

# Operating and maintenance information for servopumps




conforming to Machine Directive 2006/42/EC

This operating and maintenance information applies to Atos Smart ServoPumps - SSP.  
It is intended to provide useful guidelines to avoid risks when the servopumps are installed in the hydraulic system.  
It contains important information on the safe and proper installation, commissioning, operation transport and maintenance of the products.  
Atos disclaims any liability for damage and / or injury to persons, animals or property resulting from the requirements contained in this document.  
The prescriptions included in this document must be strictly observed to avoid damages and injury.  
The respect of this operating and maintenance information grants an increased working life, trouble-free operation and thus reduced repairing costs.



## 1 SYMBOL CONVENTIONS

Following symbols are used in this documentation to evidence particular risks to be carefully avoided.  
In the following are listed the symbol conventions with their meaning, in case of non-compliance with this operating and maintenance information.

	<b>WARNING</b>	Death or serious injury could occur	risk classes to ANSI Z535.6 / ISO 3864
	<b>CAUTION</b>	Minor or moderate injury could occur	
<b>NOTICE</b>	Property damage could occur		
	Information to be observed		

## 2 GENERAL NOTES

This document is intended for machine manufacturers, assemblers and system end-users.

 **WARNING**  
**Personal injury and property damage may be caused by incorrect use of the products!**  
The products have been designed for use in industrial environments and may only be used in the appropriate way.

Before using Atos servopumps, the following requisites must be met to ensure appropriate use of the products:

- personnel who uses Atos servopumps must first read and understand the operating and maintenance information, particularly the Safety Notes in section [5](#).
- the products must remain in their original state, no modifications are permitted
- it is not permitted to decompile software products or alter source codes
- damaged or faulty servopumps must not be installed or put into operation
- make sure that the products have been installed as described in section [6](#) and [7](#)

## 3 CERTIFICATION

The servopump falls within the scope of Directive 2006/42/EC and it has been assessed to comply with the requirements set forth in Annex I of the Directive itself proceeding in accordance with Annex VIII implementing the provisions in the procedure "Internal control of production" by Atos.

The reference standards used in the performance of the verification of compliance are as follows:

### Machinery Directive (2006/42/EC)

EN60204-1: 2018 - Safety of machinery. Electrical equipment of machines. General requirements  
EN12100: 2010 - Safety of machinery - General principles for design - Risk assessment and risk reduction  
EN 809:1998+A1:2009/AC:2010 - Pumps and pump units for liquids — Common safety requirements

### EMC Directive (2014/30/EU)

EN61000-6-2: 2005 + AC:2005 - Electromagnetic compatibility - Part 6-2: generic standards - Immunity for industrial environment  
EN61000-6-4: 2007 + A1:2011 - Electromagnetic compatibility - Part 6-4: generic standards - Emission for industrial environment

### PED Directive (2014/68/EU)

Developed according clause 4.3 which applies to pressure equipment and assemblies below or equal to the limits set out in points (a), (b) and (c) of paragraph 1 and in paragraph 2 respectively, then designed and manufactured in accordance with the sound engineering practice of a Member State in order to ensure safe use.

#### 4 PRODUCT IDENTIFICATION EXAMPLES - nameplates

**Smart Servopump system nameplate (Left):**

- ① **SSP-T-SP-EH-1011-1015-022/DK/T 20 /PE**
- ② **Vn** 200V-10% + 480V+10% @ 45-65Hz  
**Pn** 15 kW  
**Tamb** 0 + 40 °C  
**Tfluid** -20 + 80 °C  
**Pmax** 280 bar  
**S/N** 0123456789  
**Year** 2023
- ③ **Warning:** read instruction manual before any operation

**Digital electronic drive nameplate (Right):**

- ④ **D-MP-T-SP-EH-022/K 20**
- ① **SSP-T-SP-EH-1011-1015-022/DK/T 20 /PE**
- ⑤ **INPUT**  
VOLTAGE 200V-10% + 480V+10% @ 45-65Hz  
CURRENT 26A  
SCCR max 5000Arms Sym
- OUTPUT**  
VOLTAGE 0+451V @ 0-500Hz  
CURRENT 22A  
OVERLOAD CURR. 44A
- FIELDBUS**  
EtherCAT
- ⑥ **UL CERTIFIED E408659**

