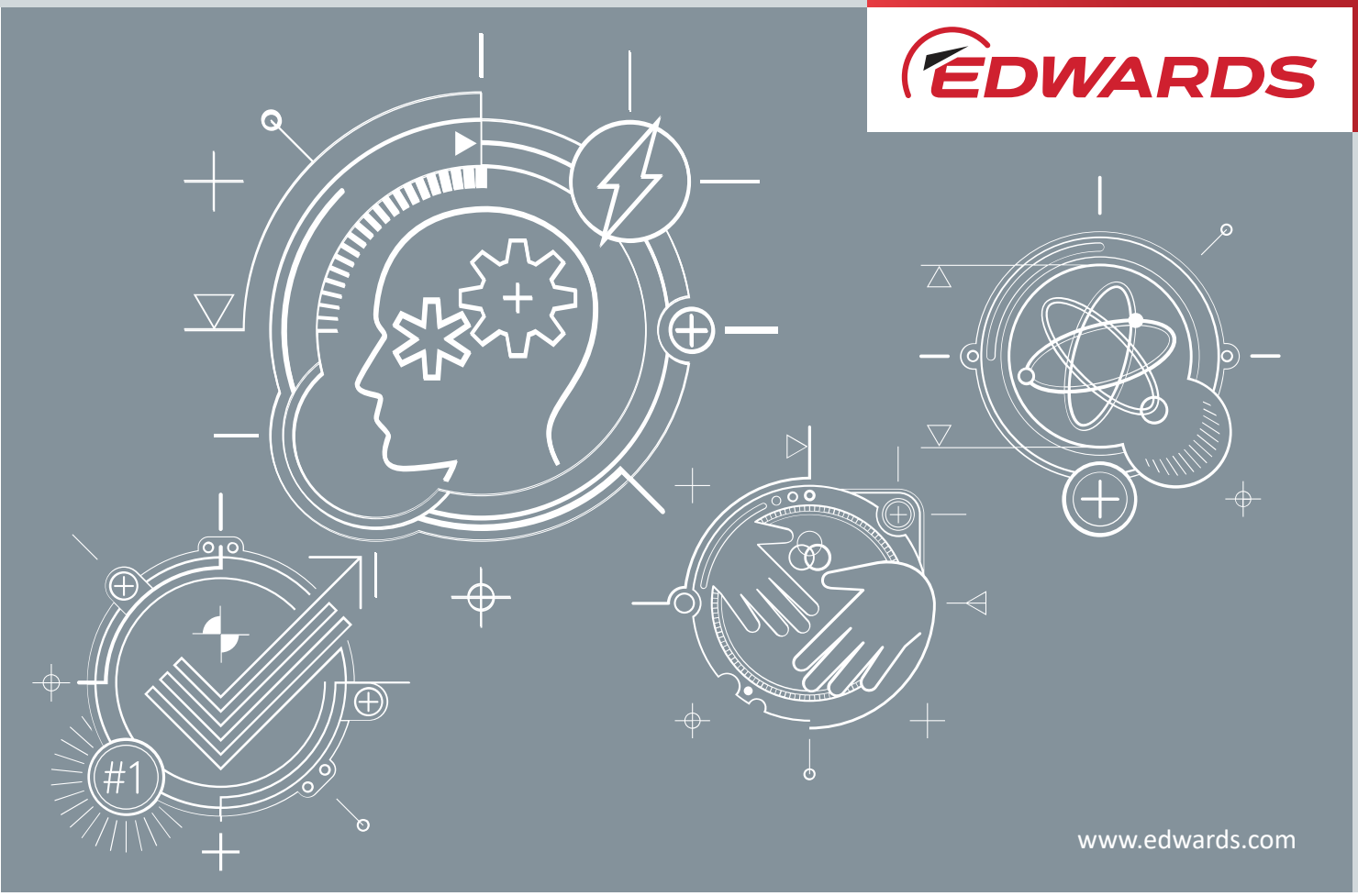

Dry Multi Stage Roots Vacuum Pumps nXL110i Enhanced, nXL200i Enhanced and nXL110i Dual Inlet Enhanced

INSTRUCTION MANUAL

A77050880_B

Original instructions

Copyright notice

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We accept no liability for loss of profit, loss of market or any other indirect or consequential loss whatsoever.

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

You must use this product as described in this manual. Read the manual before you install, operate, or maintain the product. For manual enquiries, email *manuals@edwardsvacuum.com*.

Contents

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1. Safety and compliance

For safe operation from the start, read these instructions carefully before you install or commission the equipment and keep them safe for future use. Read all the safety instructions in this section and the rest of this manual carefully and make sure that you obey these instructions.

The instruction manual is an important safety document that we often deliver digitally. It is your responsibility to keep the instruction manual available and visible while working with the equipment. Please download the digital version of the instruction manual for use on your device or print it if a device will not be available.

1.1 Definition of Warnings and Cautions

Important safety information is highlighted as warning and caution instructions which are defined as follows. Different symbols are used according to the type of hazard.

WARNING:

If you do not obey a warning, there is a risk of injury or death.

CAUTION:

If you do not obey a caution, there is a risk of minor injury, damage to equipment, related equipment or process.

NOTICE:

Information about properties or instructions for an action which, if ignored, will cause damage to the equipment.

We reserve the right to change the design and the stated data. The illustrations are not binding.

1.2 Trained personnel

For the operation of this equipment “trained personnel” are:

- skilled workers with knowledge in the fields of mechanics, electrical engineering, pollution abatement and vacuum technology and
- personnel specially trained for the operation of vacuum pumps

1.3 Safety symbols

The safety symbols on the products show the areas where care and attention is necessary.

The safety symbols that we use on the product or in the product documentation have the following meanings:

	**Warning/Caution** Risk of injury and/or damage to equipment. An appropriate safety instruction must be followed or a potential hazard exists.
	**Warning - Corrosive substances** Risk of injury or damage to equipment. Identifies the presence of corrosive gases, liquids or materials.
	**Warning - Dangerous voltage** Risk of injury. Identifies possible sources of hazardous electrical shock.
	**Warning - Flammable material** Risk of fire. Identifies possible sources of flammable gases, liquids or materials.
	**Warning - Heavy object** Risk of injury or damage to equipment. Identifies a possible hazard from a heavy object.
	**Warning - Hot surfaces** Risk of injury. Identifies a surface capable of inflicting burns through contact.
	**Warning - Topple hazard** Risk of injury or damage to equipment. Identifies a risk of an object falling over.
	**Mandatory action symbol** Failure to comply with this action may result in injury or damage to equipment.
	**Warning - Use protective equipment** Risk of injury. Use appropriate Personal Protective Equipment (PPE) when performing the task.
	**Symbol - Protective earth** Identifies an electrical equipment earth (ground) terminal.

2. General description

2.1 Overview

WARNING: INCORRECT USE OF EQUIPMENT

Risk of injury or damage to equipment. Incorrect use of the equipment can cause injury. The user is responsible for the safe operation, installation and monitoring of the system.

CAUTION: GAS BALLAST INSTALLATION

Risk of damage to the equipment. If water vapour is present within the system or is pumped by the product the gas ballast must be used to prevent damage to the product. The gas ballast should continue to be applied with the pump running, for at least 1 hour after the water vapour source has been removed to enable the pump to dry.

The nXLi Enhanced is a dry, multi-stage roots vacuum pump that offers high pumping speed in a compact form. The pump is connected by a power cord and is designed for use on clean duty applications.

The cord rating is:

Supply voltage (V)	Current (A)	Frequency (Hz)
200 - 240	16	50 or 60

The pump is not designed for use with flammable, corrosive, toxic or other hazardous gases. Gas or oxygen can mix in the pump system.

The dry pump operates in steady-state gas load conditions with an inlet pressure up to 37 mbar. If the inlet pressure is more than 37 mbar for an extended period, the pump controller reduces the motor speed. The motor speed is increased when the pressure is reduced, or when the *Transient overload protection* on page 23 has recovered.Refer to *Table: Performance data* for information on maximum inlet pressure.

The system is air cooled by a fan installed in the pump enclosure. The fan continues to operate for 5 minutes after the pump is set to off. The pump has a thermal protection device that will stop the motor if a thermal overload, for example in high ambient temperature, occurs. You must restart the pump after it has cooled down.

The pump mechanism is operated by an electric motor driven by an internal pump controller. The rotational elements of the pumping mechanism are simply supported at the end by lubricated bearings. PFPE lubricant is used and this is contained in both the gearbox and motor ends of the pump module. These are "sealed for life" and the lubricant does not need to be replaced until the pump service interval is reached.

2.2 Intended use

Instrumentation	
Analytical instruments, especially LC/MS For ICP/MS special application review is required	✓
Electron microscopy/spectroscopy	✓
General	
Chamber evacuation	✓
Turbomolecular backing pump	✓
Water vapour handling (*Gas ballast operation* on page 42)	✓

2.2.1 Flammable materials

The nXLi Enhanced pump is not suitable for mixture of flammable gases.

2.2.2 Pumped media

WARNING: FLAMMABLE MATERIAL

Risk of injury or damage to the equipment. Identifies possible sources of flammable gases, liquids or materials.

WARNING: CORROSIVE SUBSTANCES

Risk of injury or damage to the equipment. Identifies the presence of corrosive gases, liquids or materials.

The pump is designed to pump the following gases:

- Air
- Oxygen (O2) < 21 % by volume
- Neon
- Nitrogen
- Argon
- Helium

The pump is not suitable for pumping aggressive, corrosive or mixture of flammable gases.

The system has a gas ballast connection. Caution must be taken to make sure that vapour does not condense inside the pump. Refer to *Gas ballast operation* on page 42 on how to prevent condensation of water vapour in the pump.

Make sure the pump is allowed to get to normal operation temperature (1 hour) before flowing any gas/vapour and make sure that the pump is suitably purged before it is turned off to avoid accumulation of pumped gas or vapours within the mechanism.

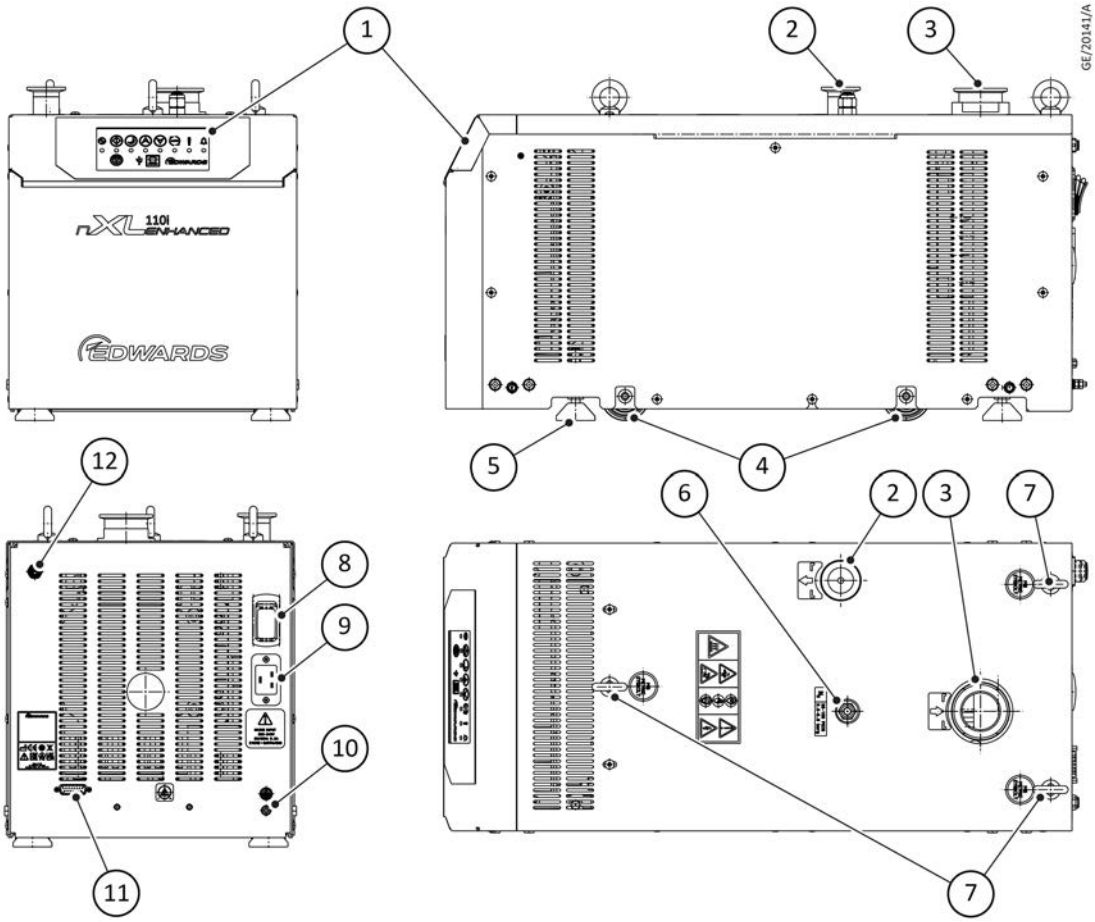
2.3 Misuse

If you use the equipment for a non-recommended application, then you might invalidate your warranty and become responsible for any resulting safety implications.

