SPXFLOW®

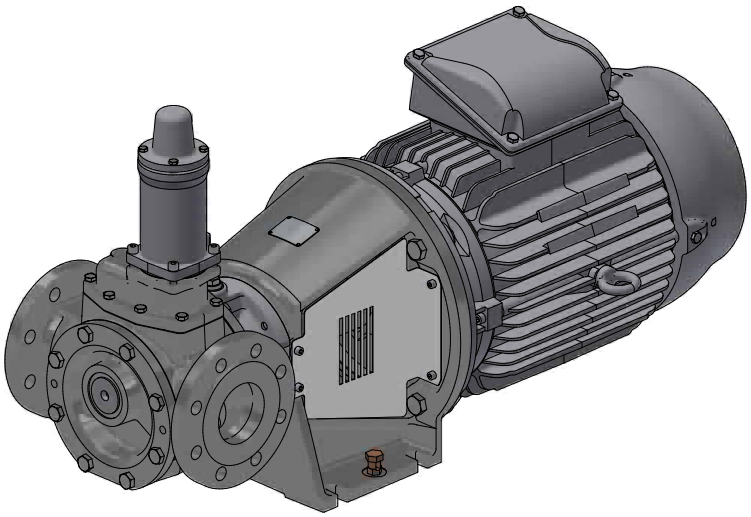
INSTRUCTION MANUAL

TopGear GS, GP, GM, H, MAG, BLOC, SRT

EXPLOSION PROTECTION ACCORDING TO 2014/34/EU (ATEX 114)

A.0500.601 – ATEX IM-TG G/ H/ MAG/ BLOC/ SRT 08.03
EN (10/2024)

ORIGINAL INSTRUCTIONS
READ AND UNDERSTAND THIS MANUAL PRIOR TO OPERATING OR SERVICING THIS PRODUCT.



These documents are stored at IBExU Institut für Sicherheitstechnik GmbH

Johnson Pump®

EU Declaration of Conformity ATEX 114

Manufacturer:

SPX FLOW Europe Limited - Belgium

Evenbroekveld 2 - 6

9420 Erpe-Mere Belgium

We hereby declare that:
the following product families, when ordered as ATEX pump, are in conformity with the relevant Union harmonization legislation: Directive 2014/34/EU.

When the product is modified without our written permission, or safety instructions from our manual have not been followed, this declaration ceases to be valid.

- Product families: TopGear GS-range, GP-range, GM-range, H-range, MAG-range, BLOC-range, SRT150/200
- Notified Body: IBExU Institut fûr Sicherheitstechnik GmbH
  Fuchsmûhlenweg 7
  09599 Freiberg
  Germany
- Tech. File Ref.: IB2466275 | 127/24_E1
- Standards: Following harmonized standards are applicable

Standard	Title
EN ISO 12100:2010	Safety of machinery - General principles for design Risk assessment and risk reduction
EN ISO 80079-36:2016	Explosive atmospheres - Part 36: Non-electrical equipment for explosive atmospheres - Basic method and requirements
EN ISO 80079-37:2016	Explosive atmospheres - Part 37: Non-electrical equipment for explosive atmospheres - non-electrical type of protection constructional safety “c”, control of ignition sources “b”, liquid immersion “k”
EN 1127-1:2019	Explosive atmospheres - Explosion prevention and protection - Part 1: Basic concepts and methodology

Marking: II 2G Ex h IIC T4...T1 Gb
II 2D Ex h IIIC T135°C...450°C Db

This declaration of conformity is issued under the sole responsibility of the manufacturer.

Erpe-Mere, November 6th 2024

F. Vander Beken,

Branch Manager

EU Declaration of Conformity ATEX 114

Manufacturer:

SPX FLOW Europe Limited - Belgium

Evenbroekveld 2 - 6

9420 Erpe-Mere Belgium

We hereby declare that:
the following product families, when ordered as ATEX pump, are in conformity with the relevant Union harmonization legislation: Directive 2014/34/EU.

When the product is modified without our written permission, or safety instructions from our manual have not been followed, this declaration ceases to be valid.

- Product families: TopGear GS-range, GP-range (except 270-150), GM-range (except 270-150), H-range (except 120-100, 270-150), MAG-range, SRT 150/200
- Notified Body: DEKRA Certification B.V. (On request)
  Meander 1051
  6825 MJ Arnhem
  The Netherlands
- Standards: Following harmonized standards are applicable

Standard	Title
EN ISO 12100:2010	Safety of machinery - General principles for design Risk assessment and risk reduction
EN ISO 80079-36:2016	Explosive atmospheres - Part 36: Non-electrical equipment for explosive atmospheres - Basic method and requirements
EN ISO 80079-37:2016	Explosive atmospheres - Part 37: Non-electrical equipment for explosive atmospheres - non-electrical type of protection constructional safety “c”, control of ignition sources “b”, liquid immersion “k”
EN 1127-1:2019	Explosive atmospheres - Explosion prevention and protection - Part 1: Basic concepts and methodology

Marking: II 2G Ex h IIC T4...T1 Gb
II 2D Ex h IIIC T135°C...450°C Db

This declaration of conformity is issued under the sole responsibility of the manufacturer.

Erpe-Mere, November 6th 2024

F. Vander Beken,

Branch Manager

SPXFLOW®

Johnson Pump®

UKCA Declaration of Conformity regarding

'The Equipment and Protective Systems Intended for Use in Potentially Explosive Atmospheres Regulations 2016 No.1107'

Manufacturer:

SPX FLOW Europe Limited - Belgium
Evenbroekveld 2 - 6
9420 Erpe-Mere Belgium

Authorized Representative of the manufacturer

SPX FLOW Europe Limited
4 Station Rd, Cheadle Hulme
Cheadle SK8 5AE, United Kingdom

We hereby declare that:

the following product families, when ordered as UKEX pump, are in conformity with The Equipment and Protective Systems Intended for Use in Potentially Explosive Atmospheres Regulations 2016 No.1107.

When the product is modified without our written permission, or safety instructions from our manual have not been followed, this declaration ceases to be valid.

- Product families: TopGear GS-range, GP-range, GM-range, H-range, MAG-range, BLOC-range, SRT150/200
- Notified Body: IBExU Institut fûr Sicherheitstechnik GmbH
  Fuchsmûhlenweg 7
  09599 Freiberg
  Germany
- Tech. File Ref.: UK2466001 | 240001-00
- Standards: Following designated standards are applicable

Standard	Title
BS EN ISO 12100:2010	Safety of machinery - General principles for design Risk assessment and risk reduction
BS EN ISO 80079-36:2016	Explosive atmospheres - Part 36: Non-electrical equipment for explosive atmospheres - Basic method and requirements
BS EN ISO 80079-37:2016	Explosive atmospheres - Part 37: Non-electrical equipment for explosive atmospheres - non-electrical type of protection constructional safety "c", control of ignition sources "b", liquid immersion "k"
BS EN 1127-1:2019	Explosive atmospheres - Explosion prevention and protection - Part 1: Basic concepts and methodology

Marking:  II 2G Ex h IIC T4...T1 Gb
II 2D Ex h IIIC T135°C...450°C Db

This declaration of conformity is issued under the sole responsibility of the manufacturer.

