work with and start up the pumps.
- This User Manual must be stored close to the pumps.

Product Description

- PVM pumps are a range of variable displacement, high-power open circuit pumps designed for industrial applications.
- They feature a swashplate design with a maximum continuous working pressure of 315 or 230 bar. They can be supplied in “higher speed” or “quiet” versions.

Manufacturer Responsibility

- The manufacturer declines any responsibility in the case of:
- Use of the product not according to safety regulations and legislation valid in the user’s country.
- Use of the product in operating conditions is not allowed according to the product’s technical information.
- Improper installation: the instructions given in this User Manual are not followed or not properly followed.
- Hydraulic system problems.
- Modification of the product.
- Operations executed by personnel not properly trained or not assigned to such a kind of operation.

Product Safety

- The safety of the product depends upon the strict observation of the indications given in this User Manual: in particular, it is necessary to.
- Always operate within allowed product working conditions (please refer to the Technical Information of the pumps in usage).
- Always perform an accurate ordinary maintenance activity.
- Assign the inspection activity as well as maintenance activity to duly trained personnel.
- Only use original spares.
- Always use the product according to the indications you find in this manual.

Intended Use

- Hydraulic pumps convert mechanical energy (torque and speed) into hydraulic energy (pressure, oil flow). PVM pumps are designed for industrial applications.
- The pumps fulfill the explosion requirements of Directive 2014/34/EU and UKEX SI 2016 No. 1107 for the category shown on the nameplate within the limiting conditions mentioned within this user manual or product catalog/ technical information.
- PVM pumps have an identifying nameplate. The nameplate provides essential information and specifications for correct and safe use.
- This identifying plate has to be maintained so that the data can be read; consequently, periodic cleaning of the plate is required. If the nameplate or other labels need to be removed for maintenance or service, they need to be reinstalled before the pump is recommissioned.

Marking of Vickers by Danfoss PVM Pumps

- The PVM hydraulic pumps are marked as equipment for Group II, category 3 for the gas environment and with

ignition protection constructional safety, and liquid immersion.
- Temperature class/Maximum surface temperature depends on the operating conditions (ambient and fluid temperature) as well as application duty cycles.

Marking	**For** the **model code option**
Ex II 3G Ex h IIC T3 Gc X	G (see *Table 1* for requirements)
Ex II 3G Ex h IIC T4 Gc X	G (see *Table 1*, for requirements)

- For detailed information on selecting the appropriate T-Codes as well as fluid viscosity and temperature requirements, please see Chapter “T-Codes and Maximum Surface Temperature.

Production Place and Date of Pump

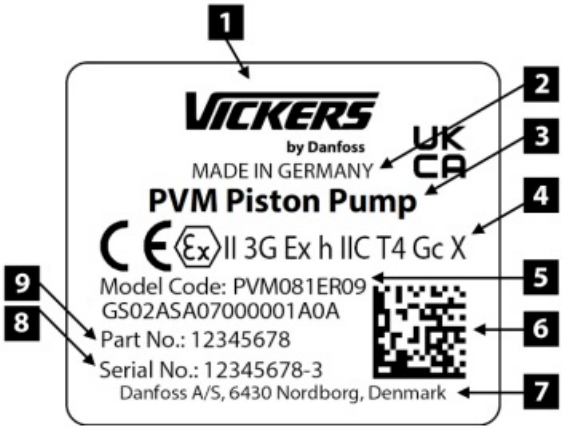
- The production location is shown on the pump label as pictured below. The date of the pumps is not shown on the pump label; however, it can be determined by contacting Danfoss and providing the serial number.

