

Premier Fluid Systems

# pompetravaini



## **INTEGRATIVE NOTES TO THE OPERATING MANUAL FOR MAGNETIC COUPLING CENTRIFUGAL PUMPS CONFORMING TO THE ATEX 94/9/CE DIRECTIVE**

**TCK... - TBK... – TBAK...**



# INTEGRATIVE NOTES TO THE OPERATOR'S MANUAL FOR INSTALLATION, START-UP AND MAINTENANCE OF MAGNETIC COUPLING CENTRIFUGAL PUMPS CONFORMING TO ATEX 94/9/CE DIRECTIVE

This booklet is an integral part of the Operator's Manual and refers to the following series of Centrifugal pumps and to the models derived from there:

**TCK**

**TBK**

**TBAK**

All these pumps are manufactured by:

**POMPETRAVAINI S.p.A.**

**Via per Turbigo, 44 - Zona Industriale - 20022 CASTANO PRIMO - (Milano) - ITALY**

**Phone 0039 0331 889000 - Fax 0039 0331 889090 - [www.pompetravaini.it](http://www.pompetravaini.it)**

The conformity of the aforesaid centrifugal pumps and their use under safety is only valid and efficient when all indications contained in the Operator's Manual for the centrifugal pumps and in this booklet are strictly observed.

The pumps must be installed and used only for the application specified in the Confirmation of order made up by POMPETRAVAINI.

This booklet must be read and understood in all its parts before carrying out the start-up of the pump. This literature must be preserved and kept available to the operators who are involved with the pump.

**As a condition of the operations necessary for safety on use of the centrifugal pumps in a potentially explosive atmospheres, Chapter 9 of this booklet must be read, understood and countersigned by the persons in charge with the reading and the application of this supplement to the Operator's Manual of the centrifugal pumps.**



**POMPETRAVAINI does not assume any responsibility either for the use of this pump in any applications different from the agreed ones or for any non observance or faults of actuation of any indications shown in the Operator's Manual and in this Supplement.**

**GUARANTEE:** All products from POMPETRAVAINI are guaranteed according to the General conditions of supply and guarantee shown in the Confirmation of order.

The non observance of the prescriptions and of the instructions contained in this Manual makes the guarantee for the product invalid.



**ATTENTION:** These instructions are valid only for the pumps with which they are supplied. They are NOT valid for the plant where they will be incorporated. The instructions for use and maintenance for the plant must be asked for from the manufacturer of the same. In any way the instructions for the plant must not be contradictory to those for the pump. In case of any doubt, please contact POMPETRAVAINI.

When editing this manual, every effort has been made to help the customer to use the pump correctly in order to avoid any improper use or any damage. In case of lack of understanding, difficulties or errors, please inform us.

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NOTE: The next pages refer to the Operator's Manual of the Centrifugal pumps simply called in the following "Operator's Manual".

All drawings represented are only schematic and are not binding.

The technical specifications shown may change due to a natural and continuous improvement of the equipment.

For further information, please contact POMPETRAVINI.

## 1 - GENERAL SPECIFICATIONS

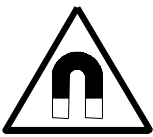
The purpose of these notes is to be a reference for the safety on use, installation, maintenance, start-up and stopping of the magnetic coupling centrifugal pumps of the TCK, TBK, TBAK series as equipment conforming to Group II, Category 2 G c T4 and Group II, Category 3 G c T4 according to the ATEX 94/9/EC Directive in force from 1 July 2003. For further information, see Chapter 1.1 of this booklet. This feature permits the use of these pumps in ambients of potentially explosive atmospheres classified as Zone 1 and Zone 2 according to the ATEX 1999/92/EC Directive. Pumps conforming to Group II, Category 1, which means zones classified as Zone 0 or Zone 20, cannot be supplied.

The pumps conforming to Group II, Category 2 are safe during the normal operation and in case of any foreseeable malfunction of one of their components. A foreseeable malfunction refers to events which may cause a fault on the pump, the leakage of liquid or other faults, which - according to the evaluation of risks carried out by POMPETRAVAINI - may occur during the correct and conscientious use of the pump for the kind of application and in the operating conditions specified in the Confirmation of order. For example, the use of the pump at a rotary speed being different from the design is considered as a foreseeable malfunction.

They may not be safe in case of any malfunction considered rare or due to any wrong use by the customer, for example, the use of a wrong liquid.

The pumps conforming to Group II, Category 3 are safe during the normal operation, i.e. when used in a correct and conscientious mode for the kind of application and in the operating conditions specified in the Confirmation of order.

They may be not safe in case of any malfunction, even foreseeable ones.



### ATTENTION!:

The pumps series TCK, TBK, TBAK, generate a strong magnetic field:

The maximum caution and care must be taken by the possible risk personnel (for example carrier of pace-maker) in charge of use and maintenance of the pumps and/or use of possible equipments that could have a malfunction or be damaged: keep to the following minimum distances.

- With the magnetic coupling components disassembled:
  - Pace-maker carrier = 2 metres
  - Floppy disk, magnetic cards, et. = 1 metre
- With the magnetic coupling components assembled to the pump:
  - Pace-maker carrier = 1 metres
  - Floppy disk, magnetic cards, et. = 0,5 metre

Before reading these integrative Notes, the Operator's Manual supplied together with the pump and any documents about the accessories or instruments supplied together with the pump must be read and carefully understood.

These notes do not replace what is shown in the Operator's Manual, but complement it as to the safety requirements prescribed by the ATEX 94/9/EC Directive. This Manual must be carefully preserved and kept available to the skilled and qualified persons in charge with operation and maintenance of the pumps.

Fig. 1 – PLATE POSITION

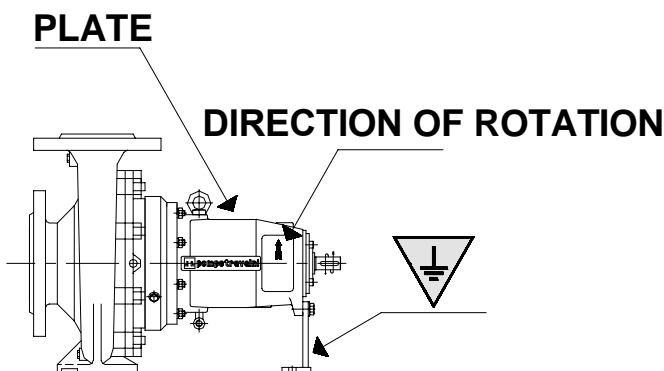
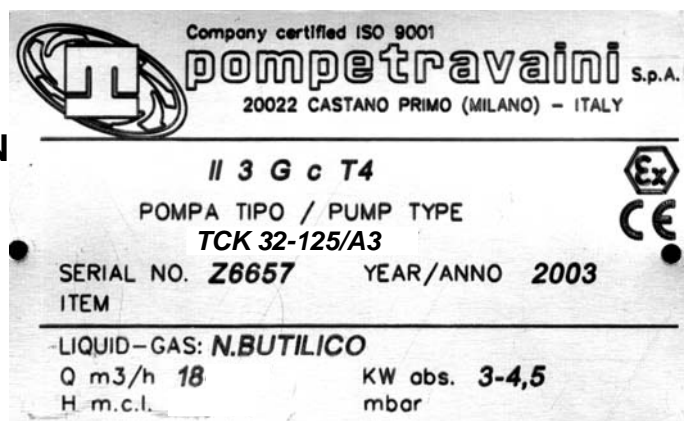


Fig. 2 – PLATE SAMPLE



The persons involved are responsible for the operations carried out and therefore must **carefully** read this booklet and fill in the form of chapter 9, before doing any operation. (Skilled and qualified personnel refers to those persons who - by their experience, training and knowledge also of the respective accident prevention rules - have been authorized by the safety manager to act for any necessary reason and are able to solve all specific problems efficiently. Also the certification of these persons for first aid is required).



The pump must be used only for the applications specified in the Confirmation of order for which POMPETRAVAINI has provided the pump. The materials used for manufacturing and the test runs, make the pump suitable for the requirements. Therefore, the pump **MUST NOT** be utilised for different applications. In any other case, please contact POMPETRAVAINI, who declines any responsibility for any use different from the foreseen one, when the respective approval has not been given.

The specifications of conformity are shown on the identification plate of the pump (Fig. 2), which can be easily identified on the pump (Fig. 1) and on the Service Card shown on the EC Declaration of conformity included in the central part of the Operator's Manual (Fig. 3).

The information shown in this booklet is an integral part of it and makes fully compliant with the safety requirements needed for an equipment certified according to the ATEX 94/9/EC Directive as belonging to Group II, Category 2, or Group II, Category 3. The information therefore must be fully accepted and applied in all its parts.

