

MANUAL



R-U

Table of contents

Introduction	6
Directives and regulations	6
Specifications.....	7
Motor electrical data	7
Materials.....	7
Connections.....	7
Usage limits	7
Model characteristics.....	7
Electric safety overview	8
Installation of the equipment.....	9
Site preparation.....	9
Inspection prior to installation	9
Anchoring of equipment.....	9
Hydraulic connection	9
Installation of hydraulic safety devices.....	10
Electrical connection.....	10
Lubrication and priming.....	11
Start-up and operation	11
Preventive maintenance of the equipment.....	13
Lubrication of rotating components	13
Electrical system	13
Gaskets and mechanical seal or lip seals	13
Integrated safety valve	13
Strainer cleaning.....	13
Possible failures and recurrent solutions.....	14
Insufficient flow.....	14
Insufficient or unstable pressure	14
Noise and vibrations.....	14
Leaks through the mechanical seal or shaft seals.....	15
Excessive temperature.....	15

Gear locking	15
Over-consumption	15
Abnormal motor operation.....	15
General exploded view of components.....	16
Use of the equipment in ATEX zones	17
Declaration of conformity	19



Introduction

The BOMBA ELIAS R-U Series gear pump is a solution designed to handle liquids such as oils and greases in demanding industrial environments. With its self-priming design and external helicoidal gears, it offers optimum performance with quiet and reliable operation. This manual provides the necessary instructions for the installation, operation, and maintenance of the pump to ensure its correct performance and prolong its service life.

Directives and regulations

- Regulation (EU) 2023/1230.
- Low Voltage Directive 2014/35/EU.
- Electromagnetic Compatibility Directive 2014/42/EU.
- Safety of machinery - EN ISO 12100:2010, EN 809:1998+A1:2009 and EN 60204-1:2018.
- Electromagnetic compatibility - EN 61000-6-2 and EN 61000-6-4.

Ctra./ Molins de Rei a Rubí, km 8,7
08191 Rubí (Barcelona)

Tel: 93.699.60.04

Email: info@elias.es

www.elias.es



Specifications

Materials

Pump casing	GG-25
Gears	Treated steel
Pump shaft	F-114
Front cover	GG-25
Sealing solution	Depending on the model and application
Rear flange	Ductile cast iron

Motor electrical data

Motor	Single/three-phase according to IEC standards
Efficiency	- IE2 or IE3 for powers > 1 HP - IE1 if the power < 1 HP - It can be supplied up to IE5.
Tension	- Single-phase 230V $\pm$ 10% up to 1 HP - Three-phase 230/400 V $\pm$ 10% up to 5,5 HP - Three-phase 400/600 V $\pm$ 10% from 7,5 HP
Poles	4 or 6 depending on the model
Level of protection	IP55
Insulation	F class

Usage limits

Range of flow rates	From 220 to 40000 l/h
Range of pressures	Up to 10 bar depending on the model
Max. working pressure	12 bar
Max. working temperature	110°C
Max. suction height	7 m

Connections

	Suction	Discharge
R-3 U	3/8	3/8
R-5 U	3/4	3/4
R-10/16 U	1"	1"
R-17/25/35/50/65 U	1" 1/4	1" 1/4
R-100/140 U	DN65	DN65
R-250 U	DN 80	DN 80
R-400 U	DN 100	DN 100