The ATEX certification of the units is done under the scope of:

- Directive 2014/34/EU of the European Parliament and of the Council of 26 February 2014 on the harmonization of the laws of the Member States relating to equipment and protective systems intended for use in potentially explosive atmospheres.”
- **And UKEX Statutory Instruments:** 2016 No. 1107 HEALTH AND SAFETY The Equipment and Protective Systems Intended for Use in Potentially Explosive Atmospheres Regulations 2016”

With the following parameters:

- **Equipment group:** II, non-mining equipment
- **Equipment Category:** 3G
- **Temperature class:** T4…T1
- **Gas Group:** IIC
- **Equipment protection** level (EPL): Gc
- **Resulting Zone:** 2 (Gas Environment)
- The Conformity Assessment Procedure must be executed according to: /1/ Directive 2014/34/EU, annex VIII, Modul A: Internal Production Control (see article 13, section 1 (c)) /2/ UKEX SI 2016 No.
- **1107 Schedule 3A, Part 6:** Internal Production control (see Part 3, article 39 (1)(c))
- The EU declaration of conformity has to be prepared and issued concerning annex X of /1/. The Essential Health and Safety Requirements” defined by /1/, annex II, have to be considered.
- The UK declaration of conformity has to be prepared and issued about schedule 6 of /2/. The “Essential Health and Safety Requirements “ defined by /2/, schedule 1, have to be considered.



Example ATEX / UKEX Label – PVM Legend

1. Manufacturer
2. Location of Production
3. Type/Brand Name of Product
4. ATEX / UKEX Code
5. Pump Model Code
6. 2D-Code for Identification
7. Manufacturer Address
8. Serial Number
9. Material/Part Number

Figure 1: PVM Sticker Label Example

Alternative PVM Black Anodized Aluminum Label

For legend, see the label above.

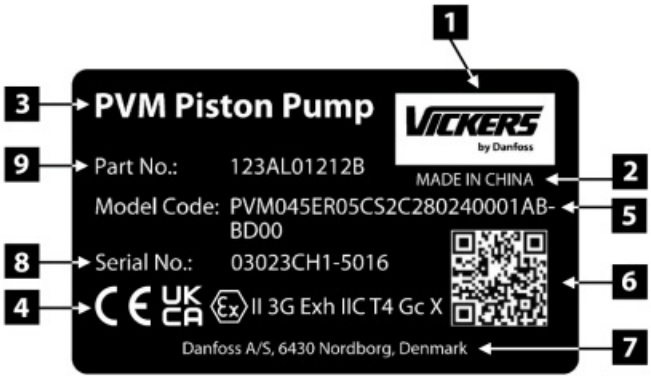


Figure 2: PVM Anodized Aluminum Label Example

Warning Avoid impact on the aluminum nameplate material to eliminate thermite sparks

Technical Information

ATEX / UKEX Technical Specifications

- The technical specifications in this chapter are supplemental for ATEX / UKEX systems only.

- For comprehensive technical specifications, including maximum pressure rating, maximum flow, etc. please refer to the standard PVM Technical Information and Technical Catalog documents.
- Danfoss does not claim responsibility for the use of the pumps in operating conditions not allowed according to the information shown in this document and the standard PVM Technical Information documents.
- Painting or coating can be an electric insulator if a thickness greater than 200 µm is applied. The thickness of the painting of original DPS paint is less than 200 µm.
- If the customer chooses to add a layer of paint, the total layer thickness cannot exceed 200 µm.
- The pumps are approved only for correct and proper use under their designated purpose, in standard industrial atmospheres.
- Contravention of such conditions voids any warranty claims and any responsibility on the part of the manufacturer.

T-Codes and Maximum Surface Temperature

Gaseous Environment (G) Table 1: Temperature Classes at Maximum Ambient and Oil Temperatures

Maximum Oil Temperature (at Inlet)	**Max. Ambient Temperature**	
	≤ 40 °C **≤ 104 °F**	**≤ 60 °C** **≤ 140 °F**
≤ 20 °C [68 °F]	T4	T4
≤ 40 °C [104 °F]	T4	T4
≤ 60 °C [140 °F]	T4	T4
≤ 80 °C [176 °F]	T4	T3

Table 2: T-codes with respective Maximum Surface Temperature

T-Code / Temperature Class	**Maximum Surface Temperature**	
	°C	**°F**
T3	200	392
T4	135	275

- To ensure that the surface temperature will not exceed the allowed value according to the used temperature class, it is recommended to attach a suitable temperature sensor to the pumps in the shown area on one of the central surfaces at the bottom side of the pumps.