United Kingdom, November 6th 2024

Mark Shanahan

Site leader

Contents

TopGear GS, GP, GM, H, MAG, BLOC and SRT Operating instructions concerning explosion protection

Disclaimer

Considerable effort has been made to ensure that this manual is free of inaccuracies and omissions. However, even though the manual contains up to date data at time of going to press, due to constant improvements some of the data contained herein may not exactly reflect the current model of the particular product described in this manual.

SPX FLOW reserves the right to change the construction and design of the products at any time without being obliged to change previous models accordingly.

These instructions contain important and useful information on explosion protection in accordance with EC directive 2014/34/EU (ATEX 114).

All relevant instructions about installation, operation and maintenance of the pump and the pump unit can be found in the separate pump's "Instruction Manual". These instructions should be adhered to at all times!

SPX Flow Europe Limited - Belgium
Evenbroekveld 2-6
9420 Erpe-Mere
Belgium
Tel. +32 (0)53 60 27 15

1.0 General

1.1 Symbol

The following symbol is used to indicate special instructions concerning explosion protection:

1.2 Safety Information

This manual covers the main issues concerning explosion protection and must be used together with the general Instruction Manual for TopGear pumps, called hereafter 'IM' and the manuals of other equipment such as gear and motor drives. For explosion protection safety it is imperative that the pump set must be protected from all unauthorised operation and unnecessary wear.

Explosive gas mixtures or concentrations of dust, in conjunction with hot, live and moving parts on pump, gear and motor unit, can lead to severe or fatal personal injuries.

Installation, connection, start-up, maintenance and repair work may only be performed by qualified personnel while taking in account:

- these specific instructions, together with all other instructions for the installed equipment and installation;
- warning and information signs on the equipment;
- the specific regulations and requirements for the system in which the pump unit will operate (current valid national and regional regulations).

1.3 Responsibility for ATEX 114 certification – extent of delivery

SPX FLOW will be held responsibile only for delivered materials and equipment selected according to the operating conditions data, based on information supplied by the customer or the end user and stated in the order confirmation. When in doubt contact your supplier.

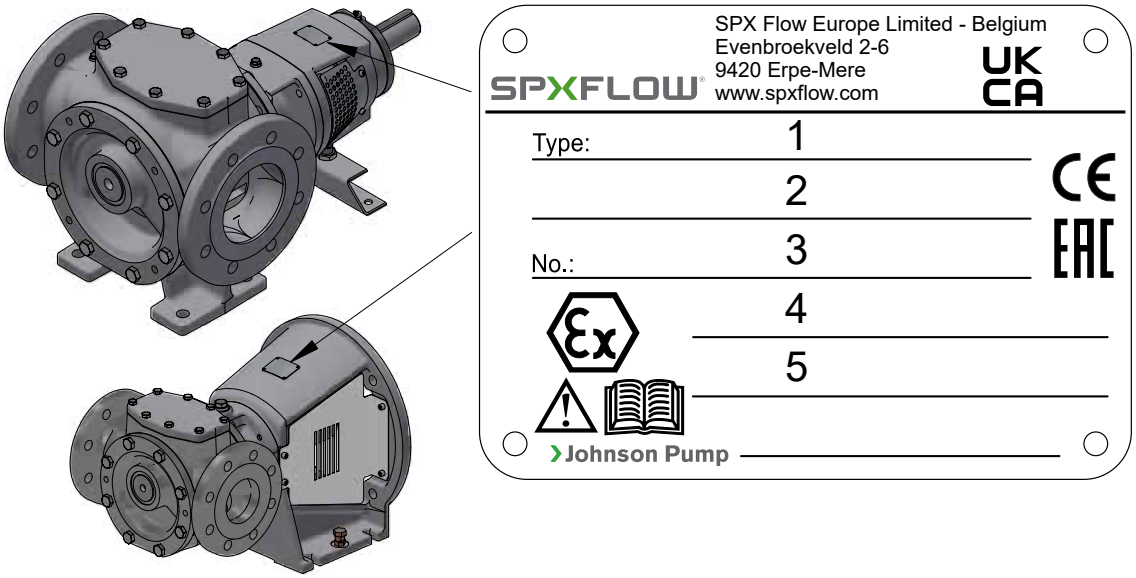
In the event SPX FLOW delivers a pump with bare shaft, the explosion protection certification marking on the pump nameplate refers exclusively to the pump part. All other assembled equipment should have a minimum level of protection as required by the area classification (zone) in which the equipment is installed. The complete unit must be certified separately by the manufacturer and must have a separate nameplate supplied by the manufacturer.

In the event SPX FLOW delivers a complete unit, the explosion protection certification, and marking on the nameplate attached to the base plate or to the pump frame, will refer to that specific unit.

1.4 Marking

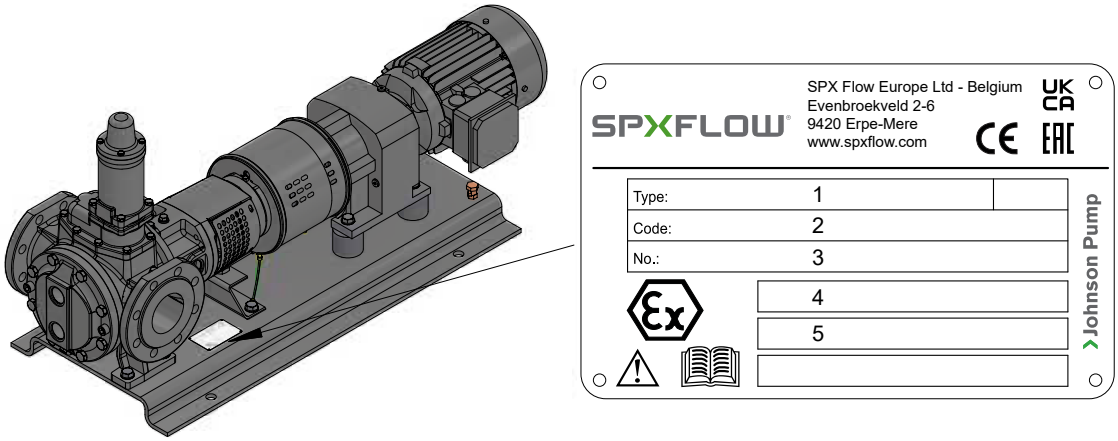
The default gas and dust group are IIB & IIIB. However, in the unlikely situation that a pump is used in an Atex environment requesting gas group IIC and dust group IIIC, special mitigating measures must be taken. Please contact a customer service representative for further details.

