

Instruction Manual

nEXPT Turbopumping Station



Description	Item Number
nEXPT Turbopumping Station	TSXX-XX-XXX





Declaration of Conformity

We, Edwards,
Innovation Drive,
Burgess Hill,
West Sussex,
RH15 9TW, UK

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

nEXPT Turbopumping Stations

T S X X - X X - 0 0 X

The preceding material numbers cover a matrix where the following features may vary according to: - X denoting a range of turbomolecular pump inlet flanges, vent options and electrical supply which may be configured or used with the following turbomolecular pumps and backing pumps.

Turbomolecular pumps:	Backing pumps:	
EXT75DX	E2M1.5	nXDS6i
nEXT85	RV5	nXDS10i
nEXT240	RV12	nXDS15i
nEXT300	XDD1	nXDS20i
nEXT400		

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

ENISO12100:2010	Safety of machinery. General principles for design. Risk assessment and risk reduction.
EN61010-1:2010	Safety Requirements for Electrical Equipment for Measurement, Control and Laboratory Use. General Requirements.
EN61326-1:2013 (Class A Emissions, Industrial Immunity)	Electrical equipment for measurement, control and laboratory Use. EMC requirements. General requirements.

and fulfils all the relevant provisions of

2006/42/EC	Machinery Directive
2014/35/EU	Low Voltage Directive
2014/30/EU	Electromagnetic Compatibility (EMC) Directive
2011/65/EU	Restriction of Certain Hazardous Substances (RoHS) Directive

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

23.11.2016, Burgess Hill


Date and Place

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

Material Declaration

In accordance with the requirements of the Chinese regulatory requirement on the Management Methods for the Restriction of the Use of Hazardous Substances in Electrical and Electronic Products Order No. 32 (also known as 'China RoHS2') and SJ/T 11364 Marking for the Restricted Use of Hazardous Substances in Electronic and Electrical Products:

Product Labels

Product	Product Label	Meaning
All pumps in the list below		This product contains hazardous substances in at least one of the homogeneous materials used which are above the limit requirement in GB/T 26572 as detailed in the declaration table below. These parts can safely be used for the environmental protection use period as indicated.

Pump Type	Pump Size
RV Pumps	RV3,5,8,12, E Lab, nRvi
EM Small Pumps	E2M0.7, 1.5, E1M18, E2M18, 28, 30, nE2M40i
nEXT Pumps	nEXT 85, 240, 300, 400, Splitflow
nXDS pumps	nXDS 6, 10, 15, 20
EXT pumps	EXT75DX
XDS pumps	XDS35, 46, 100
Diaphragm	XDD 1, D lab
Turbo Pump Carts	T station, nEXPT, nEXT station

材料成分声明 Materials Content Declaration





部件名称 Part name	危险物质					
	铅 Lead (Pb)	汞 Mercury (Hg)	镉 Cadmium (Cd)	六价铬 Hexavalent Chromium (Cr VI)	多溴联苯 Polybrominated biphenyls (PBB)	多溴二苯醚 Polybrominated diphenyl ethers (PBDE)
铸铝 Cast Aluminium	X	O	O	O	O	O
铜管管件 Brass pipe Fittings	X	O	O	O	O	O
铜接头 Brass Connectors	X	O	O	O	O	O

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

X : 表示该有害物质在该部件的至少一种均质材料中的含量超出 GB/T26572 标准规定的限量要求。
X: Indicates that the hazardous substance contained in at least one of the homogeneous materials used for this part is above the limit requirement of GB/T26572.

NOTES: These products are EU RoHS compliant, the following Exemptions apply:
6(b) Lead as an alloying element in aluminium containing up to 0.4% by weight.
6(c) Copper alloy containing up to 4% lead by weight

Packaging Information

Pallet	Over-shipper	Protection Pieces	Support Braces
			
Recyclable Natural Wood	Recyclable Cardboard	Recyclable Polypropylene	Recyclable Mild Steel

This page intentionally blank.

Contents

Section	Page
1	Introduction 1
1.1	Scope and definitions 1
1.2	Description..... 2
1.2.1	Overview 2
1.2.2	General description of the nEXPT turbopumping station major components 2
1.2.3	Electrical protection 2
1.2.4	Accessories 2
2	Technical data 5
2.1	General..... 5
2.2	Electrical data 5
2.3	Operating and storage data 7
2.4	Fuse ratings..... 7
2.5	Earth stud 7
2.6	Electrical connections 7
2.7	Connections 8
3	Installation 11
3.1	Safety..... 11
3.2	Unpack and inspect 11
3.3	Locate the nEXPT turbopumping station 12
3.4	Bench-top mounting..... 13
3.4.1	Fixing procedure..... 14
3.5	Fill the rotary pump with oil..... 14
3.6	nXDS scroll pump silencer 15
3.7	Fit accessories (optional)..... 15
3.8	Connect the nEXPT turbopumping station to the vacuum system 15
3.9	Connect to the exhaust extraction system 15
3.10	Connect the electrical supply 16
3.11	Additional earth bonding 16
3.12	Configure the nEXPT turbopumping station 16
3.13	Commission the installation..... 17
3.14	Connecting an active gauge..... 18
3.15	Connecting the logic interface 18
3.16	Connecting the serial interface 18
4	Operation 19
4.1	Use of the backing pump controls 19
4.2	Start-up 19
4.3	Shut-down 19
5	Maintenance 21
5.1	Safety..... 21
5.2	Maintenance plan 21
5.3	Inspect the hoses, pipelines and connections..... 22
5.4	Trouble-shooting..... 22
5.5	Software updates 22
5.6	EXPT TIC controller factory default 23
6	Storage and disposal 25

6.1	Storage	25
6.2	Disposal	25
7	Spares and accessories	27
7.1	Introduction	27
7.2	Spares	27
7.3	Accessories	27
7.3.1	BX bakeout band	27

For return of equipment, complete the HS Forms at the end of this manual.

