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Danfoss

Instruction

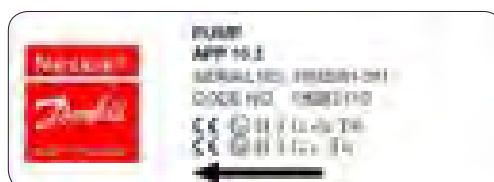
ATEX instruction for APP 0.6-10.2 / PAH 2-100 PAHT G 2-90 / PAH 25-80 Tech



Table of Contents	1.	Common demands for Category 2 and 3 installations	3
	2.	Design guide for Category 2 (zone 1) systems	5
	2.1	Temperature sensor	5
	2.2	Pressure sensor	6
	2.3	Preferred system design and P&ID for Category 2 pump.	7
	3.	Design guide for Category 3 (zone 2) systems	9
	3.1	Pressure sensor	9
	3.2	Preferred system design and P&ID for Category 3	9
	4.	EU Declaration of Conformity	11

The Danfoss pumps are marked for application in "Group II Category 2 or Category 3 systems.

CE  II 3 G c T6
CE  II 2 G c b T6



Example "ATEX pump label"

Ambient temperature: +2°C to +50°C
Fluid temperature: +2°C to +50°C
 The pump must be fluid filled before start and during operation

This document describes how to integrate a pump in a system depending on the Category demand.

Equipment groups (Annex I of the EC-Directive 94/9/EC)				
Group I (mines, mine gas)		Group II (other explosive atmospheres gas)		
Category M		Category 1	Category 2	Category 3
1	2	G (gas) (Zone 0)	G (gas) (Zone 1)	G (gas) (Zone 2)
For equipment providing a very high level of protection when endangered by an explosive atmosphere	For equipment providing a high level of protection when likely to be endangered by an explosive atmosphere	For equipment providing a very high level of protection when used in areas where an explosive atmosphere is very likely to occur	For equipment providing a high level of protection when used in areas where an explosive atmosphere is likely to occur	For equipment providing a normal level of protection when used in areas where an explosive atmosphere is less likely to occur

1. Common demands for Category 2 and 3 installations

This instruction is a supplement to existing product instruction as ATEX components are subject to some limitations compared to standard components. The limitations are described in this ATEX instruction.

Validity:

Approvals are only related to water as fluid. If other fluids are used these must be non-flammable fluids.

The pumps are designed to pump liquids and not gasses! It is the user's responsibility to ensure that the pump is filled with fluid during start-up and operation.

Fluids:

If the pump is to operate on other fluids than water, please contact Danfoss. Other operation and maintenance conditions might apply.

Minimum suction pressure:

The user must always ensure that the pump is filled with the fluid to be pumped. The pumps must always be operated with a "positive head" on suction port. The allowable minimum and maximum inlet pressure for the suction port can be found in the pump data sheet.

Maximum discharge pressure:

It is the user's responsibility that the pump discharge pressure does not exceed *the max continuous discharge pressure* stated in the pump data sheet.

Temperature:

The pump is not to be operated in systems where the fluid temperature exceeds 50°C/122°F.

Filtration:

The fluids entering the pump must as a minimum always be filtered according to the specification found in the pump data sheet.

External impacts due to:

Gases:

The pumps are made in materials resistant to most common gases. The user of the pump must ensure that materials used are resistant to the gases applied.

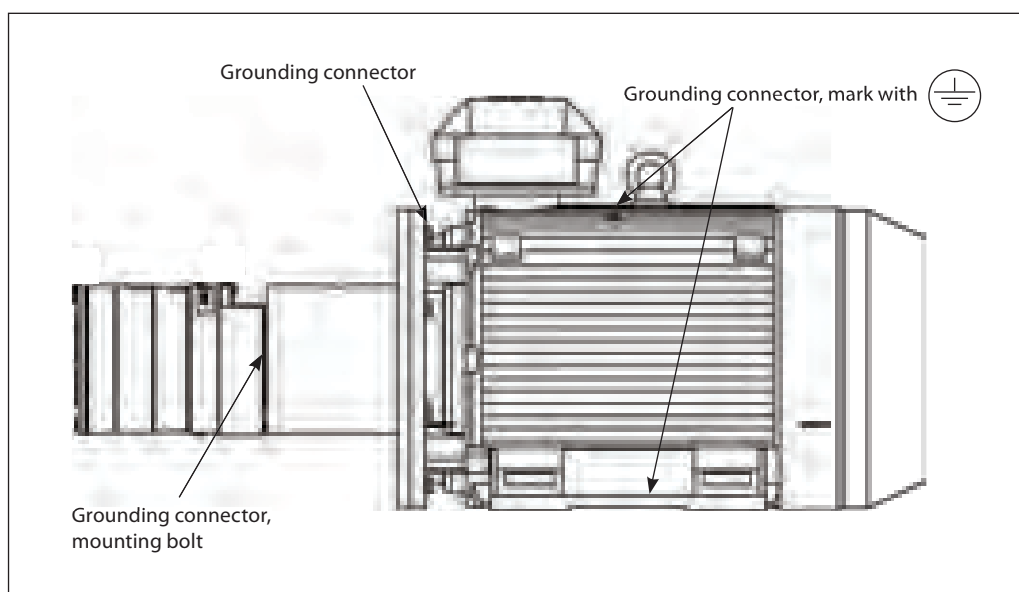
Assembly of pump drive unit:

Motor - Pump assembly and system integration:

When assembling the pump with the bell housing, flexible couplings and motor, it is the builder's responsibility that the parts used conform to the ATEX directive and that the components are assembled and running according to the operational data/design found in product data sheets and instructions.

All parts must be potential equalized, in a Category 2 and 3 system, all parts must be potential equalized by electrical wires, according to local regulations. The wire gauge must be equal to the wire gauge applied in the "supply" of the electric motor and may as a minimum not be smaller than 16mm². (EN 60079-0 Item15.4).

It is important to ground connect each component directly to a base point.



Choice of bell housing and coupling

The material for the bell housing can be steel, stainless steel or aluminium with a magnesium content below 7,5%.

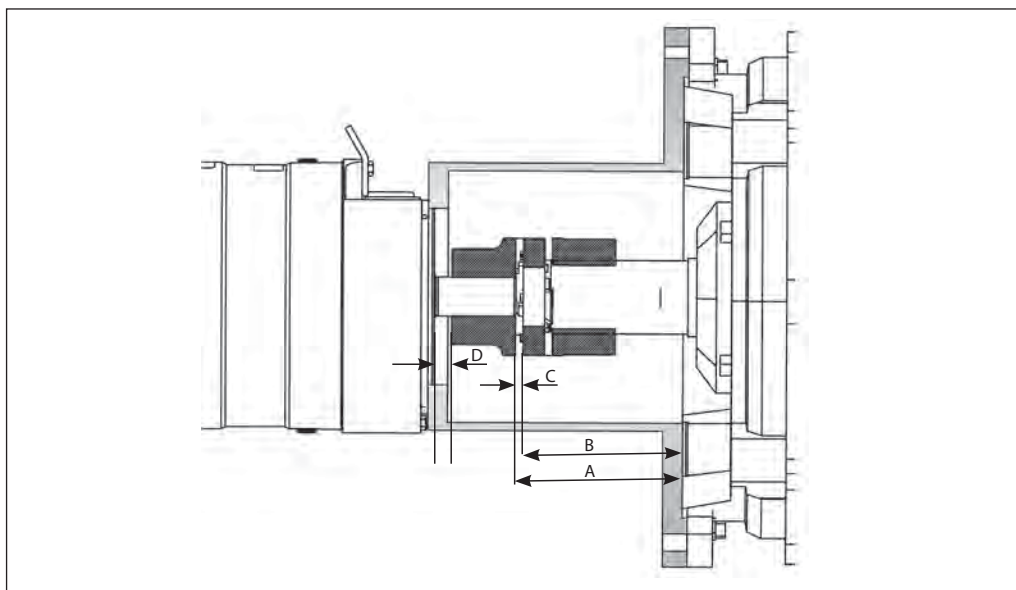
The bell housing must have an inspection and a drain hole. The drain hole must be placed at the lowest point to ensure the fluid can get out if there is a small leak from the pump shaft seal.

The distance between bell housing and the rotating parts must be at least 5mm.

Coupling for use in hazardous areas are marked with regard to the respective permissible conditions of use.

Aluminium as coupling material is generally excluded for explosive areas.

See special conditions for safe use in coupling operation- and ATEX instruction from coupling supplier.



Mounting of bell housing and coupling:

1. Mount the coupling on pump shaft. Ensure an air gap between end of coupling and pump flange of min. 4 mm (0.16 in) "D".
2. Mount the bell housing on pump. Secure bolts with the right torque - see pump instruction.
3. Measure the longest distance "A" from top of bell housing to the bottom of coupling claw.
4. Mount the coupling on motor shaft. Ensure the coupling and motor flange are not in contact with each other.
5. Measure from motor flange to the top of the coupling. That measurement "B" shall be 3-5mm (0.12 - 0.2 in) shorter than the measurement "A".
6. Adjust respectively, verify the measurement, and secure both couplings with the right torques on the locking screws (see coupling operation & mounting instruction).
7. Mount the elastic gear ring and mount the bell housing/pump on the motor. After mounting it must be possible to move the elastic gear ring 3-5mm (0.12 - 0.2 in) axial "C". The check can be done through the inspection hole of bell housing. Secure motor flange bolts with the right torque - see pump instruction.

