



**WATSON  
MARLOW  
Pumps**

## 300 Series pumpheads ATEX Directive (94/9/EC)

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

All of Watson-Marlow's ATEX pumps have been rated as Group II, Category 2 equipment. The 313 and 314 pumphead range is 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.**

### Pump models

The following 313/314 pumpheads are covered by this manual:

#### 313 and 314 ATEX Pumpheads

313DA*	033.3411.A00	3 roller, tongued drive fitting for 1.6mm wall tubing
313BA*	033.3421.A00	3 roller, bareshaft fitting for 1.6mm wall tubing
313XA*	033.3431.A00	3 roller, extension head for 1.6mm wall tubing
313XBA*	033.3441.A00	3 roller, bareshaft extension head for 1.6mm wall tubing
313D2A*	033.3511.A00	3 roller, tongued drive fitting for 2.4mm wall tubing
313B2A*	033.3521.A00	3 roller, bareshaft fitting for 2.4mm wall tubing
313X2A*	033.3531.A00	3 roller, extension head for 2.4mm wall tubing
313XB2A*	033.3541.A00	3 roller, bareshaft extension head for 2.4mm wall tubing
313B2A*	033.3521.AM0	3 roller, Manesty bareshaft fitting for 2.4mm wall tubing
313XB2A*	033.3541.AM0	3 roller, Manesty bareshaft extension head for 2.4mm wall tubing
314DA*	033.3411.A00	4 roller, tongued drive fitting for 1.6mm wall tubing
314BA*	033.3421.A00	4 roller, bareshaft fitting for 1.6mm wall tubing
314XA*	033.3431.A00	4 roller, extension head for 1.6mm wall tubing
314XBA*	033.3441.A00	4 roller, bareshaft extension head for 1.6mm wall tubing
314D2A*	033.3511.A00	4 roller, tongued drive fitting for 2.4mm wall tubing
314B2A*	033.3521.A00	4 roller, bareshaft fitting for 2.4mm wall tubing
314X2A*	033.3531.A00	4 roller, extension head for 2.4mm wall tubing
314XB2A*	033.3541.A00	4 roller, bareshaft extension head for 2.4mm wall tubing

\* 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 313 or 314 pumpheads not listed here are NOT suitable for use in hazardous environments (at date of issue).**

### Hazardous environments

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

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.

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

### Operating parameters

The following tube materials can be used with 313 and 314 pumpheads. Bore sizes range from 1.6mm 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
Peroxide-cured silicone	-20C to 80C
Pumpsil platinum-cured silicone	-20C to 80C
STA-PURE	0C to 80C
CHEM-SURE	0C to 80C
Neoprene	0C to 80C
PVC	20C to 60C

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

#### 313 and 314 pumpheads

Operational temperature range	-20C to 80C
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, 313	400 rpm
Max continuous speed, 314	300 rpm
Max intermittent speed	600 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.

### 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. 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 spindles
Tube burst and subsequent spilling of pumped fluid
Mechanical failure of rotor hub
Exothermic chemical reaction
Electrostatic discharge
Bearing failure

### Installation guidelines

Please refer to the standard 313/314 pumphead manual (PB0210) for general installation instructions.

The 313/314 pumpheads achieve ATEX II 2 G c IIB T4 equipment compliance for electrostatic discharge from non-conductive parts without modification. This is because the 313/314 pumphead projected surface area in any direction is less than 100cm<sup>2</sup>. EN13463-1:2001 par 7.7.4 for Gas Group IIB equipment states that there is a danger of electrostatic charge under normal conditions of use for equipment with greater surface area than 100cm<sup>2</sup>.

The effect of this is that a **MAXIMUM OF TWO 313/314 PUMPHEADS** can be used in a ganged, multi-channel, Group IIB equipment configuration.

If the tubing, external to the pumphead, comes into dynamic contact with another surface or is in proximity to an electrical/magnetic field, the tubing could become electrostatically charged. Tubing should be positioned to prevent this from occurring.

The torque requirement for 313/314 ATEX pumpheads is 2.2Nm under worst-case conditions. A drive unit should be selected that can safely generate this torque below any overload condition. All Watson-Marlow close-coupled drives have been configured in this way and are available with thermistors for thermal overload protection.