Illustrations

Figure		Page
1	Components of the nEXPT turbopumping station (typical system shown)	3
2	Equipment dimensions (mm) (nXDS and nEXT shown)	9
3	Position the lifting slings/lifting hooks	13
4	Bench-top mounting	13
5	M8 clearance holes	14
6	Turbomolecular pump start delay with XDD1 diaphragm pump	17
7	EXPT TIC	23

Tables

Table		Page
1	nEXPT Turbopumping Station components	2
2	Electrical data	5
3	Electrical ratings for continuous operation	6
4	Recommended fuses	6
5	Operating and storage data	7
6	Fuse ratings	7
7	Earth stud	7
8	Electrical connections	7
9	Connections	8
10	Checklist of components	11

Supplementary publications

Publication title	Publication number
XDD1 115/230 Diaphragm Pump	A746-02-885
Turbo Instrument Controller (TIC)	D397-22-880
E2M1.5 Rotary Vacuum Pumps	A371-32-880
EXT75DX and EXT255DX Turbomolecular Pump	B722-40-880
nXDS Scroll Pump	A735-01-880
RV Rotary Vane Pumps	A652-01-880
nEXT Turbomolecular Pumps	B800-00-880
nEXT85 Turbomolecular Pump	B8G0-00-880
nEXPT CD ROM Instruction Manual	B723-00-879

Associated publications

Publication title	Publication number
EXT Pump Accessories	B580-65-880
nEXT Pump Accessories	B811-00-880

This page has been intentionally left blank.

1 Introduction

1.1 Scope and definitions

This manual provides installation, operation and maintenance instructions for the Edwards nEXPT Turbopumping Station. The nEXPT Turbopumping Station must be used as specified in this manual.

Read this manual before installing and operating the nEXPT Turbopumping Station. Important safety information is highlighted as WARNING and CAUTION instructions; these instructions must be obeyed. 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 equipment, associated equipment and process.

A full list of Supplementary Publications is provided at the end of the Contents list of this manual. A number of these Supplementary Publications will be supplied with the nEXPT Turbopumping Station. The Supplementary Publications supplied will be the instruction manuals for the components in the nEXPT Turbopumping Station.

The supplied Supplementary Publications also contain WARNING and CAUTION instructions. When installing and operating the nEXPT Turbopumping Station, refer to these Supplementary Publications and obey all of the WARNING and CAUTION instructions which they contain.

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

The following IEC warning labels appear on the product and in the manual.



Warning - refer to accompanying documentation.



Warning - risk of electric shock.



Warning - hot surfaces.

1.2 Description

1.2.1 Overview

The nEXPT Turbopumping Station is a fully automatic pumping system which is suitable for a wide range of applications. The system is capable of utilising a range of standard Edwards backing pumps and turbomolecular pumps from a single compact unit. The nEXPT Turbopumping Station is available in two sizes, the size of the equipment base will depend on which backing pump is fitted. The open system configuration allows easy maintenance of the main pumping components.

The TIC controller has been configured to operate both the backing pump and the turbomolecular pump plus any optional accessories which have been fitted. Up to three active gauges can be connected using the convenient gauge interface incorporated into the system housing. The controller uses a large clear graphic display and easy-to-use control interface via a touch sensitive keypad. All systems incorporate a RS232/485 interface for control and data monitoring on a remote PC and a logic interface for interface with associated system hardware.

1.2.2 General description of the nEXPT turbopumping station major components

For the general description of the various products used on the nEXPT Turbopumping Station, click on the appropriate instruction manual reference against each product type (See [Table 1](#)).

Table 1 - nEXPT Turbopumping Station components

Pump type	Publication number
Diaphragm pump - XDD1	A746-02-885
Rotary vane pumps - E2M0.7/E2M1.5	A371-22-880
Rotary vane pumps - RV3/RV5/RV8/RV12	A652-01-880
Turbomolecular pump - EXT75DX	B722-40-880
Turbomolecular pumps - nEXT240/nEXT300/nEXT400	B800-00-880
Turbomolecular pump - nEXT85	B8G0-00-880
Scroll pumps - nXDS6i/nXDS10i/nXDS15i/nXDS20i	A735-01-880
TIC controller - Turbo instrument controller	D397-22-880

