WATSON MARLOW Pumps

WATSON-MARLOW MANUALS
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ATEX Directive (2014/34/EU) and Watson-Marlow's 825 series pumps and pumpheads

Contents

1. Introduction

Directive 2014/34/EU, commonly known as the ATEX directive, carries obligations to the person who places equipment on the market, in the EU territory, for use in potentially explosive environments. A number of pumps manufactured by Watson-Marlow are suitable for use in hazardous environments; ATEX compliant pumps from the 825 series are listed in Section 2 Pump models.

Watson-Marlow's 825 series ATEX pumps have been rated as Group II, Category 2G IIB c T4 X equipment. The X denotes that special installation instructions need to be adhered to, these are explained in section 6. The 825RGA pumps are intended for use in gas based environments only. The pumpheads are sold individually (for use with customer specified ATEX drives) and in defined configurations complete with Watson-Marlow ATEX drives.

This document provides specific ATEX information and must be used in conjunction with the original 800 series user manual (800-gb-01.pdf).

2. Pump models

825D (F and V variant) ATEX pumps and 825RGA pumpheads are quoted on application by Watson-Marlow's applications engineering department. Part codes may vary depending on the final build specification and the customer.

Watson-Marlow cased drives are not ATEX-compliant and must not be used in hazardous locations.

NB: where two or more items of ATEX equipment are combined, the complete assembly shall carry the rating of the lowest ranking individual piece of equipment.

3. Hazardous environments

When used in accordance with the operating guidelines defined in this manual, Watson-Marlow's ATEX pumps are classified as Group II, Category 2 equipment for gas-based environments, under the definitions of 2014/34/EU:

"Group II, Category 2 products should be designed to be capable of remaining within their operational parameters, as stated in the instruction manual, and based on a high level of protection for their intended use, in areas in which explosive atmospheres caused by mixtures of air and gases, vapours, mists or air/dust mixtures are likely to occur."

Watson-Marlow's ATEX pumps are rated for use in gas-based atmospheres only, and must not be used in hazardous dust environments.

Furthermore, 2014/34/EU also states, "The explosion protection relating to this category must function in such a way as to provide a sufficient level of safety even in the event of equipment with operating faults or in dangerous operating conditions which normally have to be taken into account".

Watson-Marlow pumps must not be used in the underground parts of mines, and in surface installations of such mines, likely to become endangered by firedamp and/or combustible dust.

Where two or more items of ATEX equipment are combined, the complete assembly shall carry the same rating as the lowest ranking individual piece of equipment.

4. Operating parameters

Watson-Marlow's ATEX rating can only be achieved when 825 series pumps are used with Marpene/Bioprene tubing. This is available in 25mm bore size, with a wall thicknesses of 9mm.

Only Watson-Marlow tubing should be used to guarantee continued compliance with the ATEX directive.

Tubing: working temperature range of fluid	
Marprene/Bioprene	5C to 40C

The following parameters define the boundary of the safe working envelope—these values must not be exceeded (ATEX compliance will be invalidated):

800 series ATEX pumps		
Operational temperature range	5C to 40C ambient	
Max peak pressure	3.5 bar	**WARNING! Do not run pumphead against a dead-end condition (closed discharge). This can lead to excessive pressure, which could cause tube failure.**
Max continuous speed	100 rpm	
Corrosion resistance	See 9 Materials of construction	
Tube life	See 7 Tube life	
Torque limit	135Nm	

WARNING! When operating in a IIA gas group environment do not run dry for excessive periods as this will reduce tube life.

WARNING! When operating in a IIB gas group environment do not run dry for any period of time.

It is a requirement for safe operation that appropriate pressure-protection must be designed into the system to protect against blockages. This could be achieved by using equipment such as pressure-relief valves or monitoring pressure levels and controlling the power supply to the pump.

5. Potential pump hazards

As part of the requirements of 2014/34/EU all potential hazards, including expected malfunctions, have been identified and subjected to a risk assessment. In order to prevent these ignition sources becoming effective a number of changes have been implemented (see Section 10). In addition to engineering modifications, the changes include additional operating instructions in order to specify correct usage in hazardous locations. Please refer to Sections 6-10 for further details.

Recognised ignition sources
Surface temperatures of rollers and tubing
Tube burst and subsequent spilling of pumped fluid
Mechanical failure of rotor hub
Mechanical impact following incorrect maintenance
Exothermic and pyrophoric chemical reactions
Electrostatic charging of tubing and fluid
Bearing failure
Spring failure

6. Installation guidelines

Please refer to the standard 800 series manual (800-gb-01.pdf) for general installation instructions.

All ATEX pumpheads include provision for the prevention and dissipation of electrostatic charge. In order to dissipate electrostatic charge effectively there must be sufficent electrical contact between the pumphead and the suitably earthed drive.

It is imperative that the 825 pumpheads are earthed by connecting the earth terminals (seen in the photograph below) to earth (usually via a suitable point on the pump drive, as seen here).