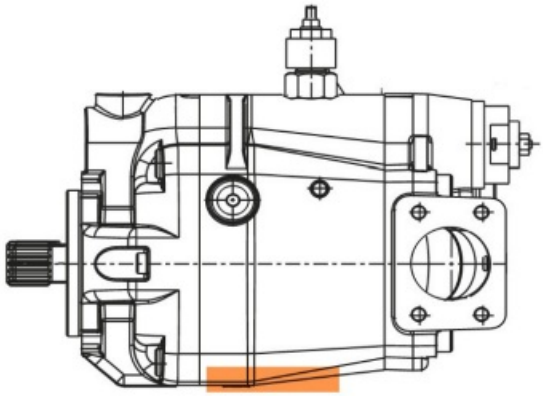


Figure 3: Recommended Location to attach Temperature Sensor

Oil Types / Operating Fluids

- In a hydraulic system, the most important task of the oil is to transfer energy. At the same time, the oil must lubricate moving parts in hydraulic components, protect them from corrosion, and transport dirt particles and heat out of the system.
- To ensure that hydraulic components operate without problems and have long operating life, it is therefore vital to select the correct oil type with the necessary additives.
- Ratings and performance data are based on operating with hydraulic fluids containing oxidation, rust, and foam inhibitors. These fluids must possess good thermal and hydrolytic stability to prevent wear, erosion, and corrosion of pump components.
- Warning It is compulsory to use oils whose inflammable degree is at least 50K above the maximum surface temperature of the pump.
- The maximum surface temperature for Group IIG can be found in Table 2: T-Codes with respective Maximum Surface Temperature.

Fluid Viscosity and Temperature for ATEX / UKEX PVM Pumps Table 3: Fluid Viscosity and Temperature Rating of PVM ATEX / UKEX Units

Features		**Data**
Viscosity	Minimum Intermittent1)	10 mm²/s [90 SUS]
	Recommended Range	16 – 40 mm²/s [83 – 187 SUS]
	Maximum (Cold Start)2)	1000 mm²/s [4550 SUS]
Inlet Temperature	Minimum (Cold Start)2)	-28 °C [-18°C]
	Maximum Rated	80 °C [176 °F]
	Maximum Intermittend1)	104 °C 3) [219 °F] 3)

1. Intermittent = Short term t < 3 min per incident.
2. Cold start = Short term t < 3 min; p ≥ 50 bar; n ≤ 1000 min-1 (rpm); please contact Danfoss Power Solutions especially when the temperature is below -25 °C [-13 °F].
3. Must not be exceeded locally either (e.g. in the bearing area). The temperature in the bearing area is (depending on pressure and speed) up to 5 °C [41 °F] higher than the average case drain temperature.

- Above maximum surface temperatures are without any deposited dust on the product. The possible insulation effect of a dust layer on the surface has to be taken into account by the safety margin to the minimum ignition temperature of the dust concerned.
- For up to 5 mm [1.97 in] layer thickness the safety margin is 75 °C [167 °F]. For further information please see IEC 60079-14.
- **Warning** The above operating temperatures (ambient and oil) of the pump must be guaranteed by the end user.

Ambient Temperature

- Maximum ambient temperature depends on the protection class needed. Refer to Table 1: Temperature Classes at Maximum Ambient and Oil Temperatures on page 7.
- In general, the ambient temperature should lie between -30° C [-22° F] and +60° C [140 °F] to ensure that the shaft seal retains its sealing capacity.

Oil Temperature

- Maximum oil temperature depends on the requested protection class needed. Refer to Table 1: Temperature Classes at Maximum Ambient and Oil Temperatures on page 7.
- Under normal operating conditions, it is recommended to keep the temperature in the range of 30 °C
- [86 °F] to 60 °C [140 °F] to achieve the expected unit lifetime

Viscosity

- Maintain fluid viscosity within the recommended range for maximum efficiency and bearing life.
- Minimum viscosity should only occur during brief occasions of maximum ambient temperature and severe duty cycle operation.
- Maximum viscosity should only occur at a cold start. Limit speeds until the system warms up.
- See Table 3: Fluid Viscosity and Temperature Rating of PVM ATEX / UKEX Units on page 8 for viscosity rating and limitations.
- We recommend the use of an oil type having a viscosity of 16 – 40 mm^2/s [83 – 187 SUS] at the actual operating temperature.
- **Filtering** It is necessary to keep the level of oil contamination at an acceptable level to ensure problem-free operation.
- The recommended maximum level of contamination in systems in the hydraulic pumps is 20/18/13 (ISO 4406-1999).
- Further information can be found in the pump’s technical catalog.