Model characteristics

Model	Power		Motor Type	Voltage V	I A	n rpm	P _{MÁX.} kg/cm ²	Flow l/h	Weight kg
	CV	kW							
(M)R-3 U	0,5	0,37	71 (IE1)	230M	2,75	1450	10	220	11,2
(M)R-5 U	0,5	0,37	71 (IE1)	230/400T	1,94/1,12	1450	10	500	11,2
(M)R-10 U	1	0,75	80 (IE1/IE3)	230M	1,94/1,12	1450	10	1000	21,6
(M)R-16 U	1	0,75	80 (IE1/IE3)	230/400T	2,9/1,69	1450	6	1600	21,6
SR-16 U	1,5	1,1	90S	230M	3,5	1450	10	1600	25
R-25 U	2	1,5	100	230/400T	4,17/2,4	1450	10	2500	50,2
R-35 U	3	2,2	100	230/400T	6/3,47	1450	8	3500	50,2
R-50 U	4	3	100	230/400T	7,96/4,6	1450	10	5000	52,6
R-65 U	5,5	4	100	230/400T	10,6/6,12	1450	8	6500	56
R-100 U	5,5	4	132M	230/400T	13,87/8,02	950	10	10000	130
R-140 U	7,5	5,5	132S	400/690T	10,8/5,72	1450	7	14000	130
OR-250 U	5,5	4	112M	230/400T	10,8/5,72	1450	2	25000	N/A
ER-250 U	7,5	5,5	132S	400/690T	13,87/8,02		4		N/A
R-250 U	10	7,5	132M	400/690T	10,8/5,72		8		146
SR-250 U	12,5	9,2	132L1 (IE2)	400/690T	14,3/7,5		10		N/A
OR-400 U	12,5	9,2	132L1 (IE2)	400/690T	17,82/9,44	1450	2	40000	N/A
R-400 U	15	11	160M	400/690T	17,82/9,44		4		287
SR-400 U	25	18,5	160L	400/690T	20,3/10,76		8		N/A
					27,27/14,42				

Electric safety overview

- Pay attention to the symbols    accompanied by the words 'danger' or 'attention', as they indicate the possibility of electrocution if the relevant safety regulations and standards are not followed.
- **Proper power cord selection:** Make sure that the power cord used complies with the **CEE** standard or **with the HO7RN-F** standard according to **VDE O250**.
- **Power disconnection:** Before installing or performing any type of maintenance on the pump, make sure that it is completely disconnected from the power source. Use a lockout/tagout (LOTO) system to prevent accidental reconnections during the procedure.
- **Earthing system:** Make sure that the pump is correctly earthed. Earthing is essential to prevent electrical accidents and for the safety of the operator in case of insulation failure.
- **Use of protective devices:** Install protective devices such as differential switches and circuit breakers to prevent overloads, short circuits and other electrical faults. These devices automatically shut down the pump in case of electrical problems, protecting both equipment and operators.
- **Handling the terminal box:** Keep the terminal box closed and do not handle internal components unless strictly necessary. If you need to intervene in this part, make sure that there is no energy present in the conductors.
- **Personal Protective Equipment (PPE):** During electrical installation and maintenance, always wear insulating gloves, safety goggles and other appropriate protection to reduce the risk of injury from accidental contact with energised parts.
- **Voltage and compatibility check:** Confirm that the supply voltage matches the equipment specifications before connecting the equipment. Incorrect installation of a unit with an inappropriate voltage can damage the electrical components of the unit.
- **Personnel training:** Ensure that only trained and authorised personnel install, handle or carry out maintenance on the pump. Proper training helps to minimise errors and risks.

Installation of the equipment

To carry out a correct installation of any model of the R-U Series it is advisable to follow these steps in order of wording:

Site preparation

- **Area review:** Check that the installation area is clean, dry and free of foreign objects that could interfere with the operation of the pump. Ensure that the motor is properly ventilated.

Bomba Elias equipment can operate outdoors, but in no case exposed to the elements. They must be protected by some type of structure, cover or shelter to avoid prolonged exposure to the elements and to ensure safer and longer lasting operation.

- **Verification of the available space:** Make sure that there is sufficient room around the pump to allow access for maintenance and that the system is correctly aligned (only applies to elastic/flexible coupled bedplate pumps, not the R-U series).

Inspection prior to installation

- **Verification of the equipment:** Before installation, inspect the pump to ensure that there is no external damage to the pump components during transport, especially the electric motor.
- **Checking specifications:** Check that the pump is designed for the type of fluid, pressure and flow to be handled by checking the data on the nameplate of the equipment supplied. Make sure that the pump is set up according to the required specifications (e.g. direction of rotation and type of connection).