Name plate on the pump



1 Pump type: example: TG GP 23-65
2 Pump internals: example: G2 OO BG2 BG2 TC
3 Serial number: example: NNNN-xxxxxxx (NNNN indicates the year of production)
4 Ex marking: Ex-symbol followed by Atex type designation – (see examples)
5 Environment temp.: To be specified if beyond the standard ATEX range -20°C / 40°C

Name plate on the unit (in case of delivery of complete unit from SPX FLOW)



1 Type: example: TG H 185-125
2 Code: example: 6.TG68A6-6786946
3 Serial number: example: NNNN-xxxxxxx (NNNN indicates the year of production)
4 Ex marking: Ex-symbol followed by Atex type designation – (see examples)
5 Environment temp.: To be specified if beyond the standard ATEX range -20°C / +40°C

1.5 Atex type designation examples

Example 1: II 2G Ex h IIB T4...T3 Gb

II 2G	Marking according to Group II, Category 2, Gas (G) protection
Ex h	Marking for non electrical Ex equipment. Type of protection „c" (constructional safety)
IIB	Gas group
T3-T4	Temperature class T4 to T3
Gb	Equipment protection level

Example 2: II 2G Ex h IIB 240°C (T2) Gb

II 2G	Marking according to Group II, Category 2, Gas (G) protection
Ex h	Marking for non electrical Ex equipment. Type of protection „c" (constructional safety)
IIB	Gas group
240°C (T2)	Maximum surface temperature of 240 degrees Celsius
Gb	Equipment protection level

Example 3: II 2D Ex h IIIB T240°C Db

II 2D	Marking according to Group II, Category 2, Dust (D) protection
Ex h	Marking for non electrical Ex equipment. Type of protection „c" (constructional safety)
IIIB	Dust group
T240°C	Maximum surface temperature of 240 degrees Celsius
Db	Equipment protection level

Environment temperature should be between -20°C and +40°C, if not, the corresponding environment temperature will be indicated on the nameplate.

1.6 Temperature classes and allowable temperatures

In normal operation the highest temperature on the surfaces of the pump should correspond to the highest temperature of the pumped product, or the heating medium in case the pump is heated by jackets. The maximum permissible temperature depends on the temperature class (T4 to T1) or on T_{max} to be complied with. The bearing bracket surfaces must be freely exposed to the atmosphere to allow cooling.

1.6.1 II 2G allowable temperature TG GS, GP, GM, H and SRT

ISO EN 80076-36 Temperature class T_{max}	Pumped medium temperature T_A	Heating medium T_A (if any)		Bearing bracket temperature (L3)
		S-jacket	T-jacket	
T4 - 135°C	≤ 120°C	≤ 120°C	≤ 120°C	≤ 100°C
T3 - 200°C	≤ 180°C	≤ 180°C	≤ 180°C	≤ 120°C
T2 - 300°C	≤ 270°C *)	–	≤ 270°C *)	≤ 160°C
T1 - 450°C	≤ 300°C *)	–	≤ 300°C *)	≤ 180°C

(*) temperature to decrease according to material limits (see IM).

- When the temperature limits are reduced because of internal materials selection, the maximum allowable surface temperature T_{max} will be supplied instead of the temperature class, the same way as in case of D, dust protection.
- TG GS, GP, GM, can be used in a temperature range between -20°C and +40°C.
- TG H in stainless steel execution can be used in a temperature range between -40°C and +40°C; materials other than stainless steel can be used in the temperature range between -20°C and +40°C.

1.6.2 II 2G allowable temperature TG MAG

ISO EN 80076-36 Temperature class T_{max}	Pumped medium temperature T_A	Heating medium T_A (if any)		Separation can temperature (L2)	Bearing bracket temperature (L3)
		S-jacket	T-jacket		
T4 - 135°C	≤ 100°C	≤ 100°C	≤ 100°C	≤ 120°C	≤ 100°C
T3 - 200°C	≤ 160°C	≤ 160°C	≤ 160°C	≤ 180°C	≤ 100°C
T2 - 300°C	≤ 250°C *)	–	≤ 250°C *)	≤ 270°C	≤ 160°C **)
T1 - 450°C	≤ 260°C *)	–	≤ 260°C *)	≤ 280°C	≤ 160°C **)

(*) temperature to decrease according to material limits (see IM).
(**) special bearing construction required, please contact SPX FLOW or your local distributor

- When the temperature limits are reduced because of internal materials selection, the maximum allowable surface temperature T_{max} will be supplied instead of the temperature class, the same way as in case of D, dust protection.
- TG MAG in cast iron can be used in a temperature range between -20°C and +40°C.
- TG MAG in stainless steel execution can be used in a temperature range between -40°C and +40°C.

1.6.3 II 2G allowable temperature TG BLOC

ISO EN 80076-36 Temperature class T_{max}	Pumped medium temperature T_A	Heating medium T_A (if any)	Lantern piece temperature (L3)
		S-jacket	
T4 - 135°C	≤ 120°C	≤ 120°C	≤ 100°C
T3 - 200°C	≤ 180°C	≤ 180°C	≤ 120°C

(*) temperature to decrease according to material limits (see IM).

- When the temperature limits are reduced because of internal materials selection, the maximum allowable surface temperature T_{max} will be supplied instead of the temperature class, the same way as in case of D, dust protection.
- TG BLOC in cast iron can be used in a temperature range between -20°C and +40°C.
- TG BLOC in stainless steel execution can be used in a temperature range between -40°C and +40°C.

1.6.4 II 2(G)D allowable temperature TG GS, GP, GM, H and SRT

The maximum surface temperature (T_{max}) is indicated on the name plate.
T_{max} is determined as the lowest temperature derived from following equations:

- T_{max} = temperature limits of selected internal materials (i.e. pump selection).
- $T_{max} = T_{5mm}$ - 75°C (T_{5mm} "ignition temperature of a dust layer of 5 mm thickness")
- T_{max} = 2/3 x $T._{Cl}$ (T_{Cl} "ignition temperature of a dust cloud").

Remark:
T_{5mm} and T_{Cl} are to be determined by the customer/user in case of dust (D) protection.
In case the ambient temperature exceeds the range of -20°C / +40°C contact your distributor.