The purpose of this booklet and of the Operator's Manual is to give all information acquired by POMPETRAVAINI for a safe and long-lasting use of their equipment. We are sure that it will satisfy the user's need for information. If there is any matter requiring more details, please contact POMPETRAVAINI for further explanations.

Fig.3 – EXAMPLE OF SERVICE CARD POSITION

Dichiarazione CE di Incorporazione		I	Dichiarazione CE di Conformità		
EC Declaration of Incorporation		GB	EC Declaration of Conformity		
Declaration CE de Incorporation		F	Declaration CE de Conformité		
EU Erklärung für den Zusammenbau		E	CE Konformitätserklärung		
Certificado de Incorporación CE		E	Certificado de Conformidad CE		
EG Verklaring Verbond van Ingebruikstelling		NL	EG Verklaring van Overeenstemming		
CE Komponenterklaring		DK	CE Overensstemmelseserklaring		
CE Forskran om översensstämelse för		S	CE Försäkran om översensstämelse		
Inbyggingsmaskiner					
EU - Valmistajan antama vakuutus koneen osiksi tarkoitettusta laitteesta		SF	EU - Vaatimustenmukaisuusvakuutus		
I - La Ditta					
GB - The Company					
F - La Société					
E - Die Firma					
D - La Empresa					
NL - Fabriek					
DK - Firmaet					
S - Företag					
SF - Yritys					
I - firmata della presente, dichiara sotto la propria esclusiva responsabilità, che la macchina è conforme a quanto prescritto dalle Direttive					
GB - the undersigned declares exclusive responsibility that the machine is according to the Directives					
F - signataire de la présente, déclare sous sa propre et exclusive responsabilité, que la machine est conforme aux Directives					
D - dessen Unterschrift, erklärt als Hersteller, ist alleiniger Verantwortung, daß die Maschine/Pumpe mit den Anforderungen der hier genannten Richtlinien übereinstimmt					
E - el abajo firmante, declara bajo su exclusiva responsabilidad, que la máquina cumple con lo prescrito por la normativa					
D - de ondergetekende van deze verklaring, verklaart de verantwoordelijkheid op zich te nemen dat de machine voldoet aan de Machineryrichtlijn					
NL - underschreven van ditte document, verklaart hiermede på eget ansvar at maskinen er i overensstemmelse med Direktivet					
DK - underteknad av denna försäkran, intygar på eget ansvar att maskinen överensstämmer med direktivet					
S - tämän allekirjoitetun vakuutuksen ollessa täysin voimassa sitä, että kone täyttää suoraan viitattujen direktiivien vaatimukset					
SF -					
98/37/CEE, 89/336/CEE, 73/23/CEE, EN 292 (1-2), EN 294, EN 809, EN 1012-2					
I	Se certificato per atmosfere esplosive	D	Wenn für explosionsgefährdete Räumlichkeiten zertifiziert	DK	Hvis godkendt for eksplosiv atmosfære
GB	If certified for explosive atmosphere	E	Si está certificado para atmósferas explosivas	S	Om certifierat för explosiv atmosfär
F	Se certificado per atmosphère explosive	NL	Indien gecertificeerd voor explosieve atmosferen	SF	Jos sertifikuat räjähtysvaaralliseen ilmastoon
94/9CE, EN 1127-1, EN 13463-1, prEN 13463-5					

L'è fatto divieto alla macchina oggetto della Dichiarazione di essere messa in servizio prima che la macchina in cui sarà incorporata od assemblata sia stata dichiarata conforme alle disposizioni della Direttiva Macchine.		I
The operation of the machine which is subject of this statement is prohibited if this machine is to be incorporated or assembled in another machine that has not been declared according to the Machinery Directive.		GB
La mise en service du matériel objet de cette déclaration est interdite, si celui-ci doit être incorporé ou assemblé dans une autre machine qui n'a pas été déclarée conforme aux règles de la Directive Machines.		F
Bei einer nicht mit uns abgestimmten Änderung an der Pumpe oder beim Einbau dieser Pumpe in eine Anlage, die nicht der Betriebsvorschrift dieser Pumpe entspricht, verliert diese Erklärung ihre Gültigkeit.		D
Queda prohibido que la máquina objeto de esta certificación, sea puesta en marcha, sin que la máquina a la cual debe incorporarse o ensamblarse, cumpla con la normativa de Máquinas de la CEE.		E
En verklaart voorts dat het een ieder verboden is de onderhavige machine in gebruik te stellen voordat de machine waarin de onderhavige machine wordt ingebouwd of waarvan deze deel zal uitmaken als geheel, d.w.z. met inbegrip van de onderhavige machine voldoet aan de Machineryrichtlijn.		NL
Opstår af maskinen som dette dokument omhandler er ikke tilladt, hvis maskinen bliver indbygget i eller sammenbygget med en anden maskine der ikke er blevet erklæret i overensstemmelse med direktivet.		DK
Uppstående av maskinen, som omfattas av denna försäkran, förbjuder att maskinen monterar i eller ansluts till någon annan maskin som inte är certifierad enligt Maskindirektivet.		S
Tässä voimassa olevassa tarkoitettua koneetta ei saa ottaa käyttöön, mikäli tämä kone liittyy tai asennetaan toiseen koneeseen jolla ei ole annettu Marekineerin mukaisia EU - Vaatimustenmukaisuusvakuutusta.		SF

pompetravaini s.p.a.		
Spet. CHEMI SPA		01011
II 3 G c T4		
N° conferma 33249 28/04/03		
V/N: Z4523 Cod.: TCHG1A03282		
TCH 40-160/1-CC/AL		
liquido/gas: H2O E SOLVENTI ORGANICI		
2 m3/h II 3 G c T4 KW abs: 15		
H m.c.l.: 3.4 mbar: 40		
I - Il Presidente	NL - Directeur	
GB - The President	DK - Administrerende Direktør	
F - Le Président	S - Verkställande Direktör	
D - Präsident	SF - Toimitusjohtaja	
E - El Presidente		
Ing. H.C. Mario Traidaini		

## Service Card

### 1.1 - ATEX 94/9/EC DIRECTIVE

The ATEX 94/9/EC Directive defines that all equipment intended for use in ambient of potentially explosive atmospheres must be classified into Groups and Categories according to the safety requirements of use which this equipment is able to achieve. The subdivision into Zones of the working ambient involved must be carried out by the user according to the ATEX 1999/92/EC Directive. It is the user's duty to select an equipment which ensures a safety level equal or higher than the one prescribed for the Zone in which the pump must be used. An indication on the assignment between Groups/Categories for the equipment and Zones of ambient is given in the following table (Tab. 1).

**The responsibility for identifying the Zones existing in the place of utilisation of the pump and the responsibility for the selection of the equipment having the necessary grade of protections is at the account of the end-user.**

The equipment of Group II has also been subdivided into temperature classes after a test carried out for establishing the maximum surface temperature developed during the operation in normal conditions (ambient temperature between - 20°C and +40°C according to EN 13463-1) (Tab. 2). The selection of an equipment belonging to the correct temperature class is in relation to the ignition temperature of the gases or the dusts present in the ambient where it will be used.

Tab. 1

Zones		Group	Category	Characteristics of the zone
Gas	Dust			
0	20	II	1	Potentially explosive atmosphere continuously present or for long periods
1	21		2	Potentially explosive atmosphere frequently present during normal operation
2	22		3	Potentially explosive atmosphere occasionally present or only for short periods during normal operation
Coal mines		I	M1	Potentially explosive atmosphere continuously present – the machine is fed by power (pneumatics, electrics, etc.)
			M2	Potentially explosive atmosphere continuously present – the machine is not fed by power (no pneumatics, electrics, etc.)

Tab. 2

Temperature classes (Group II)		EXAMPLE:
Max. surface temperature	Code CENELEC IEC	
450°C	T1	If the max. surface temperature developed under normal conditions by a machinery is of 115°C, this can be used (provided that it belongs to the correct Group and Category) in ambient where the ignition temperature of potentially explosive atmospheres is higher than 135°C (T4). Vice versa, an equipment classified as T3 can never be used in ambient where the ignition temperature of potentially explosive atmospheres is lower than 200°C. The temperature class indicated for an equipment does not mean up to which ambient temperature it can be used safely, but which temperature the equipment develops on the surface under normal conditions.
300°C	T2	
200°C	T3	
135°C	T4	
100°C	T5	
85°C	T6	
For the Group I, the classes correspond to 150°C and 450°C		

The knowledge of the temperature class - to which the equipment used in an environment of potentially explosive atmospheres appertains - is **STRICTLY** linked to the ignition temperature of the mixture consisting of air/gas/dust which is present in the atmosphere and which generates potential hazard. Every combination of air with gas or flammable volatile dust is characterised by a specific ignition temperature which – when reached - is sufficient to cause a fire or an explosion of the mixture. The value of this temperature threshold depends on different factors, among which the percentage of air and gas/dust (fuel) present in the atmosphere, the ambient pressure, the ambient humidity, the formation of mixture layers or dust deposits, etc. All this information is not known to POMPETRAVAINI, but must be known to the user. The conformity of an equipment according to the ATEX 94/9/EC Directive compels the manufacturer to carry out tests on the equipment in order to establish the temperature class to which it belongs, however the responsibility for determining if this class is safe or not for that specific use required by the customer falls only into the competence of the customer.