Installation, Operation and Maintenance

Installation, Commissioning, and General Operation of ATEX / UKEX PVM Pumps

- When assembling the pump in the machine/system it is the builder’s responsibility that the parts used conform to the ATEX directive or UKEX statutory instruments and that the components are assembled and running

according to the operational data/design found in product data sheets and instructions.
- Only use the pump as required by the explosion protection shown on the nameplate.

Always ensure that the following is maintained:

- The ambient conditions specified in this manual are maintained.
- The pump may only be operated with the housing fully mounted, unopened, and in an undamaged condition.
- The pump must be installed per specific orientation as specified within the pump catalog. The pump should be mounted in such a way that the case drain port is on the top of the pump.
- The supporting frame, chassis, or structure of equipment containing the pump shall be constructed of electrically conducting material and shall be so arranged as to provide a leakage path to earth (ground) for any static electricity that occurs on the pump.
- If this is not possible, a grounding wire needs to be attached to the pump housing. Consult Danfoss for recommendations on connection placement.
- The pump is approved for operation with the selected hydraulic fluid.
- It is compulsory to use oils whose inflammable degree is at least 50K above the maximum surface temperature of the pump according to the temperature classification (T4, T3…).
- The hydraulic fluid must be filtered to ensure the cleanliness stated above.
- All types of accessories installed on the pump are ATEX / UKEX specified and have been installed under ATEX / UKEX requirements.
- There are no creeping metal elements external to the pump.
- There are no plastic parts that might accumulate electrostatic, or they are shielded.
- The inlet and case drain oil and ambient temperature are monitored to not exceed the maximum permissible for the category and temperature class of the associated zone. The system must shut down if the case drain oil temperature exceeds 118 °C [245 °F] or inlet temperatures exceed the limits stated within this manual.
- The pump may only be operated when fully primed and filled with oil. An active oil level alarm shall be used. The system should safely shut down in the event of a low oil alarm.
- The pump must be protected against overloading and over-speeding using suitable measures. This includes the installation of pressure relief valves to prevent the pump from exceeding the maximum allowable pressures as given by the catalog.
- For applications where running the pump for extended periods (>3 min) at “high-pressure – low flow” (e.g. pressure compensated stand-by) conditions cannot be avoided, it is highly recommended to install case flushing. Consult Danfoss representative for advice.
- Manufacture the assembly flange on the machine/system where the pump has to be installed: the relevant surface has to be perfectly smooth, completely de-greased, and non-deforming.
- Coupling and protection elements shall meet the material requirements relevant to the respective ATEX / UKEX requirements (e.g. avoiding magnesium, titanium, and zirconium)
- It is necessary to verify the perfect alignment between the prime mover (e.g. engine/ e-motor) output shaft and the pump – the fitment between the pump shaft and prime mover shaft must be executed so that no radial or axial pre-load is generated – these extra loads reduce the bearings expected lifetime and can increase heat generation.

Start-Up Procedure

- The purpose of this section is to indicate the necessary procedures to perform the pump start-up.

Pre-Start-Up Controls for PVM Pump

- Before performing the first pump start-up, the following points have to be checked.
- Hydraulic components must be installed under their instruction.