Maximum surface temperature		Pumped medium temperature T_A	Heating medium T_A (if any)		Bearing bracket temperature (L3)
T_{max}	T.class *)		S-jacket	T-jacket	
135°C	(T4)	≤ 120°C	≤ 120°C	≤ 120°C	≤ 100°C
170°C	(T3)	≤ 150°C	≤ 150°C	≤ 150°C	≤ 120°C
200°C	(T3)	≤ 180°C	≤ 180°C	≤ 180°C	≤ 120°C
220°C	(T2)	≤ 200°C	–	≤ 200°C	≤ 160°C
240°C	(T2)	≤ 220°C	–	≤ 220°C	≤ 160°C
260°C	(T2)	≤ 235°C	–	≤ 235°C	≤ 160°C
280°C	(T2)	≤ 250°C	–	≤ 250°C	≤ 160°C
300°C	(T2)	≤ 270°C	–	≤ 270°C	≤ 180°C
330°C	(T1)	≤ 300°C	–	≤ 300°C	≤ 180°C

**) corresponding temperature class of Gas protection indicated on the nameplate between brackets*

- TG GS, GP, GM, can be used in a temperature range between -20°C and +40°C.
- TG H in stainless steel execution can be used in a temperature range between -40°C and +40°C; materials other than stainless steel can be used in the temperature range between -20°C and +40°C.

1.6.5 II 2(G)D allowable temperature TG MAG

The maximum surface temperature (T_{max}) is indicated on the name plate.
T_{max} is determined as the lowest temperature derived from following equations:

- T_{max} = temperature limits of selected internal materials (i.e. pump selection).
- $T_{max} = T_{5mm}$ - 75°C (T_{5mm} "ignition temperature of a dust layer of 5 mm thickness")
- T_{max} = 2/3 x $T._{Cl}$ (T_{Cl} "ignition temperature of a dust cloud").

Remark:
T_{5mm} and T_{Cl} are to be determined by the customer/user in case of dust (D) protection.
In case the ambient temperature exceeds the range of -20°C / +40°C contact your distributor.

Maximum surface temperature		Pumped medium temperature T_A	Heating medium T_A (if any)		Separation can temperature (L2)	Bearing bracket temperature (L3)
T_{max}	T.class *)		S-jacket	T-jacket		
135°C	(T4)	≤ 100°C	≤ 100°C	≤ 100°C	≤ 120°C	≤ 100°C
170°C	(T3)	≤ 130°C	≤ 130°C	≤ 130°C	≤ 150°C	≤ 100°C
200°C	(T3)	≤ 160°C	≤ 160°C	≤ 160°C	≤ 180°C	≤ 100°C
220°C	(T2)	≤ 180°C	≤ 180°C	≤ 180°C	≤ 200°C	≤ 100°C
240°C	(T2)	≤ 200°C	–	≤ 200°C	≤ 220°C	≤ 160°C **)
260°C	(T2)	≤ 215°C	–	≤ 215°C	≤ 235°C	≤ 160°C **)
280°C	(T2)	≤ 230°C	–	≤ 230°C	≤ 250°C	≤ 160°C **)
300°C	(T2)	≤ 250°C	–	≤ 250°C	≤ 270°C	≤ 160°C **)
330°C	(T1)	≤ 260°C	–	≤ 260°C	≤ 280°C	≤ 160°C **)

**) corresponding temperature class of Gas protection indicated on the nameplate between brackets*
***) special bearing construction required, please contact SPX FLOW or your local distributor*

- TG MAG in cast iron can be used in a temperature range between -20°C and +40°C.
- TG MAG in stainless steel execution can be used in a temperature range between -40°C and +40°C.

1.6.6 II 2(G)D allowable temperature TG BLOC

The maximum surface temperature (T_{max}) is indicated on the name plate.
T_{max} is determined as the lowest temperature derived from following equations:

- T_{max} = temperature limits of selected internal materials (i.e. pump selection).
- $T_{max} = T_{5mm}$ - 75°C (T_{5mm} "ignition temperature of a dust layer of 5 mm thickness")
- T_{max} = 2/3 x $T._{Cl}$ (T_{Cl} "ignition temperature of a dust cloud").

Remark:
T_{5mm} and T_{Cl} are to be determined by the customer/user in case of dust (D) protection.
In case the ambient temperature exceeds the range of -20°C / +40°C contact your distributor.

Maximum surface temperature		Pumped medium temperature T_A	Heating medium T_A (if any)	Lantern piece temperature (L3)
T_{max}	T.class *)		S-jacket	
135°C	(T4)	≤ 120°C	≤ 120°C	≤ 100°C
200°C	(T3)	≤ 180°C	≤ 180°C	≤ 120°C

**) corresponding temperature class of Gas protection indicated on the nameplate between brackets*

- TG BLOC in cast iron can be used in a temperature range between -20°C and +40°C.
- TG BLOC in stainless steel execution can be used in a temperature range between -40°C and +40°C.

1.7 Responsibility

It is the responsibility of the operator to ensure specified product temperatures are not exceeded and to ensure regular inspections and maintenance for good operation of the shaft seal, the bearings and the internal pump parts. If this cannot be ensured by the operator, suitable monitoring facilities must be provided, see paragraph 1.9.

1.8 Operation

- TG pumps are designed to run/operate continuously.
- For explosion protection it is imperative that the gear pump will not run dry. The pump internal, including shaft seal chamber or magnetic coupling and auxiliary systems, must be filled completely with, and lubricated by the product to be handled during operation (including start-up, priming and shut-off).
- In case of self priming the pump must be filled with liquid and the appropriate shaft sealing (quenched shaft seal) must be selected and controlled with regard to the quench liquid.
- The pump must never be operated continuously with the safety relief valve opened. The relief valve is designed as a safety device in case of over-pressure and may not be used for flow control.
- When flow control is performed by by-passing the return liquid, the liquid must return to the suction tank and not directly to the suction port of the pump, in which case heat accumulation in the pump could create a dangerous situation.
- The pump must never be operated with the shutoff valves in the suction or discharge lines closed.

1.9 Monitoring

If the good functioning and maximum allowable surface temperatures cannot be ensured by regular inspection by the operator, suitable monitoring devices must be provided.

1.9.1 Monitoring TG GS, GP, GM, H and SRT

Surface temperature monitoring is always of extreme importance in the following areas, see figure 1:

- Surface temperature of the pump casing at the front cover (L1).
- Surface temperature at the gland end, gland packing or mechanical seal (L2). In case of a quenched or double mechanical seal, monitoring can be done by checking the quench fluid, see paragraph 5.3. Use of a quenched single mechanical seal or a double mechanical seal is recommended when there is a risk of dry running or lubrication failure of the mechanical seal such as in case of self priming.

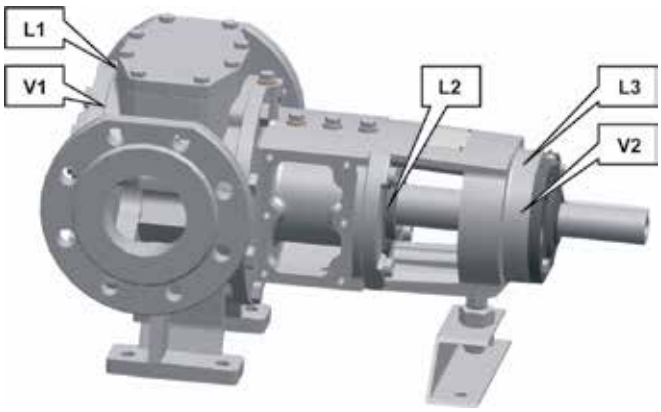


Fig 1 – Indication of monitoring possibilities and advised locations (optionally)

- Surface temperature at the ball bearing area of the bearing bracket (L3).