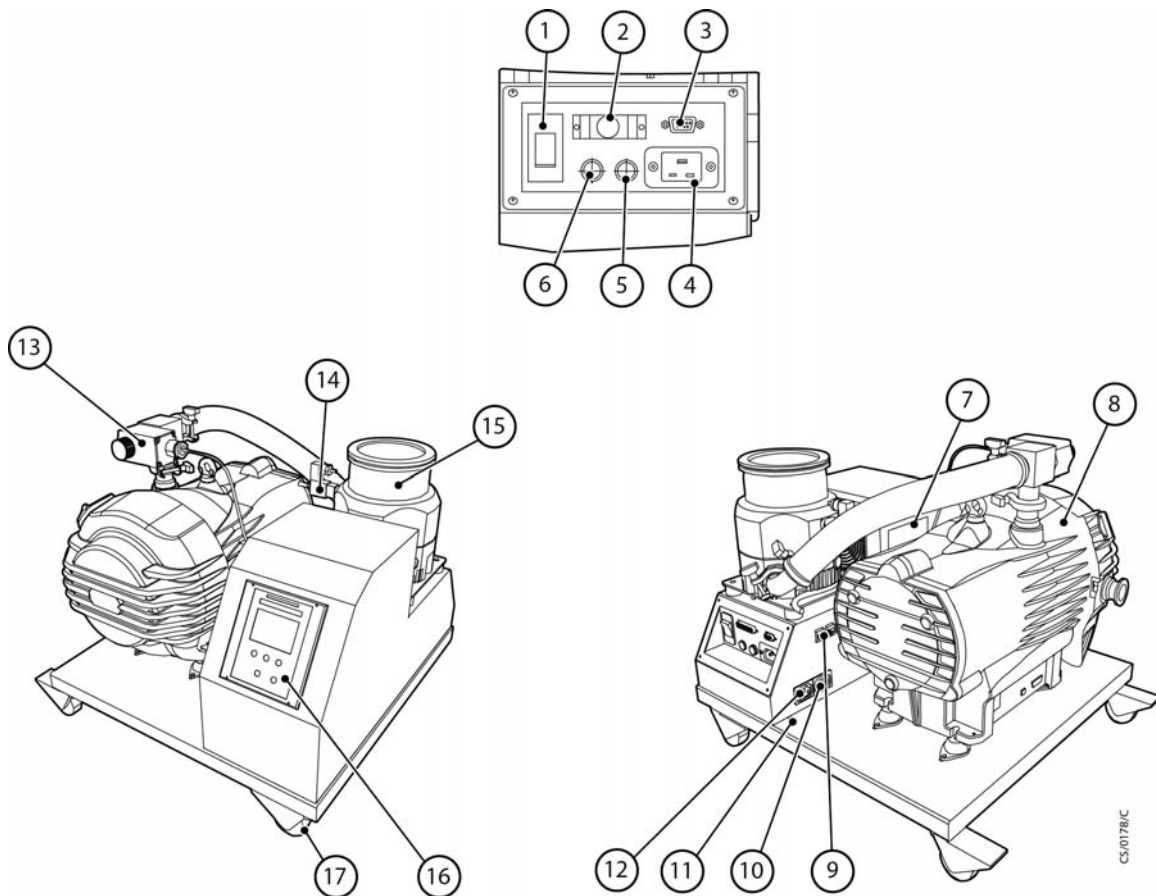
1.2.3 Electrical protection

The nEXPT Turbopumping Station has a double-pole thermal circuit breaker which provides short circuit protection. The backing pump and TIC Controller both have overload protection.

1.2.4 Accessories

A wide range of standard accessories is available for the major components of the nEXPT Turbopumping Station; refer to [Section 7](#).

Figure 1 - Components of the nEXPT turbopumping station (typical system shown)



- | | |
|--|---|
| <ol style="list-style-type: none"> 1. Mains ON/OFF 2. Logic interface (adaptor fitted) 3. Serial communications port 4. Mains input 5. Bakeout band fuse (not fitted)* 6. Backing pump fuse 7. Instruction manual holder 8. Backing pump 9. Vacuum gauge inputs | <ol style="list-style-type: none"> 10. Backing pump mains supply 11. Earth stud 12. Bakeout band mains supply† 13. Backing pump isolation valve
(Fitted to nXDS backing pumps only) 14. TAV vent valve (optional) 15. Turbomolecular pump 16. TIC controller 17. Locking castors (front and rear) |
|--|---|

* Refer to [Table 4](#) for the correct fuse rating.

† Baking the turbo pump on the Pumping Station is prohibited. Refer to [Section 3.7](#) for further information.

This page has been intentionally left blank.

2 Technical data

Note: The operating, storage conditions and performance of the nEXPT Turbopumping Station depends on the major components fitted to the nEXPT Turbopumping Station; refer to the technical data in the appropriate supplementary publications.

2.1 General

Dimensions	Refer to Figure 2
Mass	Small platform 24.9 to 35.0 kg (E2M/XDD1)
Mass	Large platform 41.2 to 52.5 kg (RV/XDS)
Electrical data	Refer to Table 2
Degree of protection (to IEC34-5: 1981)	IP20
Initial force required to push the nEXPT Turbopumping Station* (for systems with castors)	35 N maximum

* Measured under ideal conditions and will increase on uneven floor surfaces, slopes etc.

2.2 Electrical data

Table 2 lists the electrical requirements for the different nEXPT Turbopumping Stations.

Table 2 - Electrical data

Backing pump	TIC controller	Supply voltage 50/60 Hz	Current (A)		Maximum power kW
			Full load	Start*	
XDD1	100 W	100	4.67		0.355
		110-120	4.04		
		220-240	2.07		
	200 W	100	6.02		0.49
		110-120	5.14		
		220-240	2.57		
E2M1.5	100 W	110-120	5.54	14.44	0.435
		220-240	2.67	6.77	
	200 W	110-120	6.64	15.54	0.57
		220-240	3.17	7.27	
RV5	100 W	100	8.15	33.94	0.575
		110-120	7.04	20.875	
		220-240	3.67	16.87	
	200 W	100	9.5	43.1	0.71
		110-120	8.14	35.04	
		220-240	4.17	17.37	

Table 2 - Electrical data (continued)

Backing pump	TIC controller	Supply voltage 50/60 Hz	Current (A)		Maximum power kW
			Full load	Start*	
RV12	100 W	100	10.35	36.44	0.825
		110-120	10.24	22.375	
		220-240	5.27	19.27	
	200 W	100	11.7	45.6	0.96
		110-120	11.34	37.54	
		220-240	5.77	19.77	
nXDS6i	100 W	100	9.35		0.625
		110-120	8.04		
		220-240	4.47		
	200 W	100	10.7		0.76
		110-120	9.14		
		220-230	4.97		
nXDS10i	100 W	100	11.35		0.74
		110-120	9.74		
		220-240	5.37		
	200 W	100	12.7		0.875
		110-120	10.84		
		220-230	5.87		
nXDS15/20i	100 W	100	12.45		0.81
		110-120	10.64		
		220-240	5.87		
	200 W	100	13.8		0.945
		110-120	11.74		
		220-230	6.37		

* If the nEXPT Turbopumping Station uses a rotary vane pump, the system may draw up to the start current value shown in Table 2. The use a slow blow fuse to prevent unnecessary fuse failures is required. The start current could typically last for several seconds and generally occurs when the rotary vane pump oil is cold.

Table 3 - Electrical ratings for continuous operation

Pump	Supply (V a.c. rms)	Phase	Frequency (Hz)	Input current (A rms)
All variants	100-127 ±10%	Single	50-60	10
	200-240 ±10%	Single	50-60	6

Table 4 - Recommended fuses

Area	Voltage (V a.c.)	Rating
UK	230	10 A, 250 V a.c. rms
Europe	230	10 A, 250 V a.c. rms
USA	110	13 A, 250 V a.c. rms
Japan	100	13 A, 250 V a.c. rms

Note: Time-lag fuses should be used, as current transients can exceed the rated values.