It is possible to check the effectiveness of any earth connection by measuring its electrical resistance. **To ensure reliable dissipation of static the maximum resistance to earth should not exceed 1 MOhm.**

It is also imperative that appropriate over-pressure protection is designed into the installation of the pump. This will ensure that the safe operating limits of the pump are not exceeded in the event of a blockage.

Electrostatic testing has shown that when this pump is used in conjuntion with Watson-Marlow Bioprene tubing, with dimensions for use in this pump, it is compliant with a II 2G c IIB T4 X rating. The X denotes that special instructions must be followed.

For 825 pumps installed into gas group IIB hazardous atmospheres the customer MUST incorporate dry run protection into their fluid system. Dry run protection should ensure that the pump cannot run dry. Dry running reduces tube life and causes an increase in electrostatic charging of the tube.

The static generated during dry running has been measured and is below the limits in BSEN13463-1:2009 Annex D for IIA gas environments.

If customers do not wish to incorporate dry run protection into their system and are operating in a gas group IIA hazardous environment then the pump should be relabelled II 2G c IIA T4. A label is supplied with the operating manual for this purpose.

Earthed conductive pipework should be used else-where in the system.

WARNING: The tube connectors are isolated metal parts and have no path to earth via the pumphead. 800 series ATEX pumps are designed to be connected into conductive metal piping systems, where static charge on the tube connectors is dissipated via the pipe system earthing arrangement. If the pump is used in a system with non-conductive pipes or connections, the user will need to make provision for earthing the tube connectors to ensure dissipation of any static charge.

Where there is potential for the pumped fluid to become charged through pumping, protective measures should be implemented at the discharge outlet to dissipate this charge safely.

It is recommended that the chosen ATEX drive (motor/gearbox) is configured to safely reach an overload condition before the 135Nm torque limit is reached. This will prevent catastrophic mechanical failure in the rare occurrence of a major obstruction.

Self Priming in IIA gas group environments: The pump can be run dry in IIA gas group environments to facilitate self priming. However excessive periods of dry running will reduce tube life. The temperature of the rollers and tubing will increase during dry running, tests have shown that this increase in temperature will not affect the T4 temperature rating.

Priming in IIB gas group environments: Priming of the pump can be achieved by flood suction system design, or by using a separate suitable pump to prime.

7. Tube life

Only Watson-Marlow tubing should be used to guarantee continued compliance with the ATEX directive.

Factors influencing tube life
Normal tube fatigue - dependent on tube size, material and pumphead speed
Incorrect tube loading - see the 800 series manual (800-gb-01.pdf) for guidance
Excess working pressure - see Section 4: Operating parameters
Chemical incompatibility - a table of tubing compatibility can be found on www.wmftg.com/chemical. Immersion kits are available from Watson-Marlow for testing.

For each application it is strongly recommended that tube life should be determined by trials, prior to installation in a hazardous environment. If this is not possible, or if there is any doubt in terms of tube life then the following hazards should be recognised before installing a pump in a potentially explosive atmosphere:

Chemical reaction between spilled pumped fluid and pump materials - the materials of construction are listed in Section 9
Spilled, pumped fluid could be ignited by the surface temperature of the rollers - Watson-Marlow's 825 series pumpheads have been rated as T4 (meaning that even under worst-case operating conditions the maximum surface temperature will not exceed 135C)

8. Servicing and cleaning requirements

Scheduled maintenance

The stainless steel rollers and roller shafts run on sealed bearings and do not require lubrication. The bearings have a calculated life of 7,000 hours and should be replaced at that time.

WARNING: The working surfaces of the rollers must be kept free from any kind of lubricant. This is to prevent the rollers slipping against the tubing, which can lead to local heating.

If fluid is spilled inside the pumphead, flush the pumphead out with water and mild detergent as soon as possible. If specific cleaning agents are required to clean the spillage, please consult the Watson-Marlow after-sales office before proceeding, in order to confirm chemical compatibility. The same cleaning procedure should be used to limit the build-up of dust (which can become electrostatically charged and/or heated by friction).

Roller locking

If the rollers are unlocked to facilitate a cleaning procedure such as CIP/SIP (clean in place/steam in place) ensure that the roller lock is re-engaged for correct operation and no detrimental affect to tube life. Any SIP process should be discussed with Watson-Marlow for suitability.

Tube loading

825 pumpheads use Watson-Marlow tube elements. Specific tube loading instructions are contained within the 800 series operating manual which can be found on the E-manuals CD supplied with each pumphead (CDR0600).

Important: Because of the importance of dissipating electrostatic charge the earthing leads must be regularly checked for signs of corrosion.