The pumps manufactured by POMPETRAVAINI in conformity with the ATEX 94/9/EC Directive for the use in environment of potentially explosive atmospheres, classified as Zone 1 and Zone 2 according to ATEX 1999/92/EC are all available at the minimum temperature class **T4** (135°C) (T2, 300°C, if made with packing type seals). This is the minimum class as their surface temperature is strictly in relation with the temperature of the liquid pumped. If more restrictive temperature classes were required (for example: T5, 100°C), a particular pump version may be taken into consideration.



**ATTENTION:** The pumps do not have any kind of thermo-insulation towards the outside but are made of metal, which is a highly thermo conducting material. Therefore, the outer surface of a pump reaches very quickly the same temperature of the liquid pumped. If the liquid, by which it is fed, has a temperature close to T4 (135°C), the pump must be DERATED to a less restrictive temperature class such as T3, as the surface temperature of some components may be higher than T4. This refers for example to the outside of a mechanical seal (see chapter 6 of this booklet).

## 2 – SAFETY RULES



**ATTENTION: PLEASE, READ CAREFULLY THE FOLLOWING PRESCRIPTIONS.**

All precautions listed on this page must be strictly observed in order to avoid serious harm to the persons and/or damages to the pump.

- **ALWAYS** follow the performances and the intended use in our Confirmation of order for the pump involved.
- The electric connections on the pump motor must **ALWAYS** be carried out by authorized and skilled persons who must observe the provisions in force.
- Any job on the pump must **ALWAYS** be carried out in the presence of at least 2 persons.
- The pump must **ONLY** be approached by a person wearing suitable garments (garments with large sleeves, ties, necklaces, etc. must be avoided) and/or using other protective items (helmets, goggles, gloves, special footwear, etc.) which are suitable for the jobs to be carried out.
- **ALWAYS** be informed about the places for first aid inside of the company. Furthermore, read carefully the safety and the first-aid rules in force.
- **ALWAYS** disconnect the pump from the plant and switch the electric power off before any intervention on it.
- The pump must **ALWAYS** be stopped before the operator touches it for whatever reason.
- The pump must **ALWAYS** be cool or cooled down before doing any maintenance job on it.
- **NEVER** remove the safeguards from any rotary parts of the pump when it is running.
- **ALWAYS** remount the safeguards, which for whatever reason have been removed, as soon as the reason for this removal has ceased.
- **NEVER** touch the pump or the pipes connected to it when hot liquids over 80°C are conveyed.
- **ALWAYS** pay much attention when touching a pump which conveys or has conveyed toxic or acid liquids.
- **ALWAYS** have fire-preventing equipment available in the immediate vicinity.
- **NEVER** run the pump into the opposite direction of rotation than the one marked directly on the pump.
- **NEVER** put hands or fingers into the holes or openings of the electric pump unit.
- **NEVER** climb on the pump or the pipes connected with it.
- The pump and pipes fitted to it must **NEVER** be under pressure during any maintenance job on it.

NOTE: Inside the pump there are components which may present a hazard to persons who are exposed to them also during the normal procedures of use or maintenance. See the following table (Tab. 3).

Tab. 3

MATERIAL	USE	MAIN HAZARDS
Oil and grease	General lubrication, rolling bearings	Irritation of skin and eyes
Components made of plastics and elastomers	O-Ring, V-Ring, lip seal-rings, splashguards	Release of fumes in case of heating
Synthetic fibres	Tress rings	Emission of toxic dust, release of fumes in case of heating
Paint	Outside surface of the pump	Release of dust and fumes during operation, flammability.
Protective liquid	Inside surface of the pump	Irritation of skin and eyes



The non observance of the instructions shown in this booklet or in the Operator's Manual of the pump exempts POMPETRAVAINI from any responsibility in case of damage to objects or injuries to persons and makes any safety compliance for the pump invalid.

This booklet deals with the hazards when using this pump in environment of potentially explosive atmospheres. The use of the centrifugal pump however cannot be considered without any risk coming from its use as the machine is provided with moving components, electrical connections, liquids under pressure etc. Independent from the safety guarantees which come by observing the aforesaid indications, there might be some amount of risk which cannot be reasonably foreseen. Only the end-user in the context of his analysis and classification of the zones according to the provisions of the ATEX 1999/92/EC Directive may be aware of them. The safety during the use of the centrifugal pumps cannot be separated completely from any responsible use of the machine, of its accessories and of the plant to which these items are connected.

For maintaining the validity of the safety guarantees of the pump, only original spare parts from POMPETRAVAINI must be used. POMPETRAVAINI does not take any responsibility when non-original spare parts, components, accessories or those not authorized by POMPETRAVAINI are used on the pump. POMPETRAVAINI does not take any responsibility if any kind of modification is carried out on the pump, its components and accessories which has not purposely authorized.

### 3 – EVENTS OF EMERGENCY

If there is any malfunction on the pump or leakage of liquid conveyed, switch the electric voltage immediately off and follow the correct procedure for cut-out (see Chapter 11 of the Operator's Manual). Then inform the personnel responsible for the plant. At least two persons must act with the necessary attention according to the case, as the pump may convey dangerous liquids and/or liquids which may be hazardous to persons and to the environment. After having solved all troubles which have generated the emergency, all necessary tests for restarting the electric pump unit must be carried out (see Chapter 10 of the Operator's Manual).

3.1 – FIRST AID

If unfortunately hazardous substances have been inhaled or have come in touch with the human body, the necessary medical steps must be immediately taken by skilled and authorized persons according to the information shown in the customer’s factory.

4 – TECHNICAL FEATURES OF THE PUMPS

The instructions of the present booklet refer to the following series of pumps (tab. 4).

NOTE: The capacity and the pressure indicated must be considered as a guideline and correspond to the maximum values which can be reached in standard conditions of use at ambient temperatures.

Tab. 4

SERIES	FEATURES
TCK	Single-stage magnetic coupling centrifugal pumps - Closed impeller version - Delivery rate up to 280 m³/h, max. pressure 14 bar – Flange type: PN 16 (1)
TBK	Multi-stage magnetic coupling centrifugal pumps - Closed impeller version - Delivery rate up to 35 m³/h, max. pressure 16 bar – Flange type: PN 40 (1)
TBAK	Multi-stage magnetic coupling centrifugal pumps - Closed impeller version - Delivery rate up to 35 m³/h, max. pressure 16 bar – Flange type: PN 40 (1)

NOTE: - (1): The pumps of this range have been designed for a max. operation temperature of 120°C, which does **NOT** have any relation with the classification of the temperatures according to the ATEX 94/9/EC Directive.

The pumps of this range have been designed for operating also with liquids at high temperatures. The temperature of the liquid pumped is the most important parameter for determining the surface temperature reached by the pump and therefore its classification according to the ATEX 94/9/EC Directive. For further information, please consult Chapter 7, paragraph 7.5 in this booklet.  
For particular uses, special versions of our pumps may be taken into account. For this purpose, please contact POMPETRAVINI.

5 – INSTALLATION OF THE PUMP

5.1 – COUPLING TO THE ELECTRIC MOTOR

The correct alignment of the pump drive shaft to the motor shaft is of fundamental importance for the correct operation and for respecting the safety guarantees of the pump.  
In case of pumps supplied with a bare shaft, coupling must be carried out according to the instructions shown in Chapter 7 under paragraph 7.1 of the Operator’s Manual. In case of pumps in enbloc version or pumps fitted to the base supplied already with assembled electric motor, checking of alignment must be carried out before starting the pump. For this purpose, follow the instructions shown in Chapter 7 under paragraph 7.2 of the Operator’s Manual.  
If the pumps are supplied without electric motor or with the electric motor not yet installed, the alignment must be carried out according to the instructions of Chapter 7 under paragraph 7.1 of the Operator’s Manual.



