



**INSTRUCTIONS 1076 e**

Section	
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Original instructions

***Additional instructions  
for ATEX certified equipment  
Pumps and pumping units  
S series***



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# ECCENTRIC PISTON PUMPS

## MOUVEX PRINCIPLE

### ADDITIONAL INSTRUCTIONS FOR ATEX CERTIFIED PUMPS AND PUMPING UNITS

### MODELS : Pumps and pumping units S Series

The following instructions must be read at the same time as:

1. standard NF C 15 100,
2. standard NF EN 60 079-14 (electric installations in explosive gaseous atmospheres),
3. standard NF EN 60 079-17 (inspection and maintenance in dangerous locations),
4. rulings, orders, laws, directives, circulars for application, standards, professional practices and any other document related to its place of installation.

We disclaim any responsibility in the case of non-conformity with these documents.

**This manual is an addition to our general manual.**

For equipment other than the pump (probe, motor, etc.), the instructions in this manual are intended to help during assembly, but shall in no way replace the specific instruction manuals of equipment manufacturers. These specific instruction manuals must be read before assembling the equipment.

The equipment must be installed by qualified, skilled and authorised personnel.

Our equipment is labelled CE by virtue of directive ATEX 2014/34/EU.

It is designed for use in explosive atmospheres from 0,8 bar to 1,1 bar and temperatures from -20°C to +40°C and for the gas groups and zones below :

- gas group IIB
- category 2G or 2GD or 3G or 3GD
- zone 1, 21, 2 or 22

Check the compatibility between the informations on the rating plate, the explosive atmosphere present, the area of use and the ambient and surface temperatures.

According to the directive 2014/34/EU, the accessories or (and) components assembled and equipping the motors of our pumps must have a standard CE declaration of inspection.

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# 1. CATEGORY 2 AND 3 CERTIFICATION FOR MOUVEX PUMPS AND UNITS

## 1.1 Pumps and units S2C and S4C

MOUVEX S2C and S4C pumps and units carry category 2 certification (high level of protection). They are, therefore, obviously suited to category 3 uses (standard level of protection).

Unless otherwise indicated, the recommendations contained in these Instructions apply to the equipment in categorie 2.

## 1.2 Pumps and units S6C

MOUVEX S6C pumps and units carry category 3 certification (standard level of protection).

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## 2. TABLE OF PUMP CHARACTERISTICS

	S2C	S4C	S6C
Max. flow (m <sup>3</sup> .h <sup>-1</sup> )	1,5	4,8	12
Acceptable continuous max. speed (rpm)	900	750	550
Maximum suction pressure acceptable (bar)	3	3	3
Acceptable maximal differential pressure (bar)	6	6	6
Maximum temperature of cleaning product (°C)	121		
Maximum temperature of product pumped (°C)	80		

Minimum running temperature : See pump Instructions manual.

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## 3. REPLACEMENT OF PARTS

### 3.1 Pumps

MOUVEX pumps parts can only be replaced by MOUVEX parts corresponding to the original configuration of the pump.

Failure to these instructions results a modification of the pump's characteristics and its ATEX certification will no longer be applicable.

All operations on MOUVEX ATEX equipment must be carried out by MOUVEX personnel or by personnel specifically authorised to carry out such operations.

Non-conformity with this rule will result in the loss of the MOUVEX ATEX pump certification.

### 3.2 Pumping units

MOUVEX pumping unit equipment must only be replaced by equipment with a level of protection that is at least equivalent to that of the pumping unit.

Incorporation and use in the pumping unit must not change the compliance thereof with the essential requirements of Directive 2014/34/EU.

Non-conformity with these rules will result in the loss of ATEX MOUVEX certification for the pumping unit.

## 4. TEMPERATURE CLASS OF PUMPS AND PUMPING UNITS

### 4.1 Pumps

Pumps are devices whose surface temperatures greatly depend on the products they pump.

Thus the temperature classifications of MOUVEX pumps are obtained with the temperature limits of the product pumped :

#### Maximum temperature of the product pumped

Temperature class	T5	T4
<b>S series :</b> S2C - S4C - S6C	60°C	80°C

Any overshooting of the maximum temperature of the product pumped is considered as abnormal operation of the pump, that can lead to surface temperatures higher than the classification temperature T for which the pump is certified.