The maximum allowable surface temperature of L1 and L2 refers to T_A.
The maximum allowable surface temperature of L3 refers to the maximum temperature of the bearing bracket.

Additional vibration monitoring can be useful to detect excessive vibrations, indicating premature failure of ball bearing or internal wear in the following areas:

- internal areas at the pump front (V1).
- ball bearing at bearing bracket (V2).

1.9.2 Monitoring TG MAG

Surface temperature monitoring is always of extreme importance in the following areas, see figure 2:

When operating TG MAG pumps in potentially explosive areas the temperature on the separation can (L2) must be monitored permanently (see IM "Check temperature censor on can")

Furthermore we recommend to monitor the surface temperatures on the bearing bracket (L3) and on the front cover (L1) if the good functioning and maximum allowable surface temperatures cannot be ensured by regular inspection by the operator.
The temperature monitoring equipment must fulfill the requirements of ATEX 114.

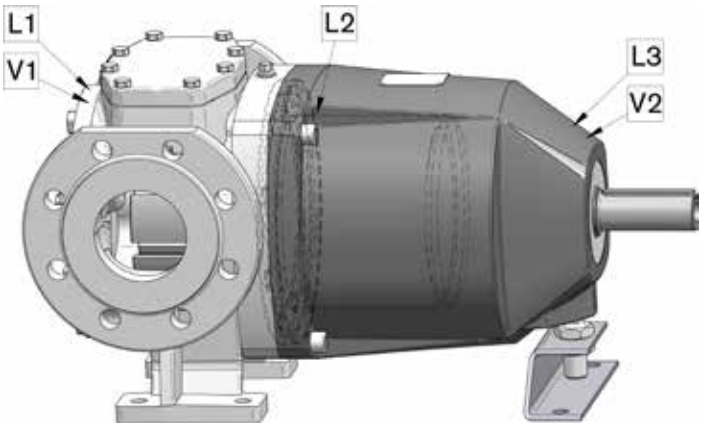


Fig 2 – Indication of monitoring possibilities and advised locations

L1 – Surface temperature of the pump casing at the front cover
L2 – Surface temperature on the separation can
L3 – Surface temperature at the ball bearing area of the bearing bracket

The maximum allowable surface temperature of L1 and L2 refers to T_A.
The maximum allowable surface temperature of L3 refers to the maxium temperature of the bearing bracket.

Additional vibration monitoring can be useful to detect exessive vibrations, indicating premature failure of the ball bearings or internal wear in follwing areas:

V1 – internal areas at the pump front
V2 – ball bearings at the bearing bracket

Furthermore we recommend to monitor the power consumption of the drive motor to detect slipping of the magnetic coupling in case of failure of the pump or if the break-away torque of the magnetic coupling is exceeded due to changing operating parameters.

1.9.3 Monitoring TG BLOC

Surface temperature monitoring is always of extreme importance in the following areas, see figure 3:

- Surface temperature of the pump casing at the front cover (L1).
- Surface temperature at mechanical seal (L2).
- Surface temperature at the ball bearing area of the bearing lantern (L3).

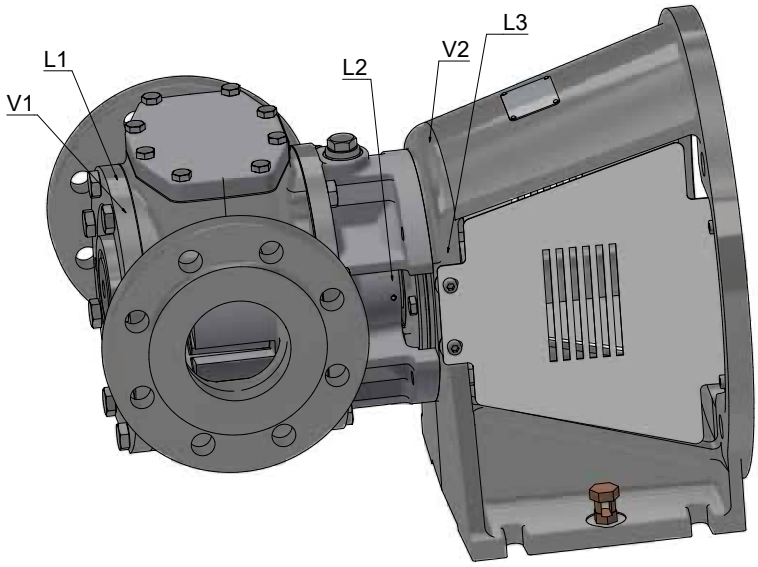


Fig 3 – Indication of monitoring possibilities and advised locations (optionally)

The maximum allowable surface temperature of L1 and L2 refers to T_A.
The maximum allowable surface temperature of L3 refers to the maximum temperature of the bearing lantern.

Additional vibration monitoring can be useful to detect excessive vibrations, indicating premature failure of ball bearing or internal wear in the following areas:

- internal areas at the pump front (V1).
- ball bearing at bearing lantern (V2).

1.10 Residual risks

List of residual risks (after risk analysis according to EN ISO 80079-36).

1.10.1 List of residual risks for TG GS, GP, GM, H and SRT

Potential ignition source			Measures applied to prevent the source becoming effective	Ignition protection used
Normal operation	**Expected malfunction**	**Rare malfunction**		
Exposed to hot surfaces of pump casing			The customer has to ensure that the temperature of the pump liquid does not exceed the permissible temperature.	EN ISO 80079-36 §6.2
			Additionally, the operator has to ensure the operating limits for speed, flow and pressure are not exceeded.	User Instructions
	Excessive heat accumulation		The customer has to ensure a minimum flow through the pump to evacuate generated heat or has to monitor the pump casing temperature.	EN ISO 80079-36 §6.2 User Instructions
Exposed to hot surface of bearing bracket			The bearing bracket must be freely exposed to the atmosphere to allow cooling of the surfaces. The operator must regularly check the tmperature for good operation and the temperature of the bearing externals. The grease selected must be suitable for the ambient and working conditions.	EN ISO 80079-36 §6.2 EN ISO 80079-37 §5.7 User Instructions
		Internal high temperatures and/or sparks	Dry running is excluded from normal operation.	EN ISO 80079-37 §5.6 & §5.7
			The operator has to ensure that the pump runs with the shaft sealing chamber filled with the pumped liquid during start, normal operation and shut-off.	User Instructions
	Excessive heat at shaft sealing -packed gland type -triple lip-seal		The operator has to ensure good lubrication of the packing rings and must regularly inspect the surface temperature and function. Lip-seal running surfaces must be greased in order to prevent any dry-run. The temperature of the shaft bush must be monitored.	EN ISO 80079-37 §5.3 User Instructions
	Excessive heat at shaft sealing, mechanical seal type		The customer has to follow the specific instructions for the mechanical seal type in the instruction manual or/and separate certificate instructions if present. Single and double mechanical seals with quench are to be protected by controlling the quench liquid.	EN ISO 80079-37 §5.3 User Instructions
		Mechanical sparks caused by contact between rotating shaft and stationary seal gland	Shaft gland materials are made from stainless steel to minimize spark risks (cold sparks).	EN ISO 80079-36
			Pump may not run dry. Excessive wear of shaft bearings and internals must be prevented through adequate maintenance.	User Instructions
		Electrostatic discharges	Customer should provide earth connections or equipotential bridges in case of indirect risks.	EN ISO 80079-36 User Instructions

