

Instruction Manual

ATEX Rotary Vane Pumps



AXXX-YY-ZZZ		
Pump Type	Variant	Motor Description
XXX	YY	ZZZ
RV3 = 652 RV5 = 653 RV8 = 654 RV12 = 655	18	985 = 115 V 1 ph 50 Hz EExd 2C 989 = 230 V 1 ph 50 Hz EExd 2C 990 = 230 V 1 ph 60 Hz EExd 2C 992 = 400 V 3 ph 50 Hz EExd 2C
RV3 = 652 RV5 = 653 RV8 = 654 RV12 = 655	19	986 = 115 V 1 ph 60 Hz EExd 2C
E1M18 = 343 E2M18 = 363	18	985 = 115 V 1 ph 50 Hz EExd 2C 986 = 115 V 1 ph 60 Hz EExd 2C 989 = 230 V 1 ph 50 Hz EExd 2C 990 = 230 V 1 ph 60 Hz EExd 2C 992 = 400 V 3 ph 50 Hz EExd 2C
E2M40 = 364 E2M80 = 365 E2M175 = 366 E2M275 = 367	18	993 = 400 V 3 ph 50 Hz EExd 2B

Original Instructions



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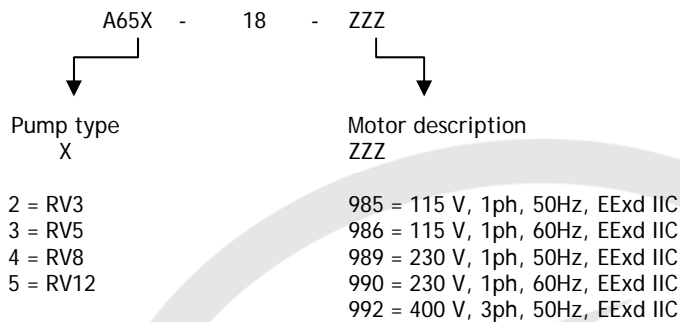


Declaration of Conformity

We, Edwards Limited,
Crawley Business Quarter,
Manor Royal,
Crawley,
West Sussex, RH10 9LW, UK

declare under our sole responsibility, as manufacturer and person within the EU authorised to assemble the technical file, that the product(s)

RV3, RV5, RV8, RV12 ATEX rotary vacuum pumps



to which this declaration relates is in conformity with the following standard(s) or other normative document(s)

- | | |
|-----------------------|--|
| EN1012-2:1996+A1:2009 | Compressors and Vacuum Pumps. Safety Requirements. Vacuum Pumps |
| EN13463-1:2009 | Non-electrical equipment for use in potentially explosive atmospheres. Basic method and requirements |
| EN13463-5:2011 | Non-electrical equipment for use in potentially explosive atmospheres. Protection by constructional safety 'c' |
| EN60079-7:2007 | Electrical apparatus for potentially explosive atmospheres. Increased safety 'e' |
| EN50581:2012 | Technical Documentation for the Assessment of Electrical and Electronic Products with respect to the Restriction of Hazardous Substances |

and fulfils all the relevant provisions of

- | | |
|------------|--|
| 2006/42/EC | Machinery Directive |
| 2014/34/EU | ATEX Directive on use in Potentially Explosive Atmospheres |
| 2011/65/EU | Restriction of Certain Hazardous Substances (RoHS) Directive |

II 3 G c IIB T4 INTERNAL

II 2 G IIC T4 EXTERNAL

Technical report MPTR0265

Note: This declaration covers all product serial numbers from the date this Declaration was signed onwards.

Mr Peter Meares
Senior Technical Support Manager, General Vacuum

10.08.2015, Burgess Hill

Date and Place

This product has been manufactured under a quality management system certified to ISO 9001:2008

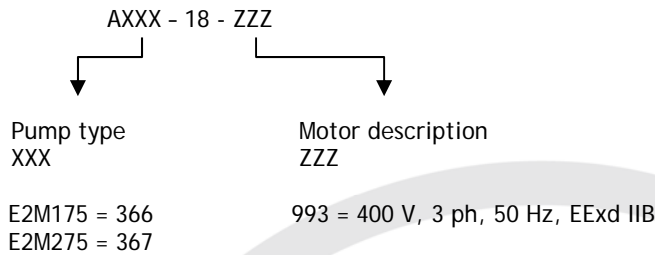


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E2M175 & E2M275 ATEX Rotary Vacuum Pumps:



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- EN1012-2:1996+A1:2009 Compressors and Vacuum Pumps. Safety Requirements. Vacuum Pumps
- EN13463-1: 2009 Non-electrical equipment for use in potentially explosive atmospheres. Basic method and requirements
- EN13463-5: 2011 Non-electrical equipment for use in potentially explosive atmospheres. Protection by constructional safety 'c'
- EN60079-7: 2007 Electrical apparatus for potentially explosive atmospheres. Increased Safety 'e'
- EN50581: 2012 Technical Documentation for the Assessment of Electrical and Electronic Products with respect to the Restriction of Hazardous Substances

and fulfils all the relevant provisions of

- 2006/42/EC Machinery Directive
- 2014/34/EU ATEX Directive on use in Potentially Explosive Atmospheres
- 2011/65/EU Restriction of Certain Hazardous Substances (RoHS) Directive

II 3 G c IIB T3 INTERNAL
 II 2 G IIB T160 EXTERNAL

Technical report MPTR0265

Note: This declaration covers all product serial numbers from the date this Declaration was signed onwards.

Mr Peter Meares
Senior Technical Support Manager, General Vacuum

16.06.2015, Burgess Hill

Date and Place

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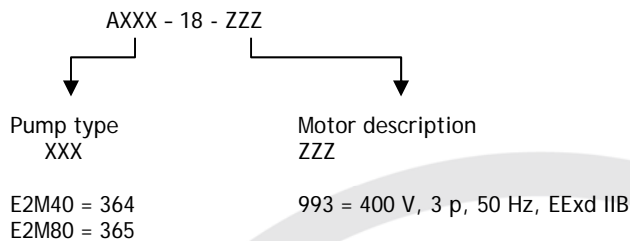


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E2M40 & E2M80 ATEX Rotary Vacuum pumps:



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- EN1012-2:1996+A1:2009 Compressors and Vacuum Pumps. Safety Requirements. Vacuum Pumps
- EN13463-1: 2009 Non-electrical equipment for use in potentially explosive atmospheres. Basic method and requirements
- EN13463-5: 2011 Non-electrical equipment for use in potentially explosive atmospheres. Protection by constructional safety 'c'
- EN60079-7: 2007 Electrical apparatus for potentially explosive atmospheres. Increased safety 'e'
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- 2014/34/EU ATEX Directive on use in Potentially Explosive Atmospheres
- 2011/65/EU Restriction of Certain Hazardous Substances (RoHS) Directive

⊕ II 3 G c IIB T4 INTERNAL
 ⊕ II 2 G IIB T4 EXTERNAL *Technical report MPTR0265*

Note: This declaration covers all product serial numbers from the date this Declaration was signed onwards.

Mr Peter Meares
Senior Technical Support Manager, General Vacuum

16.06.2015, Burgess Hill

Date and Place

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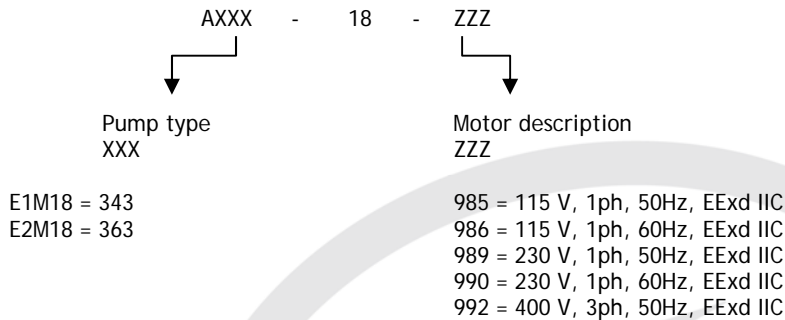


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E1M18 & E2M18 ATEX Rotary Vacuum Pumps:



to which this declaration relates is in conformity with the following standard(s) or other normative document(s)