Atos spa - Via alla Piana, 57 - 21018 Sesto Calende (VA), Italy

- ① Smart Servopump system code
- ② Smart Servopump system main data
- ③ Smart Servopump system serial number

- ④ Digital electronic drive code
- ⑤ Digital electronic main data
- ⑥ Digital electronic drive serial number

**Synchronous servomotor nameplate:**

- ⑦ **P/N SPFY000239**
- ⑧ **S/N 00000000**
- ⑨ **6000300069**
- ⑩ **PGI-2020/1D/PE**

**Synchronous servomotor main data:**

- ⑩ **PMM-T-2055-20-F**
- ⑪ **Feedback Sensor** S1 AT °C  
**Thermal Sensor** Ref. Temp 20°C  
**Fan** V<sub>fo</sub> V850Hz  
**Insulation class** F **IP** **CE** **UL**

Atos spa - Via alla Piana, 57 - 21018 Sesto Calende (VA), Italy

- ⑦ Pump serial number
- ⑧ Pump code
- ⑨ Pump internal code Atos
- ⑩ Pump rotation direction

- ⑩ Synchronous servomotor code
- ⑪ Synchronous servomotor main data

## 5 SAFETY NOTES

### 5.1 Intended use

Atos servopumps may only be operated under the environmental and operating conditions described in the servopumps technical tables.

### 5.2 Improper use

Any improper use of the components is not admissible.

Improper use of the product includes:

- use in explosive environments
- incorrect storage
- incorrect transport
- lack of cleanliness during storage and installation
- incorrect installation
- use of inappropriate or non-admissible fluids
- operation outside the specified performance limits
- operation outside the approved temperature range

Atos spa does not assume any liability for damage caused by improper use. The user assumes all risks involved with improper use.

### 5.3 Installation

Installation must be performed following the recommendations contained in the S-MAN-HW installation manual.

The personnel operating in places with a number known risks shall be trained and instructed in relations with the precautions, the behaviour, the operating procedures which are regulated by the law.



#### **WARNING: electrocution**

Install appropriate differential protection device upstream of the electrical panel.

It is forbidden to remove or tamper the guards and safety devices installed on the machine.

Do not use or do not open the machine, in the presence of water, before removing the power supply and liberated the area from the water. Do not use or do not open the machine, in the presence of flammable substance, before removing the power supply and liberated the area from the flammable substance.



#### **WARNING: emergency stop**

As a result of the risk analysis, the system shall be equipped with devices and guards to minimize possible risks to persons who may be in the vicinity of the equipment, that taking into account the reasonably foreseeable conditions of use.

Minimum requirements:

- Emergency pushbutton
  - it must be proof tested not less than 1 per year
  - it must not be muted
  - it must not be altered or modified



In case of emergency and only if the conditions let the operation to be safe, it is possible to obtain the arrest of the machinery by pressing the emergency stop button (design, erection and installation of the entire safety instrumented systems making emergency stop operations, as described below, is on charge to the user).

Pressing the button by the operator results in the immediate shutdown and isolation of the machinery. Activate the emergency button in all foreseeable conditions of risk (machine malfunctions, emergencies or accidents in the workplace).

In the event of activation of the emergency stop, before restoring the function of the system, check that:

- the emergency situation has been removed
- whether to ensure the integrity of the mixer
- the safety devices are in proper working



#### **WARNING: hot surface**

The electrical motor and drive considerably heats up during operation. Allow the electrical motor and drive to cool down sufficiently before touching it. During operation, touch the electrical motor and drive only by using protective gloves.

Please also observe ISO 13732-1 and EN 982.



#### **CAUTION:**

Use of the servopump outside the approved temperature range may lead to functional failures like overheating of the pump/electrical motor/drive. Only use the servopump within the specified ambient and fluid temperature range.