1. To avoid contamination, plastic plugs in connection ports must not be removed until just before connections are made. All inlet connections must be tight to prevent air leaks.
2. Select the hydraulic fluid as specified in the product catalog.
3. Make sure the reservoir and circuit are clean and free of dirt/debris prior to filling with hydraulic fluid. Fill the reservoir with filtered oil to a sufficient level to prevent vortexing at the suction connection to the pump inlet. (It is good practice to clean the system by flushing and filtering using an external pump before first start-up)
4. Make sure the pumps' hydraulic connections allow the pump to rotate in the desired direction. For pumps with the direction of rotation:

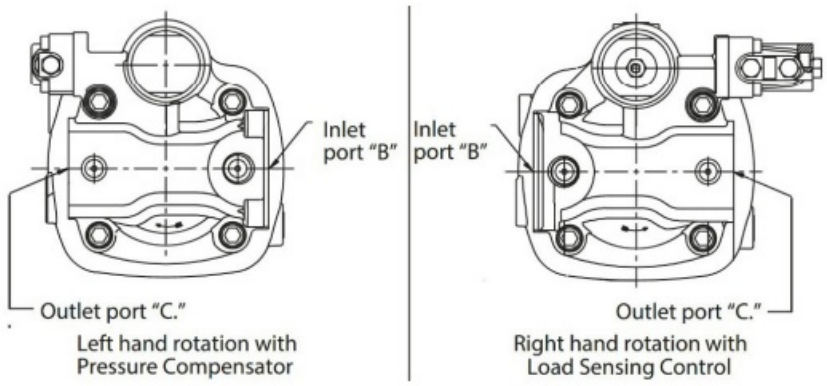


Figure 4: PVM (side-ported) Back View, Port Configuration LH/RH

   - Generic illustration shown (here PVM131/141 side-ported)
5. Ensure full contact between the pump mounting flange and the prime mover.
   - Avoid pressing the pumps into place by tightening the fixing bolts.
   - Avoid unsuitable seal materials, for example, twine and Teflon, on threaded unions.
   - Use only the seals supplied, such as O-rings, and steel washers.
6. Make sure that all couplings are completely tightened to prevent leakage.
   - Do not use more torque than the maximum values given in the instructions.
7. Before the pump is started, fill the case through the uppermost drain port with hydraulic fluid of the type to be used. The case drain line must be connected directly to the reservoir and must terminate below the oil level.
8. Check to make sure the purity of the oil is greater than 20/18/13 (ISO 4406-1999) and always use a filter when replenishing the system.

Warning The pumps must be filled with fluid before any load applications

First Start-Up

1. Make sure the reservoir and pump housing are filled with fluid and the inlet and outlet lines are open and unobstructed.
2. Start the prime mover at a reduced speed. Once the pump is started it should prime within a few seconds. If the

pump does not prime, check to make sure that there are no restrictions between the reservoir and the inlet to the pump, that the pump is being rotated in the proper direction, and that there are no air leaks in the inlet line and connections. Also, check to make sure that trapped air can escape at the pump outlet.

3. After the pump is primed, operate for five to ten minutes (unloaded) to remove all trapped air from the circuit. If the reservoir has a sight gauge, make sure the fluid is clear – not milky.
4. To ensure the best pump performance, run the pump for approximately one hour at 30% of rated pressure and speed before running at full load.
   When running make sure the pump and oil temperature and noise level are sufficiently low. High temperature or noise level might be symptoms of unforeseen operation conditions that have to be analyzed and cleared.
5. Check for system leakage and make sure the system is operating satisfactorily.
6. To ensure that the contamination in the hydraulic system does not damage the pump; the following procedure is recommended after a brief period of operation:
   - **a**. After a brief period in operation, have a hydraulic fluid specimen analyzed for the required cleanliness level.
   - **b**. Replace the oil filter or change the hydraulic fluid if the required cleanliness level is not reached.

Operational checks

- The product is a component that requires no settings or changes during operation.
- The machine/system manufacturer is responsible for the proper project planning of the hydraulic system and its control.
- Danfoss recommends ongoing tests for optimal pump performance.

1. Continuously verify that the temperature of the ambient and the operating oil are those initially determined.
2. Do not subject the pumps to pressure, pressure drop or speeds exceeding the maximum values stated in the appropriate catalogs.
3. Filter the oil to maintain the grade of contamination at 20/18/13 (ISO 4406-1999) or better.