2.3 Operating and storage data

Table 5 - Operating and storage data

General items	Reference data
Ambient operating temperature range	0°C to 35°C
Ambient storage temperature range	-30°C to 70°C
Maximum ambient operating humidity	Max 90% RH non cond at 40°C
Maximum operating altitude	2000 m maximum
Equipment type	Fixed equipment, for indoor use only
Pollution degree	2

2.4 Fuse ratings

Table 6 - Fuse ratings

General items	Reference data
BX bakeout band fuse (Heater)	
90 to 132 V a.c. electrical supply	1 A, type F 20 mm
180 to 264 V a.c. electrical supply	0.5 A, type F 20 mm
Backing pump	
Refer to backing pump documentation	10 A, type T 20 mm (maximum)

2.5 Earth stud

Table 7 - Earth stud

General items	Reference data
Earth stud	M5

2.6 Electrical connections

Table 8 - Electrical connections

General items	Reference data
Electrical supply (refer to Figure 1, item 4)	
Inlet plug type	CEE/IEC 320 (16 A)
Backing pump (refer to Figure 1, item 10)	
Outlet socket type	CEE/IEC 320
Max power	600 W
Bakeout band (refer to Figure 1, item 12)	
Outlet socket type	CEE/IEC 320
Max power	150 W

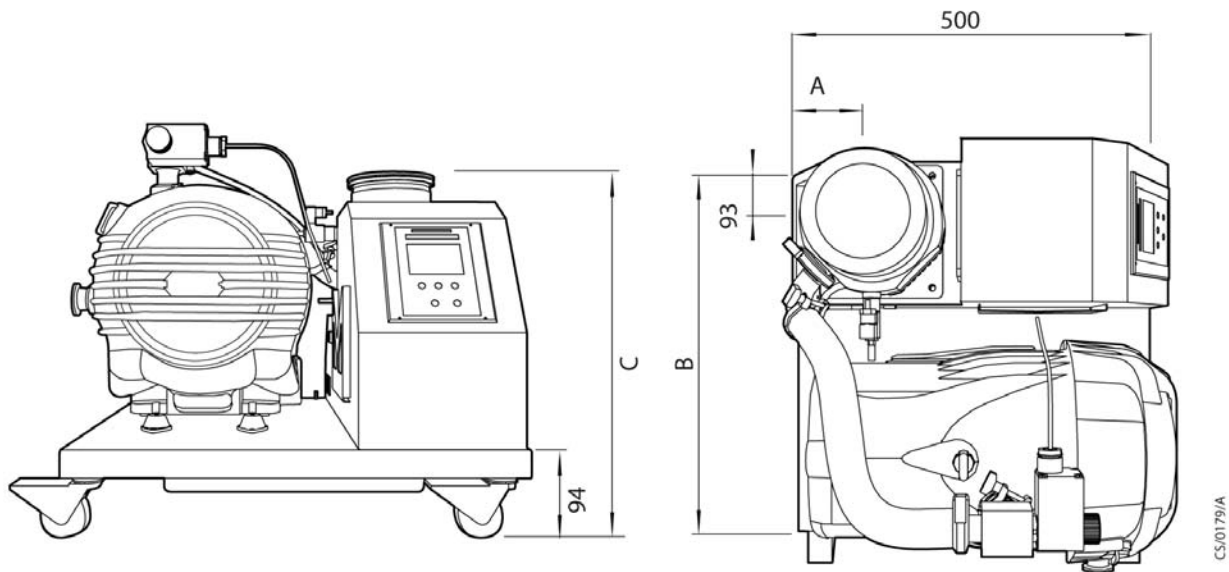
2.7 Connections

Note: The connectors listed in [Table 9](#) offer the same functionality as the connectors on the TIC Controller. Refer to the TIC instruction manual for full details for these connectors.

Table 9 - Connections

General items	Reference data
Active gauge connectors	
Connector type	FCC/RJ45, 8-way
Power supply	24 V d.c.
Logic interface	
Connector type	25-way sub-miniature 'D' type socket
Power supply	24 V d.c.
Serial communications	
Connector type	9-way sub-miniature 'D' type socket

Figure 2 - Equipment dimensions (mm) (nXDS and nEXT shown)



Turbo Pump	Dimensions (mm)		
	Position A	Position B*	Position C
EXT75DX ISO63	144	380/500	409
EXT75DX NW40	144	380/500	421
EXT75DX CF63	144	380/500	427
nEXT85 ISO63	144	380/500	401
nEXT85 NW40	144	380/500	427
nEXT85 CF63	144	380/500	415
nEXT240 ISO100	135.5	380/500	443.2
nEXT240 CF100	135.5	380/500	451.2
nEXT300 ISO100	135.5	380/500	448.7
nEXT300 CF100	135.5	380/500	463.2
nEXT400 ISO160	135.5	380/500	448.7
nEXT400 CF160	135.5	380/500	453.7

* 380 mm refers to small platforms with XDD1 backing pumps.
 500 mm refers to large platforms with nXDS/RV backing pumps.

This page has been intentionally left blank.

3 Installation

3.1 Safety



WARNING

Obey the safety instructions given below and take note of appropriate precautions. Failure to do so can cause injury to people and damage to equipment.

- When referring to a manual supplied as a Supplementary Publication, obey all of the WARNING and CAUTION instructions in the manual.
- A suitably trained and supervised technician must install the nEXPT Turbopumping Station.
- Check that all the required parts are available and of the correct type before commencing work.
- Ensure that the installation technician is familiar with the safety procedures which relate to the products pumped. Wear the appropriate safety-clothing if contact with contaminated components is anticipated.
- Isolate the other components in the system from the electrical supply so that they cannot be operated accidentally.
- Do not reuse O-rings and Co-seals if they are damaged.
- Dispose of components, grease and oil safely (refer to [Section 6](#)).
- Take care to protect sealing-faces from damage.
- Leak-test the system after installation and seal any leaks found.

3.2 Unpack and inspect

Remove the outer cover and all packing materials, remove the protective covers from the inlet and outlet ports, inspect the system for any damage. If the nEXPT Turbopumping Station is damaged, notify the supplier and the carrier in writing within three days; state the order number and invoice number. Retain all packing materials for inspection. Do not use the nEXPT Turbopumping Station if it is damaged. Check that the package contains the items listed in [Table 10](#). If any item is missing, notify the supplier within three days.

