



IMO<sup>®</sup>

## Additional Instructions for 3-Screw and CIG Gear Pumps in Gas Explosive Atmospheres

### ATEX



#### WARNING

These instructions should be read thoroughly by all personnel involved with pump operation prior to pump installation, operation or maintenance.

Manual No. SRM00092

Rev. 04 (20-0182)

July, 2020

Notes: These additional instructions apply to applications where Pumps have evaluated for use in potentially explosive atmospheres according to Directive 2014/34/EU (ATEX) and are only valid Together with Safety and Operation Manual (SRM00100), the Installation, General Maintenance and Troubleshooting Manual (SRM00101), and the individual maintenance instructions manual for the Particular pump series.

Operating data, dimensions and other additional information are contained in the order specific section of the documentation.

Keep these additional instructions in the vicinity of pump

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# 1. For Your Safety:

Pump is manufactured in accordance with latest state-of-the-art safety regulations. However, danger to life and limb of user and third parties and damages to pump can arise during operation. To ensure optimal and safe operation of pump, maintenance must be carried out by appropriately qualified expert personnel. Work on electrical equipment must be carried out by authorized electricians in accordance with respective national standards and electrical technology guidelines.

## 1.1 Proper Use:

Never operate with water. Pump is designed for liquids having general characteristics of oil. It is not suitable for pumping chemically corrosive fluids.

## 1.2 Operators Obligations

- Evaluate and document the location, where the system is to be operated, and dangers from explosions in accordance with directive. Evaluate and document the operating areas of the system for danger of explosions in accordance with Directive 99/92/EC, Annex I.
- Ensure that directive 99/92/EC, to protect the health and safety of the employee in potentially explosive atmospheres, is maintained.
- Only use the pump as allowed by the explosion protection nameplate.
- Always ensure the following.
  - The pump is grounded.
  - There is no contact between the coupling and coupling guard
  - Pump interior, seal chamber, auxiliary systems, inlet and outlet piping, are always completely filled with the liquid being pumped.
  - The maximum permissible surface temperature of the pump is not exceeded (see 2.3).
  - The maximum permissible fluid medium temperature is not exceeded (see 2.3).
  - Valves on the inlet and outlet of the pump are set correctly.
  - The pump has regular maintenance and monitoring.
  - It is impossible for the pump to run dry i.e., by monitoring tank levels, flow measurements, etc.
- Ensure that the motors, couplings, gears and monitoring equipment supplied on site correspond to the category and temperature class of the associated zone.
- Note the information on order data sheet
- Inform personnel regarding special dangers
  - Danger of explosions through removal of dust buildup

## 1.3 Materials:

All pump parts and accessories must consist of electrically conductive materials.

With combustible pumped liquids, all pressure bearing parts must be of ductile material for internal pump pressures of 10 bar (145 psi) or greater.

For IIC explosion group, the total applied thickness of the paint system may not exceed 200 µm (0.008")

## 2. Explosion Protection Labeling

2.1 Temperature class and type of explosion protection marking are on nameplate.



II 2G Ex h IIC T4...T1 Gb X



\_\_\_\_\_ CE Label



\_\_\_\_\_ Symbol for explosion protected equipment

II \_\_\_\_\_ Equipment group per EEC guidelines in 95/9/EEC  
II is other than underground

2 \_\_\_\_\_ Equipment Category (section 2.2 below)

G \_\_\_\_\_ Explosion Atmosphere (G = Gas)

h \_\_\_\_\_ Ignition protection reference (see 2.4 below)

T4 ... T1 \_\_\_\_\_ Temperature class (see 2.3 below for Special Use Conditions)

Gb \_\_\_\_\_ Equipment protection level (EPL)

X \_\_\_\_\_ Ambient Temperature (see 2.5 below for Special Use Conditions)

### 2.2 Category

Category 2 - The frequency of occurrence of dangerous potentially explosive atmospheres is only occasional (any faults occurring must not become a source of ignition)

Category 3 - The frequency of occurrence of dangerous potentially explosive atmospheres is unlikely and can occur only rarely and for a short time

1. The pump guarantees a normal level of protection.
2. No unacceptable high surface temperatures may become an ignition risk during normal operation.

**2.3 Temperature Class** – Flammable gases and vapors are divided into temperature classes for their flammability on hot surfaces. Surface temperature of pump must always be less than lowest ignition temperature in the temperature class.

#### Classification of maximum surface temperature for Group II Equipment

Temperature Class on Accordance with EN 80079-36	Maximum Permissible Surface Temperature of the Pump
T4	135 °C (275°F)
T3	200 °C (392°F)
T2	300 °C (572°F)
T1	450 °C (842°F)

**Special Use Condition- Marking T4 . . .T1**

**The maximum surface temperature depends on operating condition. Refer to the Declaration of Conformity for T code and Maximum Fluid Temperature indicated.**

**Special Use Condition – In certain pumps with mechanical seal the maximum permissible medium Temperature must not be exceeded. Refer to the Declaration of Conformity for the maximum permissible medium temperature.**

**2.4 Ignition Protection Type:**

Type of Protection for non-electrical equipment	Meaning
b	Ignition source monitoring for category 2 application
c	Safe design constructional safety
h	Mark for non-electrical equipment (not a protection method)

**2.5 Ambient Temperature:**

**Special Use Conditions-**

**The pumps conform to the ambient temperature service range specified by the application parameters provided by the customer. Please refer to the Declaration of Conformity for the ambient temperature range. If no range is provided, the normal Ambient temperature of  $-20^{\circ}\text{C} \leq T_a \leq +40^{\circ}\text{C}$  applies.**

**2.6 Zone / equipment group / area of use /category**

The zone depends on the probability of an explosive atmosphere occurring and distinguishes between gases (G) and dusts (D). Pumps are divided by area of use into groups or equipment groups and equipment protection level (EPL) or categories. The category or equipment protection level (EPL) describes the safe design of the pump and depends on the zone.