**POMPETRAVINI cannot be held liable for any wrong choice of the motor if supplied or installed by the end-user. If the Confirmation of order foresees the execution of mechanical assembling of the pump and of the motor, POMPETRAVINI may reject the execution if the motor supplied by the end-user does not have a safety level equal or higher to that of the pump to which it must be coupled. The choice of the motor must always be done from the models which have a certification according to ATEX 94/9/EC, which guarantees a safety level equal or higher than that of the pump and is able to satisfy the electrical parameters required for the correct operation of the pump.**



If the pumps are supplied without flexible coupling and this coupling has been chosen by the user, it is suitable to use a model certified according to the ATEX 94/9/EC Directive for a safety level equal or higher than the one of the pump to which it will be mounted. We recommend strongly to select a model which ensures the rotation without any contact between mechanical parts in case of malfunction of the rubber elements so to avoid any impacts and sparks between rotating metal parts. The purpose of the flexible coupling is to transmit all the mechanical power to the pumps necessary for the job. The load factor recommended must be equal or higher to 2.5 for pumps of Group II, Category 2 and Category 3.



**If the coupling has been chosen and installed by the user, POMPETRAVINI does not have any responsibility for any trouble arising from a wrong selection or installation.**

The pump must never be used when the flexible coupling presents signs of wear or deterioration of the elastic or metal parts. Checking of the alignment conditions and wear of the elastic coupling must be carried out by authorized and



skilled persons every 800 operation hours. In case of frequent stops and start-ups of the pump, the frequency of checking must be reasonably increased. After a certain period of keeping the pump in stock or after a long standstill period, a checking of the alignment and of the conditions of the components of the coupling must be carried out before starting the pump again. If the parts present signs of wear (parts deteriorated, cracks, wear, inelastic areas etc.), those parts must be replaced with new pieces of the same type.

The flexible coupling between pump and motor, if correctly selected and installed, is efficient and safe during normal operation till the elastic and metal parts maintain their integrity. If these parts are deteriorated, the coupling may become a dangerous source of ignition or lose its capacity of transmitting the power.



**For maintaining the validity of the safety guarantees of the pump, only original spare parts from POMPETRAVAINI must be used.**

Any errors of alignment may cause a rapid wear of the moving parts of the pump and especially of the mechanical seal of the pump and consequently a leakage of the liquid pumped. Any incorrect linkage will cause also vibrations, overheating of the components and rapid wear of the flexible coupling.



The installation of monitoring systems for detecting the vibrations or the temperature in the area of the pump between the bearings of the shaft is highly recommended for all pumps conforming to Group II, Category 2 and Category 3 so as to avoid any damage on the rotary components due to misalignment errors. This kind of instruments is also very useful for preventive maintenance on the pump.



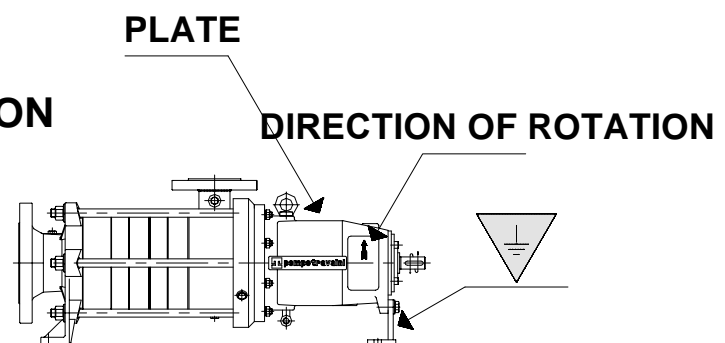
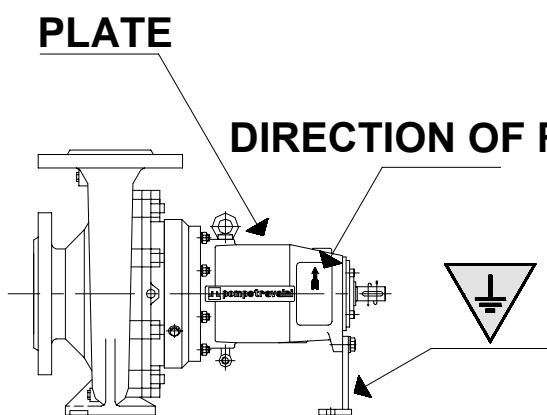
**RESIDUAL RISK:** Any running of the pump - when the coupling to the electric motor is misaligned - may cause trouble to the mechanical sealing system and therefore cause leakage of the liquid pumped. In this case, the sealing system must be replaced as described in the Instructions for Disassembly and Assembly of the Single-stage Centrifugal Pumps. Furthermore, any run with coupling errors will cause heavy vibrations which might cause seizing or even breakage of the pump rotating components and consequently an increase of temperatures or events of sparking.



**RESIDUAL RISKS:** Breakage of the coupling is not considered a foreseeable malfunction due to the type of coupling mounted and to the safety factor used when dimensioning during design. Therefore, this is not an event for which protective measures are required for pumps conforming to Group II, Category 2 and Group II, Category 3 of the ATEX 94/9/EC Directive according to the explanations of the Annex to the Directive. If during the operation of the pump the coupling for whatever reason is overstressed until leading to breakage, its metal fragments have a considerable kinetic energy which may be very dangerous for the safety of the persons and of the objects around the pump and may also develop events of sparking.

Fig. 4 – BARE SHAFT PUMPS

Fig. 5 – CLOSE-COUPLED PUMPS



## 5.2 – CONNECTION TO GROUND

The pump – both in bare shaft and close-coupled version or coupled to an electric motor - must always be connected to grounding by means of a cable. This job must be carried out by authorized and skilled personnel according to the provisions in force. The purpose of connection to the grounding is to discharge any accumulated static electricity to the pump body which might then cause electric sparks that present a source of ignition in potentially explosive atmospheres. The recommended point of connection for the grounding cable depends on the kind of execution of the pump. The lug for the connection must be of suitable material and must not generate phenomena of local electrochemical corrosion.

### 5.2.1 - Pumps in bare-shaft version

The connection to the grounding must be carried out on one of the fixing screws of the pump to the base which are fitted to the appropriate round holes or long holes on the pump feet (*Fig. 4*). In order to enable the electric continuity between the grounding cable and the pump, the paint in the contact area between the lug for the grounding cable and the pump foot must be scraped off. The point of preparation is put into evidence by a triangle (yellow), which shows the symbol (black) of grounding (*Fig. 7*). If the pump has been correctly installed on the base or the fixed metal frame, the connection to grounding can also be carried out by fastening the grounding cable to the base or to the frame. However, the electric continuity between the pump and the grounding cable must be ensured.

### 5.2.2 - Pumps in close-coupled version

The connection to the grounding must be carried out on one of the linking screws between the pump lantern and the electric motor (*Fig. 5*). In order to enable the electric continuity between the grounding cable and the pump, the paint in the contact area between the lug for the grounding cable and the pump body must be scraped off. The point of preparation is put into evidence by a triangle (yellow), which shows the symbol (black) of grounding (*Fig. 7*).

For the pumps of the TCHM series, the connection to grounding is carried out by using the same grounding connection used for the electric motor, as this specific execution ensures the electric continuity between all parts of the pump.

Fig. 6 – COUPLED PUMP

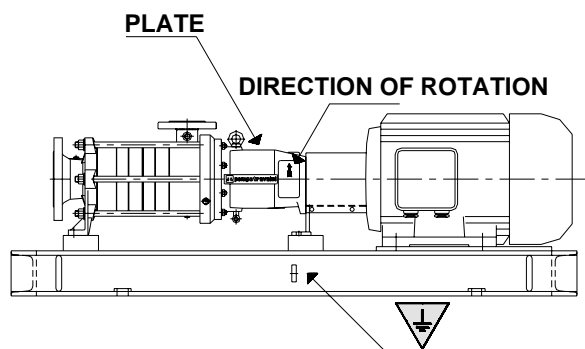
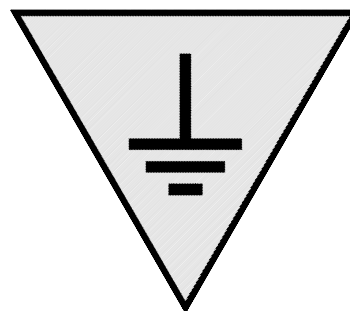


Fig. 7 – SYMBOL FOR GROUNDING



### 5.2.3 - Pumps coupled to the baseplate

The connection to the grounding must be carried out on the appropriate plate at one side of the base (*Fig. 6*). In order to enable the electric continuity between the grounding cable and the pump, the paint in the contact area between the plug for the grounding cable and the base plate must be scraped off. The point of preparation is put into evidence by a triangle (yellow), which shows the symbol (black) of grounding (*Fig. 7*). After the connection, use an appropriate instrument to check the electric continuity between at least three spots of different pump components of conducting material away from the connection point and the grounding cable. If there is any discontinuity, make sure that all connections are correctly fixed and have not been tampered with. If the continuity is still insufficient, please contact POMPETRAVINI. For cleaning the pump, do not use rags or wool brushes or any other material which facilitates the generation and accumulation of electrostatic charges which might be the source of sparking.