Caution! Read the pump & coupling Installation, Operation, Maintenance instructions before mounting.

Electric motor

Motor for use in hazardous areas are marked with regard to the respective permissible conditions of use.

Marking:

Category 2, Zone 1: Ex d, Ex de, Ex e
Category 3, Zone 2: Ex nA

All rating plate values relating to certification must be carefully checked to ensure that the motor protection, atmosphere and zone are compatible.

See special conditions for safe use in electric motor operation manual and ATEX instruction.

Caution! Ensure with regular inspection the motor flange is not affected by severe corrosion.

Motors in variable speed operation:

Certain criteria must be considered to ensure that the combination of VFD and motor can be used safely. The requirements depend on the protection type in use.

The motor must be dimensioned so that its surface temperature remains at a safe level with respect to the temperature class. In most cases

this requires either combined type tests or the use of direct temperature control.

Caution! Consult motor manufacturers for right dimensioning.

Cabling and electrical connections

Suitable cable lugs must be used for the connection of all main cables.

The cable connection must fulfil the requirement stated in the national standards for installation or in the standard EN 60204-1 and EN 60079-14.

In addition, earthing or bonding connection facilities on the outside of electrical apparatus must provide effective connection of a conductor.

Caution! Read the Installation, Operation, Maintenance manual of the chosen motor to ensure all applicable warranties.

Failure modes due to operational conditions
Following operational conditions can cause a pump failure:

- Pump running dry
- Too high inlet pressure
- Too low inlet pressure
- Too high temperature of the fluid being pumped
- Too high ambient temperature
- Pump is pumping against blocked port
- Pump operate with a non-specified/ approved fluid
- Pump running the wrong direction
- Non-return valve in front of the pump inlet
- Insufficient filtration
- Pump is not being serviced accordance to Danfoss specifications.

Danfoss recommends building systems with a high inherent safety degree. The PI&D on the next pages shows how a high degree of safety can be reached when using a Danfoss pump.

2. Design guide for Category 2 (zone 1) systems

2.1 Temperature sensor

Pump housing temperature increase causing problems due to pump breakdown/failure in a Category 2 rated system.

In a Category 2 system, the pump housing temperature must be monitored.
Pump housing temperature must always be lower than 85°C / 185°F.

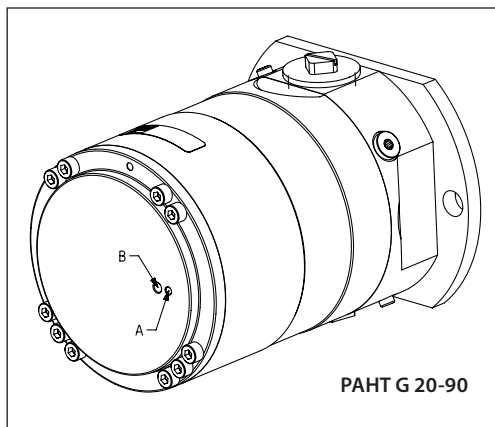
A sensor integrated on the pump must be used to monitor pump housing temperature.
This sensor must be mounted on the pump as shown in the drawings.

The system must stop the pump, if a temperature of 60°C / 140°F is exceeded.

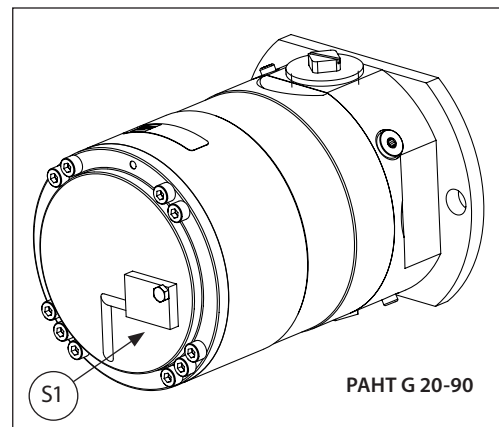
Electronic equipment/control of temperature and pressure measuring must comply with EN 954 (Category 3) or EN 13849-1 to fulfil IPL2.

Caution:

The sensors may not be exposed by direct cooling as it will affect the thermal readings. Therefore they shall be protected against direct wind.