The user of the pump must ensure that the temperature of the product pumped must never exceed the maximum temperature specified. This can be done, for example, by using a pump shutdown control device.

This device must conform to current regulations and standards especially with regulation related to electric equipment in explosive atmosphere (EN 50495...). The choice of its characteristics (temperature resistance, category, etc.) must guarantee a level of protection at least equal to that of the pump.

S Series pumps can be cleaned in place using a cleaning product (see instructions of the pump). During this cleaning operation, the operating temperatures of the pump are directly influenced by the temperature of the cleaning product circulating in the pump.

#### Maximum temperature of the cleaning product

Temperature class	Pump stopped		Pump in operation	
	T5	T4	T5	T4
<b>S series :</b> S2C - S4C - S6C	90°C	121°C	60°C	80°C

### 4.2 Pumping units

The temperature classification of the pumping units depends on the temperature classification of all equipment making up the pumping unit ; the one enforced is that of the element with the most restrictive classification.

Example : A pumping unit with T3 motor, a T6 pressure switch and a T4 pump will have a T3 temperature classification.

## 5. OPERATION WITHOUT ANY PUMPED PRODUCT

Pumps using the MOUVEX principle, S series, can be run dry, without any pumped product in the pump, throughout the pump priming time without causing the temperature to exceed the temperature classification (for example during the priming or emptying of pipes). However, this is allowed only on condition that the following restrictions are complied with :

Internal explosive atmosphere at the pump	Temperature class	Authorized operation
No	T4	Yes, within the limits specified below
	T5	No
Yes Ignition temperature > 160°C	T4	Yes, within the limits specified below
	T5	No
Yes Ignition temperature < 160°C	All	No

### 5.1 Operating limits without any pumped product

- Pump showing no presumed failure (absence of abnormal behavior of the pump, as drop in flow rate / pressure, abnormal noise...).
- Temperature of the external surfaces of the pump at start-up less than 40°C,
- Differential pressure when the pump works without the pumped liquid limited to 3 bar,
- Operating time without pumped product (dry running) not exceeding the value defined below.

#### Maximum running time without any pumped product

Temperature class	Duration
T4	6 min

This duration may be spread over several operating periods spaced at least 15 minutes apart. Any operation for longer than this period will entail detailed inspection of the equipment and possibly disassembly of it to ensure that the previous operation did not lead to any additional ignition risks (particular attention will be paid to the fact that even though the external temperatures of the pump comply with the limits defined above, the inside surfaces can nonetheless be at high temperatures).

It is strictly forbidden to operate the pump without observing these recommendations.

The user must evaluate his installation and list all possible situations in which it functions without pumped product and take the necessary steps to ensure compliance with the operating limits.

The situations involving operation without pumped fluid can for example be the following :

- priming of the pump,
- draining the pipes,
- interruption of pump feed (tank empty),
- suction pipe blocked (valve, filter fouled, etc.)
- air block at suction,,
- ...

This can for example be checked by an operator ensuring that the applications dependent on the pump are working or that the physical values dependent on the presence of liquid (flow, pressure, torque, etc.) correspond to those expected.

These control measures can be automated by using a pump shutdown control device.

This device must conform to current regulations and standards especially with regulation related to electric equipment in explosive atmosphere (EN 50495...). The choice of its characteristics (temperature resistance, category, etc.) must guarantee a level of protection at least equal to that of the pump.

#### REMINDER :

**In case of pump presumed failure, the pump must not be operated without pumped product. Consequently, the pipe must not be drained by the pump.**

## 6. DISCHARGE PRESSURE RELIEF

Any overshoot of the maximum allowable pressures is considered to be abnormal pump / pumping unit operation which can lead to surface temperatures in excess of the pump / pumping unit temperature classification, as well as risks to the user and/or the installation.

To avoid these risks, the user must equip the pump / pumping unit with a pressure limiter with a threshold chosen according to the lowest allowable maximum pressure for the circuit components (including head losses).

### 6.1 Pumping units equipped with an integrated relief valve

Since the pressure relief is incorporated in the elements of the pumping unit, the product is recirculated directly from the discharge pipe to the suction pipe.

The short length of the recirculation circuit means that if the pump operates with a blocked discharge port, the outer surfaces of the relief valve can reach very high temperatures in a short time.

