

## **ATEX Directive (94/9/EC) and Watson-Marlow's 700 series pumpheads**



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## **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 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 701RA 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 Pump models

The following 700 series pumps are covered by this manual:

701RA ATEX Pumpheads		
701RA	073.0101.A00	Driven roller pumphead for baseplate pumps (continuous)
701REA	073.0104.A00	Driven roller pumphead for baseplate pumps (elements)
701RXA	073.0111.A00	Extension pumphead for baseplate pumps (continuous)
701REXA	073.0114.A00	Extension pumphead for baseplate pumps (elements)
701RGA	073.0121.A0G	Baseplate pumphead for Sta-Pure tubing

**Any 700 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 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.**

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

## 4 Operating parameters

The following tube materials can be used with 701RA pumpheads. Bore sizes range from 9.6mm to 25.4mm, with a wall thickness of 4.8mm.

Tubing: working temperature range	
Marprene	5C to 80C
Bioprene	5C to 80C
Pumpsil platinum-cured silicone	-20C to 80C
STA-PURE	0C to 80C
CHEM-SURE	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).

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.

701RA pumpheads	
Operational temperature range	-20C to 80C
Max peak pressure (701RBA, 701RBXA, 7014RBEA and 701RBEXA)	2 bar
Max peak pressure (701RBGA)	4 bar
Max continuous speed	360 rpm
Corrosion resistance	See 7 Materials
Tube life	See 5 Tube failure

Watson-Marlow offer a number of ATEX-compliant close-coupled drive units with fixed or variable speed control.

701 baseplate drives	
Operational temperature range	-20C to 40C
Storage temperature range	-40C to 70C
Max continuous speed (fixed speed drives)	134 rpm or 348 rpm
Max continuous speed (variable speed drives)	175 rpm or 265 rpm

**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.**

## 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. 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

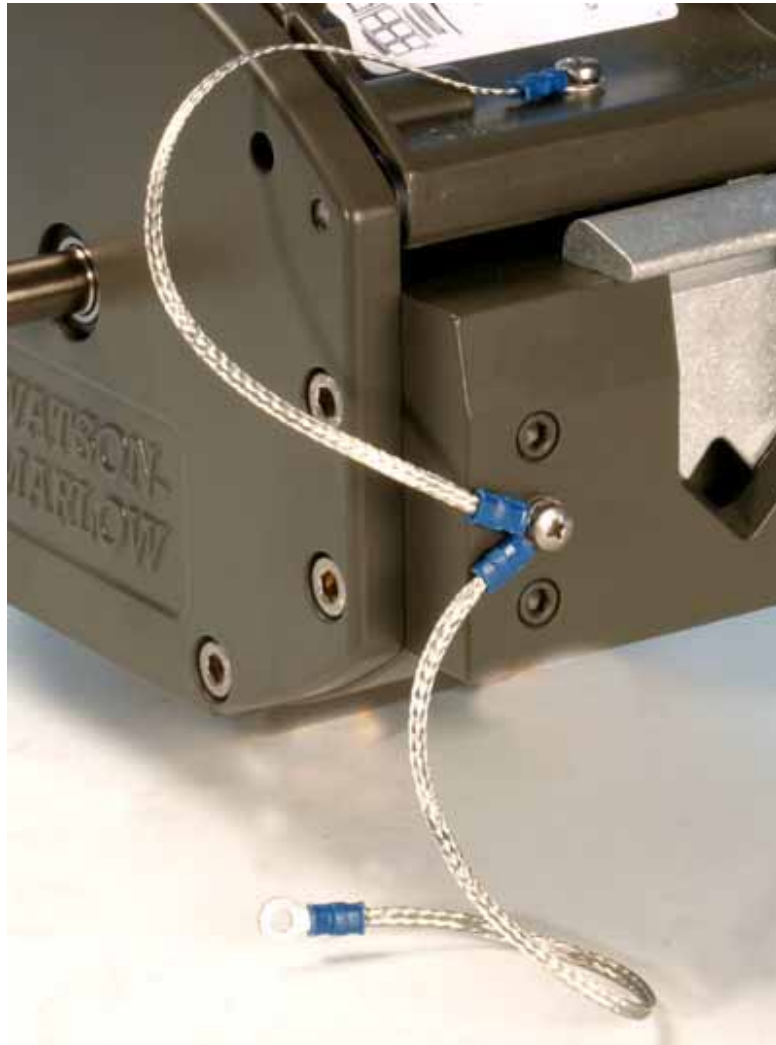
Spring failure

## 6 Installation guidelines

Please refer to the standard 701R manual (PB0230) 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 701RA pumpheads are earthed by connecting the earth strap to a suitable point on the drive - usually through the bolts/feet of the gearbox or directly onto the baseplate.**



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.

