

ATEX Directive (2014/34/EU) and Watson-Marlow's 501RL ATEX pumpheads



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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 500 series are listed below, in Section 2 "Pump models".

All of Watson-Marlow's ATEX pumps have been rated as Group II, Category 2G IIB c T4 equipment. The 501RLA 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 should be used in conjunction with the original user manual.

2 Pumphead types

The following 500 series pumpheads are covered by this manual:

501RLA ATEX Pump-heads		
501RLA*	053.0001.A00	Twin roller for 1.6mm wall thickness tubing
501RL2A*	053.0001.A20	Twin roller for 2.4mm wall thickness tubing
501RLGA*	053.0011.A0G	Twin roller for 1.6mm wall Sta-Pure tubing
501RL2GA*	053.0011.A2G	Twin roller for 2.4mm wall Sta-Pure tubing
501RLCA	053.0002.A00	Close-coupled for 1.6mm wall tubing
501RL2CA	053.0002.A20	Close-coupled for 2.4mm wall tubing
501RLCGA	053.0022.A0G	Close-coupled for 1.6mm wall Sta-Pure
501RL2CGA	053.0022.A2G	Close-coupled for 2.4mm wall Sta-Pure

* NB: these pumpheads are compatible with a number of Watson-Marlow cased drives. However, the Watson-Marlow cased drives are not ATEX compliant and must not be used in hazardous locations.

Any 500 series pumpheads not listed here are NOT suitable for use in hazardous environments (at date of issue).

3 Hazardous environments

All of Watson-Marlow's ATEX pumps are classified as Group II, Category 2G IIB c T4 equipment 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."

Furthermore, "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.

NB: 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

The following tube materials can be used with the 501RLA pumpheads. Bore sizes range from 0.5mm to 8.0mm, with an option of 1.6mm or 2.4mm wall thickness:

Tubing: working temperature range	
Marprene	5C to 80C
Bioprene	5C to 80C
Pumpsil	-20C to 80C
STA-PURE PCS	0C to 80C
STA-PURE PFL	0C to 80C
Neoprene	0C to 80C
PVC	0C to 80C

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

501RLA pumpheads	
Ambient temperature range	5C to 40C
Max peak pressure (0.5 to 4.8mm bore)	2 bar
Max peak pressure (6.4 to 8.0mm bore)	1 bar
Max continuous speed	300 rpm
Max intermittent speed	500 rpm
Corrosion resistance	See 7 Materials
Tube life	See 5 Tube failure

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

WARNING! Do not run pumphead against a dead-end condition (closed discharge). This can lead to excessive roller and tubing temperatures and pressures in excess of the limits in the table above.

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.

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. 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 - 11 for further details.

Recognised ignition sources

Surface temperatures of rollers and spindles
Tube burst and subsequent spilling of pumped fluid
Mechanical failure of rotor hub
Exothermic chemical reaction
Electrostatic discharge
Bearing failure
Spring failure

6 Installation guidelines

Please refer to the standard 501RL manual (PB0202) 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 sufficient electrical contact between the pumphead and the suitably earthed drive.

It is imperative that the 501RLA pumpheads are earthed by connecting the earth terminal on the track (circled in the photograph below) to earth (usually via a suitable point on the pump drive).



It is possible to check the effectiveness of any earth connection by measuring its electrical resistance. The resistance from any point on the safeguard to the earth terminal is typically 25 Ohms. **To ensure reliable dissipation of static the maximum resistance to earth should not exceed 1 MOhm.**

Peristaltic tubing has limited conductivity and so its use should be limited to the length adjacent to the pumphead. Electrostatic testing and length of tubing limitations have been used to determine that Watson-Marlow tubing is compliant with a II 2G IIB rating. Earthed, conductive pipework should be used elsewhere in the system.

7 Tube life

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

Factors influencing tube life

Normal tube fatigue - dependent on tube size and material

Incorrect tube loading - see 501RL manual (PB0202) 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 pumped fluid and pump materials - the materials of construction are listed in Section 10

Pumped fluid can be ignited by surface temperature of rollers - all Watson Marlow's ATEX equipment has been rated as T4 (meaning that even under worst-case operating conditions the maximum surface temperature will not exceed 135C)

8 Tube materials in ATEX applications

The following Watson-Marlow tube materials are suitable for use in ATEX applications:

- Pumpsil (platinum-cured silicone)
- Marprene
- Bioprene
- STA-PURE PCS
- STA-PURE PFL
- Neoprene
- PVC

Please note from the table below that there are limitations of length that can be used for certain tube materials. Pumpsil cannot be used in any ATEX application above the specified lengths listed. When using Bioprene and Marprene there is a reduction in class suitability when they are in contact with Polyimides.

Permissible length of tubing (cm) for IIB rating:

Series	Bore (mm)	Wall (mm)	OD (mm)	Pumpsil (cm)	STA-PURE PCS* (cm)	STA-PURE PFL* (cm)	Marprene**	Bioprene**	PVC	Neoprene
313DA, 501RLA, 505LA	9.6	2.4	14.4	69	69	69	unlimited	unlimited	unlimited	unlimited
313DA, 501RLA, 505LA	8.0	2.4	12.8	78	78	78	unlimited	unlimited	unlimited	unlimited
313DA, 501RLA, 505LA	6.4	2.4	11.2	89	89	89	unlimited	unlimited	unlimited	unlimited
313DA, 501RLA, 505LA	4.8	2.4	9.6	104	104	104	unlimited	unlimited	unlimited	unlimited
313DA, 501RLA, 505LA	3.2	2.4	8.0	125	125	125	unlimited	unlimited	unlimited	unlimited
313DA, 501RLA, 505LA	1.6	2.4	6.4	156	156	156	unlimited	unlimited	unlimited	unlimited
313DA, 501RLA	8.0	1.6	11.2	89	89	89	unlimited	unlimited	unlimited	unlimited
313DA, 501RLA	6.4	1.6	9.6	104	104	104	unlimited	unlimited	unlimited	unlimited
313DA, 501RLA	4.8	1.6	8.0	125	125	125	unlimited	unlimited	unlimited	unlimited
313DA, 501RLA	3.2	1.6	6.4	156	156	156	unlimited	unlimited	unlimited	unlimited
313DA, 501RLA	2.4	1.6	5.6	179	179	179	unlimited	unlimited	unlimited	unlimited
313DA, 501RLA	1.6	1.6	4.8	208	208	208	unlimited	unlimited	unlimited	unlimited
501RLA	0.8	1.6	4.0	250	250	250	unlimited	unlimited	unlimited	unlimited
501RLA	0.5	1.6	3.7	270	270	270	unlimited	unlimited	unlimited	unlimited

* If length limit exceeded for STA-PURE PCS and STA-PURE PFL, ATEX rating reduced to IIA

** Marprene and Bioprene rated IIA when in contact with Polyimides

9 Servicing and cleaning requirements

If aggressive liquids are spilled onto the pumphead, the head should be removed and cleaned with a mild detergent. Remove any tubing from the pumphead, and swing out the crank handle to expose the rotor retaining screw. Turn the screw anti-clockwise to release the collet and withdraw the rotor from the shaft. Loosen the track locating screw and pull the track clear.

The same cleaning procedure should be used to limit the build-up of dust (which can become electrostatically charged and/or heated by friction).

The moving parts of the rotor should be checked from time to time for freedom of movement. Pivot points and rollers should be lubricated occasionally with Teflon lubricating oil.

Because of the importance of dissipating electrostatic charge the earthing lead should be regularly checked for signs of corrosion.

10 Materials of construction: 501RLA pumpheads

Description	Part No.	Material	Finish
Rotor body	MN0496C	Zinc alloy	Chromium plating
Rotor arm	MN0933C	Zinc alloy	Chromium plating
Roller spindle	MN0009T	Stainless steel 303S31	
Lever	MN0013T	EN58BM	
Guide spindle	MN0113T	Stainless steel 303S31	
Spring, rotor (1.6mm)	SG0001	Stainless steel DIN 17224	Blue paint
Spring, rotor (2.4mm)	SG0002	Stainless steel DIN 17224	Red paint
Collet	CL0656T	Stainless steel 303S31	
Roller (standard)	MN0011T	MOS2 Filled Nylon	
Roller (Sta-Pure)	MN1275T	Stainless steel 303S31	
Roller, follower	MN0012T	MOS2 Filled Nylon	
Tube clamp	MN1219M	Kematal (Acetal copolymer)	
Tube clamp	MNA626A	Kematal (Acetal copolymer)	
Spring, tube clamp	MN0014S	Stainless steel 301S21	
Guide roller	MN0164M	Kematal (Acetal copolymer)	
Safeguard	MN1322T	Polycarbonate	Carbon paint
Track	MN1323T	Zinc alloy	Powder coated
Track (cc)	MN1324T	Zinc alloy	Powder coated
Hinge	MN0266M	Kematal (Acetal copolymer)	
Spring	MN1217T	Stainless steel DIN 17224	
Fastener	FN4502	Carbon spring steel BS1449	Nickel plating
Screws		Stainless steel DIN 17224	
Earth lead	MNA0684A	Copper	Tin coating

11 Summary of modifications

ATEX features of the 501RLA pumpheads	
Conductive coating	The safeguard has been coated with a carbon-based paint to enable the dissipation of electrostatic charge
Earth strap	An earthing bond links the safeguard and the track
ATEX label	This is a requirement of the Directive and includes the ATEX rating for the pumphead (II 2G IIB c T4)
ATEX manual	This is an addendum to the existing manual and includes ATEX specific information

12 ATEX marking

501RLA pumpheads have been marked with the following labels:



13 Replacements

Spares and replacements should be ordered through Watson-Marlow pumps or through an official representative. **Only Watson-Marlow spares and replacements should be used in order to guarantee continued compliance with the ATEX directive.**

Watson-Marlow's policy is to provide spare parts for all products for a minimum of 7 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: support@wmftg.co.uk
Web: www.wmftg.com*

14 Manufacturer's Declarations

501RLA pumphead



Watson-Marlow Limited
Falmouth
Cornwall
TR11 4RU
England

EU Declaration of Conformity

1. 501RLA ATEX compliant, peristaltic pumpheads.

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 covered:

053.0001.A00	501RLA	Twin roller for 1.6mm wall tubing
053.0001.A20	501RL2A	Twin roller for 2.4mm wall tubing
053.0011.A0G	501RLGA	Twin roller for 1.6mm wall Sta-Pure tubing
053.0011.A2G	501RL2GA	Twin roller for 2.4mm wall Sta-Pure tubing
053.0002.A00	501RLCA	Close-coupled for 1.6mm wall tubing
053.0002.A20	501RL2CA	Close-coupled for 2.4mm wall tubing
053.0022.A0G	501RLCGA	Close-coupled for 1.6m m wall Sta-Pure tubing
053.0022.A2G	501RL2CGA	Close-coupled for 2.4mm wall Sta-Pure tubing

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.



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 been archived with the following notified body:

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

Signed for and behalf of:
Watson Marlow Ltd
Falmouth, 31st July 2017

Simon Nicholson, Managing Director, Watson-Marlow Limited