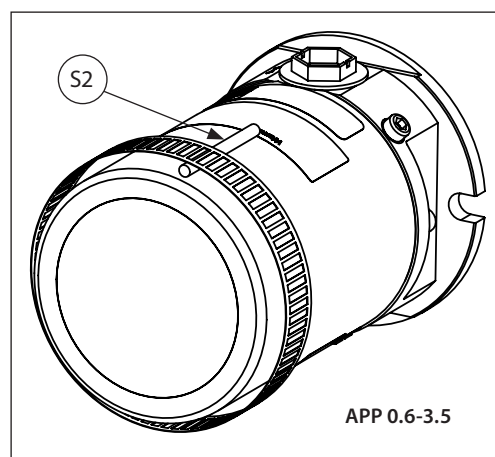
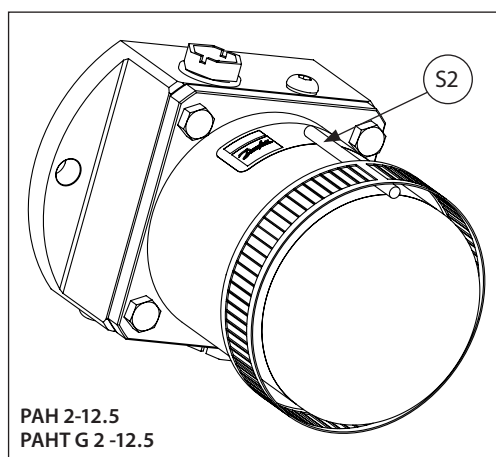


Use the M6x10 (A) or M8x10 (B) thread to locate the temperature sensor. Ensure good thermal contact between the sensor and pump end cover and avoid corrosion (material choice of sensor, crevice corrosion).



Temperature sensor WIKA TR50-O Explosion protected version with stainless steel contact block can be used (see S1 at picture).

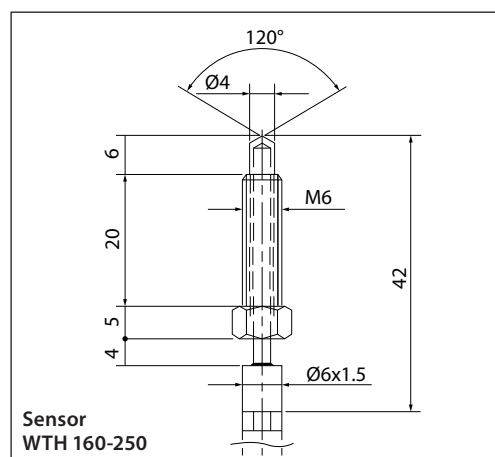
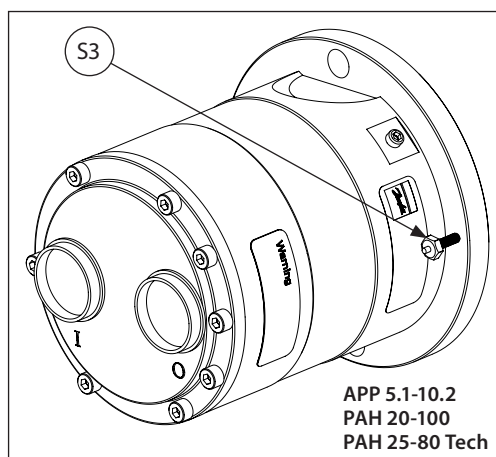
Mount the sensor with a M6 screw on the pump end cover. Ensure good thermal contact between the sensor and pump end cover and avoid crevice corrosion.



Temperature sensor WIKA TR50-Q Explosion protected version with worm drive hose clip made of stainless steel can be used on these pump types (see S2 at picture).

Ensure good thermal contact between the sensor and pump housing and avoid crevice corrosion.

Select the right diameter size of the worm drive hose clip. Find the diameter of pump housing in the pump data sheet.



Temperature sensor WTH 160-250 Explosion protected version from Heinz Messtechnik can be used on these pump types (see S3 at picture).

Mount the sensor in the M6x7 thread hole at pump mounting flange.
Ensure good thermal contact and avoid crevice corrosion.