Do not use the pumps to pump hazardous substances.

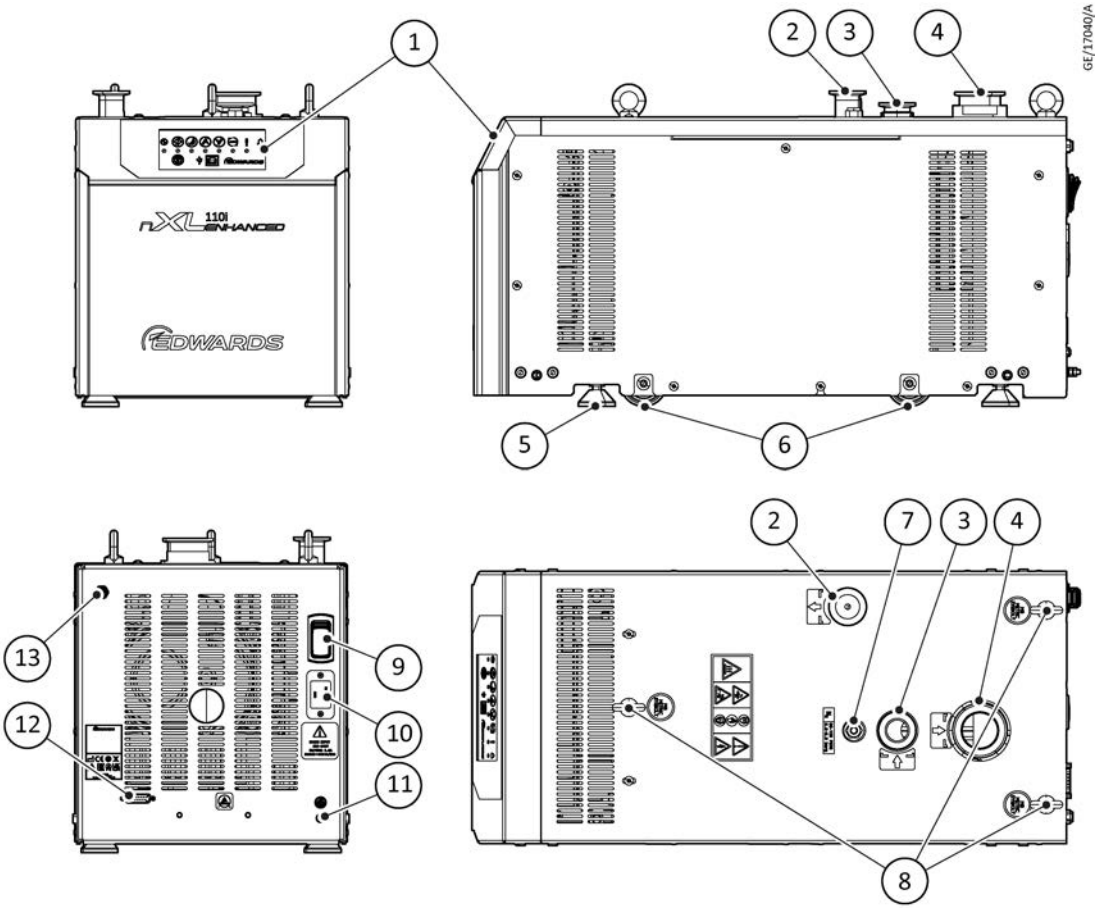
2.4 Pump features

Figure 1 nXL110i Enhanced (Pump features and their positions are identical for the nXL200i Enhanced)



1. *Control panel*
2. *Exhaust port*
3. *Inlet port*
4. *Levelling feet x 4*
5. *Castors x 4*
6. *Gas ballast connection*
7. *Lifting eyebolts positions*
8. *Mains circuit breaker*
9. *Mains connector port*
10. *Protective earth stud*
11. *15-way D-type connector*
12. *Auxiliary connector*

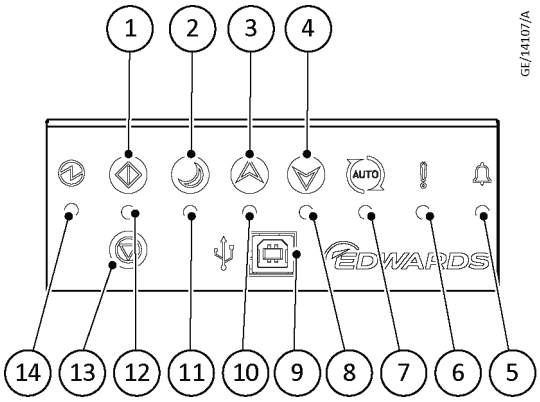
Figure 2 nXL110i Dual Inlet Enhanced



1. *Control panel*
2. *Exhaust port*
3. *Secondary inlet port*
4. *Primary inlet port*
5. *Levelling feet x 4*
6. *Castors x 4*
7. *Gas ballast connection*
8. *Lifting eyebolts positions*
9. *Mains circuit breaker*
10. *Mains connector port*
11. *Protective earth stud*
12. *15-way D-type connector*
13. *Auxiliary connector*

2.5 Interfaces and control panel

Figure 3 Control panel



1. *Start button*
2. *Standby button*
3. *Standby increase button*
4. *Standby decrease button*
5. *Alarm indicator LED*
6. *Service indicator LED*
7. *Auto-run indicator LED*
8. *Standby decrease indicator LED*
9. *USB port (not for operation)*
10. *Standby increase indicator LED*
11. *Standby indicator LED*
12. *Run indicator LED*
13. *Stop button*
14. *Power status LED*

2.5.1 Auxiliary connector socket

An auxiliary control connection on the rear panel controls an optional inlet valve. This inlet valve can be operated in parallel with the normal pump output signal. Refer to *Pump features* on page 11. The valve is usually closed and:

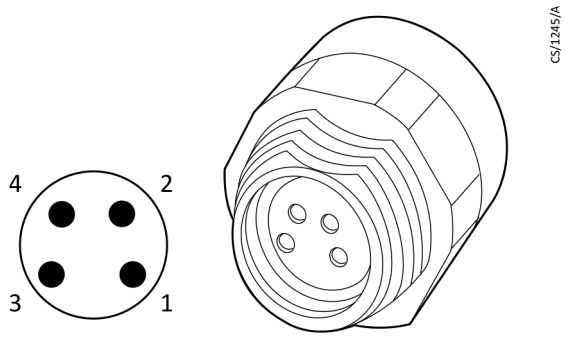
- will open when the normal signal is active (pump at speed)
- will close when you select stop, or if there is a fault condition.

The reaction time will be in line with the valve selection. The output signal is 24 V d.c. Refer to *Figure: Valve connector* for the polarity of the connector pins when the connector is energised.

The auxiliary connector is regulated to 24 V d.c. to control the accessories. Refer to *Table: Auxiliary load currents*, the output will shut down to protect the pump controller.

Refer to *Table: Recommended mating plugs* for the recommended mating plugs.

Figure 4 Valve connector



Pin number	Signal	Polarity
1	Valve 1 – Control output	Positive
2	Valve 2 – Control output	Positive
3	Valve 1 - Return	Negative
4	Valve 2 - Return	Negative

Table 1 Auxiliary load currents

Description	Data
Connector plug	Phoenix part number SACC-DSI-M 8FS-4CON-M12/0.5
Voltage output	24 V d.c. -25%, +10% (18 V d.c. to 26.4 V d.c.)
Output power	2 Channels with 4 watts per channel

Table 2 Recommended mating plugs

Mating connector plug	Phoenix part number
Screw connection, straight	SACC-M 8MS-4CON-M-SW
Solder connection, straight	SACC-M 8MS-4CON-M
Screw connection, right angle	SACC-M 8MR-4CON-M-SW
Solder connection, right angle	SACC-M 8MR-4CON-M

2.5.2 Logic interface

The logic interface is designed to support the serial control and the parallel control to monitor and control through one connector.

The pump controller can be operated through the 15-way D-type logic interface connector (refer to *Pump features* on page 11). The signals on the logic interface are:

- Control inputs: switch type and analogue signals that control the pump.
- Status outputs: to identify the status of the system.

For serial control select RS232 or RS485. Refer to Serial Comms Interface manual.

For control modes refer to *Table: Manual control mode* on page 33.

For logic interface data refer to *Logic interface data*.

2.5.3 Auto-run

The auto-run setting configures the pump to start automatically when the power is switched on, without any customer intervention.

You can configure the auto-run through serial communications, or with the start or stop button. Push and hold the start or stop button for more than eight seconds to enable or disable the auto-run setting. The auto-run LED displays the auto-run setting.

The pump can be stopped by either manual, parallel or serial control modes when in auto-run mode.

Note:

Refer to Operation safety for guidelines on how to configure different operational modes and any associated earnings to consider.

2.5.4 Pump controller

CAUTION: ELECTRICAL SUPPLY

Risk of damage to equipment. Do not disconnect the pump from the electrical supply until it has has fully stopped.

The pump controller contains the drive electronics to control the pump operation.

The pump controller controls the supply of electric current to the motor for the operating conditions. This allows the pump to be connected to a single phase mains supply.

The control panel is installed on the pump controller. The pump can be operated:

- Manually, with the buttons on the user control panel. Refer to *Figure: Control panel*.
- Remotely, with the serial communications or the digital and analogue process control (parallel). The control is connected to the pump through the 15-way D-type interface connector. Refer to *Pump features* on page 11 and *Connection for remote control and monitoring*.