### 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 313/314 pumphead manual (PB0210) for guidance
Excess working pressure - see Section 4 "Operating parameters"
Chemical incompatibility - a table of tubing compatibility can be found on <a href="http://www.watson-marlow.com/wmb-gb/p-chem-a.htm">http://www.watson-marlow.com/wmb-gb/p-chem-a.htm</a> . 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)

## Materials of construction 313/314 pumpheads

Description	Part No.	Material	Finish
Body - rear	DE1601M	PPA IXEF 1022	
Body - front	DE1602M	PPA IXEF 1022	
Track	DE1604M	PPA IXEF 1022	
Lever	DE1605M	PPA IXEF 1022	
Locking lever	DE1606M	Nylon 66 (30% glass fill)	
Clamp - tube	DE1607M	PPA IXEF 1022	
Rotor	RM1610M	Nylon 66 (30% glass fill)	
Roller	DE1612T	Nylatron GS	
Adjuster - tube clamp	DE1608M	Nylon 6	
Knob - tube clamp adj	DE1609M	Nylon 6	
Clamp - tube 313/314	DE1620M	PPA IXEF 1022	
Plate - adaptor	DE1615M	PPA IXEF 1022	
Spindle	DE1614T	BS970.230M07PB (EN1A)	Nickel plate
Shaft	DE1613T	Stainless steel 303S31F9	
Ball bearing	BB0014	Steel (1% carbon, 1.5% chromium)	
Bearing	BB0049	Sintered bronze	
Spring	SG0011	Mild steel	
Pin - Groverlok	FN2500	Zinc alloy	
Screws		Stainless steel	
Nuts		Stainless steel	
Screw - Plastite 45	FN0299	Mild steel	Zinc plate

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.

## 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 ● Chem-Sure ● 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* (cm)	Chem-Sure* (cm)	Marprene**	Bioprene**	PVC	Neoprene
840A	40.0	12.8	65.5	n/a	n/a	n/a	n/a	unlimited	n/a	n/a
825A	25.0	9.0	43.0	n/a	n/a	n/a	n/a	unlimited	n/a	n/a
701RA	25.4	4.8	35.0	29***	29***	29***	unlimited	unlimited	unlimited	unlimited
701RA	19.0	4.8	28.6	35	35	35	unlimited	unlimited	unlimited	unlimited
701RA	15.9	4.8	25.5	39	39	39	unlimited	unlimited	unlimited	unlimited
701RA	12.7	4.8	22.3	45	45	45	unlimited	unlimited	unlimited	unlimited
701RA	9.6	4.8	19.2	52	52	52	unlimited	unlimited	unlimited	unlimited
620LA	16.0	4.0	24.0	42	42	42	unlimited	unlimited	unlimited	unlimited
620LA	12.0	4.0	20.0	50	50	50	unlimited	unlimited	unlimited	unlimited
620LA	8.0	4.0	16.0	63	63	63	unlimited	unlimited	unlimited	unlimited
620RA	15.9	3.2	22.3	45	45	45	unlimited	unlimited	unlimited	unlimited
620RA	12.7	3.2	19.1	52	52	52	unlimited	unlimited	unlimited	unlimited
620RA	9.6	3.2	16.0	63	63	63	unlimited	unlimited	unlimited	unlimited
620RA	6.4	3.2	12.8	78	78	78	unlimited	unlimited	unlimited	unlimited
313DA, 501RLA, 05LA	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 and Chem-Sure, ATEX rating reduced to IIA \*\* Marprene and Bioprene rated IIA when in contact with Polyimides

\*\*\* 25.4mm tube not suitable for use in REA pumpheads

## 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.

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.

The rotor shaft runs on sealed bearings which do not require lubrication.

## Summary of modifications

### ATEX features of 313/314 pumpheads

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.

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PB0353/10

## Replacements

Spares and replacements should be ordered through Watson-Marlow Bredel 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.

## ATEX marking

313 and 314 ATEX (A) pumpheads have been marked with the following labels:



## Manufacturer's Declaration

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.

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.

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