Maintenance

Warning

- If maintenance has to be performed in an explosive and hazardous atmosphere, an anti-sparking safety tool must be used.
- Maintenance measures involving disassembly or opening of the pump must only be carried out in non-explosive atmospheres.
- Before loosening any connection of the hydraulic system, ensure the residual pressure has been safely removed from the system.
- With hydraulic systems, the main criterion for reliability and operating life is very thorough regular maintenance.
- Regularly check the system for the presence of leakage and the oil level. The equipment must be regularly serviced and cleaned in an explosive atmosphere. The intervals are specified by the operator on-site per the environmental impact to which the equipment is exposed.
- During the system’s function, it is necessary regularly to verify that the temperature of the ambient and the operating oil are those initially determined. Replenish and change the oil, the oil, and the air filters as stated in

the respective instructions.

- Regularly check the condition of the oil – viscosity, oxidation, filtration level, etc:
- **Viscosity** Verify that the viscosity level is within the recommended values as indicated in
- **Table 3:** Fluid Viscosity and Temperature Rating of PVM ATEX / UKEX Units.
- **Oxidation** Mineral oil gets oxidized proportionally to the usage degree and operating temperature. The oxidation of oil is evident because it changed color, bad smell, and acidity an increase, and because of the generation of sludge inside the tank.
- In case symptoms of this kind are detected, the system oil must be immediately changed.
- **Water presence** The presence of water inside oil can be determined by taking oil samples from the bed of the oil tank: oil floats on water, if present, water tends to stay on the tank's bed. If its presence is determined, water must be regularly purged.
- The presence of water in the hydraulic system can severely damage the pump.
- **Degree of contamination** A high degree of contamination of the operating oil causes severe wear of all hydraulic components: for this reason, the cause of the contamination must be identified and eliminated.
- To avoid mixing of different oils, when replacing the operating fluid. It is necessary to empty all the machinery and pipes, clean them carefully, and clean the tank.

Recommended Check Activities

Activity	Visual Check1) Monthly	Close-Up Check 1) Every 6 Months or 4000hr	Detailed Check1) Every 12 Months or 8000hr
Visual check pump for leaks, and remove dust/dirt /debris deposits	●		N/A
Check the external temperature of the pump using suitable measuring aids to ensure it is below 125° C [257°F] when the pump is operating at a cut-off		●2)	N/A

1. Definitions of terms as per IEC 60079-17
2. Not necessary if monitored by the recommended surface temperature sensor

Service and Repair

- Only Authorized Service Centers or Danfoss Technicians may perform repairs specified in the Service Manual.
- The pump shall be overhauled or replaced before reaching the anticipated operating life as specified within the product catalog. For specific application inquiries contact Danfoss Technical Support.
- Pump components may only be replaced by genuine original Danfoss service parts which are also approved for use in explosive atmospheres. This also applies to the lubricants and service products used.
- In case a service or repair intervention on the pumps is required, it must be performed according to the information shown in the below-mentioned Service Manual.
- The Service Manual includes the spare part list and information about how dismantling and assembling the pumps is done properly.
- See PVM Piston Pumps Service Manual; Literature Number: AX445454003735en-000101

Safety Precautions

- Always consider safety precautions before beginning a service procedure. Protect yourself and others from injury. Take the following general precautions whenever servicing a hydraulic system.

Tools Warning

- It is compulsory to use anti-sparking safety tools in case the service/repair activity has to be performed in an explosive hazardous atmosphere.

Sparking from External Impacts Warning

- Avoid impact on the aluminum nameplate material to eliminate the risk of thermite sparks. Only applicable if an aluminum nameplate is used.

Unintended Machine Movement Warning

- Unintended movement of the machine or mechanism may cause injury to the technician or bystanders.
- To protect against unintended movement, secure the machine or disable/disconnect the mechanism while servicing. Follow the manufacturer’s instructions for securing the machine.

Personal Safety Warning

- Protect yourself from injury. Use proper safety equipment, including safety glasses, at all times.

Hot Surfaces Warning

- The pump surface temperature may exceed 70°C [158°F] during operation and after system power-down.
- Precautions should be taken to prevent accidental skin contact.