Remarks:

- For category 2, the risks at “normal operation” and those at “expected malfunction” have to be controlled.
- For category 3, the risks at “normal operation” have to be controlled.

1.10.2 List of residual risks for TG MAG

Potential ignition source			Measures applied to prevent the source becoming effective	Ignition protection used
Normal operation	**Expected malfunction**	**Rare malfunction**		
Exposed to hot surfaces of pump casing and jackets			Customer has to ensure that the temperature of the pump and heating liquid do not exceed the allowable llmits.	EN ISO 80079-36 §6.2
			Additionally, the operator has to ensure the operating limits for speed, flow and pressure are not exceeded.	User Instructions (IM)
Exposed to hot surfaces at the outside surface of the can (i.e. inside the bearing bracket)			Customer has to ensure that the pump is properly filled to ensure good circulation over the internals of the mag-drive (i.e. forced circulation by means of the built-in auxiliary pump). The temperature of the can must be monitored.	EN ISO 80079-36 §6.2 User Instructions
	Excessive heat accumulation		Customer has to ensure a minimum flow through the pump.	EN ISO 80079-36 §6.2 User Instructions
Exposed to hot surface temperature of bearing bracket			Bearing bracket must be freely exposed to the atmosphere to allow cooling of the surfaces. Operator must regularly check temperature and good operation of external bearing.	EN ISO 80079-36 §6.2 EN ISO 80079-37 §5.6 & §5.7 User Instructions
		Internal high temperatures and/or sparks	Dry running and self-priming is excluded from normal operation.	EN ISO 80079-37 §5.6 & §5.7
			Operator has to ensure to run the pump and magnetic coupling chamber completely filled with the pumped liquid during start, normal operation and shut-off.	User Instructions
		Mechanical sparks by rubbing contact of rotating shaft with stationary pump and bracket components	In the event of failure of the bracket ball bearings, a safety device made of brass (an incendive material) is provided to avoid sparkings at the inside of the bracket. Pump may not run dry. Excessive wear of shaft bearings and internals must be prevented by adequate maintenance procedures.	EN ISO 80079-37 §5.6 & §5.7 User Instructions
		Electro-static discharges	Customer should provide earth connections or equipotential bridges in case of indirect risks	EN ISO 80079-36 User Instructions

Remarks:

- For category 2, the risks at “normal operation” and those at “expected malfunction” have to be controlled.
- For category 3, the risks at “normal operation” have to be controlled.

1.10.3 List of residual risks for TG BLOC

Potential ignition source			Measures applied to prevent the source becoming effective	Ignition protection used
Normal operation	**Expected malfunction**	**Rare malfunction**		
Exposed to hot surfaces of pump casing			The customer has to ensure that the temperature of the pump liquid does not exceed the permissible temperature.	EN ISO 80079-36 §6.2
			Additionally, the operator has to ensure the operating limits for speed, flow and pressure are not exceeded.	User Instructions
	Excessive heat accumulation		The customer has to ensure a minimum flow through the pump to evacuate generated heat or has to monitor the pump casing temperature.	EN ISO 80079-36 §6.2 User Instructions
Exposed to hot surface of bearing lantern			The bearing lantern must be freely exposed to the atmosphere to allow cooling of the surfaces. The operator must regularly check the tmperature for good operation and the temperature of the bearing externals. The grease selected must be suitable for the ambient and working conditions.	EN ISO 80079-36 §6.2 EN ISO 80079-37 §5.7 User Instructions
		Internal high temperatures and/or sparks	Dry running is excluded from normal operation.	EN ISO 80079-37 §5.6 & §5.7
			The operator has to ensure that the pump runs with the shaft sealing chamber filled with the pumped liquid during start, normal operation and shut-off.	User Instructions
	Excessive heat at shaft sealing, mechanical seal type		The customer has to follow the specific instructions for the mechanical seal type in the instruction manual or/and separate certificate instructions if present.	EN ISO 80079-37 §5.3 User Instructions
		Electrostatic discharges	Customer should provide earth connections or equipotential bridges in case of indirect risks.	EN ISO 80079-36 User Instructions

Remarks:

- For category 2, the risks at “normal operation” and those at “expected malfunction” have to be controlled.
- For category 3, the risks at “normal operation” have to be controlled.

2.0 Performance

- Operation of the pump outside its specified operating range and unauthorised modes of operation may result in the specified temperature limits being exceeded. See IM for temperature limits.
- In order to remove the heat generated by hydraulic and mechanical friction inside the pump, it must be assured that there is always a sufficient minimum flow through the pump. If this cannot be ensured under all possible operating conditions or because the conditions might change over time due to wear, we advise to foresee a suitable temperature monitoring device. (See chapter 1.9)

Note: *Internally produced friction heat depends of pump speed and of the properties of the pumped media: viscosity, specific heat, lubricating properties etc.*
It is the responsibility of the operator to ensure the pump operates below the allowable temperature limits as indicated above.

Dangerous situations can occur in the following events and should be prevented and/or excluded from normal operation and expected operation (group II-category 2) by adequate operation, supervising and maintenance:

- Running the pump without liquid will produce extra heat in the sleeve bearings and on other friction sensitive parts. Temperature can rise above allowable limits as a result of insufficient lubrication and/or lack of heat expulsion through liquid flow. Insufficient lubrication can cause preliminary pump wear and failure.
- Heat accumulation can be caused by direct return of liquid from discharge side to suction side of the pump.
  The pump temperature could increase above allowable limit when the pump is operating with the relief valve opened for a length of time or during flow control when by-passing the medium to the suction side of the pump.
- Increase of internal slip by internal wear in such a way that the output flow rate will become insufficient to evacuate the internal friction heat. Temperature could increase above allowable limit.
- Monitoring of the surface temperatures of the pump casing at indicated areas (see fig. 1 and 2) and controlling or monitoring the quench medium in case of a quenched shaft seal ensures sufficient protection against potentially dangerous situations.