- | | |
|-----------------------|--|
| EN1012-2:1996+A1:2009 | Compressors and Vacuum Pumps. Safety Requirements. Vacuum Pumps |
| EN13463-1:2009 | Non-electrical equipment for use in potentially explosive atmospheres. Basic method and requirements |
| EN13463-5:2011 | Non-electrical equipment for use in potentially explosive atmospheres. Protection by constructional safety 'c' |
| EN60079-7:2007 | Electrical apparatus for potentially explosive atmospheres. Increased safety 'e' |
| EN50581:2012 | Technical Documentation for the Assessment of Electrical and Electronic Products with respect to the Restriction of Hazardous Substances |

and fulfils all the relevant provisions of

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| 2006/42/EC | Machinery Directive |
| 2014/34/EU | ATEX Directive on use in Potentially Explosive Atmospheres |
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Technical report MPTR0265

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10.08.2015, Burgess Hill

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Associated publications

Publication title

Publication number

Vacuum pump and vacuum system safety	P300-20-000
Vacuum systems safety booklet	P400-40-100
British Autoguard Samiflex coupling installation/maintenance instructions	
Flameproof motor maintenance instructions	

1 Introduction

1.1 Scope and definitions

This manual provides installation, operation and maintenance instructions for Group 2 Category 2 ATEX pumps in respect to ignition sources external to the pump and Group 2 Category 3 ATEX pumps in respect to ignition sources internal to the pump. You must use the pumps as specified in this manual.

Read this manual before you install and operate your rotary vacuum pump. Important safety information is highlighted as WARNING and CAUTION instructions; you must obey these instructions. The use of WARNINGS and CAUTIONS is defined below.



WARNING

Warnings are given where failure to observe the instruction could result in injury or death to people.

CAUTION

Cautions are given where failure to observe the instruction could result in damage to the pump, associated equipment and process.

The units used throughout this manual conform to the SI international system of units of measurement.

Note: The content of this manual may change from time to time without notice. Edwards accept no liability for any errors that may appear in this manual, nor does it make any expressed or implied warranties regarding the content. So far as is reasonably practicable Edwards has ensured that its products have been designed and constructed so as to be safe and without risks when properly installed and used in accordance with Edwards Operating Instructions. Edwards accepts no liability for loss of profit, loss of market or any other indirect or consequential loss whatsoever.

Note: Product warranty and limit of liability are dealt with in Edwards standard terms and conditions of sale or negotiated contract under which this document is supplied.

1.2 ATEX directive implications

This pump is designed to meet the requirements of Group II Category 2 equipment in respect of potential ignition sources external to the pump, and also Group II Category 3 in respect to ignition sources internal to the pump. This classification is in accordance with Directive 94/9/EC of the European Parliament and the Council of 23rd March 1994 on the approximation of the laws of the Member States concerning equipment and protective systems intended for use in potentially explosive atmospheres. (The ATEX Directive)

There is no potential source of ignition within or external to the pump during normal operation but there may be potential sources of ignition under conditions of rare or expected malfunction as defined in the Directive. As a result of this, it is necessary to consider the potential consequences of ignition sources occurring under rare or expected malfunction. (Ref ATEX137 1992/92/EC).

When flammable materials are present within the equipment you must:

- Not allow air to enter the equipment.
- Ensure the system is leak tight.
- Use an inert gas purge (for example, a nitrogen purge to dilute any flammable gases or vapours entering the pump inlet, and/or use an inert gas purge to reduce the concentration of flammable gases or vapours in the pump and in the exhaust pipeline to less than one quarter of the gases, published Lower Explosive Limits (LEL).

See Section 6.5 of the safety booklet P400-40-100 for details on how to avoid the flammable zone.

Edwards pumps are not intended for use in explosive dust atmospheres.



WARNING

The oil-sealed vacuum pumps are supplied with a sealed Gas Ballast. Plugs have been fitted to prevent flammable atmospheres accidentally entering the pump. If the gas ballast facility is required, a purge gas must be used, or clean air supplied from a safe area. Failure to obey these instructions may cause harm, injury or death to persons.

For further information, please contact Edwards: refer to the addresses page at the end of this manual for details of your nearest Edwards company.

1.3 Description

The Edwards range of rotary vacuum pumps are single or two-stage oil sealed, sliding vane, high vacuum pumps designed for reliable, long term operation in both laboratory and industrial environments.

The RV3, RV5, RV8, RV12 and EM175 and EM275 pumps incorporate an inlet valve, which when the pump is switched off seals the inlet and prevents back migration of oil into system being evacuated.

The pump is designed to meet the requirements of Group II Category 2 equipment in respect to ignition sources external to the pump.

The pump has already gained ATEX Group II Category 3 certification in respect to ignition sources internal to the pump.