If the nEXPT Turbopumping Station is not to be used immediately, replace the protective covers. Store the nEXPT Turbopumping Station in suitable conditions as described in [Section 6.1](#).

Table 10 - Checklist of components

Qty	Description	Check (✓)
1	nEXPT Turbopumping Station	<input type="checkbox"/>
1	Instruction Manual Package	<input type="checkbox"/>
1	Logic Interface Interlock D-Connector	<input type="checkbox"/>
1	TMP Flange Inlet Seal	<input type="checkbox"/>
1	Rotary Pump Oil (RV/E2M pumps only)	<input type="checkbox"/>
4	Mounting-pillars (used for bench-top fixing)	<input type="checkbox"/>
1	Exhaust mist filter (RV/E2M pump only)	<input type="checkbox"/>

3.3 Locate the nEXPT turbopumping station



WARNING

Heavy objects can cause muscle strain or back injury. It is advisable to use suitable lifting equipment when moving the nEXPT Turbopumping Station.



WARNING

For safety reasons, all four castors must be locked when the equipment is in operation. Failure to follow this warning and the turbo pump seizes, the sudden movement of the nEXPT Turbopumping Station may cause further damage to the equipment and cause injury to people.



WARNING

If operating the nEXPT Turbopumping Station on a bench-top, the installation instructions in Section 3.4. must be followed.

Failure to follow these guidelines and the turbo pump seizes, the sudden movement of the nEXPT Turbopumping Station may cause further damage to the equipment and cause injury to people.

CAUTION

When lifting the nEXPT Turbopumping Station, do not attempt to support the mass of the system from the backing pump.

CAUTION

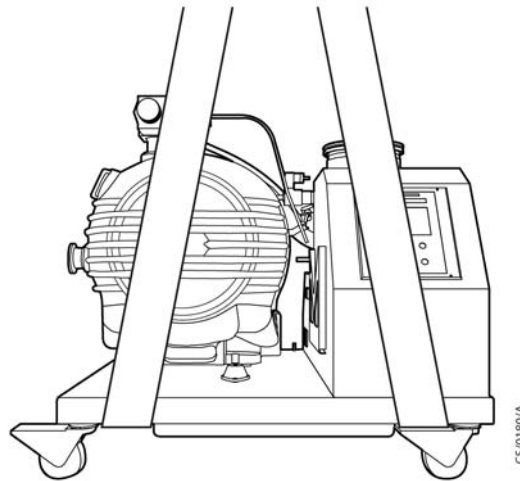
When lifting the nEXPT Turbopumping Station, always use slings with sufficient length to prevent damage of the system components.

CAUTION

When locating the nEXPT Turbopumping Station, care should be taken not to restrict the ventilation grid located under the base of the system. Failing to observe this may result in over heating of the controller and the turbomolecular pump.

Before attempting to lift the nEXPT Turbopumping Station, move the system (on its pallet) close to the operating position. Ensure that a firm level base is provided before removing the system from its pallet. It is advisable to always use mechanical lifting equipment when moving the larger platform nEXPT Turbopumping System. Use slings around the base of the system from front to back, make sure each sling is routed between the castors or feet and the base guides to prevent slippage. Alternatively use straps with lifting hooks. Refer to Figure 3 which shows where to locate the slings or lifting hooks.

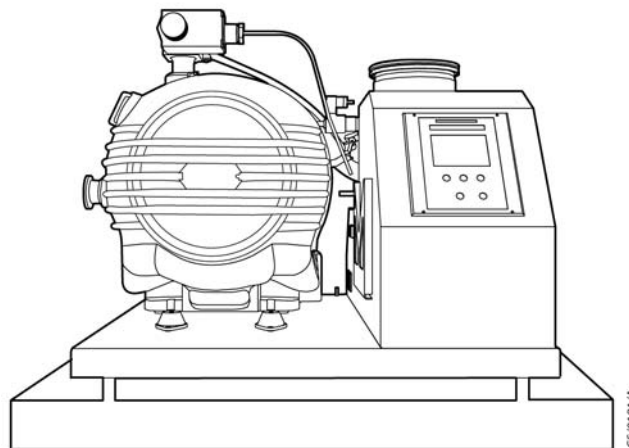
Figure 3 - Position the lifting slings/lifting hooks



3.4 Bench-top mounting

The base of the nEXPT Turbopumping Station can be securely fixed to a bench-top using the mounting-pillars supplied, refer to Figure 4.