Zone	Frequency of occurrence of dangerous explosive atmosphere	Group	EPL	Equipment group / area of use	Category	Design safety
-	-	I	Ma	1 / Underground	M1	very high
-	-	I	Mb	1 / Underground	M2	high
0	Constantly or over long periods or frequently	II	Ga	II / Other	1G	very high
1	Occasionally (any faults occurring may not become source of ignition)	II	Gb	II / Other	2G	high
2	Unlikely: if it does occur, then rarely and short-term (in normal operation, surface temperature may not become source of ignition)	II	Gc	II / Other	3G	normal
20	Constantly or over long periods or frequently	III	Da	II / Other	1D	very high
21	Occasionally (any faults occurring may not become source of ignition)	III	Db	II / Other	2D	high
22	Unlikely: if it does occur, then rarely and short-term (in normal operation, surface temperature may not become source of ignition)	III	Dc	II / Other	3D	normal

### 3) ATEX Measures

#### 3.1 Installation and connection of pump (Measures depend upon category.)

##### 3.1.1 Category 3

- 1 Stay within the maximum permissible temperature of the pumped fluid on the Declaration of Conformity.
- 2 Prevent overheating when operating in a circulating system by routing the return line from the safety valve to the tank, and not into the suction pipe.
- 3 For couplings with coupling guards:
  - a. Couplings must correspond to the requirements in the explosion hazard area (group and category).
  - b. Only use guards made from electrically conductive materials
  - c. Secure the setscrews to fix the coupling halves to the guards with medium strength loctite.
  - d. For aluminum guards, remove swarf and dirt from coupling guard
- 4 Ignition protection type is c = structural safety. (No additional monitoring equipment is required.)
- 5 For Pumps with motors supplied by the operator, motors must correspond to the requirements in the explosion hazard area (group and category).
- 6 Earthing Terminals must be provided for pump units, including baseplate and motor.

##### 3.1.2 Category 2

- 1 Ensure that there is monitoring equipment installed in the system to prevent pump dry running. (ex. Tank level switch or flow switch).

This equipment shall have a suitable level of reliability and installed with established safety principles able to withstand expected influences during operation. This equipment shall provide adequate warning that dry running can develop, must be capable of being checked at suitable intervals and include the detection of loss of safety function. The equipment manufacture's use instructions shall specify the interval between periodic maintenance checks and include advise on methods for detecting failure modes and actions to be taken to remedy. (Ref. EN 80079-37 Clause 6.5.1)
- 2 Ensure there is monitoring equipment installed to prevent pump overheating.
  - If the system controller is not suitable for monitoring, install power monitor.
  - Set monitoring according to:
    - The pumping parameters
    - The characteristic curve of the pump
    - The motor manufacturers' specifications
- 3 If the pumped fluid is contaminated with solid particles:
  - a. Install a temperature sensor on the pump case surface
  - b. Adjust temperature monitoring device according per the manufacturer's specifications and to the maximum allowable temperature of the housing surface by its temperature class on the nameplate
- 4 For pumps with separate relief valves:
  - c. Install a pressure relief valve in the pressure line and adjust it accordingly
  - d. Provide a return line into the tank or fluid reservoir

## **3.2 Operation**

### **3.2.1 Stay within the maximum permissible surface temperature**

#### **Pumped liquid**

1. Stay within the maximum permissible temperature on the Declaration of Conformity.

#### **Housing surface** (Only relevant to category 2)

1. If the pumped liquid is contaminated with solid particles, monitor the temperature of the case surface so that maximum permissible temperature of the housing surface does not go higher than permissible by the temperature class on the nameplate.

### **3.2.2 Avoid Overheating** (Only relevant to category 2)

Overheating results from the impermissible operating conditions of:

- a. Dry Running
- b. Operating pump while the pressure side valve is closed.
- c. Operating pump while inlet side valve is closed
- d. Operating outside the pumps design parameters

Monitor motor power to detect the above problems with overheating.

### **3.2.3 Do not operate in an explosive atmosphere.** (Only relevant to category M2)

1. If an explosive atmosphere occurs, switch off pump

## **3.3 Maintenance** (Reduce maintenance intervals for more difficult operating conditions.)

### **3.3.1 Maintenance to perform**

1. Check at appropriate intervals:
  - Motor and pump couplings according to manufacturers operating instructions
  - Deformation of guard around coupling and spacing to rotating parts
  - Functioning of monitoring devices
  - Surface temperature of pump and motor
  - Entire unit for excess vibrations
  - Pump during operation for altered running noises
  -
2. Change at appropriate intervals:
  - a. Change seal when leakage exceeds 5 drops per hour
  - b. Change ball bearing every 17,500 hours if found to be overheating or noisy

## **4.1 Additional measures for category 2 or 3D (Dust)**

1. Periodically remove dust build up before thickness gets to 5 mm.
2. Remove swarf and dirt from on and below the coupling guards.

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