3. Technical data

3.1 Operating and storage conditions

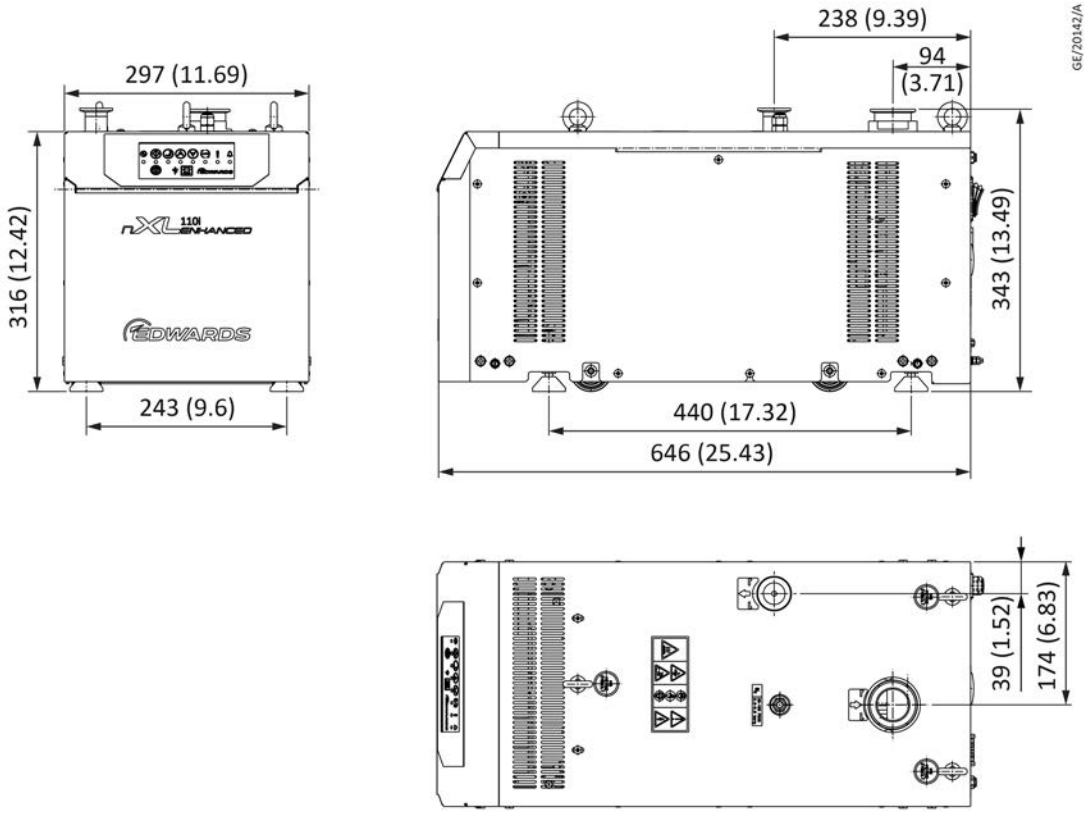
Table 3 Operating and storage conditions

Range	Data
Ambient operating temperature range	5 °C to 40 °C
Ambient operating humidity range	10% to 90% RH (non-condensing)
Maximum operating altitude	2000 m
Ambient storage temperature range	-30 °C to 70 °C
Pollution degree	2
Installation category	II
Equipment type	Indoor use
Enclosure protection	IP20

Note:

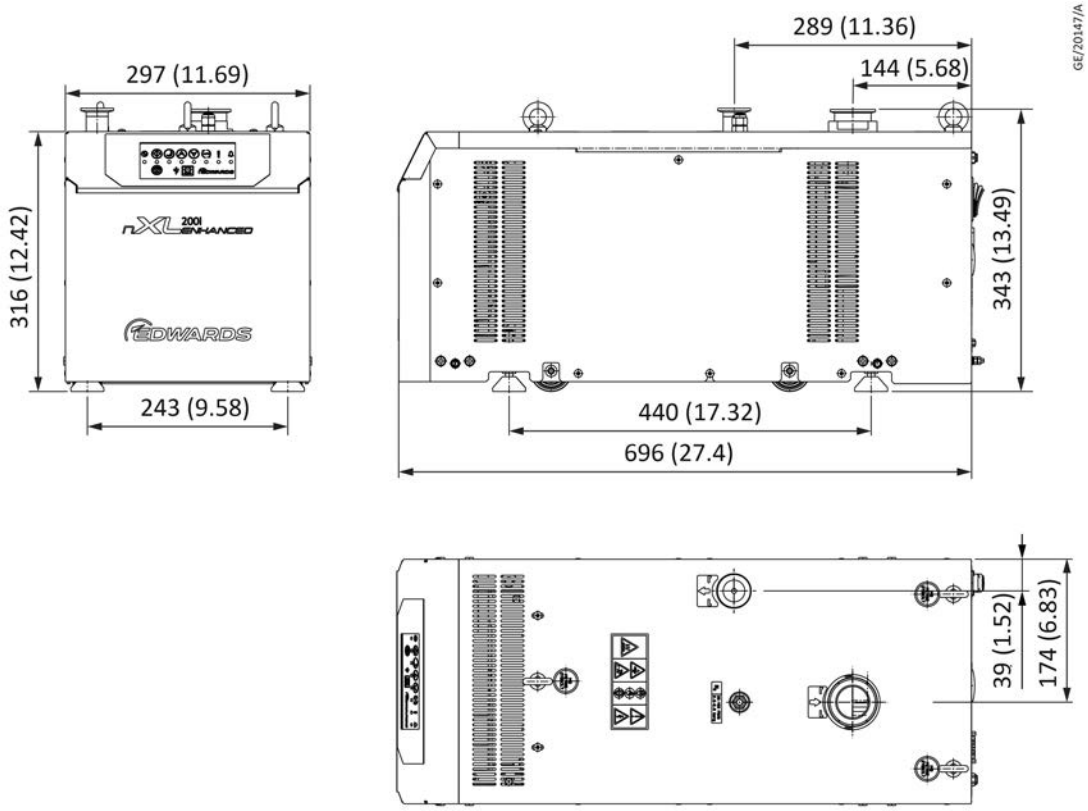
The pump-system is designed to meet the electrical safety creepage and clearance requirements for 3000 m altitude. For maximum thermal performance, de-rating is required between 2000 m and 3000 m. Reduce the maximum operating ambient temperature from 40 ^{O}C to 35 ^{O}C between 2000 m and 3000 m linearly.

Figure 5 nXL110i Enhanced dimensions



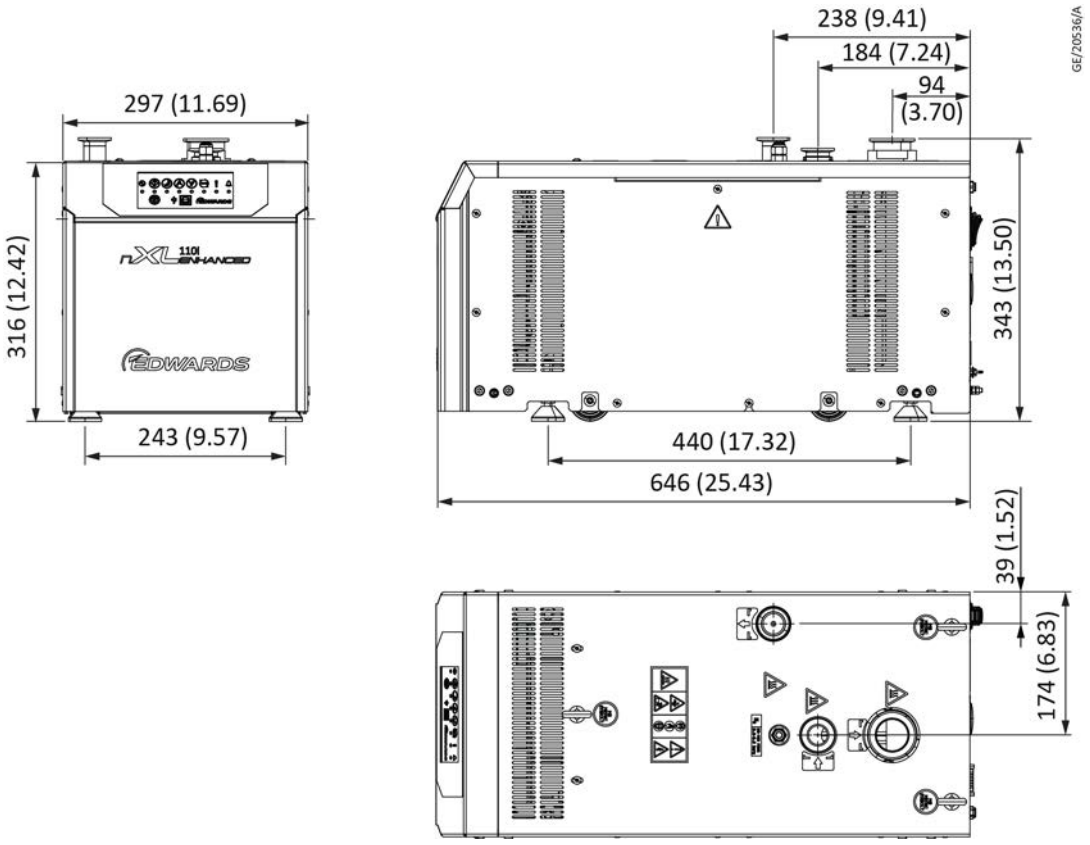
All dimensions are in mm (inches).

Figure 6 nXL200i Enhanced dimensions



All dimensions are in mm (inches).

Figure 7 nXL110i Dual Inlet Enhanced dimensions



All dimensions are in mm (inches).

Table 4 Mechanical data

Parameter	Units	nXL110i E	nXL200i E	nXL110iD E
Overall dimensions (L x W x H)	mm	646 x 297 x 343	696 x 297 x 343	646 x 297 x 343
Maximum tilt angle	deg	25	25	25
Nominal rotational speed	rpm	9000	9000	9000
Mass	kg	78	83	78
Primary inlet connection	-	NW40 or NW50	NW40 or NW50	NW40 or NW50
Secondary inlet connection	-	-	-	NW25
Exhaust connection	-	NW25	NW25	NW25

3.2 Performance

Table 5 Performance data

Parameter	Units	nXL110i E	nXL200i E	nXL110iD E
Maximum pumping speed*	m^3/h	Primary inlet - 110	Primary inlet - 200	Primary inlet - 98 Secondary inlet - 78
Ultimate pressure	mbar	< 0.02	< 0.02	< 0.07
Maximum continuous inlet pressure	mbar	45	18	Primary inlet - 37 Secondary inlet - 51
Maximum inlet pressure	mbar	1013	1013	1013
Maximum continuous exhaust pressure	bar(g)	0.4	0.4	0.4
Suck-back protection	-	By exhaust valve	By exhaust valve	By exhaust valve
Leak tightness (static)	mbar l/s^{-1}	< 1 x 10-5	< 1 x 10-5	< 1 x 10^{-5}
Maximum water vapour pumping rate	kg/h	0.05	0.05	0.05

** Values for the maximum pumping speed are taken at a sea level. At levels higher than sea level, the pump performance can be affected and the rotational speed can drop below the nominal value.*

Table 6 Sound data

Declared dual-number noise-emission values in accordance with ISO 4871			
	nXL110i E	nXL200i E	nXL110iD E
Measured A-weighted emission sound pressure level, L_{pA} at ultimate vacuum 1 m from the pump in free space dB(A)	57		
Uncertainty, K_{pA} dB(A)	2.5		
Values from ISO 3744: 2010			