Figure 4 - Bench-top mounting



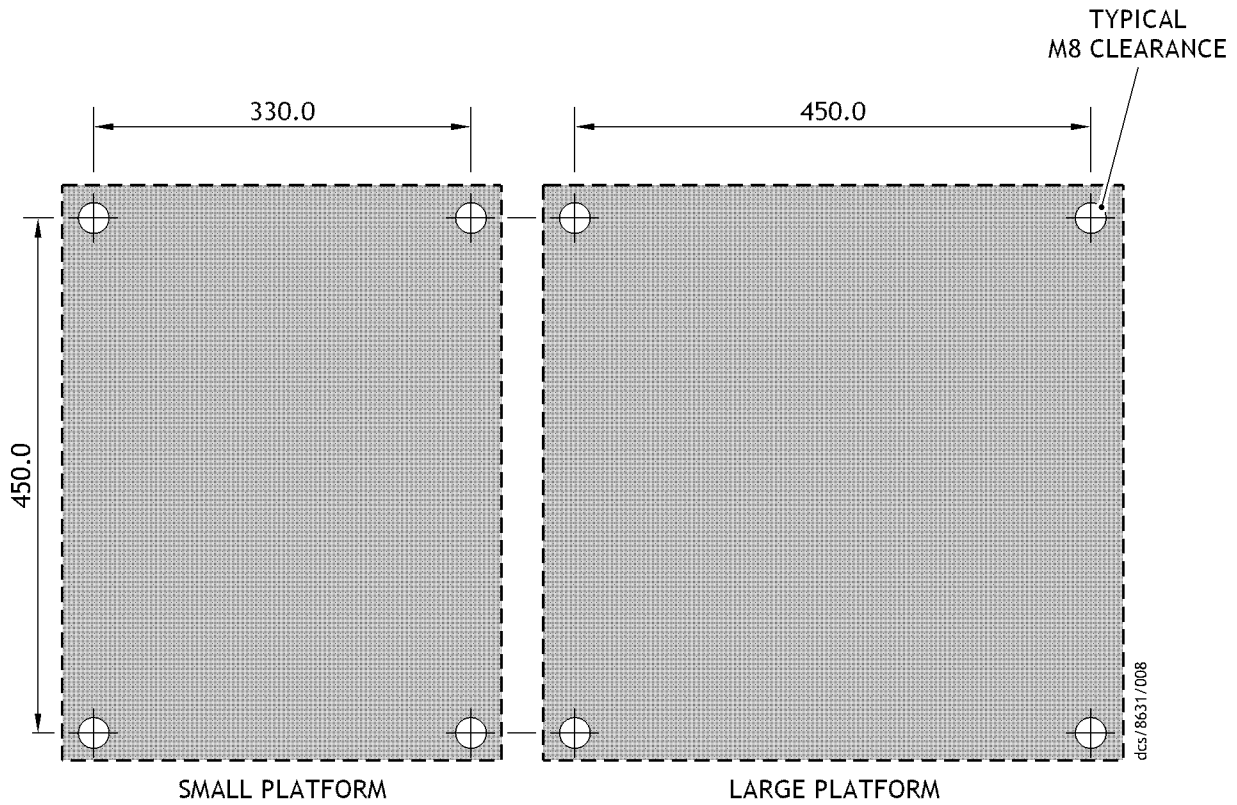
WARNING

Ensure the bench-top that the nEXPT Turbopumping Station is operating on is firmly fixed to a support or wall and can support the weight of the equipment. The bench-top must be able to withstand a destructive torque of up to 5.0 kNm in the unlikely event that the turbo pump seizes.

3.4.1 Fixing procedure

1. Drill four M8 clearance holes in the bench-top, refer to Figure 5.

Figure 5 - M8 clearance holes



2. Raise the nEXPT Turbopumping Station and place on blocks if required so that all four castors are accessible.
3. Remove all four castors by unscrewing the M8 nut holding the castor to the base, retain the nuts and washers for the next stage. Edwards recommends that the castors should be kept in a safe place if required for future use.
4. Fit the mounting-pillars into the now vacant holes using the M8 nuts and washers previously used to secure the castors. Ensure that all four nuts are securely fastened.
5. Locate the nEXPT Turbopumping Station by aligning the mounting-pillars with the holes previously made in the bench-top, secure the nEXPT Turbopumping Station using M8 bolts (not supplied). It is advisable to use washers either side of the bench-top surface. Ensure that all four bolts are securely fastened.

3.5 Fill the rotary pump with oil

If the nEXPT Turbopumping Station uses a EM or RV series rotary or rotary vane pump it must be filled with the correct quantity of oil (supplied with the equipment) before operating the equipment, as described in the pump Instruction Manual.

3.6 nXDS scroll pump silencer

The silencer is used to reduce exhaust noise during pump down and gas ballast operations. This part can be ordered as an accessory, refer to [Section 7.3](#). To fit the silencer, follow the instructions in the nXDS Accessories manual A735-01-840.

3.7 Fit accessories (optional)

If accessories are to be fitted to the nEXPT Turbopumping Station, fit them now, before installing the nEXPT Turbopumping Station into the vacuum system. Install accessories as described in the instruction manuals supplied with the accessories. Refer to [Section 7](#) for further information on the accessories available and for specific fitting instructions to fit the accessories to the nEXPT Turbopumping Station.

Note: The use of water coolers on the nEXPT Turbopumping Station is not permitted. If these accessories are to be fitted, it is advisable to install the turbomolecular pump away from the nEXPT Turbopumping Station. For further details regarding turbomolecular pump remote mounting please contact Edwards UK.

3.8 Connect the nEXPT turbopumping station to the vacuum system



WARNING

Connect the turbo pump inlet to the vacuum system before applying power to the nEXPT Turbopumping Station. This will ensure that the pump cannot operate accidentally causing injury.



WARNING

If installing the vacuum system directly onto the nEXPT turbopumping station, the centre of gravity of the mass must be above and within 300 mm of the centre line.

The turbo pump can be securely fixed to the vacuum system via the inlet-flange. Make sure that the pump-inlet and all components fitted to the pump-inlet are clean and dust-free. If the pump-inlet is not kept clean, the pump-down time may be increased. The inlet connections for the nEXPT pump are CF flange, ISO flange and NW flange:

- If the pump has a CF flange, use the copper compression gasket supplied with the pump and use a full complement of bolts to connect the inlet-flange of the pump to the vacuum system.
- If the pump has an ISO flange, use the Edwards combined inlet screen and trapped O-ring supplied with the pump and use a minimum of four claw clamps (each torque to 10 Nm) to connect the inlet-flange of the pump to the vacuum system. Alternatively, use a rotatable collar and the combined inlet screen and trapped O-ring supplied with the pump to connect the inlet-flange of the pump to the vacuum system; use a full complement of bolts with the rotatable collar.
- If the pump has an NW flange, use the Edwards combined inlet screen and trapped O-ring supplied with the pump and use any type of NW40 fitting to connect the inlet flange of the pump to the vacuum system.

All inlet flange bolts must be re-tightened once the system is under vacuum. Ensure that no torques or other forces are transmitted to the pump from the vacuum system or the associated pipelines.

3.9 Connect to the exhaust extraction system

Note: For further information, refer to the instruction manual which corresponds to the backing pump fitted to the nEXPT Turbopumping Station.

3.10 Connect the electrical supply



WARNING

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



WARNING

Ensure the mains cord is routed so as not to cause a trip hazard.

Check that the electrical supply is suitable for this equipment. Refer to [Table 2](#) for the electrical requirements for this equipment. The nEXPT Turbopumping Station is supplied with an electrical cable which includes a moulded IEC connector fitted at one end, the other end of the cable will be fitted with a moulded plug suitable for connection to the local electrical supply.