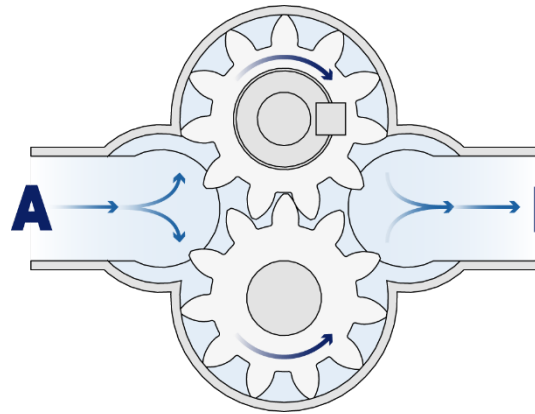
Anchoring of equipment

- In the case of the R-U Series, it is imperative that the unit is supported on a solid, flat base. From there, it is recommended, but not mandatory, to anchor the pump with screws through the legs of the electric motor. This anchoring will be very useful for subsequent piping connections.

Hydraulic connection

- **Diameter suitability:** The diameter of the piping must match the diameter of the pump ports to ensure proper flow and to avoid performance problems.
- **Use of adaptors:** If the piping does not match the size of the pump ports, adapters can be used to achieve the proper connection.
- **Suction inlet:** Connect the suction pipe to the pump. Make sure that the connections are tight and that the piping is free of impurities that could damage the pump.
- **Discharge outlet:** Connect the discharge piping in such a way that it is not subject to excessive stresses and angles, which could affect the performance of the pump.

- **Flow direction checking:** Check that the piping is installed according to the recommended flow direction and that the direction of fluid flow is correct for the pump. The arrow label on the fan cover indicates the direction of rotation of the drive shaft.



Installation of hydraulic safety devices

- The R-U Series is equipped with an **integrated pressure relief safety valve** that connects the suction and discharge areas, ensuring that the pressure does not exceed the recommended limits for each model. It is recommended to verify that the valve is working properly by pressure testing.
- As a positive displacement pump, it is essential to check that the discharge pipework is unrestricted, as any blockage can cause the pressure to rise rapidly, activating the pressure relief.
- The **suction strainer** is essential to protect the pump from impurities or particles in the fluid, preventing them from entering the gears or other sensitive components, which could cause damage and reduce the service life of the equipment. It is installed at the suction inlet of the pump.
- The installation of a **foot valve** on the suction side is recommended, but not mandatory, although the pump has a high suction capacity (up to 7m) and is also self-priming.
- Depending on the specific purposes and characteristics of the installation, the fitting of a **check valve** on the suction side to limit the direction of flow is recommended instead of a foot valve.
- Additionally, the installation of a **pressure gauge** in the discharge line will allow you to measure and monitor the pressure in the system.

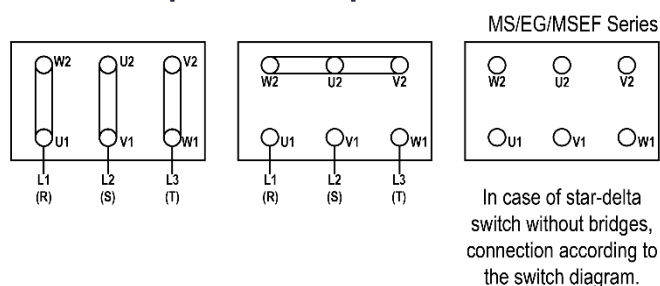
Electrical connection

- **Power disconnection:** Make sure that the pump and motor are disconnected from the power supply before making any electrical connections.
- **Voltage and compatibility check:** Confirm that the supply voltage matches the specifications on the pump nameplate before connecting the pump. Incorrect installation of the pump with

improper voltage may damage the electrical components of the motor.