The pump is intended for use in explosion groups IIA, IIB and IIC.

A four-pole, single-phase and three phase ATEX approved flameproof motor provides direct drive through a flexible coupling to the RV range and the EM18 and 28 pumps.

A four-pole, three-phase ATEX approved flameproof motor provides direct drive through an ATEX certified flexible coupling to the EM 40/80/175 and 275 pumps.

A plastic cooling fan is attached to the drive coupling on the EM18/40/80 pumps. The EM175/275 are water-cooled.

Lubrication is provided by a sliding vane oil pump, which delivers pressurised oil to the vacuum pumping mechanism.

An inert purge gas can be introduced into the pumping mechanism via the gas ballast inlet.









For much of the operating cycle the pump operates at pressures significantly below 0.8 bar absolute. However the final stage of the pump will exhaust to atmospheric pressure and there is a start-up and shutdown period where the whole pump is briefly operating at atmospheric pressure.

A surface temperature thermal snap switch is fitted to the body of the EM175 and 275 rotary vacuum pumps. If the pump temperature should rise due to a fault condition, the thermal snap switch activates and the pump is shut down.


The thermal snap switch must be connected to an intrinsically safe circuit suitable for the classification of the hazardous zone in which the pump will be located. If this is not possible, the circuit should be placed in a safe zone.

1.4 ATEX certification

Table 1 - ATEX certification

Pump type	ATEX certification	
	Internal	External
RV3, 5, 8, 12	 II 3 G c IIB T4	 II 2 G IIC T4
E2M18	 II 3 G c IIB T4	 II 2 G IIC T4
E2M40, 80	 II 3 G c IIB T4	 II 2 G IIB T4
E2M175, 275	 II 3 G c IIB T3	 II 2 G IIB T160

The elements of this certification have the following meaning:

-  - Equipment to be used in a potentially explosive atmosphere
- II - Equipment group II - non mining equipment
- 3 - Equipment category 3
- 2 - Equipment category 2
- G - Where explosive atmospheres caused by gases, vapours or mists are concerned
- c - Protection by constructional safety
- IIB Internal - Suitable to pump gas group IIB
- IIB or IIC External - Suitable for use within IIB or IIC explosive atmospheres
- T3, T4, T160 - Auto ignition temperature of gas, that is T3 (200 °C), T4 (135 °C), T160 (160 °C)

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2 NORMAL OPERATION

Normal operation of the rotary vane pumps is defined by this instruction manual used in conjunction with the specific pump manual. Instructions in this manual take precedence over those in the specific pump manual. This means that:

- The pump is connected to the correct electrical supply as defined by the instruction manual.
- The pump has the correct services as defined by the instruction manual.
- The pump additional protection device (refer to [Section 5](#)) is connected to a safety interlock circuit that will stop the pump when an unsafe condition occurs.

In normal operation the pump is safe for use in atmospheres containing gas groups IIA, IIB and IIC depending on the class of motor fitted.

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3 ABNORMAL OPERATION

The following usage of the equipment is prohibited:

- Use of the equipment in a zone with a higher ATEX category than that applied to the equipment (for example, using category 2 equipment in a category 1 system).
- Use of the equipment as a positive pressure compressor.
- Use of the equipment whilst subjected to high back pressure (for example, as caused by an exhaust line blockage).
- Reverse rotation of the pump.
- Pumping of or use in the presence of potentially flammable or explosive dust atmospheres.
- Use in ambient conditions other than those specified in [Section 4.3](#) of this manual.
- Pumping of pyrophoric materials.
- Pumping gases that cause the inlet pipeline to exceed a surface temperature of 40 °C.
- Pumping of hydrocarbon oxides.
- Pumping of gases that tend to self decompose or are chemically unstable.
- Pumping of IIC gases.
- Use with materials with auto ignition temperatures below the defined temperature rating.
- Operation such that the pump inlet temperature falls below the dew point of a flammable vapour. This could lead to condensate that can collect and lead to the risk of corrosion or an ignition hazard.
- Use with oxygen enriched atmospheres.
- Use in an external atmosphere where there is a potentially flammable dust atmosphere.

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4 SYSTEM DATA

4.1 Physical data

4.1.1 Dimensions

The figures shown in Table 2 are typical values of the overall length of the pump when fitted with a flameproof motor. This is the only dimension that deviates from the standard product.