**RESIDUAL RISK:** Any incorrect execution of grounding may cause the accumulation of electrostatic charges on the pump, which may cause sparks and represent an ignition source due to the potentially explosive atmospheres.

### 5.2.4 – Carry out of the baseplate

The baseplate where the magnetic coupling pump will be installed must be insulated from possible external sources of vibrations due to other machine present nearby or vibrations coming from the plant's pipes connecting the pump. If it is foreseen that the pump will suffer from vibrations induced by external sources must be installed on anti-vibrations baseplate. The vibrations are dangerous for the magnetic coupling integrity. For further information look at the paragraph 6.2.



**RESIDUAL RISK:** if the pump suffers from vibrations, it could cause impact or cracking due to brittleness of the magnetic coupling components, with consequent possible development of sparks, high temperatures or seizing of the pump. This leading to really higher temperature than the class Tx for which the pump has been classified.

### 5.3 – ELECTRIC CONNECTIONS



The electric connections for powering the motor and any of its additional instruments must only be carried out by skilled and authorized persons who must observe the instructions of the manufacturer of the motor and of the electric appliances and the national provisions in force. This refers particularly to the selection of components correctly certified according to the ATEX 94/9/EC Directive for a level of safety equal or higher than that of the pump. POMPETRAVAINI absolutely cannot be held responsible for any damage to persons or objects in relation with the electric appliances installed on the pump but not purposely authorized or with errors when making the electric connections.



**OBSERVE THE SAFETY PRESCRIPTIONS SHOWN IN CHAPTER 2 OF THE OPERATOR'S MANUAL.**  
**ANY JOB ON THE UNIT MUST BE CARRIED OUT WITH THE ELECTRIC POWER SWITCHED OFF.**



**RESIDUAL RISK:** Any incorrect electric connections may generate sparks or high temperatures which may ignite the potentially explosive atmospheres present. Therefore, maximum care must be applied during installation so as to avoid any false contacts, overloads, etc.

When carrying out the electric connections for powering the motor, always check the direction of rotation in order to avoid wrong rotation of the pump impeller. The correct direction of rotation is shown by the red arrow on the pump body (Fig. 1). The instructions for checking the direction of rotation are shown in Chapter 8 of the Operator's Manual.



To guarantee better starting conditions to the pump and long life of the magnetic coupling it is strongly recommended the use of a soft start system. The use of this kind of system, if duly installed, allows to reduce the risk of losing the synchronism between the two parts of the magnetic coupling.



**RESIDUAL RISK:** Due to mistaken or sudden start and stop of the pump, strong vibrations could be generated due to the magnetic field of the coupling resulting in impact or break-up of components.

If the electric motor combined with the pump is supplied completely by POMPETRAVAINI, the instruction Manual supplied by the motor manufacturer is always enclosed. The connection of the electric motor must be carried out according to the instruction manual of the motor manufacturer. This manual must be carefully preserved together with the one of the pump. If the manual for the electric motor is not available when carrying out the connections, please contact POMPETRAVAINI.

### 5.4 - DIRECTION OF ROTATION

The impeller of the pump must **NEVER** turn into the opposite direction. The correct direction of rotation is shown by the red arrow on the pump body (Fig. 1). After having completed the installation of the pump inside of the plant and after having carried out all the necessary connections, check the pump for the correct direction of rotation. For this purpose, use all the necessary precautions. The same steps must be carried out similar to the ones for a pump start-up. For further information refer to paragraph 11.1 in Chapter 11 of the Operator's Manual and to the operator's manuals of the plant where the pump has been installed, if such manuals are available. The instructions for checking the direction of rotation are shown in chapter 8 of the Operator's Manual.

In order to avoid that the liquid in the delivery pipe of the pump flow back due to specific situations of the plant and the pumps not rotating in the opposite direction, a non-return valve must be installed inside of the pump delivery pipe. The installation of a non-return valve serves also for preventing any effect of water-hammer which may occur when the pump stops. The instructions for installing the non-return valve are shown in Chapter 9 under paragraph 9.2.2 of the Operator's Manual.



The correct direction of rotation of the standard pumps series TCK and TBK is clockwise if seen from electrical motor side, while is counter clockwise for the series TBAK, always seen from the electrical motor side.



**RESIDUAL RISK:** The rotation of the impeller in the opposite direction to the foreseen one may cause unscrewing of the impeller lock-nut and therefore cause impacts, frictions and overheating between the impeller and the pump body, even complete jamming of the pump. Also the electric motor is subject to a higher power input and overheating. This influences also all components of the electric power cable which may break, become overheated, create sparking and burning if not correctly sized or installed.

The magnetic coupling is made of 3 different main parts: the internal rotor with bushings, the external rotor and the sealing vessel or can (Fig.8).

The internal rotor bears a series of permanent magnetos placed on its circumference, in number, dimensions and position variable according to the coupling size and torque to be transferred. To the internal rotor is connected the pump shaft. The internal rotor bearing is on bushings made of special material, corrosion resistant but particularly sensitive to impact and vibrations. The running of the pump involves the reciprocal rubbing between static and rotating elements of the bushings of the internal rotor with consequent heat development, that is removed by the circulation of the pumped liquid around the rotor.

The rotor is sealed inside the pump by the sealing vessel or can, that physically divides the inside and outside of the pump containing the pumped liquid. The distance between the internal rotor and the can is really tight to allow a better efficiency of the coupling and reduce the eddy current generated by the turning magnet, because it develops heat. On the outside of the can there is the external rotor, with its permanent magnets, positioned coupled with the ones of the internal rotor, to create a series of magnetic bonds able to transfer the movement to the pump shaft. The external rotor is connected to a shaft on ball bearings moved by the pump motor. Also the distance between the external rotor and the can is really tight for better performances of the coupling.

As all the parts of the coupling assembly are built with heat conductive materials, we can assume that the external surface temperature of the can is always some degree above the temperature of the pumped liquid. From the tests it was measured that usually it is of 20° K above the temperature of the pumped liquid, because it receives part of the heat generated by the turning of the internal rotor, handed over to the liquid film that covers the bushings and used as lubricant and cooler; and part of the heat generated by the eddy current produced by the permanent magnets.



To guarantee better start up conditions to the pump and long lasting magnetic coupling, the use of a soft start-up system is strongly recommended. The use of this kind of system reduces the risk of losing of the synchronism between the two rotating elements of the magnetic coupling.

### 6.1 – CHECKINGS ON THE RUNNING

The correct running of magnetic coupling pumps ask for a special attention to the coupling qualities that has particularly frail components.

The pump start must be executed according to the instructions reported in the Operating Manual supplied with the pump. An incorrect execution of the pump start-up procedure could lead to a mechanical damage of the coupling components with consequential mechanical problems and impossible running of the pump.

The effect of rotation transfer uses the synchronism between the internal and external magnets. If, for an unforeseen reason, the synchronism is interrupted, the pump suffers violent vibrations with the possibility of mechanical breakings of the components. Hardly can it recover back to correct running.

During functioning, the internal rotor develops heat from friction between its components and for the eddy current of the magnets; the heat is transferred to the liquid that flow around, hence it is necessary to continually monitor the presence of liquid inside the pump with a flow measurement instrument or something equivalent. If the liquid flow is not there the pump must be stopped immediately.

All the magnetic coupling pumps utilized in an environment with the possibility of presence of a potentially explosive atmosphere must be equipped with a probe to measure the temperature on the outside surface of the can. The pumps are already arranged for the installation and this fitting could be supplied by POMPETRAVAINI or installed by the user. In case of measurement of a temperature increase on the can surface above the 20°K more than the pumped liquid temperature; the pump must be stopped and the reason of the temperature increase checked. If the pumped liquid has a boiling temperature within the interval of the 20°K, this interval must be reduced as to operate the pump stop when the can temperature is at least 5°K below the boiling temperature of the liquid. If the can could reach the boiling temperature of the liquid, the latter could generate vapour bubbles and so make the pumps running dry. If - from the analysis of the pump requisites for specific operating conditions - the user needs more accurate information about the temperature increase of the magnetic coupling, he could ask POMPETRAVAINI.

#### EXAMPLE:

The pumped liquid has a temperature of 60°C and a boiling temperature of 90°C. Adding an increment of 20°K due to the heat developed by moving part of the rotor, the applied thermocouple should indicate always a surface temperature of the can below 80°C. In case that it will read a higher value of the temperature, then it will a symptom of some functioning problem of the magnetic coupling and the pump must be stopped.