3.11 Additional earth bonding

The electrical supply cable normally provides protective earthing for electrical safety. If this is not the case, or if additional earth bonding is required, the earth stud located on the base at the rear of the nEXPT Turbopumping Station should be connected to the vacuum system.

3.12 Configure the nEXPT turbopumping station

As supplied, the TIC Controller has been reconfigured for the TIC Pumping Station to suit most vacuum applications and will:

When the TIC System ON is selected:

- Switch on both the backing pump and the turbomolecular pump^{*}.
- Close the TAV vent valve.
- Open the backing valve.

When the TIC System OFF is selected:

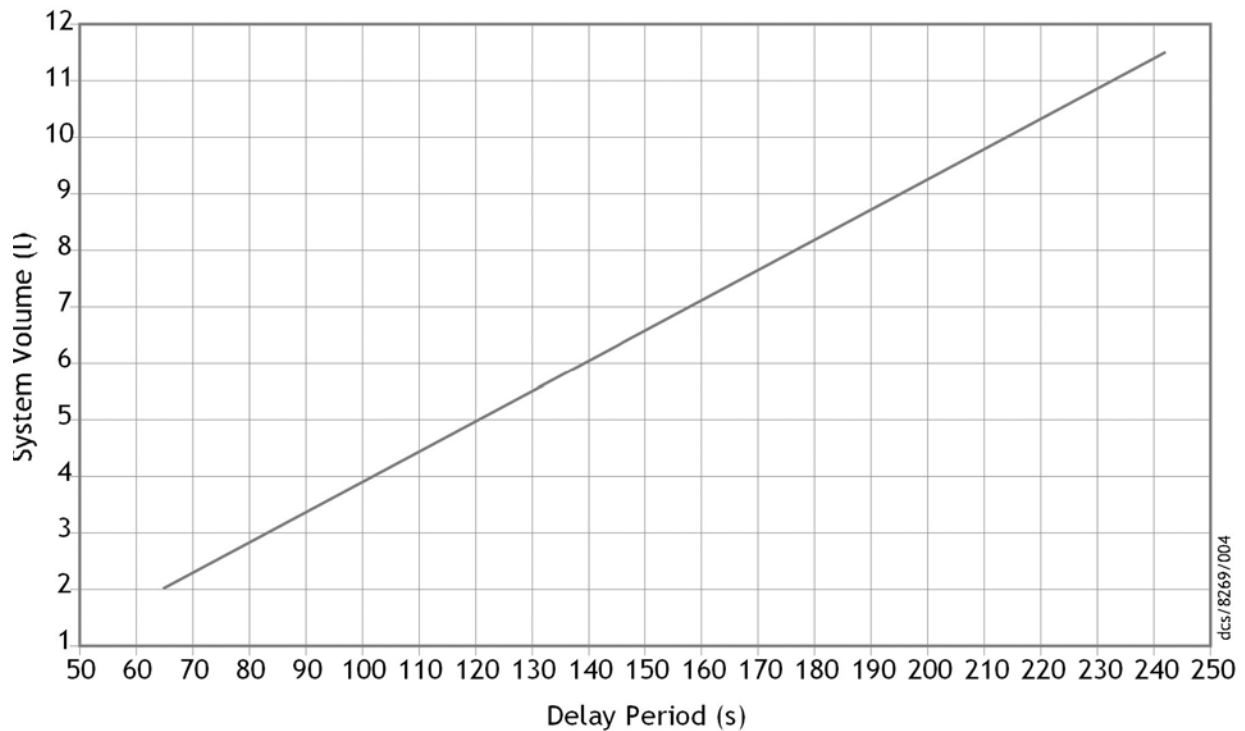
- Switch off both the backing pump and the turbomolecular pump.
- Close the backing valve.
- Open the TAV vent valve (controlled venting) from 100-50% rotational speed, and then open fully from 50% of full rotational speed.

^{*} If the nEXPT Turbopumping Station uses an XDD1 diaphragm pump, the turbomolecular pump drive will be delayed for two minutes while the backing pump reduces the pressure to a suitable level. This is typical for a five litre volume and will prevent the turbomolecular pump from running under high pressure for a prolonged period. This delay is adjustable (refer to the TIC instruction manual) and is recommended for system volumes >2 litres. Refer to [Figure 6](#) to estimate the turbomolecular start delay if the system volume is known.

Notes: 1 The TAV valve is an optional extra.

2 The TIC Controller factory settings have been changed to provide a standard operation for the nEXPT Turbopumping Station, if the TIC Controller is replaced the set up options should be reconfigured to suit the application. Refer to the TIC instruction manual for further details.

Figure 6 - Turbomolecular pump start delay with XDD1 diaphragm pump



3.13 Commission the installation



WARNING

Do not operate the system with the exhaust pipeline blocked. For example, if the nEXPT Turbopumping Station uses a rotary vane pump, oil mist may be discharged from the oil mist filter and cause injury to people.

After installing the nEXPT Turbopumping Station, use the following procedure to test the system.

1. Make sure that all the electrical connections are secure.
2. Switch on the electrical supply and the exhaust-extraction system (if available).
3. Turn ON the nEXPT Turbopumping Station using the ON/OFF switch positioned on the rear panel. To start-up the equipment, refer to the TIC instruction manual. Check that the equipment operates as described in [Section 3.12](#).
4. Inspect the vacuum, exhaust and pipeline connections and check that there are no leaks. Seal if any leaks are found.
5. Wait until the turbomolecular pump has reached full speed, then select OFF on the front panel of the TIC Controller again; check that both pumps stop.

3.14 Connecting an active gauge

CAUTION

Do not connect Barocel capacitance manometers to the TIC Pumping Station gauge connectors. Doing so will result in damage to the gauge and will invalidate the warranty.

Up to three compatible active gauges can be fitted to the gauge connectors on the rear inside of the nEXPT Turbopumping Station housing, refer to [Figure 1](#). Connect the gauges using Edwards active gauge cables to each of the three sockets. The number indicated above each socket corresponds to the same gauge number shown on the TIC Controller display. This option is only available if the nEXPT Turbopumping Station uses a TIC turbo and instrument controller.