Note: Customers should be aware that there might be differences in dimensions, terminal box size and position when sourcing replacement motors.

Table 2 - Overall length

RV3/5	RV8	RV12	E1M18	E2M18	E2M28	E2M40	E2M80	E2M175	E2M275
510 mm	550 mm	570 mm	526 mm	576 mm	606 mm	775 mm	840 mm	1010 mm	1110 mm

4.1.2 Mass

Table 3 - Pump mass

Pump type	Mass with no oil (kg)
RV3	28.0
RV5	28.0
RV8	31.0
RV12	32.0
E1M18	37.0
E2M18	39.0
E2M28	42.0
E2M40	85.0
E2M80	111.0
E2M175	265.0
E2M275	270.0

4.2 Mechanical data

Degree of protection	IP55 (1 ph and 3 ph pumps)
Maximum tilt angle	10°
Motor rotational speed (50 Hz supply)	1430 rpm
Motor rotational speed (60 Hz supply)	1710 rpm

4.3 Operating conditions

Temperature range	
Operating	+12 °C to +40 °C (53 °F to 104 °F)
Relative humidity	10% to 90%
Maximum operating altitude	1000 m.

4.4 Noise data

Note: Data measured at ultimate vacuum 1 metre from end of the pump.

Table 4 - Noise data

Pump Variant	dB (A)
RV3, 5, 8, 12 1 ph 230 V 50 Hz	48
E1M/E2M18 E2M28 1 ph 230 V 50 Hz	57
E2M40 3 ph 400 V 50 Hz	72
E2M80 3 ph 400 V 50 Hz	70
E2M175 3 ph 400 V 60 Hz	75
E2M275 3 ph 400 V 60 Hz	75

4.5 Vibration data

Refer to pump instruction manual.

4.6 Electrical data

4.6.1 Electrical data: single-phase pumps

When you start a cold pump, the motor will draw the start-up current shown in Table 5 for several seconds. A slow-blow fuse is required to prevent fuse failure during pump start-up. Within five minutes, as the oil and pump warms up, the current drawn will slowly reduce to the full load current specified in Table 5.

Table 5 - Electrical data (single-phase pumps)

Pump	Nominal supply (V)	Frequency (Hz)	Power (kW)	Full load current (A)	Start-up current (A)	Recommended fuse rating (A)
RV3, 5, 8, 12	230	50/60	0.55	5.6	22.5	10
E1M18, E2M18, E2M28	230	50/60	0.75	6.4	24	10

4.6.2 Electrical data: three-phase pumps

When you start a cold pump, the motor will draw the start-up current shown in Table 6 for several seconds. The current will then reduce quickly as the motor reaches rated rotational speed. Within 5 minutes, as the oil and pump warms up, the current drawn will slowly reduce to the full load current specified in Table 6.

When you start a warm pump, the motor will draw the start-up current shown in Table 6 for up to 0.5 seconds. The current drawn will then immediately fall to the full load current specified in Table 6.

Electrical short-circuit and ground-fault protection of the pump will be provided by fitting Class CC fuses of the values shown in Table 6 at the point of connection to the supply. If these are not available in your country of use, Type aM European fuses of the same rating can also be used.

Table 6 - Electrical data (three-phase pumps)

Pump	Nominal supply (V)	Frequency (Hz)	Power (kW)	Full load current (A)	Start-up current (A)	Recommended fuse rating (A)
EM40	400	50/60	1.1	2.55	11	5
EM80	400	50/60	2.2	4.8	14	10
EM175	400	50/60	5.5	11	52	20
EM275	400	50/60	7.5	14.5	52	25

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5 INSTALLATION

The system as supplied by Edwards is configured for operation as defined in this manual. This is an ATEX approved system and no modifications may be made to the system and maintenance is restricted to the activities listed in [Section 7](#). Exceptions to this instruction may invalidate the ATEX certification of the system. If in doubt please consult Edwards.

5.1 Safety



WARNING

Obey the safety instructions given below and take note of the appropriate precautions. If you do not, you can cause injury to people or damage to equipment.



WARNING

The oil sealed vacuum pumps are supplied with a sealed Gas Ballast. Plugs have been fitted to prevent flammable atmospheres accidentally entering the pump. If the gas ballast facility is required, a purge gas must be used, or clean air supplied from a safe area. Failure to obey these instructions may cause harm, injury or death to persons.