When used in presence of a potentially explosive atmosphere, the external atmosphere could penetrate inside the bearing housing that contains the external rotor of the magnetic coupling. In this conditions a possible malfunctioning (look at paragraph 6.2) could cause to lit the small amount of explosive atmosphere inside the bearing housing. With the use of the monitoring systems indicated above it was evaluated as sufficient to lower the probability of similar events at least to be considered a rare event that does not need to be mentioned for the pump belonging to Category 2 and 3 according to ATEX Directive.



As further precaution to prevent that some of the potentially explosive atmosphere surrounding the pump succeed to penetrate inside the bearing housing, it is possible to generate a small overpressure inside the bearing housing. The effect could be obtained by connecting the vapour venting plug of the bearing housing (Fig. 8) to a source of compressed air, dry and without any gas or other flammable substances, feeding with a very low flow, up to a pressure of 0,1 bar maximum, measured at the outlet. The effect causes a light leakage of air through the drain plug at the bottom and the shaft bearings. In this way the external atmosphere is prevented from penetrating. If the pumped liquid is dangerous for people's safety, the pump or the environment; system must be set up for carrying to a secure place the leakage from the drain plug.

POMPETRAVINI is not responsible on the technical solutions adopted to realize the overpressure system.



**All the monitoring systems of the pump's running must be chosen in such a way to guarantee a protection level at least equal or superior to that of the pump. In case their selection or installation is done by the user, POMPETRAVINI can not assume any responsibility on eventual mistakes committed.**



The measurement of the eventually presence of vibrations on the pump casing is a useful system of monitoring the running conditions. The vibrations may be generated by a pump's problem itself (e.g. functioning in cavitations condition, alignment's error of the coupling, flow instability, etc.) or it may be imposed to the pump by the specific installation. The components of the magnetic coupling and particularly the internal part of the rotor are build of relatively frail material and are assembled with tight assembling tolerances. The presence of vibrations could cause impacts or frictions that compromises the life of the coupling system and the pump integrity. The installation of a vibrations monitoring system is useful to signal the possibility of a mechanical problem on the pump as a result of hydraulic malfunctioning or mechanical failures.

The magnetic coupling pumps however follow all the other indications for maintenance, checking and functioning given in the Operating Manual.

## 6.2 –POSSIBLE MALFUNCTIONING

The magnetic coupling is an item of a quite complex construction for specific material used and for the tight functioning tolerances. The foreseeable malfunctioning as indicated by ATEX Directive are reported in the following paragraphs.

### 6.2.1 – Dry running

The pumped liquid carries out also the function to lubricate and cool down the internal rotor of the magnetic coupling, made of particularly frail materials. The possible dry running of the pump causes a quick increase of the rotor temperature, which follows a thermal expansion of its components that could lead to more friction or break-up of some components due to abnormal increase of internal strain.

The pump with a magnetic coupling must **NEVER** run dry.

In case of dry running for a period of time longer than 5 seconds, the coupling could suffer unfixable mechanical damage due to thermal expansion strain. In case of dry running for a short period of time followed by flow again the thermal strain would be the opposite of the earlier mentioned and for sure could lead to break-up of some internal components of the rotor.

A flow monitoring system must be provided at the inlet of the pump that could stop the pump if there is no pumped liquid.

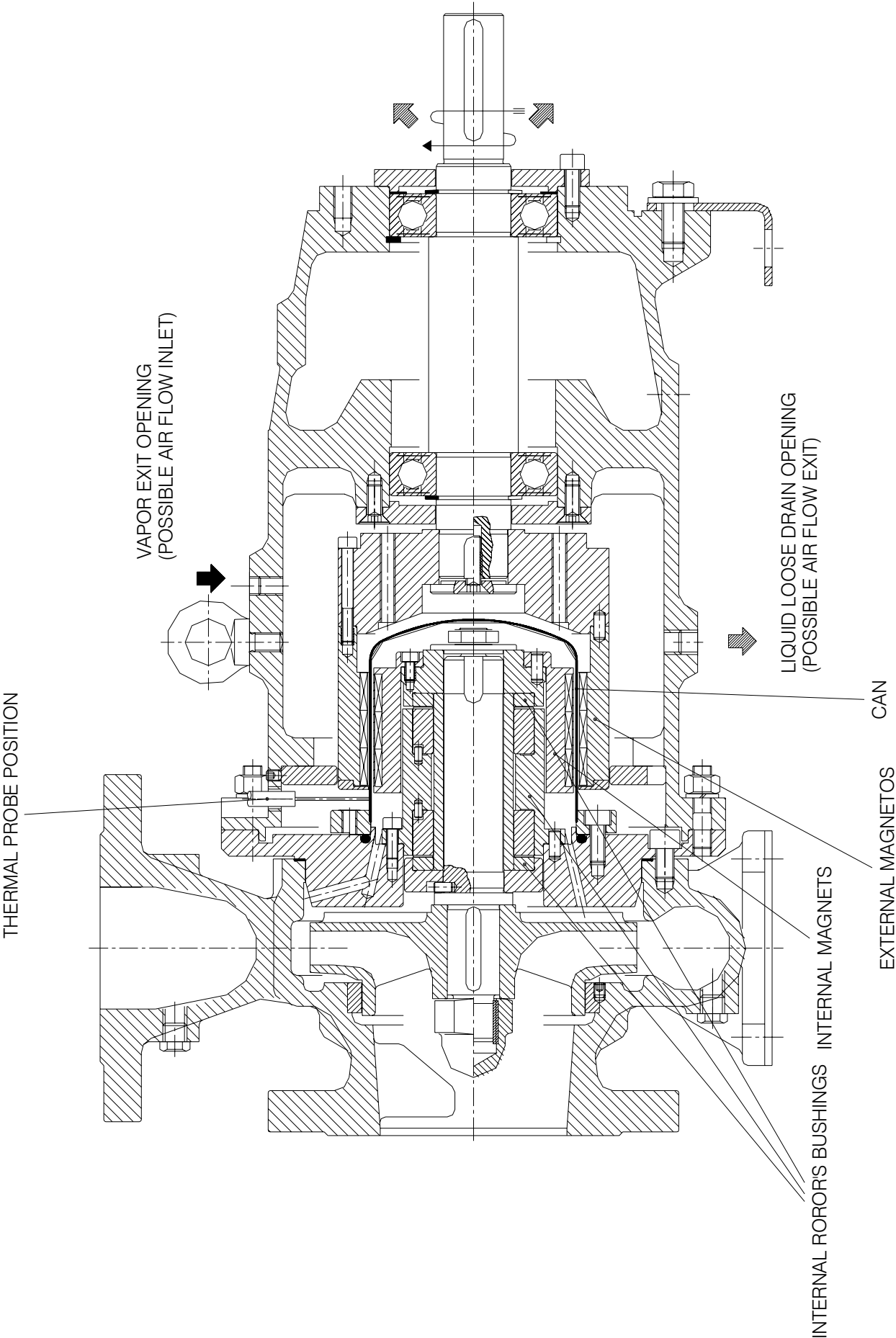


**RESIDUAL RISK:** in case of lacking of the pumped fluid the rotor temperature grows up immediately up to the break-up of the same and transmitting the heat to the outside of the pump. In case of dry running the temperature of the pump's component could widely overrun the temperature class Tx for which the pump have been classified. Could be reached temperatures really higher than 300°C that could lead to ignition of flammable substances, internal or external to the casing, possibly present.

### 6.2.2 – Loosening of the assembling screws of the coupling

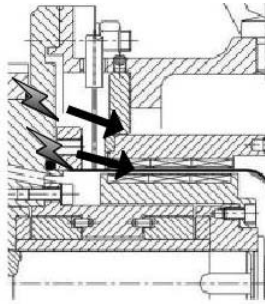
The loosening of the assembling screws of the magnetic coupling, because of presence of vibrations due to alignment error, cavitation, etc. could cause it to become futher loose, with consequent generation of vibrations and impact with the can or other internal components (Fig.9).

Fig. 8 – SAMPLE OF A SECTION OF PUMP SERIES TCK



The increased vibrations could lead to other bad damages for break-up of internal and external components, loss of synchronism between the magnets or seizing of the pump.

Fig.9 – POSSIBLE CONTAC POINTS



**RESIDUAL RISK:** impacts and sliding could lead to sparks development or high temperatures inside the pump bearing, overrunning the temperature class Tx for which the pump has been classified.



**RESIDUAL RISK:** the continuous impact of the rotor or the external rotor against the can could lead to the cutting of the can thickness with consequent coming out of the pumped liquid. The liquid could be dangerous for people, environment or other pump components and could carry out other damage or ignition sources.