2.2 Pressure sensor

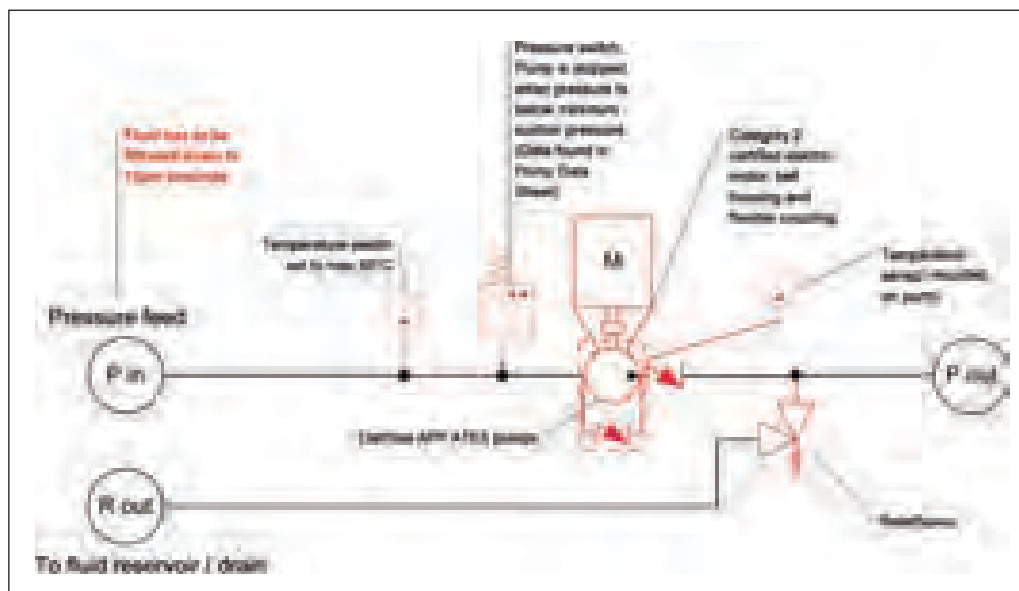
Checking whether suction port is fluid filled and fluid flows unrestricted:

To monitor if suction line is fluid filled at right pressure, a pressure switch/sensor must be placed in the pump suction port. This switch/sensor must as a minimum be set to the minimum suction pressure specified in the pump data sheet. Pump must be stopped by system, if pressure declines below sensor pressure setting.

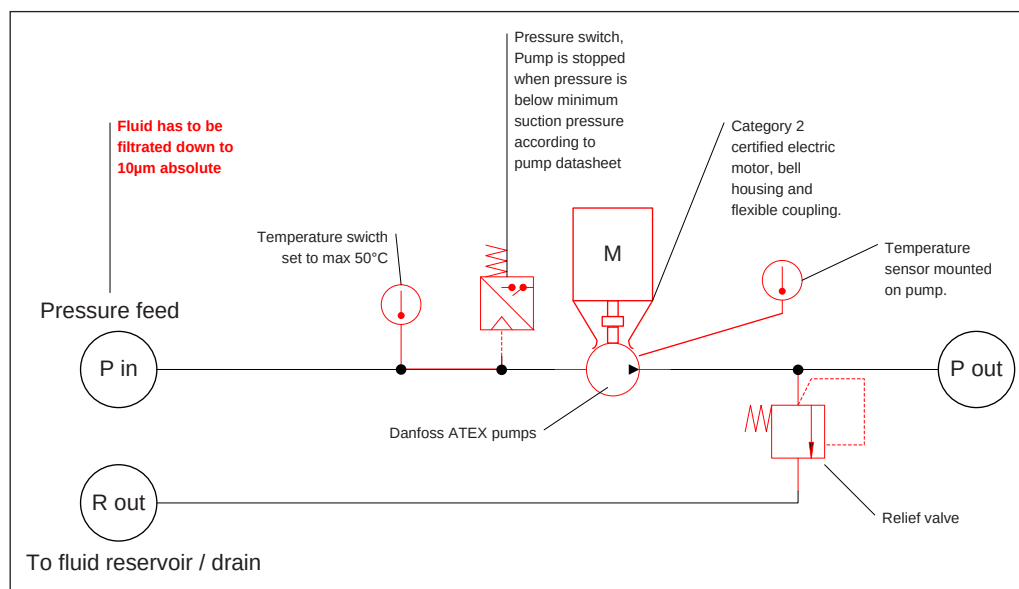
2.3 Preferred system design and P&ID for Category 2 pump

Pressure and temperature sensors are mounted due to a direct demand originating from ATEX risk evaluation.