- **Motor connection:** Make the electrical connections to the motor according to the diagram provided below. Check that the connections are correct and that there are no loose or incorrectly connected wires.

1-speed three-phase motor

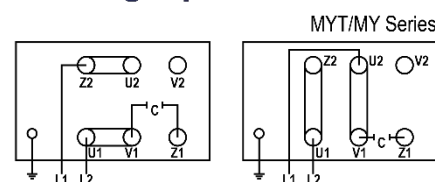


Low voltage (Δ)

High voltage (Y)

Starter (Y- Δ)

Single-phase motor



Clockwise

Counterclockwise

- **Continuity test:** Before switching on the pump, perform an electrical continuity test using a multimeter to check that everything is correctly connected.
- **Checking the direction of rotation of the motor:** As indicated above, an arrow label indicates the direction of rotation of the drive shaft. Perform another short start-up to verify, via the fan, that the direction of rotation is correct. If not, the direction of rotation can be changed by alternating two of the three phases (called L1, L2 and L3, or R, S and T), for three-phase AC motors. For single-phase motors the process is more complex to carry out.

Lubrication and priming

- In the particular case of the R-U Series, no lubrication is required prior to start-up. The gears are lubricated by the transfer fluid itself, which also floods the mechanical seal housing or lip seals, avoiding dry running. The ball bearing is type 2RS, with protective seals and internal lubrication throughout its service life.
- By internal design, the entire range of Bomba Elias' external gear pumps is self-priming. In consideration of this, the R-U Series does not require any manual priming process prior to its implementation.

Start-up and operation

- **Dry running test:** Firstly, perform a no-load test run (only if the pump type allows it, as in the case of the R-U Series) to verify that all electrical and mechanical systems are in perfect condition before putting the pump into operation under load.
- **Load testing:** Once the no-load start has been verified, proceed to charge the pump with fluid and put it into normal operation. Make sure that the pump starts sucking the fluid in without problems and that the hydraulic system responds properly.

- **Leakage check:** During loaded operation, inspect the pump and system connections for fluid or oil leaks. If any leaks are detected, stop operation immediately and make any necessary adjustments.
- **Operation monitoring:** During the first minutes of operation, monitor pressure, temperature, and vibration levels. Make sure the pump is operating within the proper parameters to detect potential problems early.

Preventive maintenance of the equipment

First of all, it is essential to remember that before carrying out any maintenance on the pump, it must be completely disconnected from the power supply. Use a lockout/tagout (LOTO) system to prevent accidental reconnection during maintenance work.

The maintenance tasks to be carried out to extend the life of the unit and the frequency with which they should be carried out, as well as further recommendation, are detailed below:

Lubrication of rotating components

- Not required for R-U Series gear pumps. The gears and shaft sealing solution are permanently lubricated by the operating fluid. The ball bearing is of type 2RS, with plate-sealed inner lubrication for the entire service life of the bearing.
- Lubrication of the gears is only recommended when the equipment is stored, after appropriate cleaning work has been carried out.

Electrical system

- **Frequency:** Every 3 months (quarterly).
- **Tasks:** Check electrical connections to ensure that they are secure and in good general condition. Also check that the protection system is working properly..

Gaskets and mechanical seal or lip seals

- **Frequency:** Every 12 months (annually) or when a leakage is observed in the operation.
- **Tasks:** Check that the pump operation is completely leak-free. If a leak is present, identify where it is and contact Bomba Elias sales department for the appropriate selection of spare parts.
- **Recommendation:** Every four pump operating years, carry out a complete replacement of seals and mechanical seals or lip seals to prevent possible future leakages.

Integrated safety valve

- **Frequency:** Every 12 months (annually).
- **Tasks:** Check that there is no solid body inside the housing obstructing the safety valve or keeping it permanently open. Clean it if necessary or replace it if the damage is irreparable.