3.0 Installation

3.1 Checks

Before installation, the equipment must be checked.

- Ensure that all checklists are recorded during installation/commissioning and document the completed installation checklist.
- Ensure the equipment data (as indicated on nameplate, documentation etc.) corresponds to the explosive atmosphere zone, category and system requirements.
- Possible damage: the installed equipment must be undamaged and must have been properly stored before installation (for maximum 3 years). In case of any doubt or any damage found contact your supplier.
- Ensure that heated air from other units will not affect the environment of the pump unit; environment air should not exceed a temperature of 40°C.

3.2 ATEX 114 certification

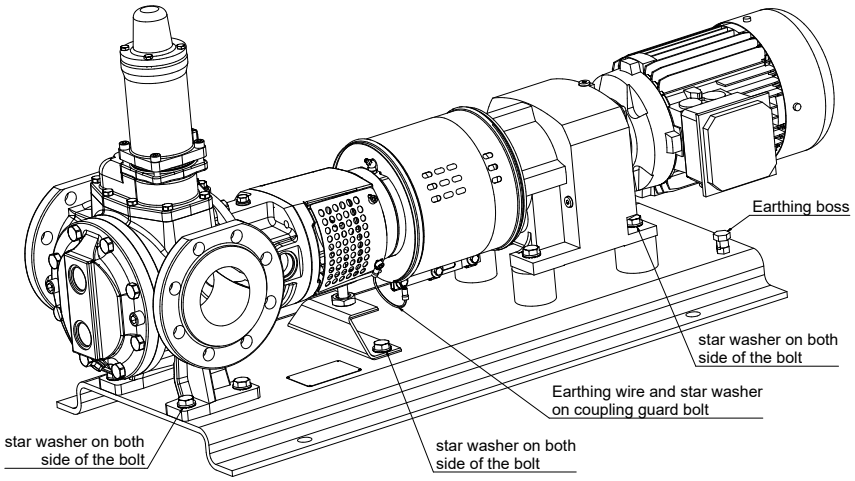
All additional equipment such as shaft couplings, guards, drive, motor, auxiliary equipment etc. must be part of the ATEX 114 certification or must be certified separately for the appropriate temperature category. The assembled pump unit must have a separate certification and a separate nameplate supplied by the pump unit manufacturer.

3.3 Working environment

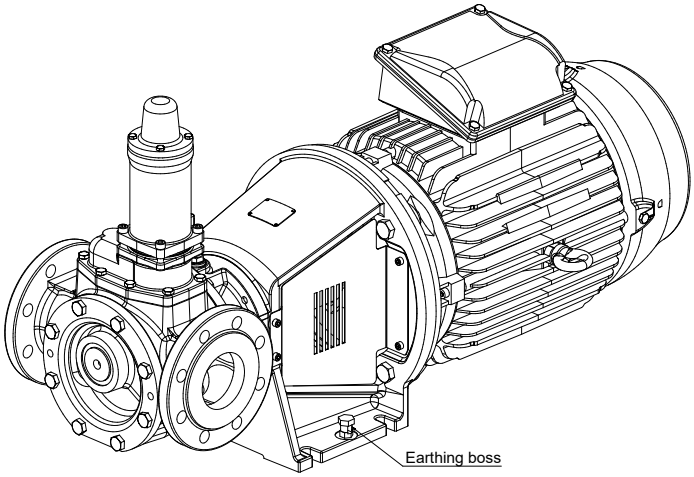
- The pump and unit must be accessible for maintenance and inspection during operation, see IM.
- Unobstructed air supply to the pump, drive and motor should be ensured.
- An electric motor should have a free inlet for cooling air of at least 1/4 of its motor diameter.
- The pump should be mounted horizontally, bearing entirely and squarely on the pump feet. Deviation from the prescribed installation will influence draining, filling, venting and good functioning of the shaft seal.
- The bearing bracket must be exposed to the atmosphere to allow cooling and to ensure good functioning and lubrication of the grease lubricated ball bearing. Insufficient cooling could lead to unacceptable surface temperatures of the bearing bracket, to insufficient lubrication and to premature ball bearing failure. If proper cooling cannot be maintained at all times, monitoring of the surface temperature of the bearing bracket should be ensured.
- Proper separate earthing facilities should be provided close to the pump unit baseplate.
- In hazardous areas the electrical connection has to be EN 60079-14 compliant.
- The execution of the temperature monitoring equipment must fulfill the requirements of ATEX 114.

3.4 Base plate

- The baseplate always must be provided with an earthing boss.
- Ensure the earth circuit is properly connected to the baseplate.
- Earthing continuity is established from the pump and coupling guard to the baseframe via a star washer installed on the pump mounting bolt, along with a small earthing wire connected from coupling guard to the mesh guard, as depicted in the illustration



- TG BLOC pumps are always without baseplate hence earthing connection is provided on lantern piece



3.5 Drive, shaft coupling and protection guard

- The starting torque of an internal gear pump is almost identical to the nominal torque during operation. The starting torque of the motor must be sufficiently high: the motor power is selected 20% to 25% higher than the absorbed power of the pump.
  If the starting torque is too low it will take longer to start the pump and the motor temperature could increase to an unacceptable level. When using a variable speed motor the cooling device of the motor must operate independently from the motor speed or must be guaranteed to be sufficient at its lowest speed.
- Follow the separate instructions for gear and motor drive and for explosion protected shaft couplings.
- When using a belt drive, ensure the belts have sufficient electrical conductivity to avoid electrostatic loads. Use only belts with electrical leakage resistance lower than 10^9 Ohm and avoid using aluminium or light metal pulleys containing more than 7.5% magnesium.

- Certification of the protection guard must be included in the explosion protection certificate of the drive or pump unit or should be certified separately by the manufacturer or supplier of the guard. The coupling guard must be made of non-sparking materials. **Never use light metals containing more than 7.5% magnesium!** In case of aluminium coupling parts or belt-pulleys, the coupling guard must be made of brass.
- For magnetically driven pumps, the size of the magnetic coupling (break-away torque) must be selected in function of the start-up torque of the electric motor to avoid that the magnetic coupling slips during start-up. This could lead to unacceptable high surface temperatures and/or failure of the magnetic coupling and/or bearings.

3.6 Direction of rotation

- Gear pumps can run in both rotation directions: ensure that the relief valve or top cover is set to the right direction of rotation, see IM.
- The pump units' direction of rotation should be tested with the pump filled only, to avoid dry running.
- If necessary the direction of rotation of the motor should be tested independently from the pump i.e. not coupled to the pump. Remember to secure or remove the shaft key in case of separate testing.

Always align the coupling after having disassembled it and refit the coupling guard!