Figure 8 nXL110i Enhanced Performance graph

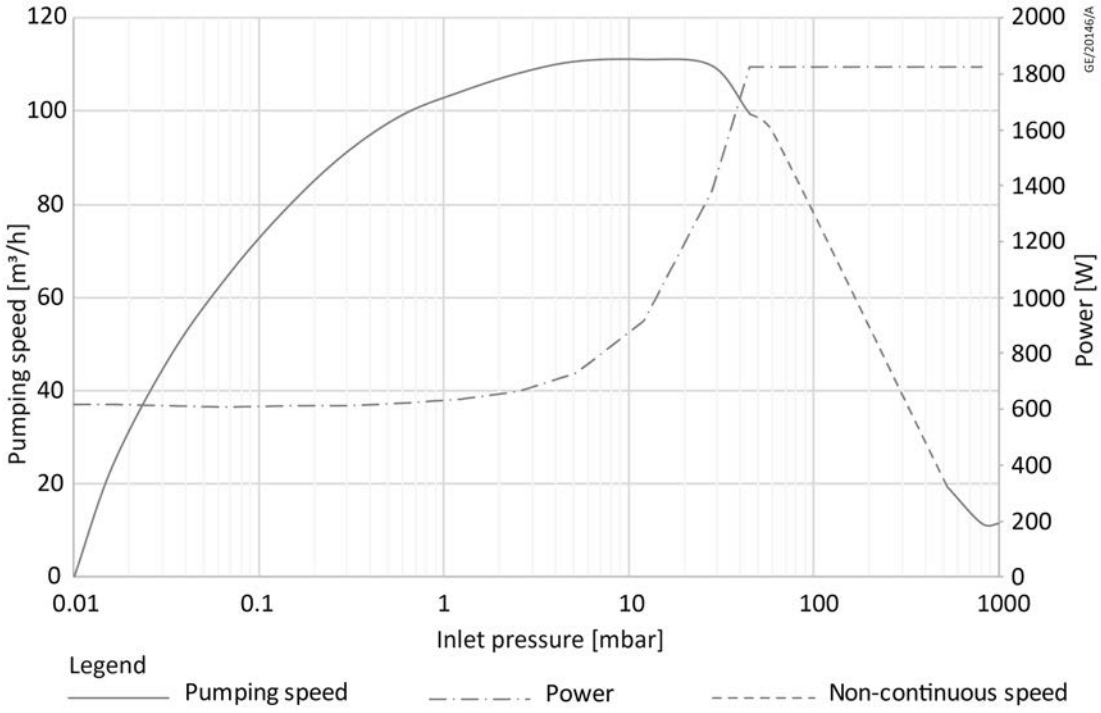


Figure 9 nXL200i Enhanced Performance graph

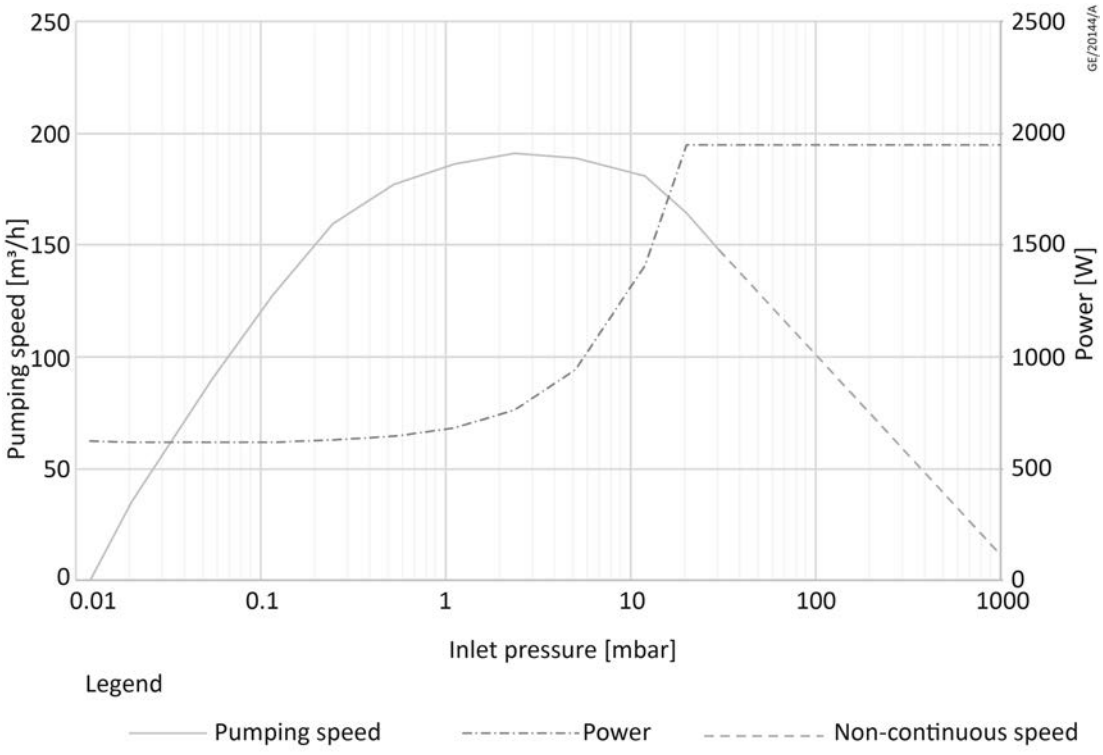
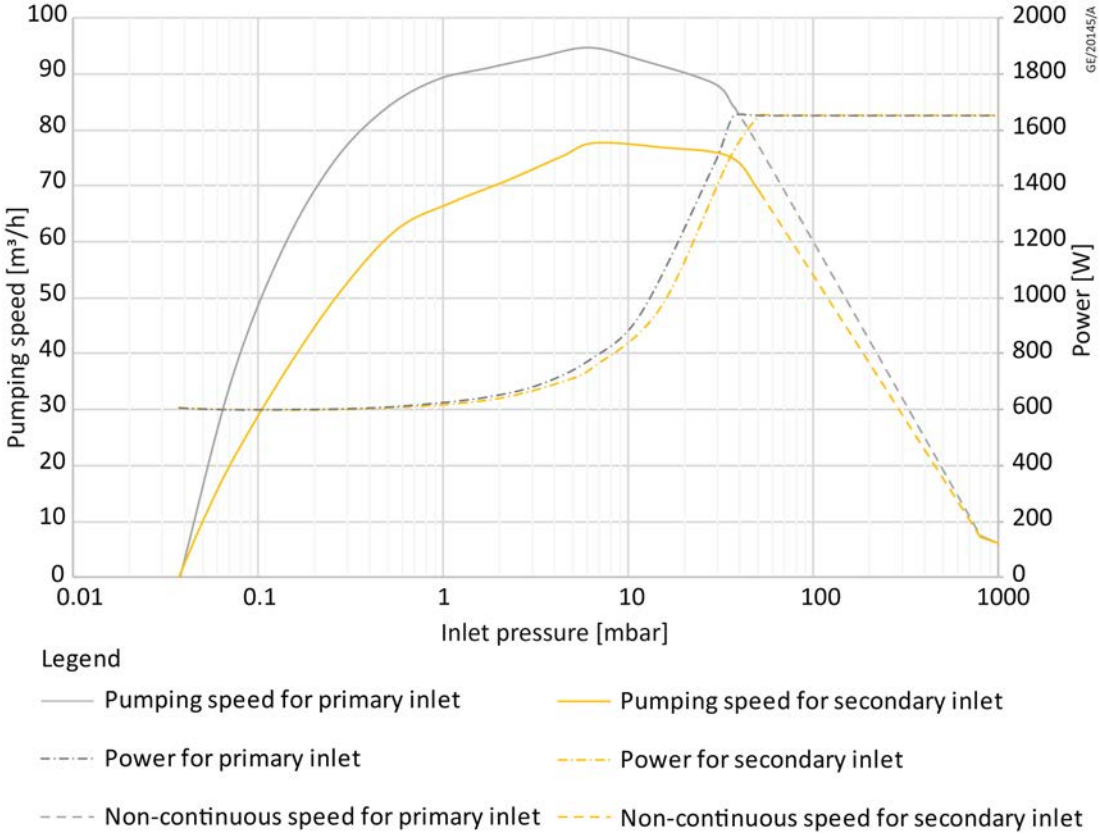


Figure 10 nXL110i Dual Inlet Enhanced Performance graph



3.3 Material exposed to pumped gases

The materials and the components exposed to the gases in the pump are:

- Iron
- Aluminium alloy
- Steel
- Fluoroelastomer (seals)
- PTFE (seals)
- PFPE lubricant

3.4 Electrical data

Table 7 Electrical rating for continuous operation

Supply voltage (V a.c. rms)	Phase	Frequency (Hz)	Rated current (A rms)	Max continuous current (A rms)	Max overload current (A rms)
200 - 240 +/-10%	Single	50 - 60	3.5	10	16.5 for maximum 3 minutes

Note:

In a transient overload condition the maximum overload current drawn by the pump is 10 amps. Refer to Transient overload protection on page 23 for more information.

3.5 Transient overload protection

The nXLi Enhanced pump can be used in either transient or steady state gas load conditions. The pump can sustain continuous operation with a maximum continuous current of 10A. When the load increases, the pump can work for a limited time of up to 3 minutes at an overload current of 16.5A with overload transient protection. After 3 minutes current will drop to 10A where it can be operated continuously.

4. Installation

4.1 Installation safety

CAUTION: BLOCKED EXHAUST PIPELINE

Risk of damage to equipment. Make sure that the exhaust pipeline is not blocked. If an exhaust isolation valve is used, make sure that the pump is not operated with the valve closed.

WARNING: SAFETY INSTRUCTIONS

Risk of injury or damage to equipment. Follow the safety instructions and take note of all appropriate precautions.

Possible hazards on the dry pumping system include electricity, process chemicals, and Fomblin® (PFPE) oil:

- Contact us or the local service centre for more information for advice or assistance on installation.
- Do not remove the temporary covers from the system inlet and exhaust until ready to connect.
- Do not operate the system unless the inlet and exhaust are connected to the vacuum and exhaust extraction system.
- Isolate the other components in the process system from the electrical supply to prevent accidental operation.
- Electrical supplies are potentially hazardous energy sources. Lockout and tagout before you do the maintenance.
- Obey all national and local rules and safety regulations when you install the system.
- Tighten the cables, hoses and pipework during installation to prevent a trip hazard.
- Make sure that the installation area is clean and free from debris and contamination before you install the pump.
- Make sure that all facilities given in this manual are available for the system to perform correctly.

4.2 Unpack and inspect

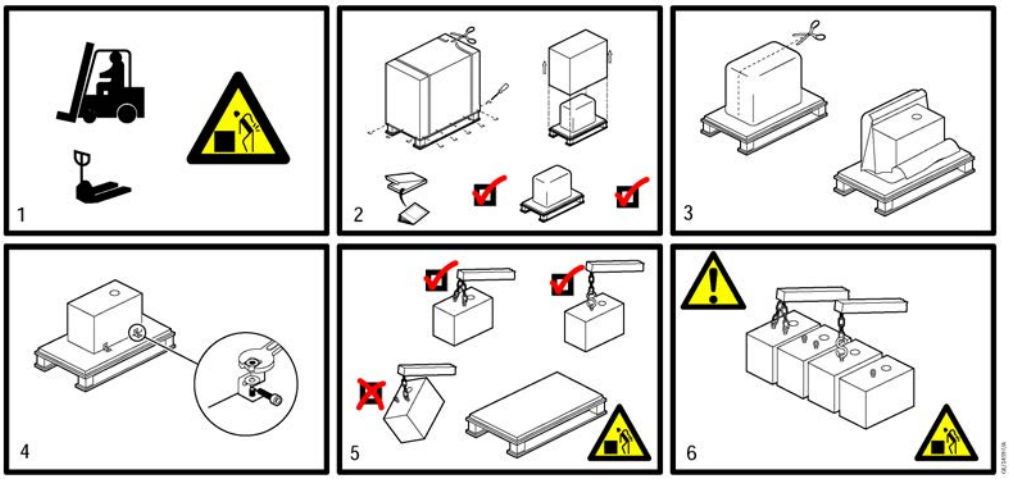
WARNING: DAMAGED PUMP

Risk of injury to people or damage to equipment. Do not use the pump if it is damaged. Failure to do so can result in injury to people and/or damage to equipment.

CAUTION: PUMP LIFE

Risk of damage to equipment. Unpack the pump carefully and avoid excessive shock to the pump. Excessive shock will damage the bearings and reduce the life of the pump.

Figure 11 Unpacking Instruction



Refer to *Table: Mechanical data* on page 19 for the mass of the pump.

To unpack the pump follow the instruction as shown in the *Figure: Unpacking Instruction*.

The pump is attached to a wooden pallet with metal brackets in a cardboard package. The metal brackets must be removed and kept.

1. Open the cardboard box from the top.
2. Remove the packing material. Keep all the packing materials for use in inspection and if the pump is returned for service.
3. Examine the pump for damage. If the pump is damaged, tell your supplier and the carrier immediately. Give the supplier and the carrier the information that follows:
   - part number of the pump
   - serial number of the pump
   - order number
   - supplier's invoice number
4. Do not use the pump if the pump is damaged.
5. If the pump is not to be used immediately, store the pump in the conditions given in *Storage* on page 50.
6. The pump is supplied with sealed inlets and outlet to prevent the entry of dust and vapour. Do not remove the seals until the pump is ready to be installed on the vacuum system.

4.3 Mechanical installation

WARNING: HEAVY OBJECT

Risk of physical injury. Use suitable equipment to lift the pump.

WARNING: TRIPPING HAZARD

Risk of injury or damage to equipment. Make sure that cables or pipe work attached to the pump are installed carefully to prevent a slip or trip hazard and the damage to the cable.