Strainer cleaning

- **Frequency:** Depending on the type of fluid and conditions of use. Ideally, a monthly cleaning should be carried out.
- **Tasks:** Clean or replace the suction strainer to ensure that the flow to the pump is free of particles that could clog the system.

Possible failures and recurrent solutions**Insufficient flow**

Possible cause	Suggested solution
Suction pipe with insufficient diameter	Replace with one of equal or greater diameter than that of the pump.
Partially open suction valve	Clean or replace the valve.
Air intake in suction preventing vacuum	Inspect the entire suction pipe, including unions and accessories.
Fluid too viscous	Heat to reduce viscosity and allow proper flow.
Incorrect rotation direction	Reverse the motor's rotation direction.
Totally or partially clogged strainer	Clean or replace the strainer.
Working pressure exceeding the maximum allowed, triggering the safety valve	Adjust the pressure, reducing it within the limits specified on the nameplate.

Insufficient or unstable pressure

Possible cause	Suggested solution
Partially closed suction valve	Inspect the condition and repair or replace the valve.
Air intake in suction causing pressure fluctuations	Check the entire suction system, including joints and fittings.
Internal leaks	Identify the location of the leak and install the necessary spare parts.
Damage or excessive wear on gears	Replace the gear set.

Noise and vibrations

Possible cause	Suggested solution
Wear or damage to bearings	Inspect the bearings and replace them if worn.
Internal leaks or air intake	Check the pump for leaks in connections, gaskets, mechanical seals or lip seals.
Misalignment between the motor shaft and pump shaft	Realign the rigid coupling or replace the pump shaft or entire motor.
Improper installation or poor anchoring	Adjust connections and anchors to prevent additional vibrations.

Leaks through the mechanical seal or shaft seals

Possible cause	Suggested solution
Wear of the mechanical seal or lip seal components	Replace the sealing solution.
Presence of abrasive particles in the pumped fluid	Ensure a good suction filtration system and/or replace the mechanical seal or lip seals with one more suitable for abrasive fluids.
Incorrect operation conditions (excessive temperature or pressure)	Ensure that the pump operates within the recommended temperature and pressure ranges.
Material incompatibility	Check that the mechanical seal or lip seals, gaskets and o-rings are compatible with the pumped fluid and replace them if needed.
Prolonged dry running (only applies to mechanical seal)	Avoid prolonged and long dry running. Replace the mechanical seal if worn.

Excessive temperature

Possible cause	Suggested solution
Insufficient or blocked ventilation	Ensure that the pump and motor are installed in a well-ventilated area and, if necessary, change the location or the ventilation system.
Fluid at a temperature above pump specifications	Verify the temperature of the fluid before passing through the pump. Install heat exchangers or select another type of pump.

Gear locking

Possible cause	Suggested solution
Suction of solid particles	Clean the gear housing and check for damage.