- TG MAG pumps are assembled for only one specific direction of rotation, due to the internal cooling system of the magnetic coupling. The direction of rotation is indicated on the name plate and with an arrow-plate on the top cover or the safey relief valve. The last digit of the pump type description on the nameplate, (2) pump internals, is indicating the direction of rotation:

  R = clockwise seen from the shaft end

  L = counter-clockwise seen from the shaft end

3.7 Piping

The suction and discharge lines should be designed properly for the required performance conditions and should be executed accordingly (see IM). Non compliance to the working conditions of the pump unit can cause severe problems such as NPSH-problems, vapour lock, excessive vibrations and premature pump failure. Lines should be checked on dimensions and tightness under pressure and should be internally cleaned and be free of welding and foreign particles before they are connected to the pump.

3.8 Shaft sealing auxiliary connections

The gear pumps allow the application of several types of shaft seals. In order to ensure proper functioning, venting and lubrication of the shaft seal a number of connections are available which will enable liquid circulation or flushing. See IM for more information on the possibilities and connections.

3.9 Check alignment

After installation the alignment of the pump shaft and drive shaft must be checked, preferably with the pump and the pipes completely filled with liquid, and must be corrected if necessary.

4.0 Commissioning

4.1 General

Take note that the TopGear pump is a Positive Displacement pump and procedures may often differ from procedures commonly used for centrifugal pumps. Follow the instructions and checklist given in the IM and the separate instructions for gear and motor drives.

Ensure that all the shut-off valves are fully opened and the strainers are unclogged before starting up the pump.

4.2 Precautions

For explosion protection the following precautions are of importance:

- Ensure that the area around the pump and the pump unit is clean.
- Ensure that the suction line is fitted securely and tight and should be clean. Welding particles should be removed in advance.
- The pump, the shaft sealing area or magnetic coupling and the auxiliary equipment must be vented and filled with the product to be pumped before any operation.
- **a dry-running protection system with Safety Integrity Level SIL1 has to be provided by the user**
- In case of self priming dry running of the pump must be avoided and an appropriate quenched shaft seal must be provided to prevent dry running of the shaft seal.
- Determine the direction of rotation with the motor disconnected from the pump or ensure that the pump is filled up and vented before start-up.
- Avoid the use of process fluids that could potentially react with thermal oil.
- Ensure the shutoff valves in the suction and discharge lines are opened at start-up.
- In case the pumped liquid needs to be heated, ensure the pump, shaft sealing area and the product to be pumped are sufficiently preheated before start-up.
- Shut down the pump immediately in the event of irregular operating modes or malfunction.
- Shut down the pump in case the flow drops or the pump pressure changes abnormally (i.e. lower or higher pressure). A flow decrease or pressure change is often a sign of malfunction, a clogged strainer or internal wear. The cause must be found and repaired before the pump should be started again, see Trouble Shooting list in the IM.

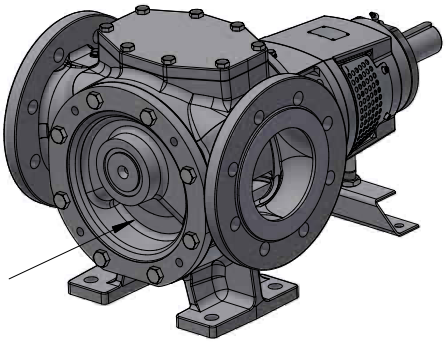
5.0 Maintenance

5.1 General

- Pumps certified for 'Explosion protection' need maintenance and precaution to prevent risks of ignition due to malfunction and unacceptable wear.
- Follow the Maintenance Instructions given in the Instruction Manual (IM). Follow the separate instructions for gear and motor drive as well.
- A decrease of flow rate (or in case the pump does not supply the required pressure) is an indication of a possible malfunction or a sign of internal pump wear and requires maintenance or repairs. Other indications of internal pump wear is excessive noise during operating, vibrations or shaft seal leakage.
- Use anti-sparkling tools when working on the pump or pump unit in an potentially explosive atmosphere.

! Only use a damp cloth for cleaning all surfaces.

Specifically, for ATEX Dust environment:



Dust must be removed on a weekly basis using a damp cloth, focusing particularly on the front cover cavity as illustrated in the pictures.

5.2 Ball bearing

- The bearing bracket and external bearing assembly must be checked regularly for correct functioning.
- Excessive noise, vibrations and heat build-up are an indication of malfunction and premature failure of a ball bearing or its lubrication.
- It is recommended to check the bearing(s) on vibrations by monitoring it.

TG GS, GP, GM, H and SRT

- Relubrication of the ball bearing(s): see IM.
- The axial clearance of the running internals is achieved by adjustment of the bearing assembly. For information about axial clearance adjustment, see IM.

TG BLOC

- The ball bearings in the bearing lantern are sealed and filled with grease for life-time. and do not require re-lubrication.

TG MAG

- The ball bearings in the bearing bracket are sealed and filled with grease for life-time. and do not require re-lubrication.
- Ball bearings must be lubricated with heat-resistant grease when pumping liquids over 180°C.

5.3 Shaft seal

- The correct function and lubrication of the shaft seal must be checked regularly and dry running must be prevented. Gland packing must have a small, visible leakage.
- Several types of connections can be made to ensure proper liquid circulation, venting and lubrication. For more information see IM.
- For single shaft seals, such as gland packing and single mechanical seal, the operator must ensure that the temperature of the seal area surfaces will not exceed the allowable temperature. If this cannot be ensured by the operator, monitoring devices should be installed.
- Quenched mechanical seals (single or double) have to be protected by controlling the quench liquid.

For a non-pressurised quench:

- Check the level in the supply reservoir;
- Check the temperature of the quench liquid;
- Check the condition of the quench liquid by inspection: change the quench liquid in case it is heavily contaminated with leaking fluid.

Note: *Frequent contamination is an indication of an unacceptable shaft seal leakage, which should be repaired.*

For a pressurised quench:

- Check the level in the supply reservoir;
- Check the temperature of the quench liquid;
- Check the pressure.

Take note: the quench liquid should always be pressurised while the pump is running, including at start and at shut-off period.

- Check the condition of the quench liquid: change the quench liquid in case it is contaminated with leaking fluid.

Note: *Contamination of the liquid is an indication of irregular or faulty operation and should be inspected. E.g. the mechanical seal at medium side may be leaking or may be opened due to insufficient counter pressure of the quench liquid.*

5.4 Magnetic coupling

- TG MAG pumps used in explosive environment must be equipped with a temperature sensor on the separation can. (Position L2 see fig. 2).
- The temperature sensor must be connected and pre-set before the pump is started after maintenance. Temperature settings of the sensor see under 1.6.2 and 1.6.4.
- Apply heat-conducting paste to the tip of the sensor in order to secure good heat transmission

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TopGear GS, GP, GM, H, MAG, BLOC, SRT

EXPLOSION PROTECTION

ACCORDING TO 2014/34/EU (ATEX 114)

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