For these reasons, a temperature limiter device can be necessary to respect the temperature classification, depending on equipment category and its use (see board below).

The temperature limiter device has to :

- be installed in emplacement provided for this purpose <sup>a</sup>,
- cut the power supply to the pump and control any safety measures required by the installation,
- be conform to current regulations and standards especially with regulation related to electric equipment in explosive atmosphere (EN 50495...),
- have a level of protection against explosions equivalent or higher than that of the pumping unit,
- have a level of integrated safety adapted to the material category and the type of the relief valve using (see board below).

Type of the relief valve using <sup>b</sup>	Protection		Regulation	
Pumping unit category	3	2	3	2
Temperature limiter device required	no	yes	yes	yes
Level integrated security required	-	neither	neither	SIL 1

The activation threshold of the temperature limiter device should be selected to ensure that the temperatures at controlled locations do not exceed the values given below.

Setting of the activation threshold should take into account the precision of the temperature limiter device.

Example : to a precision of  $\pm 5K$ , activation threshold in temperature class T4 should be set to  $125 - 5 = 120^{\circ}C$ .

Temperature class	Maximum detection threshold of the temperature limiter device
T5	95°C
T4	125°C

### NOTICE :

The temperature limiter device installed on the integrated relief valve is not designed to control pump surfaces temperature as required in the section TEMPERATURE CLASS OF PUMPS AND PUMPING UNITS, but to be triggered when a malfunction could raise the temperature of the relief valve surfaces to a level higher than what is acceptable for the ATEX area. The temperature of pump surfaces must be checked using a device that is separate from the temperature limiter device installed on the relief valve.

### 6.2 Pumps and pumping units without an integrated relief valve

#### 6.2.1 Protection by pressure switch

Protection may be provided by installing a pressure switch that stops the equipment in the event of over-pressure.

This device must conform to current regulations and standards especially with regulation related to electric equipment in explosive atmosphere (EN 50495...). The choice of its characteristics (temperature resistance, category, etc.) must guarantee a level of protection at least equal to that of the pump / pumping unit.

#### 6.2.2 Protection by external relief valve

Over-pressure protection can be provided by installing an external relief valve with return to the tank / suction pipe.

In this case, the user must ensure that the circuit complies with the recommendations of § CLOSED-CIRCUIT OPERATION.

We also recommend checking that heating on the relief valve remains compatible with the temperature classification of the zone in which it is installed.

<sup>a</sup> See pumping unit overall dimensions

<sup>b</sup> Types of the relief valve using :

**Protection** : protection of the pump against accidental and non-repetitive over pressures. The relief valve cannot also fulfil a control role.

**Pressure control** : controlling the pressure / flow on the application (e.g. : control of the flow of the pump without returning to the tank or speed control). The relief valve can also fulfil a protective role.

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## **7. CONTROLLING THE ROTATION SPEED**

Any overshoot of the maximum allowable speed is considered to be abnormal pump operation which can lead to surface temperatures in excess of the pump temperature classification, as well as risks to the user and / or the installation.

At first start-up or after any modification to the pumping unit or its settings, the pump rotation speed must be checked to ensure that it remains below or equal to that defined for the application.

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## **8. CLOSED-CIRCUIT OPERATION**

Closed-circuit operation with small volumes of pumped product can lead to significant heating of the pumped product.

The user must check that the recirculation circuit is large enough to ensure that the pumped product temperature rise remains below the temperature limits of all circuit elements.

This check can for example be carried out by installing a temperature sensor controlling shutdown of the installation if the maximum allowable values are exceeded.

This equipment must conform to current regulations and standards especially with regulation related to electric equipment in explosive atmosphere (EN 50495...). The choice of its characteristics (temperature resistance, category, etc.) must guarantee a level of protection at least equal to that required by the area where it will be installed.

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## **9. SOLVENTS NOT COMPATIBLE WITH SEALS**

The user must ensure that the seals equipping the pump / pumping unit are compatible with the product pumped and products used to clean the pump / pumping unit.

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## **10. RISKS OF EXOTHERMIC REACTION**

When the pump / pumping unit is operated successively on different products, the user must make the necessary arrangements to avoid heating through an exothermic reaction between the various products pumped.