Over-consumption

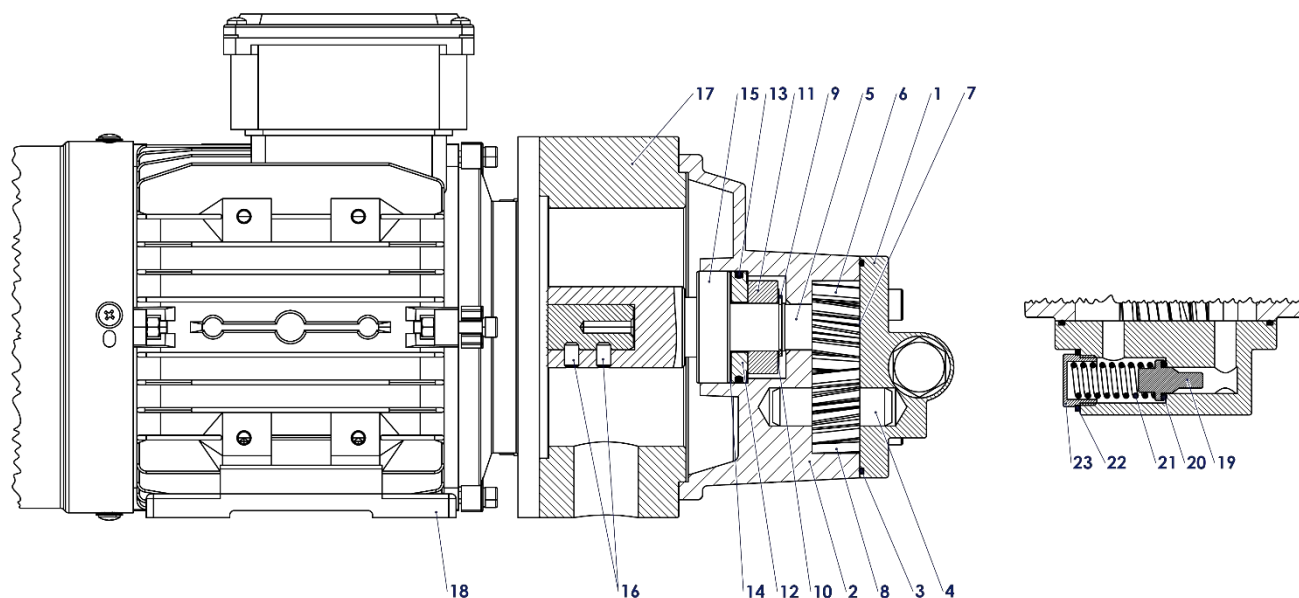
Possible cause	Suggested solution
Excessive fluid viscosity	Heating the fluid to reduce its viscosity as it passes through the pump.

Abnormal motor operation

Possible cause	Suggested solution
Incorrect power supply	Check that the power supply is within the voltage parameters specified for the motor.
Poor engine connection	Check the electrical connections of the motor, ensuring that the wires are securely connected, with no signs of corrosion or wear.

General exploded view of components

The following drawing is a general exploded view of the R-U Series. It should be noted that some pump models are equipped with different and/or additional components. Therefore, the drawing is only indicative. If any spare parts are required, please contact our sales department.



Pos.	Designation	Pos.	Designation
1	Pump front cover	13	Mechanical seal o-ring
2	Pump casing	14	Ball bearing adjusting washer
3	Front cover-Pump casing o-ring	15	Ball bearing
4	Driven shaft	16	Set screws
5	Drive shaft	17	Pump casing-Motor flange
6	Drive gear	18	Motor
7	Shaft key	19	Valve main part
8	Driven gear	20	Valve o-ring
9	Seeger	21	Valve spring
10	Mechanical seal adjusting washer	22	Valve plug gasket
11	Mechanical seal	23	Valve plug
12	Stationary mechanical seal		

Use of the equipment in ATEX zones

This section only applies to pump types of the R-U series which have been specially supplied for potentially explosive atmospheres at the customer's request. In no case does this classification apply to pump models supplied without an ATEX-certified electric motor.

The user must first prepare a risk assessment of the area where the R-U pump is to be installed, in accordance with the application of Directive 1999/92/EC, of 16 December 1999 (published in the DOCE no. 23, of 16 January 2000) and its regulatory transpositions to the legislation of each country (in Spain it is transposed by Royal Decree 681/2003, of 12 June 2003, regarding the protection of health and operators' safety against the potentially explosive atmospheres risks), for the purposes of classifying the preconditions for the location of the installation. In particular, it is necessary to delimit the emplacement and obtain its classification in accordance with the provisions of art. 7 and Annex I of the aforementioned Royal Decree 681/2003.

Equipment and components intended for installation in locations classified and affected according to Directive 1999/92/EC (mentioned in the previous point) must comply with the ATEX Directive 2014/34/EU of 26 February 2014, on the harmonisation of the laws of the Member States concerning equipment and protective systems for use in potentially explosive atmospheres (recast) and with its regulatory transpositions to the legislation of each country (in Spain, Royal Decree 144/2016 of 8 April is applied, which establishes the essential health and safety requirements for equipment and protective systems for use in potentially explosive atmospheres).