WARNING: LIFTING EYE INTEGRITY

Risk of injury or damage to equipment. Make sure that the maximum angle between the paired slings used to lift the system is 45 degrees. Increased angle could decrease the lifting eye integrity.

WARNING: INSTALLATION SAFETY

Risk of injury or damage to equipment. Install the pump in the vacuum system before you connect the pump to the power supply. This will make sure that the pump is not operated and injure people during installation.

WARNING: TOPPLE HAZARD

Risk of injury or damage to equipment. Do not exceed the topple angle when you move the pump or the pump can fall over and injure people.

WARNING: HEAVY OBJECT

Push-pull hazard with strain injury. Push or pull the pump system only for short distance and over flat surfaces. Lift the system if the floor is uneven or has obstacles.

WARNING: EXHAUST BLOCKAGE

Risk of injury or damage to equipment. A peak pressure of 3 bar(g) can be generated in the pump if the exhaust or pipework attached to the exhaust are blocked.

WARNING: STATIC PRESSURE

Risk of injury or damage to equipment. Do not step or stand on the pump, it is not designed to withstand large static loads.

CAUTION: INSTALLATION SAFETY

Risk of damage to the environment. Obey all local legislation when the pump is installed or removed to reduce the impact of the pump on the environment.

CAUTION: CONDENSATE DRAINAGE

Risk of damage to equipment. Use a catchpot to prevent the drainage of condensate back into the system. Condensate that drains back into the system could damage the pump.

Note: Do not touch power cable with hot surfaces.

Obey the instructions that follow when you install the pump:

- Make sure that there is no blockage to access the pump electrical supply cable or the other controls.
- Make sure that there is a minimum air gap of 40 mm on all sides of the pump to allow effective air circulation.
- Make sure that the system is on a firm and levelled surface that can support the mass of the pump.
- Make sure that the system is installed away from combustible materials.
- You must do a risk assessment of the location and make sure that you can move the pump safely and as per the local and national manual handling guidelines.

To attach the system to the floor:

1. Put the M10 (class 12.9) bolts (not supplied) in the slotted holes of the shipping brackets to attach the the system to the floor.
2. Tighten the M10 (class 12.9) bolts.
3. If the vibration transmission to the floor is a problem, install the applicable vibration isolators (not supplied) between the brackets and the tie bolt or the stud.
4. Level the pump to a maximum of 5 degrees (measured at the pump inlet).

Note:

The shipping brackets that are used to attach the pump to the shipping pallet can be used for seismic restraint. The shipping brackets are designed to withstand a level 4 earthquake at a ground floor installation.

To move the pump:

1. Attach the correct lifting equipment to all 3 lifting eyebolts. Refer to *Pump features* on page 11.
2. Move the pump carefully to the installation area. Refer to *Table: Mechanical data* on page 19 for weight of the pump.
3. Adjust the levelling feet (Refer to *Pump features* on page 11) to make sure that the dry pumping system is levelled and not supported by the castors. The recommended jacking height is 5 mm.
4. Remove the plastic caps from the inlet and exhaust before you connect the pump to the vacuum system. Use appropriate NW vacuum fittings for the connection to the system.

Obey the instructions that follows when you connect the pump to the vacuum system:

- Connect the pump to an exhaust line to minimize the noise and the exhaust emissions.
- Make sure that the pipeline connected to the pump inlet is as short as possible. Make sure that the pipeline has a minimum internal diameter to get maximum pump speeds.
- Put support under the vacuum pipeline to prevent the load on the coupling joints.
- Make sure that the pump exhaust line is not blocked as a pressure of 3 bar(g) can be generated in the exhaust pipework. Connect the pump with appropriate pipework and fittings.
- If necessary, install flexible bellows in the system pipelines to reduce the transmission of the vibration and to prevent the load on the coupling joints. The pressure rating of the bellows must be higher than the highest pressure generated in the system. We recommend that you use the manufacturer's bellows.
- Install an inlet isolation valve in the pipeline between the vacuum system and the pump. The inlet isolation valve isolates the vacuum system from the pump when the system is set to off. This prevent the flow of the process gases and particles back into the vacuum system.
- Make sure that the sealing surfaces are clean and are not scratched.
- We recommend that you use an exhaust extraction system appropriate for use with all pumped process gases. Make sure that the exhaust extraction system is not blocked or obstructed when the pump is in operation.

4.4 Leak test

WARNING: SYSTEM LEAK TEST

Risk of injury or damage to equipment. Do the leak test of the system after installation. Seal all the leaks found to prevent leakage of dangerous substances out of the system and leakage of air into the system.

We will accept no liability or warranty claims for damages caused from flammable mixtures because of air leaks.

1. Do the leak test of the vacuum system after installation.
2. Seal all the leaks found.

4.5 Electrical installation

WARNING: ELECTRICAL CONNECTION

Risk of electric shock. The electrical installation must be done by a qualified person. Always make the electrical connections to the pump after the pump has been installed on the vacuum system.

WARNING: INSTALLATION SAFETY

Risk of electric shock or damage to equipment. The pump must be electrically installed in accordance with regional and local codes, and must obey the local and national safety requirements.

WARNING: HAZARDOUS VOLTAGE

Risk of electric shock or damage to equipment. The logic interface is 30 V maximum rated PELV and must only be connected to PELV interfaces. Failure to use an correctly rated supply could result in electric shock.

The pump is a cord-connected device rated at 8.5 A and must be installed in accordance with local electrical regulations. The pump is to be supplied from a single phase 200 - 240 V branch circuit protected supply rated at 20 A maximum. Refer to *Table: Recommended cord sets* on page 52.

4.5.1 Connect the electrical supply

WARNING: PROTECTIVE EARTH

Risk of electric shock. Make sure that the pump and electrical cables are protected against earth (ground) faults. It is recommended that a protective earth (ground) conductor (with a cross sectional area of 2.5 mm^2 / 14 AWG be fitted to the protective earth (ground) stud.

Make the electrical connection to the pump mains connector port (Refer to *Pump features* on page 11) with an appropriate cord set. Refer to *Table: Recommended cord sets*.

The pump must be grounded through the conductor of the mains input connector.

4.6 Connect the system

4.6.1 Connection for remote control and monitoring

To operate the pump with parallel or serial control, use the 15-way D-type connector. Refer to *Pump features* on page 11.

Refer to *Figure: Logic interface connections - parallel control*, *Figure: Logic interface connections - analogue speed control* for details of the logic interface pins.

The pump is also equipped with a front USB port for service purposes using serial communication. This connector cannot be used for pump operation, but for setting and reading parameters and for pump monitoring.

5. Commission the pump

To commission the pump:

1. Make sure that all openings to atmospheric pressure in the foreline vacuum system are closed.
2. Connect the power cord.
3. Set the mains circuit breaker (*Pump features* on page 11) to ON. Make sure that the power indicator LED (*Figure: Control panel* on page 13, (14)) illuminates. If the LED does not illuminate, contact us.
4. Press the start button (*Figure: Control panel* on page 13 (1)) until the run indicator LED (*Figure: Control panel* on page 13, (13)) begins to flash.
5. When the dry pumping system starts and continues to operate, if an alarm condition is indicated:
    a. Shut down the dry pumping system. Refer to *Shut down the pump* on page 41.
    b. Refer to *Fault finding* on page 47.
    c. If the problem has not been rectified, contact us.
6. After you commission the dry pumping system:
    a. to continue to operate the system, refer to *Start the pump* on page 41
    b. to shut down the system, refer to *Shut down the pump* on page 41.

6. Operation

6.1 Operation safety

WARNING: DAMAGED PARTS

Risk of electric shock. Do not operate the pump with any parts of the enclosures removed or damaged as there can be a risk of an electric shock.

WARNING: OPERATIONAL SAFETY

Risk of injury or death. Do not expose any part of the human body to vacuum as this can result in injury or death of people.

WARNING: PUMP TEMPERATURE

Risk of injury. Do not touch the pump inlet manifold or exhaust when the pump is in operation as the pump inlet manifold and exhaust can get hot. Allow the pump to cool down after the pump has stopped.

WARNING: AUTOMATIC START

Risk of injury or damage to equipment. The system has an auto-run mode which, if configured, is designed to automatically start the pump system once power is applied.

CAUTION: CONDENSATE DEPOSITION

Risk of damage to equipment. Do not use the pump to pump particulates or condensate. Deposition may occur in the pump. This can degrade the pump performance and reduce the pump life.

CAUTION: MAXIMUM CONTINUOUS OPERATING PRESSURE

Risk of damage to equipment. The pump can be controlled, stopped or put in standby mode only through the interface used to start the pump. In auto-run mode, the stop button on the user interface panel will override the starting interface and stop the pump.

CAUTION: EN55011

This equipment is not intended for use in residential environments and may not provide adequate protection to radio reception in such environments.

Note:

This is an industrial (Class B, Group 1) product as defined by EN55011 and EN61326 in compliance with European Electromagnetic Compatibility (EMC) requirements for EMC emissions. "Group 1" is defined as equipment which does not use RF energy as an intrinsic part of operation or process.

6.2 Operational modes

The pump can be controlled through:

- Manual control mode – with the buttons on the user interface panel
- Parallel control mode – through the 15-way D-type logic interface connector located at the rear of the pump
- Serial control mode – through the 15-way D-type logic interface connector located at the rear of the pump
- Auto-run

6.2.1 Manual control mode

Refer to *Figure: Control panel* on page 13 for the pump control functions.

Table 8 Manual control mode

Operation	Button	Status
Apply power	Mains power	The pump will remain off (factory default). The power indicator will illuminate.
Start the pump	Start button	The pump will accelerate up to full running speed. The run indicator will flash while the pump accelerates. The run indicator will remain on when the pump reaches full speed.
Select and deselect the standby speed	Standby mode select button	When engaged, the standby indicator will illuminate and the pump will run at the standby speed setting. The pump is set by default at 87% of full speed.
Increase or decrease the pump speed when in standby mode	Standby speed increase button	The pump speed will increase. The increase standby indicator will remain illuminated when the pump reaches a maximum of 100% of full speed.
	Standby speed decrease button	The pump speed will decrease. The decrease standby indicator will remain illuminated when the pump reaches a minimum of 83% of full speed.
Select and deselect the Auto-run function	Start or stop button (>8 sec)	When engaged, the auto-run indicator will illuminate. The pump will restart automatically after the power has been restored.

Start and stop

Use the buttons *Figure: Control panel* on page 13 to start and stop the pump.

Note:

The stop command does not isolate the pump from the electrical supply.

Standby

In standby mode the pump operates at a reduced speed to improve the service life of the pump.

1. Push the standby button to select standby mode. The pump will run at factory default standby speed (87% of full speed).
2. Adjust the speed with the increase and decrease standby speed buttons. The maximum standby speed is 100% of the default run speed and the minimum standby speed is 83% of the default run speed.
3. A single short push will change the speed by 1% of the default run speed. Hold the button to change the speed by 1% per second.
4. Once adjusted, the pump will return to the new user defined speed each time standby speed is selected.
5. Push the standby button to return to normal run speed.

Table 9 LED Indicators

Refer to *Figure: Control panel* on page 13 for LED locations on the pump dashboard.

Description	Function
Power indicator	Indicates that electrical mains supply to the pump is ON.
Run indicator	Indicates that the pump is running.
▪ LED continuously ON	▪ Pump runs at full speed
▪ LED flashing	▪ When changing speed
▪ LED OFF	▪ Pump is not running
Standby mode indicator	Indicates that the standby mode has been selected.
Standby speed increase indicator	The indicator will blink with every short push of the standby speed increase button. The indicator will remain ON when maximum standby speed has been reached.
Standby speed decrease indicator	The indicator will blink with every short push of the standby speed decrease button. The indicator will remain ON when minimum standby speed has been reached.
Auto-run indicator	Indicates that the auto-run mode has been selected.
Standby indicator LED	Once the standby function is selected the run indicator will flash at 50% duty while the rotational speed is changed. Once steady state running speed has been reached both the run speed and standby indicators will be illuminated.
Service indicator	Indicates that a service interval has been reached.
Alarm indicator	Indicates an alarm has been triggered.