#### **CAUTION: pressurized systems**

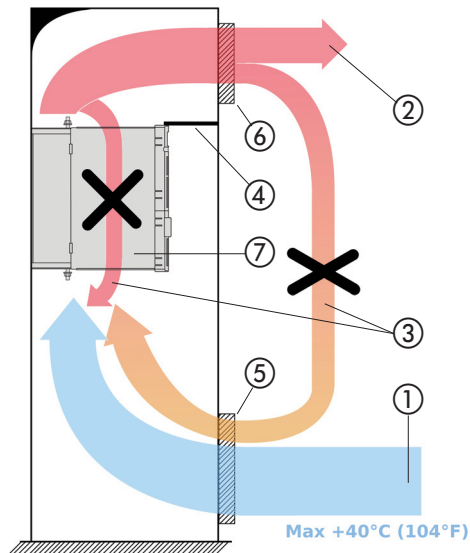
When working at hydraulic systems with stored energy (accumulator or cylinders working under gravity), servopump may even be pressurized after the hydraulic power supply has been switched off.

During assembly and disassembly works, serious injury may be caused by a powerful leaking of hydraulic fluid jet.

Ensure that the whole hydraulic system is depressurized and the electrical control is de-energized.

**WARNING: drive cooling**

Provide sufficient air ventilation to remove the heat generated by the drive and by other components as reported in the user manual.



- ① Cabinet input air flow
- ② Cabinet output air flow
- ③ Unattended air flow
- ④ Air baffle
- ⑤ Cabinet input air cooling filter
- ⑥ Cabinet output air cooling filter
- ⑦ Drive

**WARNING: motor cooling**

The motor must be fitted in such a way that heat loss can be adequately dissipated. Do not impede free ventilation of motors.

**NOTICE: disconnection and connection of plug-in connectors**

Do not plug-in or disconnect the electric connector as long as the voltage supply is ON.

**NOTICE: impact**

Impact or shock may damage the servopumps. Never use the servopumps as step.

**NOTICE: dirt and foreign particles**

Penetrating dirt and foreign particles lead to wear and malfunctions of the servopumps.

During assembly, be careful to prevent foreign particles such as metal chips getting into the pump or into the hydraulic system.

**Environmental protection**

Hydraulic fluids are harmful to the environment.

Leaking hydraulic fluid may lead to environmental pollution.

In case of fluid leakage immediately act to contain the problem.

Dispose of the hydraulic fluid in accordance with the currently applicable national regulations in your country.

## 6 HYDRAULIC AND MECHANICAL INSTALLATION

### 6.1 Commissioning

It must be possible for the pump to be started without load.

During initial system checkout, it is absolutely necessary to bleed the pressure line.

After bleeding the pump, the pressure control valve (present on the optional manifold available with options /C or /D, otherwise it's on customer behalf) must be secured against being readjusted.

Prior to switching off the pump, the load must be unpressurized.

After some operating hours, check the filter and oil temperature.

### 6.2 Fluid conditioning

A high-performance system must be thermally conditioned to ensure a limited fluid temperature excursion (generically between 40°C and 50°C) so that the fluid viscosity remains constant during operation.

The machine working cycle should start after the prescribed temperature has been reached.

### 6.3 Air bleeds

On commissioning the pump, it is absolutely necessary to carry out sufficient bleeding of pressure control valves so that the pump does not run dry, get overheated or breaks down early due to lack of oil. The system has to be bled until no cracking noise or formation of foam can be determined any more.

### 6.4 System flushing

In order to obtain the required minimum cleanliness level, the hydraulic system must be flushed for a sufficient time.

A decisive factor for the flushing time is the contamination level of the hydraulic fluid which can only be determined by means of a particle counter. During the flushing procedure, perform a frequent monitor of the filters clogging indicator, replacing the filter elements when required.

### 6.5 Hydraulic fluids and operating viscosity range

Mineral oils type HLP having high viscosity index are recommended.

The hydraulic fluids must be compatible with the selected seals.

The type of fluid has to be selected in consideration of the effective working temperature range, so that the fluid viscosity remains at the optimal level.