### 6.2.3 – Overpower transmission

The magnetic coupling is dimensioned and selected to transmit a precise maximum level of torque and power. If used to transmit heavier loads, for example due to higher viscosity or density of the fluid, different from the foreseen or due to presence of a higher pressure at the discharge, may result in the loss of synchronism between the magnetic rotors and consequential strong vibrations, impacts and mechanical break-up.

POMPETRAVAINI take care of the correct selection of the magnetic coupling for the requested application of the customer, following the instructions given by coupling supplier. The responsibility of the correct installation and use of the pump is charged to the user.



**RESIDUAL RISK:** impacts and sliding could lead to the development of sparks or high temperatures of the bearing, higher than the temperature class Tx for which the pump has been classified.

### 6.2.3 – Functioning with presence of vibrations

The pumps with magnetic coupling must **NEVER** run in presence of vibrations or suffer vibrations during transport, storage, or any other moment of non-running. It is recommended to not let the pumps suffer vibrations higher than 1,5 mm/sec and in any case **NEVER** above 2,2 mm/sec. The magnetic coupling components are assembled with tight tolerances and are not suitable for running in presence of vibrations. It is recommended to install an appropriate vibration monitoring system to quickly stop if an increase of the pump vibrations is measured.



**RESIDUAL RISK:** Pump vibrations could cause impact or cracking due to brittleness of the magnetic coupling components, with consequent possible development of sparks, high temperatures or seizing of the pump.  
This leading to really higher than the temperature class Tx for which the pump has been classified.

### 6.2.3 – Functioning with not enough cooling/heating liquid

Some variation of the pumps allow a chamber around the internal rotor of the pump to perform a cooling or warming of the components, with the intention to keep the pumped liquid within the optimal pump running conditions. If the running conditions are not satisfied due to lack of flow or wrong liquid temperature, the internal conditions inside the can could change and result in higher power through the magnetic coupling and as a result the pump may get stuck. The installation of a cooling/heating system is responsibility of the user as he knows all the characteristics of the pumped liquid, as it is his responsibility monitoring the system functioning.



**RESIDUAL RISK:** the higher power absorbed results in the loss of running synchronism between the magnets of the coupling, generating strong vibrations, impacts and sliding that could lead to develop sparks or high temperatures of the pump bearing really higher than the temperature class Tx for which the pump have been classified.

As required by the ATEX 94/9/EC certification for the use in zones classified such as Zone 1 and Zone 2, the pump is not provided with redundant safety systems combined one with the other, with the exception of the system with double mechanical seals.

The use of the pump therefore presents residual operational risks for which special rules of application, installation and monitoring are required. The description of these risks is shown in the following paragraphs, together with the prescriptions of how to avoid these risks.

### 7.1 – INTAKE OF FOREIGN BODIES

The intake of foreign bodies into the pump must be avoided by cleaning carefully the suction piping before starting the plant and by using suitable filters, in the event that foreign bodies are present in the liquid pumped (the TCT series is built for accepting the passage of foreign bodies of a certain size). However, exact relevant information must be given for determining the type and the characteristics of the pump to POMPETRAVAINI). Cleaning of the filters must be carried out regularly by authorized and skilled persons at the time intervals established by the user according to his own experience.

The requirements are shown in Chapter 9 under paragraph 9.2.1 of the Operator's Manual.



**RESIDUAL RISK:** The intake of foreign bodies into the pump may cause friction and overheating between the impeller and the pump body and even seizing of the pump components. Also the electric motor will be subject to higher power input and overheating. This influences also all components of the electric power cable which may become overheated, create sparking and burning, if not correctly dimensioned or installed for absorbing this higher power input.

### 7.2 – DRY RUNNING

The pump must NEVER be run in a dry state. In order to prevent the running of the pump without liquid pumped, either at least one monitoring system of the liquid delivery rate must be installed in downstream position of the pump or a monitoring system for the power input into the electric motor. The monitoring system must emit signals to the operator or control cutting-out of the pump, if it is in a dry state. Such installation is compulsory for all pumps conforming to Group II, Category 2, but it is also very much advisable on pumps of Group II, Category 3.



The installation of a measuring instrument for the out flowing delivery rate from the pump is advisable to prevent operation against any obstruction on the delivery side, as described in the following paragraph 7.3. These accessories must be chosen among the ones certified according to the ATEX 94/9/EC Directive for a grade of protection at least equal or higher to that of the pump which will be monitored. The correct selection and installation is completely at the account of the end-user, if such systems have not yet been installed and supplied by POMPETRAVAINI. For further information about the right choice and installation, please contact POMPETRAVAINI.

During any dry running, all rubbing surfaces inside of the pump will not be lubricated and the heat developed will not be dissipated by the liquid pumped. When running in a dry state, inside of the pump there is a sudden temperature increase on some of its components. Due to the consequences of thermal expansion, there might be higher friction or seizing of the moving parts, requiring higher electric power input to the motor which therefore absorbs more electric current and may overheat itself.



**RESIDUAL RISK:** In case of dry running, due to internal frictions, some surfaces of the pump may become hot and reach temperatures much higher than the Tx temperature for which the pump has been classified.



After a long period of dry running, the mechanical seal – if it has not been correctly lubricated and cooled - may no longer be able to contain the liquid pumped. The pump must be stopped and the mechanical sealing system replaced.

### 7.3 – OPERATION AGAINST OBSTRUCTION AT THE DELIVERY SIDE

The pump must NEVER run against any obstructions on the delivery pipe. The obstructions may depend on different causes, such as complete closing of the delivery-flow control valve of the pump in delivery.

The adjustment valve on the delivery pipe of the pump **only** for start-up and stopping must be set to completely closed position and only for a certain time established according to the indications in Chapter 11 under paragraph 11.3 of the Operator's Manual.

In order to make sure that the pump is not running against any obstacle on the delivery pipe, at least one monitoring system (flow gauges, flow meters, pressure gauges, etc.) must be installed in downstream position on the delivery side of the pump. The monitoring system must have a signal for the operator or a control on the pump



shut-down, if running in a condition against an obstruction on the delivery side. This installation is compulsory for all pumps conforming to Group II, Category 2 and it is very much recommended for the pumps of Group II, Category 3.



The installation of a measuring device for the flow-rate at the exit of the pump is useful also for preventing any dry running, as already described in the previous paragraph 7.2. These accessories must be chosen from the ones certified by the manufacturer according to the ATEX 94/9/EC Directive for a level of protection equal or higher than that of the pump to be monitored.

Alternatively, a circuit for the minimum flow-rate may be installed, always being provided with a monitoring system, as described in Chapter 9 under paragraph 9.3 of the Operator's Manual.

For the pumps conforming to Group II, Category 2, it is compulsory to install a relief valve for venting the pressure accumulated inside, if the pump is running against any obstructions on the delivery side. This valve must enable the relief of the pressure towards a safe section of the plant. The installation of a pressure relief valve is strongly recommended also for all pumps conforming to Group II, Category 3.

Running against any obstructions in the delivery pipe will cause a sudden overheating of the fluid inside of the pump. During the running against obstructions at the delivery side, the power consumed by the motor is mainly transferred to the liquid in form of heat. The excessive increase of the temperature of the liquid pumped can even reach the boiling state and subsequent conversion into vapour.



**RESIDUAL RISK: In case of running against obstructions on the delivery side, the pump continues to cede heat to the fluid. The temperature of the fluid and of the pump will continue to increase. The pump does not have any kind of insulation. Therefore, its surface temperature is equal to the liquid contained therein. In case of operation with the delivery line closed, the temperature of some external surfaces of the pump may reach temperatures much higher than the Tx temperature for which the pump has been classified.**



**If the pump is compelled to run with the liquid already close to its boiling temperature, it will be subject to phenomena of cavitations (described in paragraph 7.6). As soon as the liquid passes over to vapour, it will run at a dry state. The mechanical consequences are high vibrations and the risk of seizing.**

## 7.4 – LUBRICATION

### 7.4.1 Oil lubrication

The pump must **NEVER** run without a sufficient quantity of lubricant oil inside of the journal. The indications for a correct lubrication are shown in Chapter 13 of the Operator's Manual.



**The bearing of the pump is cooled by the air flow generated by the electric motor for cooling the motor down. The air flow must not be hindered for any reason from cooling the pump bearing journal, as the temperature of the journal may increase considerably due to the lack of cooling.**

The oil level in the pump and its state must be checked by authorized and skilled persons every 400 operation hours and also at the first start-up. The temperature developed by the journal near the bearings must be checked and monitored in order to avoid surpassing 85°C during the steady run of the pump. No abnormal vibrations shall be noticed.

If the temperatures or the vibrations do not respect these indications, the pump must be stopped. Then the causes must be found out and the necessary steps taken to eliminate them. Any replacement of bearings must be carried out as described in the Instructions for Disassembly and Assembly of the Single-stage Centrifugal Pumps.