6.3 Logic interface data

The pumps have a 15-way D-type logic interface connector located on the user interface panel (*Pump features* on page 11). The logic interface connector can be plugged directly into the 200 W Turbo Instrument Controller (TIC) with a TIC cable and in conjunction with controller extension cables.

For Turbo controller, or Turbo and Active Gauge controller (TAG), a suitable connector mating half must be used (not supplied) to connect the pump to the customer control system. Refer to *Table: Logic interface pins* for the electrical connections.

Table 10 Interface technical data

Connector	**15-way D-type (male)**
Start, serial enable and remote enable:	
▪ Enable control voltage: low (closed) ▪ Disable control voltage: high (open)	▪ 0 to 0.8 V d.c. (IOUT = 0.55 mA nominal) ▪ 4 to 26.4 V d.c. (internal pull-up to a Thevenin equivalent circuit: 5.3 V and 11 kOhms nominal)
Standby control input:	
▪ Enable control voltage: low (closed) ▪ Disable control voltage: high (open)	▪ 0 to 0.8 V d.c. (IOUT = 0.3 mA nominal) ▪ 4 to 26.4 V d.c. (internal pull-up to a Thevenin equivalent circuit: 2.5 V and 10.3 kOhms nominal)
Analogue and RS485 enable control inputs:	
▪ Enable control voltage: low (closed) ▪ Disable control voltage: high (open)	▪ 0 to 0.8 V d.c. (IOUT = 0.55 mA nominal) ▪ 4 to 26.4 V d.c. (internal pull-up to a Thevenin equivalent circuit: 5.5 V and 11.4 kOhms nominal)
Analogue speed input	8.3 to 10 V d.c. directly proportional to the motor speed e.g. 8.3 V = 125 Hz, 10 V = 150 Hz
Voltage accuracy	± 5% full scale
NORMAL status output:	
▪ Type ▪ < Normal speed (default 80%) ▪ >Normal speed ▪ Maximum current rating ▪ Maximum voltage rating	▪ Open collector transistor plus pull up resistor ▪ OFF (4.7 k pull up + diode to 12 V d.c.) ▪ ON (< 0.8 V d.c. sinking 10 mA) ▪ 10 mA ▪ 28.8 V d.c
Analogue 10 V reference	+ 10 V d.c. analogue voltage reference uni- polar output with diode protection
Voltage accuracy output	± 2% full scale
Current	≤ 5 mA for specified accuracy

Table 11 Logic interface pins

Pin number	Signal	Polarity	Use
1	Analogue speed enable – control input	-	Connect to pin 2 (0 V) to enable analogue speed control via pin 9.
2	0 V control reference	-	0 V reference for all control and status signals listed within this table.
3	Start/Stop – control input	-	Connect to pin 2 (0 V) to start the pump system.
4	Standby – control input/serial-RX/RS-485 A-	-	Connect to pin 2 (0 V) to enable standby speed when the serial enable control input is inactive.
5	Serial enable – control input	-	Connect to pin 2 (0 V) to enable serial communications.
6	RS-232/RS-485 – control input	-	Default configuration is RS-232 with pin 6 disconnected. Connect to pin 2 (0 V) to enable RS-485 serial communications.
7	Fail – status output/ Serial-TX/ RS-485 B+	-	Logic high when a fail/fault condition exists and the serial enable control input is inactive.
8	0 V control reference	-	0 V reference for all control and status signals listed within this table.
9	Analogue speed – control input	-	8.3 -10 V analogue input: 8.3 V = 83% speed; +10 V = 100% speed
10	Chassis/Screen	-	Screen
11	+10 V analogue reference – Control output	Positive	+10 V analogue voltage reference output: 5 mA; unipolar output, diode protected.
12	Chassis/Screen	-	Screen
13	Not connected	-	Unused control pin
14	Remote – control input	-	Connect to pin 2 (0 V) to enable remote control via parallel or serial control modes.
15	Normal – status output	-	Logic low when the pump rotational speed is at normal speed or above.

6.4 Parallel control and monitoring

CAUTION: EMF RISK

Risk of damage to equipment. If you use the normal and fail lines to drive the coils of d.c. relays, include a back EMF suppression diode in parallel with each relay coil to protect the pump.

Connect the control equipment to the control input pins of the logic interface mating half. Refer to *Table: Logic interface pins* to identify the logic interface connector pins. The control inputs are:

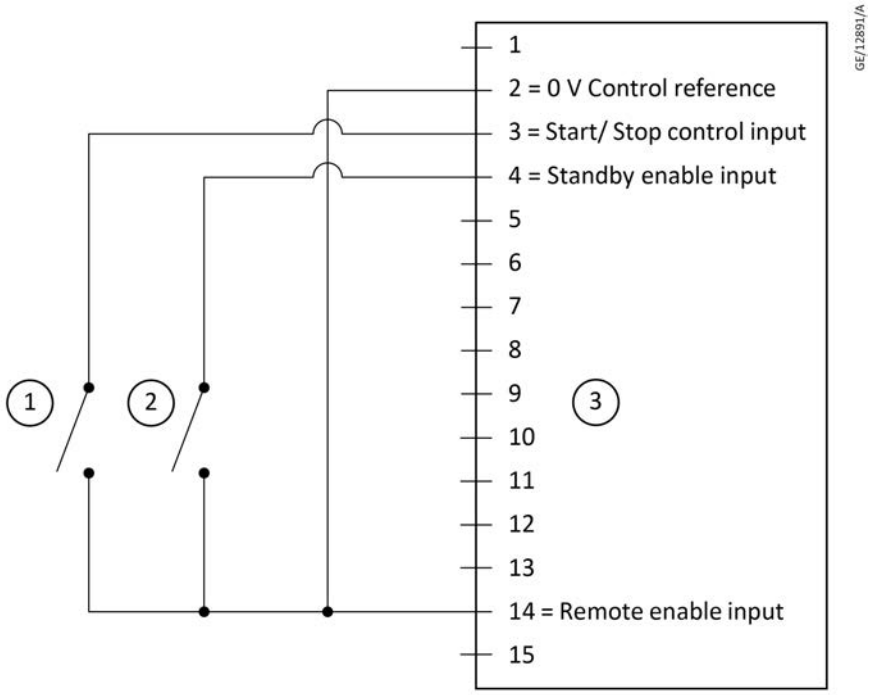
- Start
- Standby speed
- Analogue speed

A. To activate the control inputs, connect the relevant control input (pin 14) to the 0 V control reference.

B. The NORMAL output can go down up to 100 mA when you control an external relay coil with an external coil voltage of + 24 V d.c. The external + 24 V voltage source must be referenced to the common control voltage of the pump control system, i.e. pin 2 of the 15-Way D-Type customer interface connector. Alternatively, if the NORMAL output is connected to + 10 V reference output of the control system, i.e. pin 11 of the 15-Way D-Type connector, a 4.7 kOhm pull-up resistor is recommended to be kept in the current rating of + 10 V reference rail.

C. The FAIL output can go down up to 100 mA when you control an external relay coil with an external coil voltage of + 24 V d.c. The external + 24 V voltage source must be referenced to the common control voltage of the pump control system, i.e. pin 2 of the 15-Way D-Type customer interface connector. Alternatively, if the FAIL output is connected to + 10 V reference output of the control system, i.e. pin 11 of the 15-Way D-Type connector, a 4.7 kOhm pull-up resistor is recommended to be kept in the current rating of + 10 V reference rail.

Figure 12 Logic interface connections - parallel control

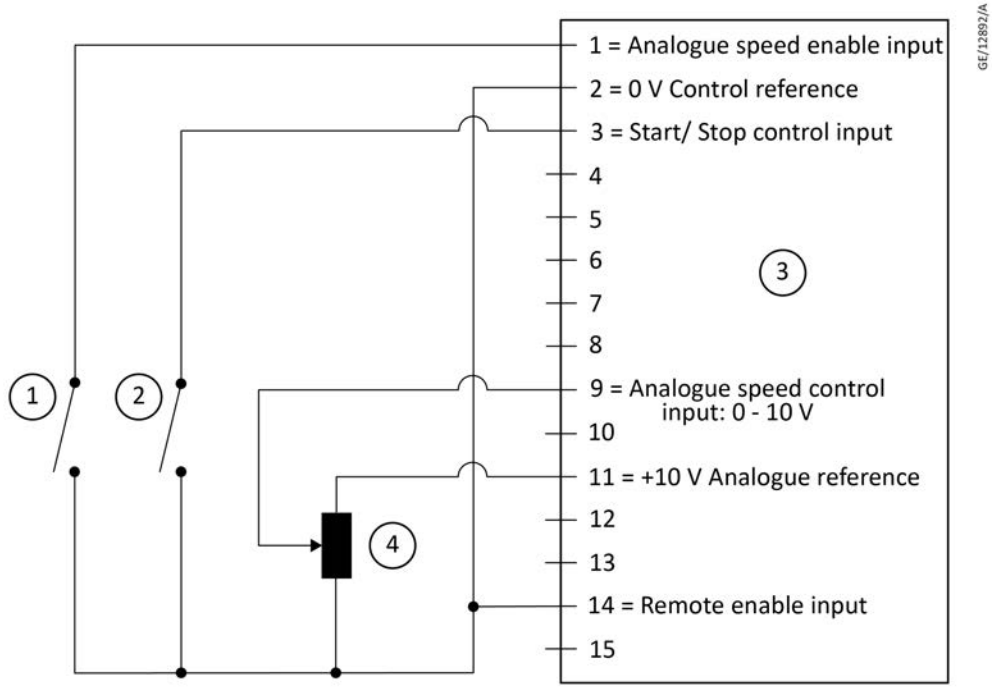


1. *Start switch*
2. *Standby switch (optional)*
3. *Pump logic interface*

6.5 Analogue speed control

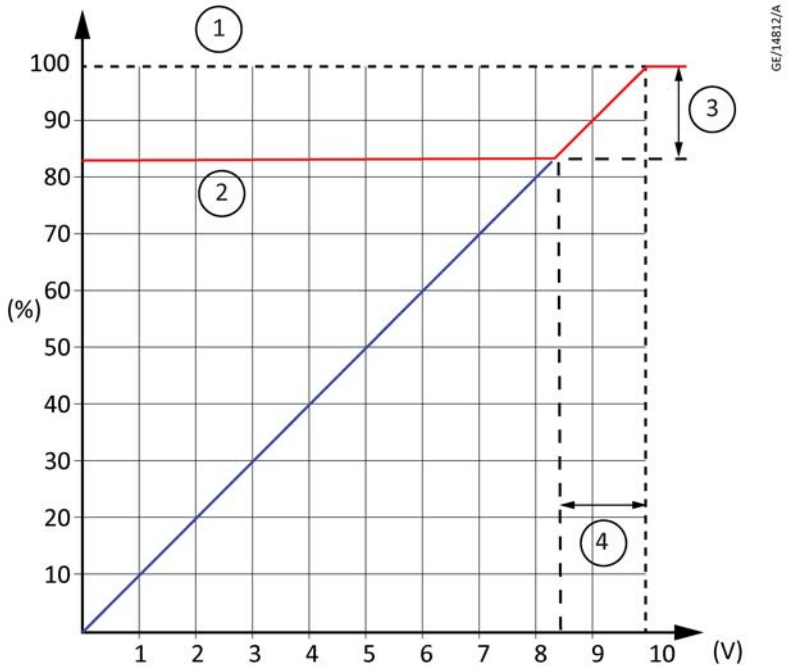
The analogue speed input is a process control source which enables the pump to run at variable operating speeds. This speed control source is an alternative to standby speed control.

Figure 13 Logic interface connections - analogue speed control



1. *Analogue control switch*
2. *Start switch*
3. *Pump logic interface*
4. *Potentiometer*

Figure 14 Analogue speed control



1. *Upper speed clamp - Maximum standby setting = 150 Hz*
2. *Lower speed clamp - Minimum standby speed setting = 125 Hz*
3. *Active speed range - 83.00% to 100.00% (125 Hz to 150 Hz)*
4. *Active Voltage range - 8.4 V to 10.00 V*

Note:

Voltages below 8.4 V will result in a clamped speed of 83% of full speed.