Hydraulic fluid	Classification	Ref. Standard
Mineral oils	HL, HLP, HLPD, HVLP, HVLDP	DIN 51524

**Fluid viscosity:** 10 ÷ 300 mm<sup>2</sup>/s - cold start max 2000 mm<sup>2</sup>/s



**CAUTION: easily inflammable hydraulic fluid**

In connection with fire or other hot sources, leaking hydraulic fluid may lead to fire or explosions.

### 6.6 Filtration

The correct fluid filtration ensures a long service life of the pumps and it prevent anomalous wearing or sticking.



**CAUTION**

Contamination in the hydraulic fluid may cause functional failures e.g. jamming or blocking of the pump. Ensure adequate hydraulic fluid cleanliness according to the cleanliness class required for the pump.

**Max fluid contamination level**, see also filter section at [www.atos.com](http://www.atos.com) or KTF catalog:

- normal operation: ISO4406 class 20/18/15 NAS1638 class 9
- longer life: ISO4406 class 18/16/13 NAS1638 class 7

### 6.7 Drive fastening

Proceed with the drive installation observing the minimum distances around it.

Fix the drive to the wall by means of fixing screws (for screws size see related technical table).

### 6.8 Motorpump group fastening

Fix the motorpump group using the motor's feet (for screws size see related technical table).

Use vibration Dampers to absorb rotational vibrations.

Install the motorpump in horizontal position only, possibility with pump inlet under the oil level.

## **7 ELECTRICAL INSTALLATION**

### **7.1 Power supply**

Following additional notes have to be considered:

- Remove the D-MP drive from its packaging only in a protected working area
- Switch-off power supply before any wirings operation (wait at least 8 minutes for the capacitors to discharge)
- During the system start-up, verify electrical noise level and apply protection to avoid reference signals interference from electrical noise
- Use protection fuse on power supply line: see user-manual for fuses size
- Use inductance on power supply line. The 3-phase inductance is used to reduce the current peaks on the diode bridge DB and the effective value of the current through the capacitors. It is also used to reduce interference from the supply line to the drive and from the drive to the line: see user-manual for inductance type
- The power mains to which the drive is connected must meet the technical specifications (see technical specifications data) and fulfill the requirements of the laws in force in the country of use
- The manufacturer disclaims all liability for faults or malfunctions of the Atos drive due to voltage fluctuations beyond the tolerances specified by the electricity distribution authority (voltage  $\pm 10\%$ ).

#### **Drive power supply (L1, L2, L3)**

The drive must be connected to the main power supply trough terminals L1, L2, L3 and with the ground cable connected to the PE stud. The drive must be wired steadily through appropriately sized cables: see the relevant technical table for wire size.

#### **Motor power supply (U, V, W)**

The PMM motor must be connected to terminals U, V, W of the drive with the ground cable connected to the PE stud. In sizes from 090 to 140 pass the motor three-phase through the present toroid inside, without shield and ground. Always use cables of appropriate size. Atos recommends to use an inductance between the drive and the motor. With cables longer than 50 meters, the inductance is obligatory.

### **7.2 Electrical wiring**

Any type of electrical material (cables, sockets, plugs and so on...) used to make the connections must be suitable for use, must bear the "CE" marking if it is subject to the low voltage directive 2014/35/EU and must comply with the requirements of the laws in force in the country where the drive is used.

Connect the motor by means of shielded or armored cables only and ground the shield on the drive side as well as on motor side. If shielded cables cannot be used, the motor cables should be placed in a metallic raceway connected to ground.

Use recommended shielded cable size for logic connection:

1,5 mm<sup>2</sup> max 30 m for 24VDC power supply and relay digital output; 0,5 mm<sup>2</sup> max 30 m for logic

### **7.3 Ground connection**



All conductive parts of the servopump assembly are equipotential: in case they are adopted, do not remove any wire intended to equalize the conductive parts (for example do not remove wires connecting metalling parts of the assembly, if any screw, bolts, etc). If necessary, in order to bond the assembly to the local structures, install and user shall adopt technique to equalize potentials of all conductive parts.

#### **Grounding the drive**

The leakage current is the current that the drive discharges towards the ground (earth) connection.

The amount of such current depends on the voltage, the PWM frequency and the parasitic capacity to ground the motor and connection cable. Also the noise filters, if any, are likely to increase the amount of leakage current.