Flammable Cleaning Solvents Warning

- Some cleaning solvents are flammable. To avoid possible fire, do not use cleaning solvents in an area where a source of ignition may be present

Fluid Under Pressure Warning

- Escaping hydraulic fluid under pressure can have sufficient force to penetrate your skin causing serious injury and/or infection. This fluid may also be hot enough to cause burns. Use caution when dealing with hydraulic fluid under pressure.
- Relieve pressure in the system before removing hoses, fittings, gauges, or components. Never use your hand or any other body part to check for leaks in a pressurized line. Seek medical attention immediately if you are cut by hydraulic fluid.

Products we offer:

- Cartridge valves
- DCV directional control valves
- Electric converters
- Electric machines
- Electric motors
- Gear motors
- Gear pumps
- Hydraulic integrated circuits (HICs)
- Hydrostatic motors
- Hydrostatic pumps
- Orbital motors
- PLUS+1® controllers
- PLUS+1® displays
- PLUS+1® joysticks and pedals
- PLUS+1® operator interfaces
- PLUS+1® sensors
- PLUS+1® software
- PLUS+1® software services, support, and training
- Position controls and sensors
- PVG proportional valves
- Steering components and systems
- Telematics
- Former Eaton Hydraulic Products
- **Hydro-Gear** **www.hydro-gear.com**
- **Daikin-Sauer-Danfoss** **www.daikin-sauerdanfoss.com**
- Danfoss Power Solutions is a global manufacturer and supplier of high-quality hydraulic and electric components.
- We specialize in providing state-of-the-art technology and solutions that excel in the harsh operating conditions of the mobile off-highway market as well as the industrial machines and marine sector.
- Building on our extensive application expertise, we work closely with you to ensure exceptional performance for a broad range of applications.
- We help you and other customers around the world speed up system development, reduce costs, and bring vehicles and vessels to market faster.
- Go to **www.danfoss.com** for further product information.
- We offer you expert worldwide support for ensuring the best possible solutions for outstanding performance.
- With an extensive network of Global Service Partners, we also provide you with comprehensive global service for all of our components.
- Vickers by Danfoss: One of the most experienced and respected names in hydraulics,
- Vickers® became part of Danfoss in 2021. Today, Vickers by Danfoss offers a comprehensive portfolio of field-proven industrial power and motion control components and systems, engineered to perform reliably even under the most extreme conditions.
- For more information and Vickers by Danfoss portfolio, visit **https://www.danfoss.com/VickersIndustrial**
- **Danfoss Power Solutions –** your strongest partner in hydraulics and electrification.

Local address:

- **Danfoss Power Solutions ApS Nordborgvej 81**
- **DK-6430 Nordborg, Denmark**
- **Phone: +45 7488 2222**
- **Danfoss Power Solutions**
- **(US) Company**
- **2800 East 13th Street**
- **Ames, IA 50010, USA**
- **Phone: +1 515 239 6000**
- **Danfoss Power Solutions II**
- **GmbH**
- **Dr. Reckeweg Strasse 1**
- **76532 Baden-Baden Phone: +49 (0) 7221 682 233**
- **Contact: info@danfoss.com**
- **Support: industrialpumpsmotorsupport@danfoss.com**
- Danfoss can accept no responsibility for possible errors in catalogs, brochures, and other printed material. Danfoss reserves the right to alter its products without notice. This also applies to products already on order provided that such alterations can be made without sub-sequential changes being necessary in specifications already agreed upon. All trademarks in this material are the property of the respective companies. Danfoss and the Danfoss logotype are trademarks of Danfoss A/S. All rights reserved.

Documents / Resources

	Danfoss PVM Variable Displacement Piston Pump [pdf] User Manual PVM Variable Displacement Piston Pump, Variable Displacement Piston Pump, Displacement Piston Pump, Piston Pump, Pump

References

- Engineering Tomorrow | Danfoss
- Engineering Tomorrow | Danfoss
- Hydro-Gear Drivetrain Solutions | Home
- Industrial Solutions | Industrial | Danfoss
- Industrial Solutions | Industrial | Danfoss
- User Manual