6.6 Hardware configuration

Use the 15-way D-type connector (*Pump features* on page 11) and configure the signal to enable the analogue speed control source:

- Connect the analogue speed enable control input (pin 1) to the 0 V control reference (pin 2).
- Connect a suitably calibrated analogue voltage source (0 to +10 V), for example, (DAC) to the analogue speed control input (pin 9).
- As an alternative, connect the output of a potentiometer referenced to the pump reference voltage (pin 11) to the analogue speed control input (pin 9). Refer to *Figure: Logic interface connections - analogue speed control*. The 0 V rail of the external voltage source must be connected to the 0 V control reference (pin 2) of the pump controller.

6.7 Operational modes

- A +10 V input results in a mechanical running speed which is equal to 100% of the default run speed, that is 150 Hz.

- The minimum running speed provided by the analogue speed control source, is clamped at the minimum standby speed setting (approximately 83% of the default run speed).
- The maximum running speed provided by the analogue speed control source is clamped by the maximum standby speed setting (100% of the default run speed).

6.8 Start the pump

WARNING: EXHAUST PIPELINE BLOCKAGE

Risk of damage to equipment. Do not operate the pump if the exhaust pipeline is restricted or blocked. The pump will not operate correctly and can be damaged.

1. Make sure that the vacuum system isolation valve is closed (if installed).
2. Make sure that the mains supply to the pump is isolated.
3. To connect the pump to the power supply use the power cord which is part of the delivery scope.
4. Make sure that the exhaust extraction system is not restricted and that the valves in the exhaust extraction system are open.
5. Supply the power.
6. Start the pump with the applicable control source that follows:
   - manual control mode - push the start button, refer to *Figure: Control panel* on page 13, item 2
   - parallel control mode - use the start, stop control input
   - serial control mode - use the start command
7. Open the vacuum system isolation valve (if installed).

6.9 Shut down the pump

WARNING: PUMP SUPPLY ISOLATION

Risk of injury. Do not remove the inlet connections until the pump stops rotating and the power and nitrogen supply has been isolated. The pump can take up to 3 minutes to fully stop.

CAUTION: ELECTRICAL SUPPLY

Risk of damage to equipment. Do not disconnect the pump from the electrical supply until the pump has fully stopped.

You can shut down the pump with:

- the front panel controls
- the 15-way D-type connector in either parallel or serial control mode.

Note:

If the pump is to be shut down for storage, remove any process gases by running on a gas ballast for at least one hour.

To shut down the pump:

1. Close the gas ballast.
2. Close the vacuum system isolation valves to prevent suck-back into the vacuum system (where fitted).
3. Stop the pump system with the appropriate control source.
   - use the stop button in manual control mode, refer to *Figure: Control panel* on page 13.
   - use the start/stop control input in parallel control mode.
   - use stop command in serial control mode.
4. Isolate the mains supply.

If the pump is to be stored, we recommend you either keep the pump under vacuum or fill the pump with dry nitrogen to prevent condensation in the pump. To keep the pump under vacuum, we recommend you seal the inlet and run the pump for at least 20 seconds.

6.10 Restart the pump

If the pump is shut down automatically because of high pump power make sure the pump rotates freely. Restart the pump. If the problem occurs again, contact us.

If the pump is shut down automatically because of an alarm condition, correct the alarm condition before you start the pump. To restart the pump, refer to *Start the pump* on page 41.

6.11 Unplanned shutdown

Allow the pump to cool after a sudden power outage, for example, due to power cut, circuit breaker trip or if the power cord is removed accidentally. We recommend a minimum of one minute to cool the pump, more time is required if the pump is working with a high load or high ambient temperature.

If the pump is configured for auto-restart, the pump may trip due to over- current if the power cut is less than 7 seconds. A longer cooling period is required to reset the pump. Disconnect the power supply for one minute and then reconnect it. If an error occurs, refer to *Fault finding*.

6.12 Gas ballast operation

If water vapour is present within the system, or will be pumped by the product the gas ballast must be used to prevent damage to the product. The gas ballast should continue to be applied with the pump running, for at least 1 hour after the water vapour source has been removed to enable the pump to dry.

The recommended gas ballast flow rate is 20 slm of Air/Nitrogen. This allows the pumping of up to 50 grams of water vapour per hour. Gas ballast flows higher than 20 slm could reduce the performance of the pump depending on the gas load at the pump inlet.

6.13 Gas ballast connection

WARNING: HAZARDOUS SUBSTANCES

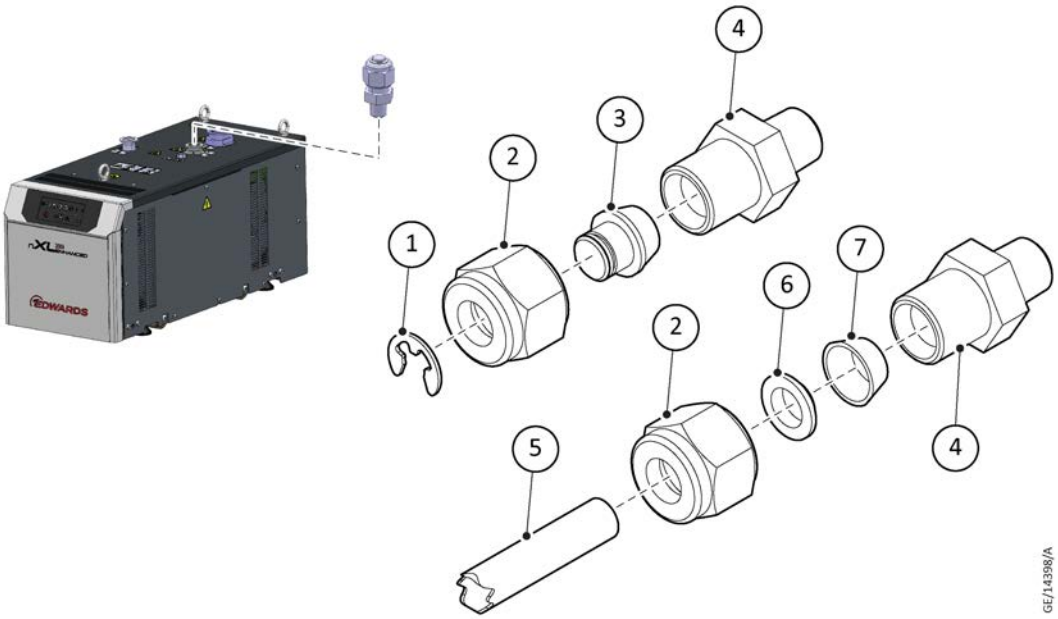
Risk of explosion. The pump is intended for clean applications only. It is not suitable for use with hazardous production materials.

Gas ballast is operated by Let-Lok pipe fitting. It enables externally actuated valves or a controlled gas supply to be used through a metal tube with 8 mm outer diameter. Use air or an inert gas such as nitrogen for the gas ballast.

To install the pipe:

Remove the plug (item 1,2 and 3). Assemble nut, front and back ferrule. Tighten the nut by hand. Insert the pipe and check if it rests firmly on the fitting shoulder. Use wrench to tighten the nut. One and quarter turn is required to assure an effective seal. Refer to *Gas ballast operation*.

Figure 15 Gas ballast connection



1. *Retaining ring*
2. *Nut*
3. *Plug*
4. *Fitting*
5. *Pipe*
6. *Back ferrule*
7. *Front ferrule*

7. Maintenance and service

7.1 General maintenance

The system requires no user maintenance. Maintenance must be done by our service centres. The frequency of the maintenance depends on the process. The frequency of the maintenance can be adjusted based on pump use.

We recommend a monthly visual inspection of the dry pump system. Check that the electrical supply cord, hoses and pipelines connected to the pump are in good condition and tightened.

7.2 Maintenance plan

More frequent maintenance may be required if the pump is used to pump aggressive gases or vapours, solvents, organic substances and acids, or if the pump is operated continuously at high operating temperature.

Table 12 Maintenance plan

Operation	Frequency (months)	Service indicator	Reference
Inspect and clean the external fan cover if required	12	No	*Clean the external fan grill*
Replace the pump bearings	60	Yes	*Replace the pump bearings*
Replace the pump controller	120	Yes	*Replace the pump controller*
Electrical safety check	60	No	*Electrical safety check*

7.3 Clean the ventilation slots

If the ventilation slots are not kept clean, the air flow over the pump can be restricted and the pump may overheat.

To clean the ventilation slots:

1. Switch off the pump and disconnect from the electrical supply.
2. Use a dry cloth and a soft brush to remove dirt and deposits on the ventilation slots.

7.4 Replace the pump bearings

The service indicator, (flashing ON 3 sec/OFF 1 sec) is activated to indicate that a bearing replacement service interval has been reached. Bearing wear cannot always be detected under normal operating conditions. This service interval is a recommendation that a bearing replacement is required and is useful in the preventative maintenance plan.

Note:

Failure to replace the pump bearings on time can damage the pumping mechanism.

To reset the service indicator, refer to *Table: Service indicator codes*.

Bearing replacement is not possible by the customer, the pump must be returned to a Service Technology Centre for maintenance.

7.5 Replace the pump controller

The service indicator, (flashing ON 3s / OFF 3s) is activated to indicate that the pump controller must be replaced. Contact us for further details.

To reset the service indicator, refer to *Table: Service indicator codes*.

Controller replacement is not possible by the customer, the pump must be returned to a Service Technology Centre for maintenance.

7.6 Electrical safety check

Test the earth continuity and the insulation resistance of the pump system in accordance with local regulations for the periodic test of electrical equipment.

The earth continuity must be less than 0.1 Ω and the DC insulation resistance greater than 1.0 MΩ. If the pump fails any of these tests, contact us or the supplier.

7.7 Service indicator codes

The pump controller has a service indicator, refer to *Figure: Control panel* on page 13. The service indicator will flash a specific code whenever a service interval is reached. See *Table: Service indicator codes* for service levels.

Table 13 Service indicator codes

Service flash code	Comments
ON 3s/OFF 1s	Pump bearing service
ON 3s/OFF 3s	Pump controller service

7.8 Service

It is recommended that the pump should be serviced every 5 years. The pump should then be returned to an Edwards Service Technology Centre.

Our products are supported by a world-wide network of Service Technology Centres offering a wide range of options including:

- Complete remanufacturing (includes 6 months warranty)
- Exchange pump (includes 12 months warranty)

Both services include decontamination, repair, rebuild and test to factory specification.

A local Service Technology Centre can also provide trained engineers to support the exchange pump option. For more information about service options, contact us or the nearest Service Centre.

7.8.1 Return the equipment or components for service

Before you send your equipment to us for service or for any other reason, you must complete a Declaration of Contamination Form. The form tells us if any substances found in the equipment are hazardous, which is important for the safety of our employees and all other people involved in the service of your equipment. The hazard information also lets us select the correct procedures to service your equipment.

If you are returning equipment note the following:

- If the equipment is configured to suit the application, make a record of the configuration before returning it. All replacement equipment will be supplied with default factory settings.
- Do not return equipment with accessories fitted. Remove all accessories and retain them for future use.
- The instruction in the returns procedure to drain all fluids does not apply to the lubricant in pump oil reservoirs.

Download the latest documents from *edwardsvacuum.com/HSForms/*, follow the procedure in HS1, fill in the electronic HS2 form, print it, sign it, and return the signed copy to us.

NOTICE:

If we do not receive a completed form, your equipment cannot be serviced.

8. Fault finding

A list of fault conditions and their possible causes is given to assist in basic troubleshooting. If you are not able to correct a fault, call your supplier or your nearest manufacturer service centre for advice.