If an RDC (Residual Current Device) is installed, the drive will work without false input as long as:

- a type B RDC is being used
- the RDC release limit is 300 mA (TT or TN systems)
- each RDC powers only one drive
- the output cables are shorter than 50 m (screened) or 100 m (unscreened)



The RDC used must supply protection from the direct current components present in the fault current and must be suitable for suppressing current peaks quickly. We recommend protecting the drive separately using fuses, and observing the regulations of the individual user countries.



Always make sure that the Atos drive is disabled before disconnection from the motor.



This drive cannot work unless the protection conductor is steadily grounded (earthed).

#### Power and protection cables size - IEC specifications

Drive type	Servomotor type	Drive power cables	Servomotor power cables	Drive, servomotor power cables and braking cables tightening torque	Protection cables	Protection cables tightening torque	Power cables max length
		[mm²]	[mm²]	[Nm]	[mm²]	[Nm]	[m]
		L1 , L2 , L3	U , V , W	L1 , L2 , L3 U , V , W + , F	PE	PE	L1 , L2 , L3 U , V , W
D-MP-*-022	PMM-*-1009	6	6	1,7	6	8,5	50
D-MP-*-032	PMM-*-1015	10	10	1,7	10		
D-MP-*-046	PMM-*-1024	16	16	3,8	16		
D-MP-*-060	PMM-*-1032	25	25	3,8	16		
D-MP-*-090	PMM-*-2042	50	50	15 - 20	35	15 - 20	
D-MP-*-100	PMM-*-2055	70	70	15 - 20	35		
D-MP-*-140		70	70	15 - 20	50		
D-MP-*-165	PMM-*-2080	95	95	25 - 30	70	25 - 30	
D-MP-*-210	PMM-*-2100	95	95	25 - 30	70		

#### Power and protection cables size - UL specifications

Drive type	Servomotor type	Drive power cables	Servomotor power cables	Drive, servomotor power cables and braking cables tightening torque	Protection cables		Protection cables tightening torque	Power cables max length
		[AWG / kcmil]	[AWG / kcmil]	[Lbin-in]	[AWG]		[Lbin-in]	[ft]
		L 1 , L2 , L3	U , V , W	L1 , L2 , L3 U , V , W + , F	PE [UL]	PE [CSA]	PE	L1 , L2 , L3 U , V , W
D-MP-*-022	PMM-*-1009	AWG 8	AWG 8	15	10	10	75	164
D-MP-*-032	PMM-*-1015	AWG 6	AWG 6	15	8	10		
D-MP-*-046	PMM-*-1024	AWG 3	AWG 4	40	8	8		
D-MP-*-060	PMM-*-1032	AWG 2	AWG 3	40	8	8		
D-MP-*-090	PMM-*-2042	AWG 1	AWG 1	132.3-177	6	6	133-177	
D-MP-*-100	PMM-*-2055	AWG 1/0	AWG 1/0	132.3-177	4	4		
D-MP-*-140		AWG 4/0	AWG 4/0	132.3-177	4	4		
D-MP-*-165	PMM-*-2080	250 Kcmil	250 Kcmil	221.3-265.5	3	3		
D-MP-*-210	PMM-*-2100	350 Kcmil	350 Kcmil	221.3-265.5	3	3		

#### 7.4 Suppression of interferences by electrical noise

When starting the system, it is always advisable to check that feedback, references signal are free from interferences and electrical noise which can affect the characteristics of the signals and generate instability in the whole system.

Electrical noises can be suppressed by shielding and grounding the signal cables, see section [8](#).

Most of electrical noises are due to external magnetic fields generated by transformers, electric motors, switchboards, etc.

### **8 SHIELD CONNECTION**

The correct shielding of signal cables has to be provided to protect the electronics from electrical noise disturbances, which could affect the servo-pumps functioning.