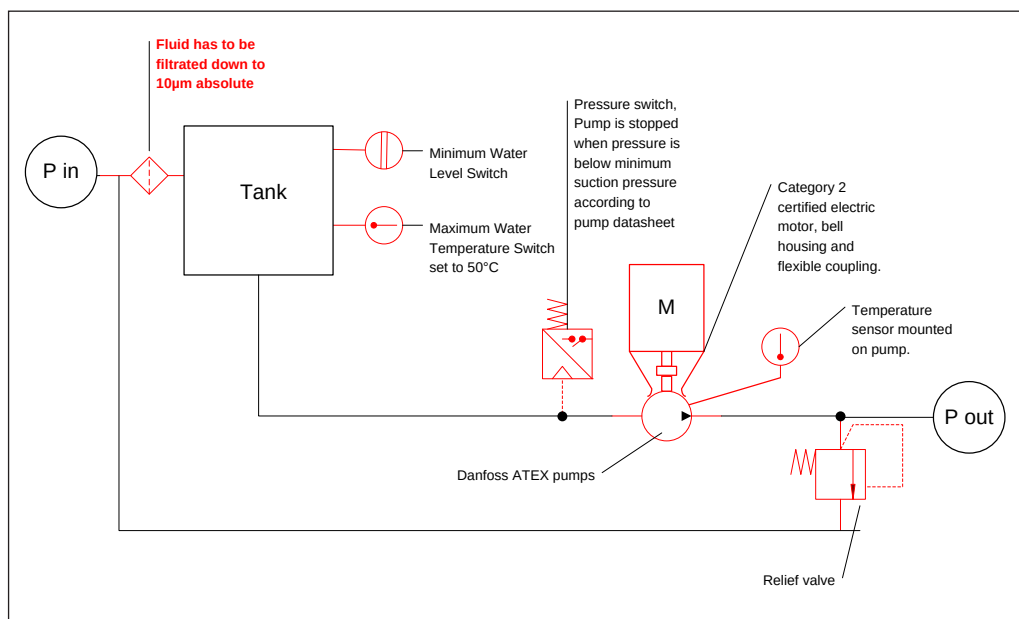
The pump is directly fed by a pressure line (feed pump).



The pump is directly fed by a pressure line (feed pump).



System where fluid is supplied from tank.
Pump is placed outside the tank. Pump suction
port is always below fluid level.



3. Design guide for Category 3 (zone 2) systems

3.1 Pressure sensor

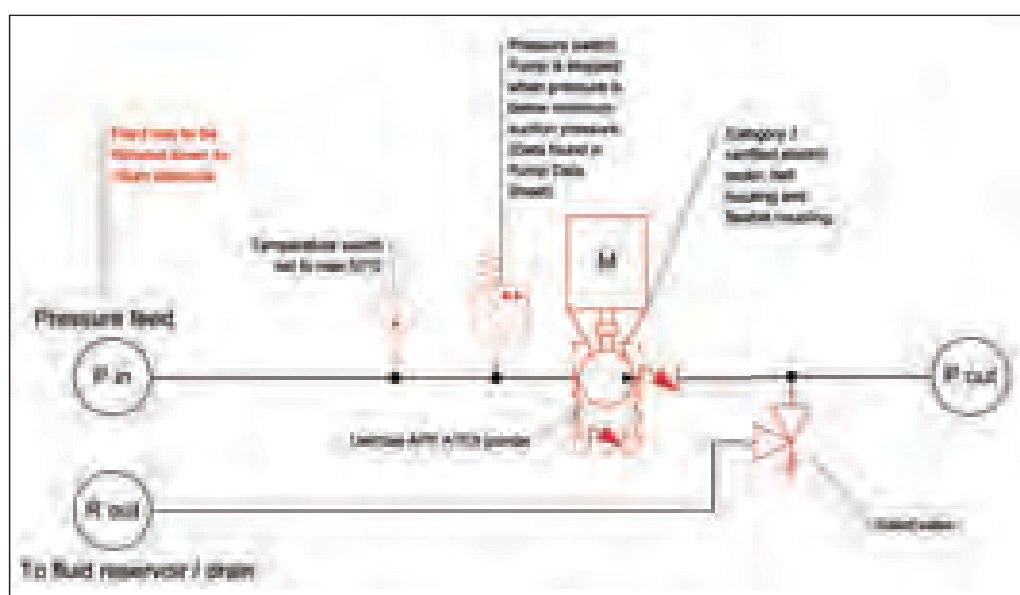
Checking whether suction port is fluid filled and fluid flows unrestricted:

To monitor if suction line is fluid filled at right pressure, a pressure switch/sensor must be placed in the pump suction port. This switch/sensor must as a minimum be set to the minimum suction pressure specified in the pump data sheet. Pump must be stopped by system, if pressure declines below sensor pressure setting.