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## **11. PROTECTION AGAINST FOREIGN BODIES**

The user will take the necessary steps to protect the installation against ingress of any foreign bodies that could damage the pump / pumping unit, for example by ensuring that neither the pumped product nor the piping contain foreign bodies liable to damage the pump / pumping unit, or by installing an appropriate suction filter.

If the pump is operated without pumped product, particular attention must be given to the risk of sparks and hot surfaces generated by friction between foreign bodies and the inner surfaces of the pump / pumping unit. This must be assessed prior to any use of the pump without pumped product.

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## 12. MAINTENANCE

### 12.1 Pump

Excessive wear of pump parts is considered to be abnormal pump operation which can lead to surface temperatures in excess of the pump temperature classification, as well as risks to the user and / or the installation.

#### 12.1.1 Lubrication

Lubrication of S Series transmission is guaranteed over transmission lifetime and does not require any particular maintenance.

#### 12.1.2 Friction parts

Inspection intervals of friction parts are highly dependent on conditions of service, they should be defined according to the application.

##### Cylinder and piston

The user must check that the wears on cylinder and piston remain below the maximum allowable values defined in the Instructions supplied with the pump.

#### 12.1.3 Transmission

The user must ensure compliance with replacement intervals defined below :

Pump	Speed $\Omega$	Replacement interval
<b>S2C</b>	$675 < \Omega \leq 900$	4300 hours *
	$450 < \Omega \leq 675$	8600 hours *
	$225 < \Omega \leq 450$	12900 hours *
	$\Omega \leq 225$	17200 hours *
<b>S4C</b>	$563 < \Omega \leq 750$	4300 hours *
	$375 < \Omega \leq 563$	8600 hours *
	$188 < \Omega \leq 375$	12900 hours *
	$\Omega \leq 188$	17200 hours *
<b>S6C</b>	$413 < \Omega \leq 550$	4300 hours *
	$275 < \Omega \leq 413$	8600 hours *
	$138 < \Omega \leq 275$	12900 hours *
	$\Omega \leq 138$	17200 hours *

\* or two years

These intervals have been defined for normal operating conditions (respecting operating limits and avoiding for instance cavitation or over pressures).

They do not replace a visual inspection with a periodicity defined by user and based on its operating experience.

#### 12.1.4 Alignment

After any maintenance on the pump, pump and gear motor alignment must be controlled.

### 12.2 Pumping unit

#### 12.2.1 General

Maintenance of the equipment making up the pumping unit will be carried out in accordance with instructions provided by the manufacturer.

#### 12.2.2 Maintenance of electrical equipment

Before performing any maintenance on electrical components (engine, control box, safety elements, control and protection of the pump, etc.) you should :

- Refer to the technical documentation accompanying the equipment,
- Respect the safety instructions and, especially, do not open when live.

During maintenance operations :

- Check the cable glands, tighten the glands, terminals and other connections,
- When closing electrical components, check the lubrication and cleanliness of the mating surface(s).

#### 12.2.3 Alignment

After any maintenance on the pumping unit, pump and gear motor alignment must be controlled.

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## 13. POSSIBLE LEAKS OF THE PUMPED PRODUCT

Possible leaks of liquid via the pump / pumping unit seals or mechanical seals do not lead to additional risks of fire provided that the explosive atmosphere surrounding the equipment corresponds exactly to the type of atmosphere for which it was selected.

Make sure to check that when coming into contact with the atmosphere surrounding the pump or with material located near the pump / pumping unit, the pumped products do not risk to modify the classification of the area where the equipment is located.

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## 14. PAINT

### 14.1 Pumps

If the painting on the pumps is retouched, the user must make sure that the recommendations of standard EN 13463-1 are being complied with regard to non-conductive coatings on metal surfaces (total thickness of non-conductive coating not exceeding 2 mm for group IIA and IIB gas and vapours or 0,2 mm in the case of group IIC gas and vapours).

To do this, it may be necessary to sand the pump before doing any paint retouches.

### 14.2 Pumping units

During any possible paint touch-up operation of the pumping unit's elements, the user must ensure compliance with the recommendations contained in the specific instructions from the equipment manufacturers.

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## 15. DUST

To prevent any risk of dust igniting, the user must check that the layer of dust on the pump / pumping unit is no more than 5 mm thick.