WARNING

If your pump is certified for IIC external operation, you must only wipe the outside of the pump with a damp cloth.

Skilled technicians familiar with vacuum equipment must perform the installation of this equipment. Edwards recommends that you read the Safety Booklet P400-40-100.

- To ensure the validity of the ATEX certification, the pump oil box must remain at a positive pressure at all times. When pumping flammable gases this can be accomplished by providing a constant purge of inert gas through the gas ballast porting (as described in the specific pump manual) using appropriate ATEX certified equipment. See Section 6.5 of the safety booklet P400-40-100 for details on how to avoid the flammable zone.
- In the event of an exhaust line becoming blocked, there is a possibility of the inlet side of the pump and any process volume attached to it, being pressurised. Such a blockage should be prevented.
- All lifting operations must be carried out using the identified lifting points and appropriate equipment and techniques.
- You must connect the additional thermal protection devices as specified in [Section 5.3.3](#) such that the system will stop if a fault condition occurs.
- Where appropriate, the system should be purged to remove harmful process materials. This could occur before the start of the process and at the end of the process or before shutdown. Failure to do so could lead to process materials causing corrosion, or an undesired reaction producing materials with a lower auto ignition temperature than the system is certified to pump.
- The pump must not be able to restart until a fault condition has been cleared.
- Your control must incorporate a manual reset device, which you must use to restart the system after a fault condition.
- The design of the pumps is such that it will not stop or limit the range of explosion flames or pressures if such an explosion occurs in adjacent equipment. It is the users responsibility to consider this when he/she undertakes the system design.

5.2 Mechanical installation

Consider the following points when you design your pumping system:

- Unpacking, storage and disposal of all packaging.
- Ensure both the motor and the pump have ATEX labels.
- Position the pump using suitable lifting equipment.
- Connect water supplies (E2M/175/275).
- Check the integrity of all system connections.
- The inlet and outlet connections are the interfaces between the pump and the process and exhaust lines. The configuration of these connections is important and the connections must meet the requirements of BS 4504 (for DN flanges) or ANSI B16.5 (ANSI flanges).
- Connect the exhaust outlet to your exhaust system. Ensure that your system is capable of dealing with the exhaust gases safely.
- Make sure that the exhaust pipeline cannot become blocked. If you have an exhaust-isolation valve, make sure that you cannot operate the pump with the valve closed.
- Provide for a purge of inert gas when you shut down the pumping system, to dilute dangerous gases to safe concentrations.

5.3 Electrical installation



WARNING

Obey the instructions given below and take note of the appropriate precautions. Failure to do so will compromise the ATEX compliance and may cause harm, injury or death to persons.



WARNING

The external thermal snap switch fitted to the body of the EM175 and EM275 rotary pumps must be connected to an intrinsically safe circuit suitable for the hazardous zone in which it may be located. Otherwise it must be located in a safe area. Failure to do so will compromise the ATEX compliance and may cause harm, injury or death to persons.



WARNING

The thermal trip (open when overheated) which is fitted to the motor of the RV3, 5, 8, 12 and EM18/28 rotary pumps must be connected to an intrinsically safe circuit suitable for the hazardous zone in which it may be located. Otherwise it must be located in a safe area. Failure to do so will compromise the ATEX compliance and may cause harm, injury or death to persons.

Skilled technicians familiar with vacuum equipment must perform the installation of this equipment. Edwards recommends that you read the safety booklet P400-40-100.

5.3.1 Check and configure the motor: single and three phase pumps

CAUTION

Ensure that the motor is correctly configured for your electrical supply. If you operate the pump when the motor is not correctly configured for the electrical supply, you will damage the motor.

Note: Edwards does not supply the motor cable gland. Therefore the customer must provide an 'EEx-d' certified cable gland to maintain the integrity of the flameproof motor.

1. Remove the screws that secure the cover of the motor terminal-box using a 5 mm hexagonal key.
2. Fit an 'EEx-d' certified cable gland. Refer to [Table 7](#) below.

Table 7 - Cable gland reference

Pump type	Gland thread	
	ATAV motor	CEMP motor
RV3, 5, 8, 12 and EM18, 28	M20	-
EM40, 80	M20	M25
EM175, 275	M25	M32

3. Ensure that the motor is correctly rated and configured for your electrical supply. Refer to the motor manufacturer's wiring diagram supplied inside the motor terminal box lid. If necessary, reconfigure the links to suit your electrical supply.