This R-U Series external gear pump unit, according to the classification by the Spanish transposition of Directive 2014/34/EU (RD 144/2016 of 8 April, in its Annex I) has the classification:

- **Equipment group II:** Equipment designed for use in industrial (non-mining) areas with explosive atmospheres due to gases, vapours, mists or dusts.
- **Equipment category 3:** Basic protection, for areas where explosive atmospheres are less frequent and present only under abnormal conditions.
- **Explosive atmosphere type G:** Equipment designed for explosive atmospheres with gases, vapours or mists.

This R-U Series external gear pump unit is designed to be used in the following zones, according to the classification by the Spanish regulations of the Directive 1999/92/CE (RD 681/2003 of 12 June, article 7 and Annex I):

- **Zone 2:** Unlikely to occur, only under abnormal conditions.

The use, installation or maintenance of the R-U Series gear pump is not permitted outside the Zones listed in the list above. In particular, its use is not permitted in Zones 0, 1, 20, 21 and 22.

In compliance with Directive 2014/34/EU (ATEX) on equipment intended for use in explosive atmospheres and in accordance with EN 60079-15, the R-U Series gear pump has been granted the following Ex-protection type:

- **Protection by construction Type Ex 'c':** This protection ensures that the pump has been safely designed to minimise the risk of ignition through a robust design that prevents the generation of sparks, excessive heat or electric arcing under normal operating conditions. No additional potting or pressurisation is required.

In accordance with Directive 2014/34/EU concerning equipment intended for use in explosive atmospheres, and following the applicable regulations for the classification of gases and temperatures, this pump has been classified as follows:

- **Gas group IIB:** This equipment has been classified for use in atmospheres containing medium-hazardous gases, such as ethylene. Classification IIB corresponds to gases of lower hazard compared to those of group IIC, but is still suitable for use in areas where potentially explosive gases may be present. This classification is in accordance with EN 60079-20-1.
- **Temperature Class T3:** The pump has been classified with a maximum surface temperature of 200 °C. Although the operating temperature of the pump does not exceed 110 °C, the T3 classification is appropriate as it covers the maximum temperature range achievable by the equipment. This classification is in accordance with EN 60079-0 and the Annexes of the ATEX Directive 2014/34/EU.

The marking/labelling of the R-U series pumps (according to EN ISO 80079-36), and their intended uses permitted according to current legislation is:



II 3 G Ex c IIB T3

Declaration of conformity

Company details:

Company	BOMBA ELIAS S.A.
Address	Ctra. de Molins de Rei a Rubí km 8,7, 08191, Rubí (España)

Equipment data

Series	R-U
Models included	(M)R-3 U, (M)R-5 U, (M)R-10 U, (M)R-16 U, R-17 U, R-25 U, R-35 U, R-50 U, R-65 U, R-100 U, R-140 U, R-250 U, R-400 U
Year of construction	From 2023 onwards

BOMBA ELIAS S.A declares under his sole responsibility that the above-mentioned product is in compliance with the requirements of the following directives and regulations:

- **Regulation (EU) 2023/1230.**
- **Low Voltage Directive 2014/35/UE.**
- **Electromagnetic Compatibility Directive 2014/42/UE.**

The following harmonised standards have been applied to demonstrate compliance:

- **Machine safety - EN ISO 12100:2010, EN 809:1998+A1:2009 y EN 60204-1:2018.**
- **Electromagnetic compatibility - EN 61000-6-2 y EN 61000-6-4.**

Place and date: Barcelona, enero de 2024

Signature: Francisco Elias, president


Francisco Elias



Ctra./ de Molins de Rei
a Rubí (C-1413-a) km 8,7
08191 Rubí, Barcelona (Spain)



info@elias.es



+34 936 996 004



www.elias.es