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## 16. PUMP DRIVE

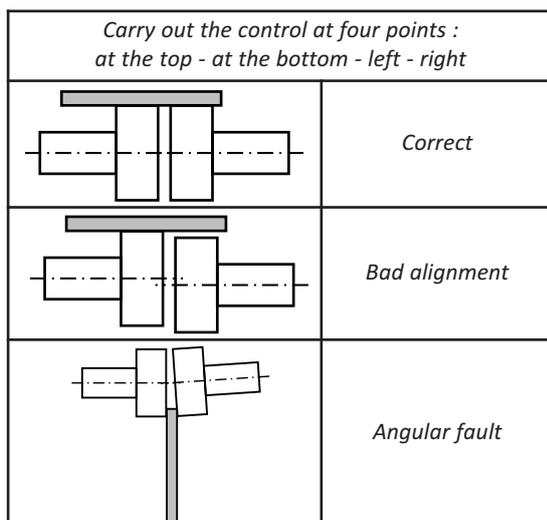
### 16.1 Alignment of the pump and drive

To carry out alignment of the pump and drive, use a perfectly straight steel rule to control misalignment and feeler gauges for angular misalignment.

It is important to control the alignment of each step of the installation in order to ensure that none of the steps lead to stresses on the unit or the pump :

- after fastening on the foundations,
- after fastening the piping,
- after the pump has operated at normal operating temperature.

An alignment control should be performed every 6 months. The following three figures show the various faults that could be encountered. The allowable misalignment values are stated in the Instructions supplied with the coupling.



**REMINDER :**

A flexible coupling does not avoid to do a good alignment.

### 16.2 Elastic coupling

ATEX certified elastic coupling must be used. This coupling must have a level of protection equivalent or better than that of the pumping unit. For mounting the elastic coupling, follow the indications in the specific Instructions of the equipment manufacturer.

### 16.3 Electric installation of the pump motor or gear motor

Check that the indications on the pump rating plate and the supply voltage match.

Follow the indications in the specific Instructions of the equipment manufacturer to connect the motor to the mains supply.

Refer to the wiring diagram, use wiring adapted to the power and ensure that the contacts are tightened vigorously.

Motors must be protected by circuit breakers and fuses provided in the manufacturer's Instructions.

Connect the regulatory earthing connections.

Start the pump up empty to check that the connections are correct and check that the direction of rotation corresponds well with the direction of suction and discharge of the installation.

### 16.4 ATEX characteristics of the pump motor or gear motor

The motor or gear motor used must conform to current regulations and standards especially with regulation related to electric equipment in explosive atmosphere.

The level of protection selected has to be equal to or greater than that of the pumping unit. For instructions on maintenance of motor and gear motor, follow the indications in the specific Instructions of the equipment manufacturer.

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## 17. EARTHING CONNECTION

To avoid the risk of ignition due to electrostatic discharge, the pump and the pumping unit must be grounded.

Particular attention should be given to earthing connection for the pumping units mobile or mounted on truck.

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## 18. DIRECT SUNLIGHT EXPOSURE

A direct exposure of the pump / pumping unit to the radiance of the sun is likely to increase the temperature of their surface above ambient temperature.

As a result of fact, the User must take sure that the pump / pumping unit is not displayed in the direct radiance of the sun or the temperature of the external surfaces of the pump is compatible with its level of protection.

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## 19. PUMP MARKING

The marking of the S series pumps is as follows :

MOUVEX F89 AUXERRE

Ppe S + Short description of the pump

**S2 - S4C :**

 II 2GD or 2G or 3GD or 3G c II B T5 or T4

**S6C :**

 II 3GD or 3G c II B T5 or T4

Serial no.

Year

INERIS 02 ATEX 3007 X

The marking of the S series pump units is as follows :

MOUVEX F89 AUXERRE

Gpe S + Short description of the pump unit

**S2 - S4C :**

 II 2GD or 2G or 3GD or 3G c II B T5 or T4

**S6C :**

 II 3GD or 3G c II B T5 or T4

Serial no.

Year

INERIS 02 ATEX 3007 X

In the case of a MOUVEX pumping unit :

- the pump marking is removed and replaced by the pumping unit marking. This marking takes into account all the components of the pumping unit at its delivery,
- all other ATEX-certified components in the pumping unit retain their marking.