5.3.2 Connect the pump to your electrical supply



WARNING

Ensure that the electrical installation of the pump conforms to your local and national safety requirements. It must be connected to a suitably fused and protected electrical supply with a suitable earth point.

Connect the motor to the electrical supply in accordance with the manufacturer's recommended installation instructions supplied with the motor. In addition, the following points must be observed.

- You must use a suitable electrical supply cable.
- You must use a flameproof cable gland, certified to 'EEx-d'.
- Connect the electrical supply to the motor through a starter or circuit breaker, which has thermal over current protection.
- You must connect the thermal protection devices. This is an ATEX requirement and must be performed to maintain certification. See [Section 5.3.3](#).
- We recommend that you connect the motor to the electrical supply through suitable control equipment that requires a manual reset after an electrical supply failure. If you do not, the pump will restart when the supply is restored.

5.3.3 Connection of additional thermal protection devices

5.3.3.1 RV3, 5, 8, 12 and E1M/E2M18 and E2M28 pumps

The thermal trip (open when overheated) located in the motor terminal box, must be connected to a circuit breaker, which prevents the pump from restarting once a fault condition has occurred.

5.3.3.2 EM40/80 pumps

No additional thermal protection devices are required.

5.3.3.3 EM175/275 pumps

The external thermal snap switch located on the body of the pump, must be connected to an intrinsically safe circuit in accordance with EN50020 Electrical apparatus for use in potentially explosive atmospheres - Intrinsic safety "i" for use with simple apparatus suitable for the classification of the hazardous zone in which the pump will be located.

If this is not possible, the circuit should be placed in a safe zone.

5.3.4 Check the direction of rotation

CAUTION

Ensure that the pump-motor rotates in the correct direction. If it does not, the pump and your vacuum system can become pressurised.

1. Correct direction of rotation is anti clockwise when looking on the motor fan.
2. Watch the motor fan, switch on the supply to the motor for a few seconds, and then switch off.
3. If the direction of rotation is incorrect, isolate the motor from the supply and reconfigure the electrical connections to the motor; refer to the manufacturer's recommended installation instructions supplied with the motor.
4. Repeat the above check to ensure the direction of rotation is correct.

6 OPERATION

Note: We recommend that you obtain and read the Vacuum Pump and Vacuum System Safety manual (publication number P300-20-000), available from Edwards or your supplier.



WARNING

If you supply your own control system you must include emergency stop devices. These should be fitted with restart lockouts such that a new start command may only take effect after the lockouts have intentionally been reset.



WARNING

You must obey the instructions within this manual. Failure to do so will compromise the ATEX compliance and may cause harm, injury or death to persons.

6.1 Pumping flammable/pyrophoric materials



WARNING

You must obey the instructions and take note of the precautions given below, to ensure that pumped gases do not enter their flammable ranges.

When flammable materials are present within the equipment you must:

- Not allow air to enter the equipment.
- Ensure the system is leak tight.
- Use an inert gas purge (for example, a nitrogen purge) to dilute any flammable gases or vapours entering the pump inlet, and/or use an inert gas purge to reduce the concentration of flammable gases or vapours in the pump and in the exhaust pipeline to less than one quarter of the gases' published lower explosive limits (LEL).

Use an inert gas purge in to the pump gas ballast connection to prevent the condensation of flammable vapours within the pump mechanism and exhaust pipeline.

6.2 Gas purges



WARNING

If you use inert gas purges to dilute dangerous gases to a safe level, ensure that the rotary vacuum pump is shut down if an inert gas supply fails.



WARNING

You must obey the instructions and take note of the precautions given below, to ensure that the pumped gases do not enter their flammable ranges.



WARNING

You must obey the instructions within this manual. Failure to do so will compromise the ATEX compliance and may cause harm, injury or death to persons.

Switch on the inert gas purge to remove air from the pump and the exhaust pipeline before the process starts. Switch off the purge flow at the end of the process only after any remaining flammable gases or vapours have been purged from the pump and exhaust pipeline.

If liquids that produce flammable vapours could be present in the pump foreline, then the inert gas purge to the vacuum pump should be left on all the time this liquid is present. Flammable liquids could be present in the foreline as a result of condensation, or may be carried over from the process.