Any excess of lubrication oil will increase the temperature on the bearings. If the frame has more oil than necessary, the exceeding oil quantity must be drained. For this purpose open the plug for emptying the journal (d9), until the correct level has been reached. See Chapter 9 under paragraph 9.3 of the Operator's Manual.

This job must be carried out when the pump is not running. For this purpose, the authorized and skilled personnel must observe strictly the safety rules shown in Chapter 2 of the Operator's Manual. The maintenance people must wait until the oil temperature goes down and is no longer dangerous. The used oil must be disposed according to the provisions in force.



**RESIDUAL RISK: In the event of running in conditions of insufficient lubrication, due to internal frictions, some surfaces of the pump may become hot and reach temperatures much higher than the Tx temperature for which the pump has been classified. The rotating parts may be subject to seizing.**

### 7.4.2 Grease lubrication

The pump is provided with grease-lubricated bearings (also the TCHM type). The bearings are lubricated at the origin and have been sealed so that they do not require any subsequent greasing. Checking of the temperature developed and the vibrations of the pump must be carried out every 400 operation hours. The bearings must be replaced in case of any event of high temperatures (over 85°C) or abnormal vibrations. Checking and replacement must only be done by

authorized and skilled personnel. Only original spare parts shall be used. For any replacement, refer to the Instructions for Disassembly and Assembly of the Single-stage Centrifugal Pumps.



**RESIDUAL RISK:** In the event of running in conditions of insufficient lubrication, due to internal frictions, some surfaces of the pump may become hot and reach temperatures much higher than the Tx temperature for which the pump has been classified. The rotating mechanical parts may be subject to seizing.

## 7.5 – OPERATION WITH HOT LIQUIDS

The pump does not have any insulation for the internal heat. The material being used for manufacturing is an excellent thermal conductor. The classification of the pump for the Tx temperature class has been carried out on the basis of the indications received from the end-user on the specific conditions about the type of applications for which the pump is foreseen. For testing in the factory of POMPETRAVINI, clean water at ambient temperature has been used. The tests carried out on the pumps have indicated that - even with foreseeable malfunctioning (for further indications ask POMPETRAVINI) in the standard test conditions the surface temperature of the pump does not exceed the T4 classification (135°C).

During operation in the different applications, the external surface of the pump body reaches quickly a temperature which is equal to the liquid pumped. Therefore, it is possible to bring the pump to an external surface temperature much higher than the one reached under standard test conditions when fed with hot liquids. The Tx indication for the temperature class is derived from this.

The user must evaluate - according to his own analysis of the Zone where the pump is used - if the indicated temperature class is admissible.



If the pump shall be used with liquids either at a temperature higher than 100°C or in ambient with atmospheric temperature over 45°C, it is suitable to monitor the operation temperature of the journal to avoid reaching or exceeding a value of 85°C.

A positive temperature increase on some components of the mechanical seal must be added to the temperature reached by the pump body. For this purpose, read carefully the contents of Chapter 6 of this booklet regarding the mechanical sealing system.



**RESIDUAL RISK:** When the pump is used for pumping liquids at high temperatures, its surface temperature practically is equal to the liquid pumped. The compatibility between the temperature of the liquid pumped, the mechanical features of the pump and the surrounding ambient conditions must be verified.

## 7.6 – OPERATION IN PRESENCE OF CAVITATIONS

The pump must **NEVER** run in conditions where cavitation is present or may be originated. The phenomenon of cavitation is a direct consequence of the type and of the temperature of the liquid pumped, the pressure in the pump's suction pipe and of other minor factors. For the installation of the pump, follow the instructions as shown in Chapter 9 under paragraph 9.2 of the Operator's Manual.

If the operating conditions compel the pump to run in conditions close to the event of this phenomenon, it is advisable to check frequently the operating conditions, in order to act before a longer exposure to cavitations can damage the pump. Checking must be carried out by authorized and skilled personnel. During checking there must be no heavy vibrations on the pump or the typical noise (rattle) which indicates the presence of cavitations.

The phenomenon can be noticed only when the pump is running and in special operating conditions. The steps of how to reduce or eliminate them are suggested in Chapter 16 of the Operator's Manual.



**RESIDUAL RISK:** The operation with cavitations on the pump will cause a quick wear of the impeller and heavy vibrations on the whole pump, which may bring about sudden and unforeseeable mechanical trouble on all components of the pump.

## 7.7 – OPERATION AT WRONG ROTATION SPEED

The pump must **NEVER** run at a rotation speed higher than the one foreseen in the design. The correct rotation speed in relation to the operating conditions and the kind of application of the pump is shown on the pump's name-plate (*Fig. 1*) and on the Confirmation of order.

The effective rotation speed in rpm. of the pump – when it is running – may differ by a maximum of 5% more or less from the value shown on the name-plate and on the Confirmation of order. If any greater difference of the rotation speed is noticed, check the installation, the electric connections and the operating conditions in order to make sure that they correspond to the design features.

The pump must never run at a rotation speed lower than the one shown on the rate-plate and indicated on the Confirmation of order, as it may be subject to the loss of priming and therefore hindered from sucking the liquid in and therefore cause dry running.

Any wrong rotation speed may be due to an unsuitable electric motor or a motor not correctly installed or powered.



**RESIDUAL RISK:** Running of the motor at a higher speed than the foreseen will cause a temperature rise. If the design speed is very much exceeded, this may cause breakage of the elastic coupling.



**POMPETRAVAINI cannot be held liable for any wrong choice of the motor if supplied or installed by the end-user. The choice of the motor must always be done from the models which have a certification according to ATEX 94/9/EC, which guarantees a safety level equal or higher than that of the pump.**

**The electric connections must only be carried out by skilled and authorized persons who must observe the instructions of the manufacturer of the electric motor and the national provisions in force. This refers particularly to the selection of components correctly certified according to the ATEX 94/9/EC Directive for a level of safety equal or higher than that of the pump.**

## 7.8 – OPERATION WITH DIFFERENT LIQUIDS

The pump **must** be used only for the kind of applications specified and in operating conditions established in the Confirmation of order for which POMPETRAVAINI has provided the execution, the materials used for manufacturing and the test runs, which make the pump to be perfectly corresponding to the requirements. Therefore, the pump **MUST NOT** be utilised for different applications. In any other case, please contact POMPETRAVAINI, who declines any responsibility for any use different from the foreseen one, when the respective approval has not been given. The specifications for operation of the pump are shown on the identification plate, which can be easily identified on the pump (Fig. 1), and on the EC Declaration of conformity supplied together with the pump.



**RESIDUAL RISK:** Any use of the pump for applications different from those specified may cause a quick deterioration of metal components, gaskets and mechanical seals with consequent leakage to the outside.

## 8 – CHECKING BEFORE START-UP



Before the start-up of the pump, make sure that you are able to answer **AFFIRMATIVELY** to the questions listed hereunder. (The list underneath may not be sufficiently complete in case of any particular installation and operating conditions. In these cases, the user shall take appropriate measures for the safety during operation).

- **Has this Manual been completely read and fully understood and observed in all its necessary points?**
- **Are all accessories, devices, components - which are necessary or recommended for ensuring the safety level required for the Zone of installation of the pump - correctly certified, installed and operated according to the instructions of the manufacturer?**
- **Have all controls required in Chapter 10 of the Operator's Manual been passed **POSITIVELY**?**
- **Has this integrative booklet been compiled and undersigned in the following chapter by the persons in charge?**

## 9 – ACCEPTANCE OF THE OPERATING CONDITIONS

This booklet is an integral part of the guarantees required for the certification and safe use of the centrifugal pumps of the series previously indicated, when these are intended for use in potentially explosive atmospheres.

According to the specifications of the ISO 9001:00 Quality System, the company must give adequate training to their personnel in charge with installation, use, adjustment and maintenance of their machines.

The following table must be used for recording the names and the tasks of the authorized persons trained to the use of the pump and kept together with this booklet so that the records are available with the other instruction manuals needed for the pump.

By compiling the table underneath, this is to confirm to have **read** the entire contents of this booklet and of the Operator's Manual for of the centrifugal pumps and to have **understood** it under all aspects and to be **conscientious** of all conditions of risk when using the pump and to **actuate** all the indications for the safest and best use.

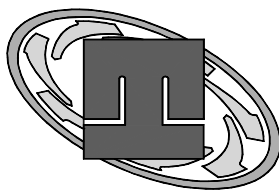


**POMPETRAVAINI does not take any responsibility on the validity of the certifications supplied together with the pump, if an interlocutor which has read, applied and compiled this booklet is not traceable by the names of the following notes.**

Date	Name	Surname	Sign	Function/charge

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