## 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 701R manual (PB0230) 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 9

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
- 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, 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 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

## 9 Servicing and cleaning requirements

### Scheduled maintenance

The polyamid rollers and the stainless steel drive shaft run on sealed bearings and do not require lubrication. The sun gear of the gearbox in the 701 ATEX pumpheads should be lightly greased with a quality gear grease every one thousand hours and after cleaning.

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 Watson-Marlow Technical Support 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).

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

### Tube loading

The 701RBA pumphead requires continuous tubing, while the 701RBEA pumphead operates with Watson-Marlow LoadSure tube elements. Specific tube loading instructions are contained within "Watson-Marlow 701 baseplate pumps" which can be found on the E-manuals CD supplied with each pumphead (CDR0600).

For both pumphead types, extension pumpheads are also available.

## 10 Materials of construction: 701RA pumpheads

Description	Part No.	Material	Finish
Gear - wheel, helical	MR0666T	Mild steel EN1A	Zinc plate
Shaft - drive	MR0665T	High tensile steel EN24	Nickel plate
Plate - front	MR0363C	Aluminium alloy LM24	Paint
Plate - back	MR0366C	Aluminium alloy LM24	Paint
Track	MR0364C	Aluminium alloy LM24	Paint
Rotor - flange	MR0879C	Aluminium alloy LM24	Paint
Cradle	MRA0152A	Aluminium alloy LM24	Paint
Tube clamp	MR0880C	Aluminium 6063	
End cap - cradle, lh	MR0881C	Aluminium 6063	Paint
End cap - cradle, rh	MR0875C	Aluminium 6063	Paint
Knob	MR1002T	Aluminium 2011	
Springs	SG0001/ SG0005	Stainless steel 301S21	
Screws / studs		Stainless steel 303S21	
Roller shafts	MR0653T	Stainless steel 303S21	
Rollers	MR0652T	Polyamid and MOS2	
Lock - tube clamp		Polyamid and glass	
Bearing - ball	BB0014/ BB0018	Steel, 1% carbon, 1.5% chromium	
Earth lead - ATEX	MRA0071A	Copper	Tin coating

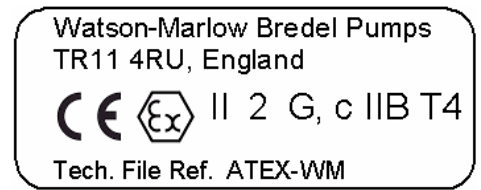
The above materials have been carefully selected and have a well proven track record. However, if there are any aggressive chemicals present then it is imperative that a risk assessment is conducted. This must not be limited to just the pumped fluid but should also include any other aggressive fluids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

## 11 Summary of modifications

ATEX features of 701RA pumpheads	
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 (Group II Category 2 for gas, T4)
ATEX manual	This is an addendum to the existing manual and includes ATEX specific information

## 12 ATEX marking

701 ATEX (A) pumpheads have been marked with the following labels:



## 13 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.

### Watson-Marlow Bredel Pumps can be contacted at:

*Watson-Marlow Bredel Pumps  
Falmouth  
Cornwall  
TR11 4RU  
England*

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



*Email: [support@watson-marlow.co.uk](mailto:support@watson-marlow.co.uk)  
Web: [www.watson-marlow.com](http://www.watson-marlow.com)*

# 14 Manufacturer's Declaration



Watson-Marlow Limited  
Falmouth  
Cornwall  
TR11 4RU  
England

## Declaration of Conformity

<b>Description</b>	700 Series, ATEX compliant, configured peristaltic pumps		
<b>Products</b>	073.0101.A00	701RA	Driven roller pumphead for baseplate pumps
	073.0104.A00	701REA	Driven roller pumphead for baseplate pumps
	073.0111.A00	701RXA	Extension pumphead for baseplate pumps
	073.0114.A00	701REXA	Extension pumphead for baseplate pumps
	073.0121.A0G	701RGA	Baseplate pumphead for Sta-Pure tubing
<b>Conformity</b>	This document certifies that the above equipment complies with the requirements of Directive 94/9/EC (the "ATEX" directive).		
<b>Rating</b>	The pumps are rated as Group II, Category 2 equipment, with a T4 temperature classification, for use in gas based environments.		
	 II 2 G, c IIB T4		
<b>Standards</b>	EN13463-1:2001 EN13463-5:2003 CLC/TR 50404:2003		
<b>Manufacturer</b>	Watson-Marlow Bredel Pumps, TR11 4RU, England.		
<b>Notified body</b>	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.		
<b>Date</b>	25 <sup>th</sup> April 2007		
<b>Signature</b>	  Christopher Gadsden, Managing Director, Watson-Marlow Limited		