WATSON MARLOW Pumps

WATSON-MARLOW BREDEL MANUALS

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ATEX Directive (94/9/EC) and Watson-Marlow's 800 series pumps and pumpheads

Contents

1. Introduction

Directive 94/9/EC, 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 Bredel are suitable for use in hazardous environments; ATEX compliant pumps from the 800 series are listed in Section 2 Pump models.

Watson-Marlow's 800 series ATEX pumps have been rated as Group II, Category 2 equipment 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 825/840 user manual (800-gb-01.pdf).

2. Pump models

800 series ATEX pumps and 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 94/9/EC:

"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.

94/9/EC 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's ATEX pumps have been designed to cope with potential ignition sources during normal operation and following expected malfunctions. EN standards have been used to apply ignition-protection concepts to prevent potential ignition sources becoming effective.

The Equipment Group II rating means 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.

For further information on the correlation between ATEX zones and ATEX equipment, please refer to the Workplace Directive (1999/92/EC).

4. Operating parameters

Watson-Marlow's standard ATEX rating (equipment group IIB) can only be achieved when 800 series pumps are used with Bioprene tubing. This is available in 25mm and 40mm bore sizes, with wall thicknesses respectively of 9.0mm and 12.8mm.

Electronic testing (to EN13463-1: 2001(E) annex C) has determined that the use of STA-PURE tubing limits the 800 series ATEX rating to equipment group IIA. Please contact Watson-Marlow for further information.

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

Tubing: working temperature range of fluid	
Bioprene	5C to 40C (standard group IIB rating)
STA-PURE	0C to 40C (limited to group IIA)

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	-20C 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 or component temperatures in excess of the 135C limit for the T4 rating**
Max continuous speed	100 rpm	
Corrosion resistance	See 9 Materials of construction	
Tube life	See 7 Tube life	
Torque limit	135Nm	

WARNING! Do not run dry for excessive periods. Roller and tubing temperatures can exceed normal operating range.

When two or more items of ATEX equipment are combined, the permissible operating envelope will be determined by the narrowest range after considering all values for a given parameter.

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 94/9/EC 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 specifiy 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 800 series 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. The resistance from any point on the guard to the earth terminal is typically 25 Ohms. **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.

Peristaltic tubing has limited conductivity and so its use should be limited to the length adjacent to the pumphead.

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.

Note: Tube contact with polyamide materials such as nylon should be avoided.

7. Tube life

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

A number of factors contribute to the life of the tubing:

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 http://www.watson-marlow.com/wmb-gb/p-chem-a.htm. 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 800 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).

Tube loading

800 series pumpheads use Watson-Marlow tube elements. Specific tube loading instructions are contained within the 825/840 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	Part No, 840	Material	Finish
Track		HFZ8013C	Aluminium LM25TF	paint
Door	HF1264C	HF1402C	Aluminium LM25TF	paint
Window	HF1005S	HF1005S	PVC	
Pin - hinge	HF1007T	HF1107T	Stainless steel 303S31	
Spacer - hinge pin	HF1224T	HF1224T	Nylatron GS	
Tube clamp, static	HF1211T	HF1411T	Aluminium HE30	
Tube clamp, dynamic	HF1212T	HF1412T	Aluminium HE30	
Pin - tube clamp	HF1213T	HF1413T	Stainless steel 303S31	
Insert - tube clamp	HF1228T	HF1428T	Stainless steel 303S31	
Rotor	HF1203C	HF1403C	Aluminium LM25TF	Paint
Plate - rotor clamp	HF1244T	HF1421T	Stainless steel 303S31	
Spacer - rocker	HF1208T	HF1408T	Nylatron GS	
Pin - rotor pivot	HF1210T	HF1410T	Stainless steel 303S31	
Spacer - pivot pin	HF1225T	HF1408T	Nylatron GS	
Spring - rotor torsion	HF1237B	HF1437B	Stainless steel 302 AMS5688	
Rocker	HF1204C	HF1404C	Aluminium LM25TF	paint
Plate - rocker side 1	HF1219S	HF1419S	Stainless steel 304S31	
Plate - rocker side 2	HF1220S	HF1424S	Stainless steel 304S31	
Spacer - rocker	HF1223T	HF1423T	Stainless steel 303S31	
Rollers	HF1216T	HF1416T	Stainless steel 316S16	
Bearing - ball	BB0044	BB0047	Steel (1%C; 1.5%Cr)	
Spindle - roller	HF1217T	HF1417T	Stainless steel 316S16	
Seal - shaft	OS0038	OS0041	NBR/Stainless steel	
Spring	SG0013	SG0015	Stainless steel	passivate
Pedestal - gearbox	HF1242S	HF1242S	Stainless steel 304S11	
Frame - support	HF1271S HF1272S	HF1467S HF1468S	Stainless steel 304S11	
Switch - door (ATEX rated)	SWZ8002	SWZ8002		

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.

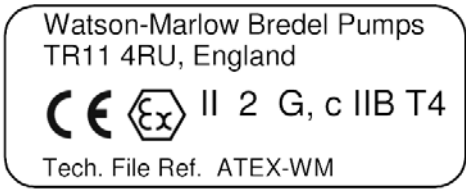
10. Summary of modifications

The table below defines the modifications made to standard 825 and 840 pumpheads for them to satisfy the requirements of the II 2 G, c IIB T4 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 (Group II Category 2 for gas, T4)
ATEX manual	This is an addendum to the existing manual and includes ATEX-specific information
ATEX-rated door switch	Standard 825 and 840 pumps are supplied with EExd switches. These are upgraded to ATEX for the ATEX-compliant 800 series
Over-pressure protection (not supplied)	The installation of appropriate pressure-relief equipment is mandatory 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:



12. Replacements

Spares and replacements should be ordered through Watson-Marlow Bredel 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 Bredel Pumps can be contacted at:

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England

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Fax: +44 (0)1326 376009

Email: support@watson-marlow.co.uk
Web: www.watson-marlow.com

13. Manufacturer's Declaration

WATSON MARLOW Bredel PUMPS

Watson-Marlow Limited
Falmouth
Cornwall
TR11 4RU
England

Declaration of Conformity

Description	800 series ATEX compliant peristaltic pumps
Products	825 and 840 ATEX models (part codes allocated for each customer)
Conformity	This document certifies that the above equipment complies with the requirements of Directive 94/9/EC (the "ATEX" directive).
Rating	The pumps are rated as Group II, Category 2 equipment, with a T4 temperature classification, for use in gas based environments. CE Ex II 2 G, c IIB T4
Standards	EN13463-1:2001 EN13463-5:2003 CLC/TR 50404:2003
Manufacturer	Watson-Marlow Bredel Pumps, TR11 4RU, England.
Notified body	Full details of the conformity assessment procedure can be found in the technical reference file, "ATEX-WM". In accordance with the requirements of Directive 94/9/EC a copy of this file has been archived with the following notified body: Intertek (CE 0359), KT22 7SB, England.
Date	17th August 2007
Signature	 Christopher Gadsden, Managing Director, Watson-Marlow Limited