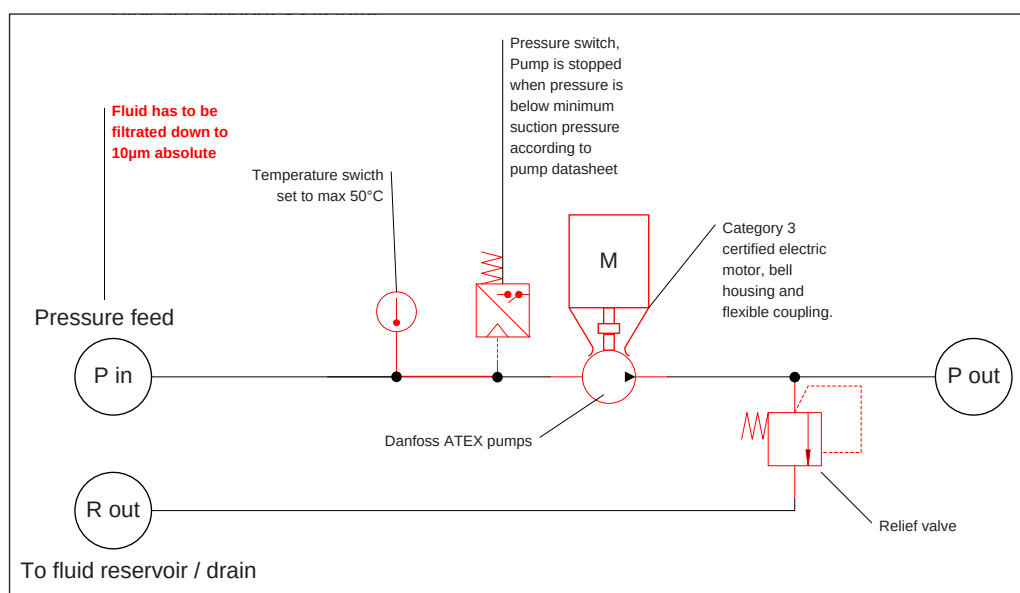
3.2 Preferred system design and P&ID for Category 3

Pressure sensor is mounted due to a direct demand originating from ATEX risk evaluation.

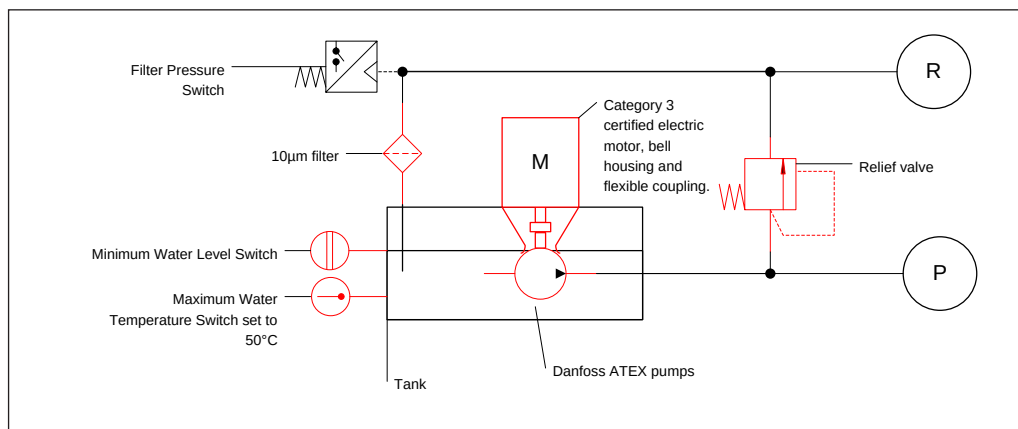
The pump is directly fed by a pressure line (feed pump).