9. Materials of construction: 800 series ATEX pumpheads

Description	Part NO. 825	Material	Finish
Track	HFZ8006C	Aluminium LM25TF	Paint
Door	HF1264C	Aluminium LM25TF	Paint
Window	HF1005S	PVC	
Pin - hinge	HF1007T	Stainless steel 303S31	
Spacer - hinge pin	HF1224T	Nylatron GS	
Tube clamp, static	HF1211T	Aluminium HE30	
Tube clamp, dynamic	HF1212T	Aluminium HE30	
Pin - tube clamp	HF1213T	Stainless steel 303S31	
Insert - tube clamp	HF1228T	Stainless steel 303S31	
Rotor	HF1203C	Aluminium LM25TF	Paint
Plate - rotor clamp	HF1244T	Stainless steel 303S31	
Spacer - rocker	HF1208T	Nylatron GS	
Pin - rotor pivot	HF1210T	Stainless steel 303S31	
Spacer - pivot pin	HF1225T	Nylatron GS	
Spring - rotor torsion	HF1237B	Stainless steel 302 AMS5688	
Rocker	HF1204C	Aluminium LM25TF	Paint
Plate - rocker side 1	HF1219S	Stainless steel 304S31	
Plate - rocker side 2	HF1220S	Stainless steel 304S31	
Spacer - rocker	HF1223T	Stainless steel 303S31	
Rollers	HF1216T	Stainless steel 316S16	
Bearing - ball	BB0044	Steel (1%C; 1.5%Cr)	
Spindle - roller	HF1217T	Stainless steel 316S16	
Seal - shaft	OS0038	NBR/Stainless steel	
Spring	SG0013	Stainless steel	Passivate
Frame - support	HF1271S HF1272S	Stainless steel 304S11	

The above materials have been carefully selected and have a well proven track record. However, if there are any aggressive chemicals present then it is imperative that a risk assessment is conducted. This must not be limited to just the pumped fluid but should also include any other aggressive fluids in the intended operating environment.

10. Summary of modifications

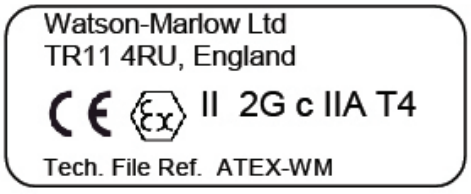
The table below defines the modifications made to standard 825 pumpheads for them to satisfy the requirements of the II 2 G, c IIB T4 X ATEX rating:

ATEX features of the 800 series pumpheads	
Earth strap	Earthing straps connect the door to the main body of the pumphead and to the drive gearbox
ATEX label	This is a requirement of the Directive and includes the ATEX rating for the pumphead
ATEX manual	This is an addendum to the existing manual and includes ATEX-specific information
ATEX-rated door switch	An ATEX rated door switch is fitted on ATEX compliant 825 series pumps.
Over-pressure protection (not supplied)	The installation of appropriate pressure-relief equipment is required to avoid exceeding the safe operating limits of the pump (following any blockage)

11. ATEX marking

The 800 series ATEX pumpheads have been marked with the following labels:

Where customers are only operating in IIA gas group hazardous environments and have not installed dry run protection the user should re-label the pump with the label below, which is enclosed with this operating manual.



12. Replacements

Spares and replacements should be ordered through Watson-Marlow Pumps or through an offical representative. **Only Watson-Marlow spares and replacements should be used in order to guarentee continued compliance with the ATEX Directive.**

Watson-Marlow's policy is to provide spare parts for all products for a minimum of seven years from discontinuation. The ability to implement this policy is not entirely within Watson-Marlow's control and cannot be guaranteed, but every effort will be made to honour this policy.

Watson-Marlow Pumps can be contacted at:

Watson-Marlow Limited
Falmouth
Cornwall
TR11 4RU
England

Tel: +44 (0)1326 370370
Fax: +44 (0)1326 376009

Email: aftersales.uk@wmftg.com
Web: www.wmftg.com

13. Manufacturer's Declaration

Watson-Marlow Limited
Falmouth
Cornwall
TR11 4RU
England

EU Declaration of Conformity

1. 825 Series, ATEX complaint, configured peristaltic pumps.

2. Manufacturer:
   Watson Marlow Ltd
   Bickland Water Road
   Falmouth
   TR11 4RU
   UK

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

4. The following models and versions of the 825D (F and V variant), ATEX pumps, configured with 825RGA pumphead.

5. The object of the declaration described above is in conformity with the relevant Union harmonisation legislation:

   Directive 2014/34/EU (the "ATEX" directive).

   The pumpheads are rated as Group II, Category 2G equipment, with a T4 temperature classification, for use in IIB gas based environments.

   II 2G IIB c T4

   This declaration applies to the pump when using the Watson-Marlow tubing stated within the pumphead manual and in accordance with the special operating instructions provided in the manual. The use of any other tubing material in the pump would invalidate this declaration.

6. Harmonised standards used:
   EN1127-1:2011
   EN13463-1:2009
   EN13463-5:2005
   CLC/TR 50404:2003

7. Full details of the conformity assessment procedure can be found in the technical reference file, "ATEX-WM". In accordance with the requirements of Directive 2014/34/EU a copy of this file has bee archived with the following notified body:

   Baseefa (CE 1180), SK17 9RZ, United Kingdom.

   Signed for and behalf of:
   Watson Marlow Ltd

   Falmouth, 25th of August 2017.

   Simon Nicholson, Managing Director, Watson-Marlow Limited