In general following basic rules should be observed:

- use shielded wirings to avoid electromagnetic noise: it is an essential part of the EMC protection from the noises that could otherwise bring disturbance through the signal and power supply connections.
- power supply cables and signal cables should be routed in separate cable conduits.
- connect cable shield at PLC/machine side and leave the other end (drive side) open to prevent ground loops
- if possible, connect shields to a protected earth (a noise-free connection with a different path from safety earth and power supply ground); it is just designed to connect command signals ground, cables shields and all other noise sensitive devices
- verify that all the ground/earth points are equipotential otherwise position and dimension of the connections must be checked
- earth connection of the drives is available on drive case; take care to the correct earthing also of the motor
- in case of high noise levels, use additional shields and filters to allow the correct working of the electronic drive

Refer to the applicable international standards for details about the shielding criteria.

## 9 MAINTENANCE



Maintenance must be carried out only by qualified personnel with a specific knowledge of hydraulics and electrohydraulics

### 9.1 Ordinary maintenance

- If Atos pumps are operated properly according to the permissible technical specifications and the operating fluid is properly filter within the max contamination level, they excel by an extremely long operating life.
- To intercept any sign of incipient wear, it must be monitored: increase the pump's running noise, increase of temperature differences of operating fluid between the pump's inlet and outlet with determined amount of cooling water
- Results of maintenance and inspection must be planned and documented
- Follow the maintenance instructions of the fluid manufacturer
- Atos Electrical motors are foreseen with ball bearings prelubricated for their life with maintenance free. Check anyway their temperature and vibrations every 2000 hours operation.
- Cleaning the external surfaces using a wet cloth to avoid accumulation of dust layer
- Don't use compressed air for cleaning to avoid any dangerous dust dispersion on the surrounding atmosphere
- Any sudden increment in temperature requires the immediate stop of the system and the inspection of the relevant components

### 9.2 Repairing

In case of incorrect functioning or beak-down it is recommended to send the servopumps back to Atos or to Atos authorized service centers which will provide for the reparation.

Unauthorized opening of the servopumps during the warranty period invalidates the warranty.

### 9.3 Transport

Check the motor-pump unit carefully to make sure it has not undergone any damage during transport. For transport, use only lifting eyes if they are present on the motor pump.

Do not use lifting eyes if the temperature is lower than -20°C .

Do not add any additional load.



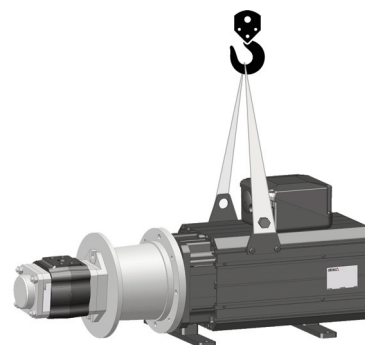
As motors contain permanent magnets, avoid closeness to people who have internal medical devices (e.g. pace-maker) or to material that can be damaged by magnetic fields.

If motor pumps are stored, make sure that they are kept in a dry, dustfree and without vibrations environment. Measure the insulation resistance before putting the motors into operation for the first time. Dry out the winding if the insulation resistance is lower than 2MΩ.

The packaging that contains the drive should be lifted with utmost care.



Manual handling of the package must be carried out in compliance with the regulations on "manual handling of loads", to avoid unfavourable ergonomic conditions that involve risks of back or lumbar injury.



### 9.4 Storage

Servopumps are boxed using a VpCi protective packing system, offering best protection to oxidation during components sea transport or long storage in humid environments. For the servopump transporting and storing always observe the environmental conditions specified in the relevant technical tables. Improper storage may damage the product.

The servopump can be stored for up to 12 months under the following conditions:

	Motorpump group	Drive
Temperature	0°C ÷ +40°C	-10°C ÷ +60°C
Humidity	+5 ÷ +90 %	+5 ÷ +90 %
Condensation	NO	NO

- Do not store the servopumps outdoors
- Protect the servopumps against water and humidity in case of storage in open air
- Store the servopumps in the shelf or on a pallet
- Store the servopumps in the original packaging or comparable packaging in order to protect them from dust and dirt
- Remove the plastic covers from the pump pressure and suction connectors only before the assembly



Every 6 months or 1 year the regeneration of Drive is necessary: see the user manual for the complete procedure