Fault	The pump has failed to start or has stopped
Cause	**The electrical supply fuse has blown.**
Remedy	Make sure that the external electrical supply is set to on and that the power indicator LED (*Figure: Control panel* on page 13, item 14) is illuminated. If the LED does not illuminate, contact us.
Cause	**The motor controller has not reset after an over temperature event.**
Remedy	Disconnect the main power supply and wait for at least one minute and attempt to restart the pump. If the pump still does not start, contact us. If the alarm indicator LED (*Figure: Control panel* on page 13, item 5) flashes, it indicates that the pump has high current load from possibly a high inlet pressure/flow. Adjust the inlet pressure/flow until the pump performance recovers.

Fault	The pump has failed to achieve the required performance
Cause	**The pressure measurement technique or gauge head is not suitable or gives an incorrect indication of pressure.**
Remedy	Make sure that the vacuum measurement equipment is calibrated and is updated. The correct gauge range must be selected for the application. Contact us for further assistance on gauge selection, if required.
Cause	**The vacuum fittings are dirty or damaged.**
Remedy	Make sure that the vacuum fittings are clean and scratch free.
Cause	**There is a blockage or high pressure in the exhaust line.**
Remedy	Make sure that the exhaust valves fitted are not closed when the pump is in operation.
Cause	**The motor controller is current limiting the supply.**
Remedy	If the alarm indicator LED (*Figure: Control panel* on page 13, item 5) flashes, the pump has high current load, possibly from a high inlet pressure/flow. Adjust the inlet pressure/flow until the pump performance recovers.

Fault	The pump is noisy
Cause	**The pump is contaminated with solid particles.**
Remedy	Contact us or the supplier for further information.

Fault	The pumping speed is poor or pump down time is too long
Cause	**The pipelines connections are too small in diameter.**
Remedy	Make sure that the pipework has sufficient conductance (user's responsibility) and the pump performance is not compromised.
Cause	**There is a leak in the system.**
Remedy	Do the leak test of the pump system in accordance with the requirements specified in *Table: Performance data*.
Cause	**The motor controller is current limiting the supply.**
Remedy	Adjust the inlet pressure/flow until the pump performance recovers.
Cause	**The pump chamber is too big.**
Remedy	If there are questions regarding chamber size, please contact us.

8.5 Alarm indicator codes

When the fail condition becomes active, the red alarm indicator shows a flashing sequence.

- If the error light is on continuously, this indicates a problem has been found with the embedded software. In this case, switch the power supply on and off.
- If the indication is not cleared, a software download may be required. In this case, contact us or the supplier.
- If the alarm indicator is flashing, identify the error flash code. Refer to *Table: Flashing error codes*.

Note:

There is a sufficient off period between each subsequent cycle repetition to mark the start of a new flash sequence. The duration of a long flash (L) is equal to 3 times the duration of a short flash(s) (0.5 s).

Table 14 Flashing error codes

Error flash position	Error flash sequence	Comment	Actions
0	s-s-s-s-s-s	Overload timeout	Check if the pump is not under constant high pressure or the inlet or outlet is not blocked.
1	L-s-s-s-s-s	Controller software error	Switch the power to the pump off and on and see whether the error code appears again. If it does, contact us or the supplier.
2	s-L-s-s-s-s	Controller failed internal configuration and calibration operation	Switch the power to the pump off and on and see whether the error code appears again. If it does, contact us or the supplier.
3	s-s-L-s-s-s	Acceleration timeout	Check if the pump is under constant high pressure or the inlet or outlet is blocked.
4	s-s-s-L-s-s	Over current trip activated, or other hardware fault	Switch power to the pump off and on and see whether the error code appears again. If it does, contact us or the supplier.
5	s-s-s-s-L-s	Self test fault	Switch the power to the pump off and on and see whether the error code appears again. If it does, contact us or the supplier.
6	s-s-s-s-s-L	Serial control mode interlock	Reactivate the serial enable and send a serial command to clear the error code.

9. Storage

WARNING: INHALATION HAZARD

Risk of asphyxiation. Do not burn the fluoroelastomer seals and O-rings.

CAUTION: LUBRICATION TRANSFER

Risk of damage to equipment. Install blanking plates to seal the vacuum inlet and outlet port. The pumps must be stored in a horizontal configuration to prevent possible lubrication transfer.

To store the pump:

1. Shut down the pump. Refer to *Shut down the pump* on page 41.
2. Disconnect the pump from the electrical supply.
3. Place and secure protective covers over the inlet and outlet ports.
4. Store the pump in a clean and dry condition until required for use.
5. When necessary, prepare and install the pump. Refer to *Installation* on page 24.

10. Disposal

WARNING: CONTAMINATION HAZARD

Risk of toxic exposure and acid burns. Identify, contain and safely dispose of contaminated items.

Dispose of the pump and any components or accessories safely. Obey all local and national safety and environmental requirements.

Our products are supported by a world-wide network of Service Centres. Each Service Centre offers a wide range of options including disposal. Refer to *Service* on page 45 for more information.

Dry pump system materials suitable for recycling include cast iron, steel, PTFE, stainless steel, aluminium, zinc alloy, nickel, mild steel, ABS and polyamide.

Take particular care with:

- Fluoroelastomers which may have decomposed as the result of being subjected to high temperatures.
- Components which have been contaminated with dangerous process substances.

11. Accessories

Contact us for the accessories available to support your pump.

11.1 Electrical cables

Recommended cord sets for regional requirements.

Table 15 Recommended cord sets

Description	Rating	Coupler type	Item number
Cord set assembly, UK	H05VV-F, 3 x 1.5 mm^2, 300 V, 70 °C installed with a BS1363 UK plug with BS1362 13 A fuse to an IEC60320 style C19 with a maximum length of 2.5 m	Straight entry	A50505003
		Right-angled entry	A50505006
Cord set assembly, Europe	H05VV-F, 3 x 1.5 mm^2, 300 V, 70 °C installed with a European Schuko VDE approved 16 A 250 V rated plug with dual earthing contact to an IEC60320 style C19 with a maximum length of 2.5 m	Straight entry	A50506003
		Right-angled entry	A50506006
Cord set assembly, USA/ Canada (200 - 240 V)	SJT, 3 x 14 AWG, 300 V, 90 °C, VW-1 installed with a NEMA 6-15P plug and IEC60320 C19 coupler with a maximum length of 2 m	Straight entry	A50507006
Cord set assembly with no plug 20 A	Black H05VV-F, 3 x 1.5 mm2, 300 V, 70 °C fitted with an IEC 60320 C19 coupler and no plug with a minimum length of 2.5 m	Straight entry	A50508003
Cord set assembly, China	Black H05VV-F, 3 x 1.5 mm2, 300 V, 70 °C fitted IEC 60320 C19 coupler and China GB2099 plug	Straight entry	A50509003

Table 16 Cables

Description	Item number
USB Interface Cable	D39801810
TIC Cable	D39803014
Controller Extension Cable 1m	D39700835
Controller Extension Cable 2m	D39700836
Controller Extension Cable 5m	D39700837

11.2 Valves

Table 17 Valves

Description	Item number
VIV40EKA 24 V DC - Vacuum isolation valve with 24 V DC control	A50637510
VIV50EKA 24 V DC - Vacuum isolation valve with 24 V DC control	A50637520
VIV LINK M8 Connector to valve - Enables the connection between VIV valve and the pump through M8 connector.	A50637399

P20010538A

EU Declaration of Conformity

This declaration of conformity is issued under the sole responsibility of the manufacturer:

Edwards Ltd
Innovation Drive
Burgess Hill
West Sussex
RH15 9TW
UK

Documentation Officer
Jana Sigmunda 300
Lutín , 78349
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nXLi Enhanced Part Number Matrix: A770ABCDE
A - Speed: 5: 110i E; 6: 200i E; 7: 110iD E; 8: 200iD E
B - Voltage: 2: High Volts
C – Inlet Port: 1: NW16; 2: NW25; 3: NW40; 4: NW50; 5: ISO63
D – Outlet Port: 1: NW16; 2: NW25; 3: NW40; 4: NW50; 5: ISO63
E – OEM Specific: 0: Standard Variant; 1-9: Customer Specific

Is in conformity with the relevant Union harmonisation legislation:

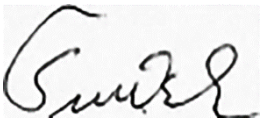
2006/42/EC	Machinery directive *Note: The safety objectives of the Low Voltage Directive 2014/35/EU were complied with in accordance with Annex 1 No. 1.5.1 of this directive.*
2014/30/EU	Electromagnetic compatibility (EMC) directive Class B Emissions, Industrial Immunity
2011/65/EU	Restriction of certain hazardous substances (RoHS) directive as amended by Delegated Directive (EU) 2015/863

Based on the requirements of relevant harmonised standards and technical documentation:

EN 1012-2:1996 +A1:2009	Compressors and vacuum pumps. Safety requirements. Vacuum pumps
EN 61326-1:2013	Electrical equipment for measurement, control and laboratory use. EMC requirements. General requirements

This declaration, based on the requirements of the listed Directives and EN ISO/IEC 17050-1, covers all product serial numbers from this date on: *2023-03-31*

You must retain the signed legal declaration for future reference
This declaration becomes invalid if modifications are made to the product without prior agreement.



Petr Šmérek – Engineering Manager
Scientific Vacuum Division, Lutín

Jan Večeřa – General Manager
Lutín, CZ

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Declaration of Conformity

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E – OEM Specific: 0: Standard Variant; 1-9: Customer Specific
The object of the declaration described above is in conformity with relevant statutory requirements:

Supply of Machinery (Safety) Regulations 2008
The objectives of the Electrical Equipment (Safety) Regulations 2016 are governed by Annex 1 1.5.1 of this regulation.

Electromagnetic Compatibility Regulations 2016
Class B Emissions, Industrial Immunity

Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2012

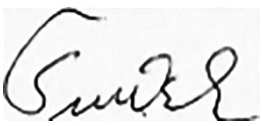
Relevant designated standards or technical specifications are as follows:

EN 1012-2:1996 +A1:2009	Compressors and vacuum pumps. Safety requirements. Vacuum pumps
EN 61326-1:2013	Electrical equipment for measurement, control and laboratory use. EMC requirements. General requirements

This declaration, based on the requirements of the listed Statutory Instruments and EN ISO/IEC 17050-1, covers all product serial numbers from this date on: *2023-03-31*

You must retain the signed legal declaration for future reference
This declaration becomes invalid if modifications are made to the product without prior agreement.

Signed for and on behalf of Edwards Ltd



Petr Šmérek – Engineering Manager
Scientific Vacuum Division, Lutín

Jan Večeřa – General Manager
Lutín, CZ

ADDITIONAL LEGISLATION AND COMPLIANCE INFORMATION

EMC (EU, UK): Industrial equipment

Caution: This equipment is not intended for use in residential environments and may not provide adequate protection to radio reception in such environments.

RoHS (EU, UK): Material Exemption Information

This product is compliant with no Exemptions

REACH (EU, UK)

This product is a complex article which is not designed for intentional substance release. To the best of our knowledge the materials used comply with the requirements of REACH. The product manual provides information and instruction to ensure the safe storage, use, maintenance and disposal of the product including any substance based requirements.

Article 33.1 Declaration (EU, UK)

This product does not knowingly or intentionally contain Candidate List Substances of Very High Concern above 0.1%ww by article as clarified under the 2015 European Court of Justice ruling in case C-106/14.

Additional Applicable Requirements

The product is in scope for and complies with the requirements of the following:

2012/19/EU	Directive on waste electrical and electronic equipment (WEEE)
Product is certified to CSA-C22.2 No.61010-1-12	Safety requirements for electrical equipment for measurement, control and laboratory use – Part 1: General requirements CU 72239583
Product is certified to UL61010-1 3rd Edition	Safety requirements for electrical equipment for measurement, control and laboratory use – Part 1: General requirements CU 72239583
IEC 61010-1:2010/AMD1:2016	Safety requirements for electrical equipment for measurement, control and laboratory use Part1: General requirements

材料成分声明

China Material Content Declaration

表示该有害物质在该部件的所有均质材料中的含量低于 GB/T 26572 标准规定的限量要求。

Indicates that the hazardous substance contained in all of the homogeneous materials for this part is below the limit requirement in GB/T 26572.

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