When you calculate the flow rate of inert gas required for dilution, consider the maximum flow rate for the flammable gases/vapours that could occur. For example, if a mass flow controller is used to supply flammable gases to the process, you should assume a flow rate for flammable gases that could arise if the mass flow controller is fully open.

Continually measure the inert gas purge flow rate: if the flow rate falls below that required, you must stop the flow of flammable gases or vapours into the pump.

6.3 Manual reset

The pump must not be able to restart automatically after a fault condition until the fault has been cleared.

Your control must incorporate a manual reset device, which you must use to restart the system after a fault condition has occurred.

7 MAINTENANCE

7.1 Safety information



WARNING

Obey the safety and maintenance instructions and take note of appropriate precautions. Failure to do this will compromise the ATEX certification and may cause harm, injury or death to persons.



WARNING

Particular care must be taken to adhere to the maintenance plan of the RV3, 5, 8, 12 and E1M/E2M18/28 pumps. In particular ensure that the flexible coupling is changed as specified in [Section 5](#) of the pump manual. Failure to do this will compromise the ATEX certification and may cause harm injury or death to persons. (For maintenance of E2M/40/80/175/275 ATEX coupling, please see [Section 7.3](#)).



WARNING

To ensure seal integrity of the pump following any maintenance, you need to ensure that the oil box gasket is positioned correctly and that the bolts are torqued to the figures stated in [Table 8](#) in [Section 7.2](#). The pump should be run and when the operating temperature has been achieved, the ultimate pressure must be checked to verify that the pump is functioning correctly. Failure to do this will compromise the ATEX certification and may cause harm, injury or death to persons.



WARNING

If your pump is certified for IIC external operation, you must only wipe the outside of the pump with a damp cloth.

Before carrying out any maintenance work, observe the following:

- The system must be allowed to cool for a minimum of 3 hours and any pressure or vacuum eliminated or isolated before attempting any maintenance work.
- Isolate the system from any electrical supply before attempting any maintenance work.
- Ensure that the system has been thoroughly purged of process material before attempting any maintenance work.

Maintenance of the equipment is mandatory to maintain ATEX certification. Each pump will have an instruction manual and the maintenance requirements in these manuals are mandatory for ATEX systems.

7.2 Maintenance plan

- For pump only maintenance, please refer to the specific pump manual.
- Any motor repair work must be carried out by trained personnel. Please refer to the supplied motor manufacturer's manual.
- For the ATEX coupling maintenance, please refer to the supplied coupling manufacturer's manual.

Weekly checks:

- Ensure the cable gland is secure.
- Ensure that the motor fan cowl is clear.
- Ensure the pump and motor are clean.
- Check condition of drive couplings, in particular the coupling insert as per the specific pump manual and ATEX coupling manual.
- Check that there is sufficient oil. Refer to the specific pump manual.
- Check the wiring.
- Check the integrity of the thermal trip.

Torque settings:

Table 8 - Torque settings

Torque setting (Nm)					
Pump type	Oil box screws	Sight glass screws	Drain plug	Oil filler plug	Exhaust flange
RV3/5/8/12	10 - 12	10 - 12	1.0 - 1.5	2.0 - 2.5	6 - 7
EM18/28	11 - 13	7.5 - 8.5	1.0 - 1.5	2.0 - 2.5	6 - 7
EM40/80	11 - 13	6.5 - 7.5	N/a	N/a	N/a
EM175/275	11 - 13	9 - 11	N/a	N/a	N/a

7.3 Control intervals of ATEX coupling insert (EM40/80/175/275)

The elastic insert of the ATEX coupling should be checked after the first 2000 hours or 6 months of operation. If no wear is observed, following inspections should occur after every 4000 hours or 12 months of operation, whichever is sooner.

If considerable wear is observed during the first inspection, it is advisable to change the elastic insert. The cause should be determined, in accordance with the breakdowns table listed in the ATEX coupling’s installation and maintenance manual supplied. Maintenance intervals must be adjusted accordingly to suit the changed operating conditions.

Refer to Section 5.2 of the ATEX coupling’s installation and maintenance manual supplied, for details on acceptable wear values of the AO and A1 type inserts.

The elastic insert of the ATEX coupling can be inspected easily during a scheduled downtime of the equipment, by displacement of the holding ring. Some disassembly of the pump is required on the EM40 and EM80 pumps.

8 SERVICE, SPARES

For standard maintenance kits please refer to the individual instruction manual provided.

For all other spares please contact Edwards.

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