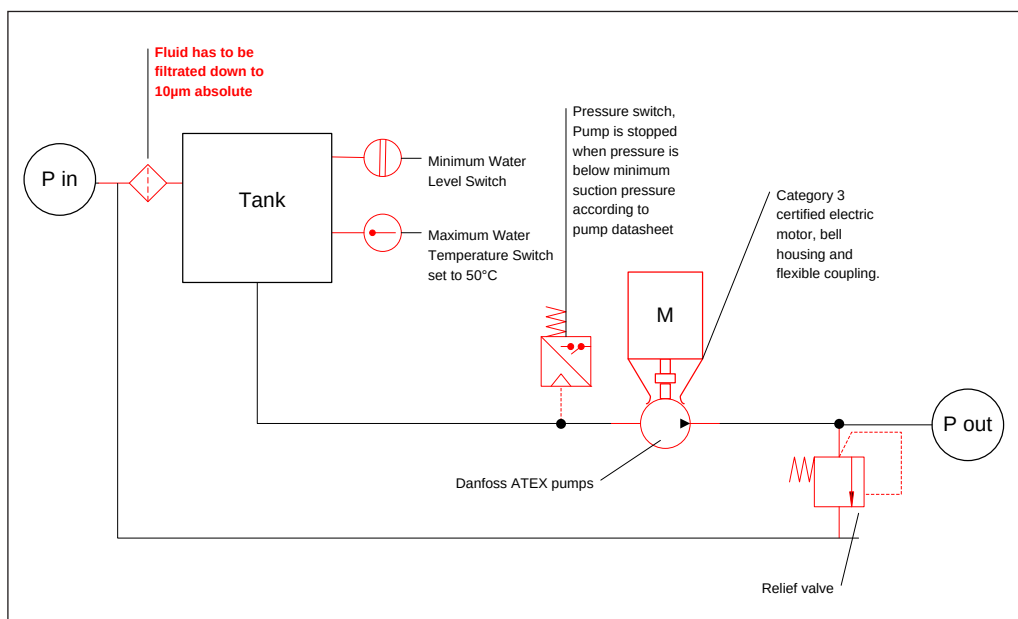
The pump is directly fed by a pressure line (feed pump).



System where fluid is supplied from tank.
Pump is submerged into tank and suction port
is always fluid covered.



System where fluid is supplied from tank.
Pump is placed outside the tank. Pump suction
port is always below fluid level.



EC Declaration of Conformity

Danfoss A/S

Danfoss High Pressure Pumps
Nordborgvej 81
6430 Nordborg
Denmark

EG-Konformitätserklärung gemäß EG-Richtlinie 94/9/EG (ATEX)	Certificate of E.C. Conformity according to E.C. Directive 94/9/EG (ATEX)	Déclaration de conformité CE conformément à la Directive 94/9/CE (ATEX)
Wir hiermit erklären, dass die nachstehende hohe-Druck-Maschine in ihrer Konfiguration und Bauart sowie in der Umsetzung der geforderten Ausführung den grundlegenden Sicherheits- und Gesundheitsanforderungen der EG-Richtlinie 94/9/EG (ATEX) entspricht. Bei einer späteren nicht abgesprochenen Änderung der Maschine verliert diese Erklärung ihren Gültigkeit.	We hereby declare that the machine depicted below has been designed, constructed and tested to fully comply with the health and safety requirements of the E.C. Directive 94/9/EG (ATEX). Any modification to the machine without our prior permission renders this declaration null and void.	Nous déclarons que la conception et la construction ainsi que le montage en exécution de la machine ci-dessous satis- font aux exigences de base en matière de sécurité et de santé de la directive 94/9/CE (ATEX). En cas de modification de la machine sans autorisation préalable, cette déclaration perd sa validité.
Beschreibung der Maschine Technische Punkte	Machine description High pressure pump	Description de la machine Pompe haute pression
Maschinentyp APP 0,6 - 10,2 PAH 2 - 100 PAHT 0,2 - 90 PAH 25 - 90 Tech	Machine designation APP 0,6 - 10,2 PAH 2 - 100 PAHT 0,2 - 90 PAH 25 - 90 Tech	Type de machine APP 0,6 - 10,2 PAH 2 - 100 PAHT 0,2 - 90 PAH 25 - 90 Tech
ATEX-Kennzeichnung CE 02 02 G 0 10 CE 02 03 G 10	ATEX marking CE 02 02 G 0 10 CE 02 03 G 10	Markage ATEX CE 02 02 G 0 10 CE 02 03 G 10
Technisches Dossier, benannte Stelle Nummer/Adresse/Archivnummer No: 0006 Adresse: Technical Institute Kongsvang Alle 29, DK-6000 C Archiv-Nr: DTI 2006-0-0006A	Technical dossier, notified body No./Address/Archive No: No: 0006 Address: Technical Institute Kongsvang Alle 29, DK-6000 C Archive No: DTI 2006-0-0006A	Dossier technique, organisme notifié No./Adresse/No d'archive No: 0006 Adresse: Technical Institute Kongsvang Alle 29, DK-6000 C No d'archive: DTI 2006-0-0006A
Angewandte Normen/normale Normen EN 10403-1: 2003, EN 10403-2: 2003, EN 10403-3: 2003, EN 12103: 2010	Used harmonized standards EN 10403-1: 2003, EN 10403-2: 2003, EN 10403-3: 2003, EN 12103: 2010	Normes harmonisées appliquées EN 10403-1: 2003, EN 10403-2: 2003, EN 10403-3: 2003, EN 12103: 2010

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