Note: Only one AIGX gauge can be connected to the TIC Pumping Station gauge connectors at a time.

3.15 Connecting the logic interface

CAUTION

Do not earth the logic interface 0 V lines (pins 7, 10, 12, and 13). If so, an earth return path will be provided for any electrical fault in the pump-motor and this could damage the Controller or the control equipment.

CAUTION

Do not connect voltages greater than 24 V to the logic interface.

The logic interface provides a number of signals that can be used for monitoring the status of the vacuum system, and for controlling certain aspects of its operation. These signals can be broadly divided into three groups: control inputs, control outputs and status outputs.

The nEXPT Turbopumping Station is supplied with an interlock D-connector connected into the logic interface at the rear of the equipment. If it is not intended to connect the logic interface to the system, the interlock D-connector must be used. Failure to do so will disable a number of control outputs which operate the nEXPT system.

Note: The user logic interface on the rear panel offers the same functionality as the logic interface on the TIC Controller. Refer to the TIC instruction manual for further details of this connector.

3.16 Connecting the serial interface

The TIC has two serial communications protocols built in, RS232 and RS485. RS232 is the simplest interface and can be used to allow a host PC to control the TIC. RS485 allows a host PC to control a small network of TICs.

Note: The user serial interface on the rear panel offers the same functionality as the serial interface on the TIC Controller. Refer to the TIC instruction manual for further details of this connector.

4 Operation

4.1 Use of the backing pump controls

If the backing pump has a mode selector and or gas-ballast control, refer to the appropriate backing pump instruction manual to optimise the performance of the pump for the application.

4.2 Start-up

Use the following procedure to start the nEXPT Turbopumping Station. If the operation of the nEXPT Turbopumping Station is to be reconfigured to suit an application, refer to the TIC instruction manual.

1. Switch on the electrical supply to the nEXPT Turbopumping Station and the exhaust-extraction system (if available).
2. Turn ON the nEXPT Turbopumping Station using the ON/OFF switch positioned on the rear panel.
3. To operate the equipment components, refer to the TIC instruction manual for full operation.

4.3 Shut-down

Use the following procedure to shut down the nEXPT Turbopumping Station.

1. Refer to the TIC Controller instruction manual to stop the turbomolecular pump (TMP) and backing pump operation.
2. Switch off the ON/OFF rocker switch located on the equipment rear panel.
3. Remove the electrical mains supply from the equipment.

This page has been intentionally left blank.

5 Maintenance

5.1 Safety



WARNING

Obey the safety instructions provided in this section and take note of appropriate precautions. If not, injury to people and damage to equipment can result.

- When referring to a manual supplied as a Supplementary Publication, all of the WARNING and CAUTION instructions in the manual must be obeyed.
- A suitably trained and supervised technician must maintain the nEXPT Turbopumping Station.
- Allow the pumps to cool to a safe temperature before commencing maintenance work.
- Check that all the required parts are available and of the correct type before commencing work.
- Ensure that the maintenance technician is familiar with the safety procedures which relate to the products pumped. Wear the appropriate safety-clothing when contact with contaminated components is anticipated. Dismantle and clean contaminated components in a fume-cupboard.
- Isolate the nEXPT Turbopumping Station and other components in the system from the electrical supply so that they cannot be operated accidentally.
- Do not reuse O-rings and Co-seals if they are damaged.
- Dispose of components, grease and oil safely (refer to [Section 6](#)).
- Protect sealing-faces from damage.
- Do not touch or inhale the thermal breakdown products of fluoroelastomer seals. These breakdown products are very dangerous and may be present if the nEXPT Turbopumping Station has been heated to 260°C and above.
- Leak-test the system after maintenance and seal any leaks found if any vacuum or exhaust pipeline connections have been disconnected.

5.2 Maintenance plan

The following documents list the minimum maintenance operations necessary to maintain the nEXPT Turbopumping Station in normal use.

More frequent maintenance may be necessary if the nEXPT Turbopumping Station has been used to pump corrosive or abrasive gases and vapours. If necessary, adjust the maintenance plan according to each experience.

Refer to [Table 1](#).

5.3 Inspect the hoses, pipelines and connections

1. If the turbomolecular pump on the nEXPT Turbopumping Station is water-cooled:
 - Inspect all of the cooling-water connections and check that they are secure. Tighten any loose connections.
 - Inspect all cooling-water hoses, pipelines and connections and check that they are not corroded or damaged and that they do not leak. Replace or repair any corroded or damaged component and seal any leaks found.
2. Inspect all of the electrical connections and check that they are secure. Tighten any loose connections.
3. Inspect all of the electrical cables and check that they are not damaged and have not overheated. Replace or repair any damaged or overheated cable.
4. Inspect all of the vacuum and exhaust connections and check that they are secure. Tighten any loose connections.
5. Inspect all of the vacuum and exhaust pipelines and check that they are not corroded or damaged and that they do not leak. Replace or repair any corroded or damaged component and seal any leaks found.

5.4 Trouble-shooting

WARNING



If the turbo pump is removed for maintenance purpose, all screws which were used to secure both the turbo pump and the turbo mounting plate onto the nEXPT Turbopumping Station must be re-used. If any of these screws are lost or cannot be re-used, a minimum screw strength of Type 12.9 (M8 x 12-15 long) for the turbo pump, and Type 8.8 (M8 x 30 long) for the turbo mounting plate must be used. Failure to follow this warning and the turbo pump seizes, the stored energy in the turbo pump may cause some or all of the screws to fail. This may result in the turbo pump being ejected from the nEXPT Turbopumping Station main housing.

For trouble-shooting instructions on the nEXPT Turbopumping Station, refer to the following documents:

Refer to [Table 1](#).

If the nXDS backing pump fails to start ensure it is in autorun mode and the autorun LED is lit. Refer to A735-01-880, Sections 2.6 and 4.5.

5.5 Software updates

The software within the Controller and the TIC PC monitor program will be updated as part of Edwards ongoing development program. The updates and associated instruction manual can be found by visiting www.upgrades.edwardsvacuum.com.

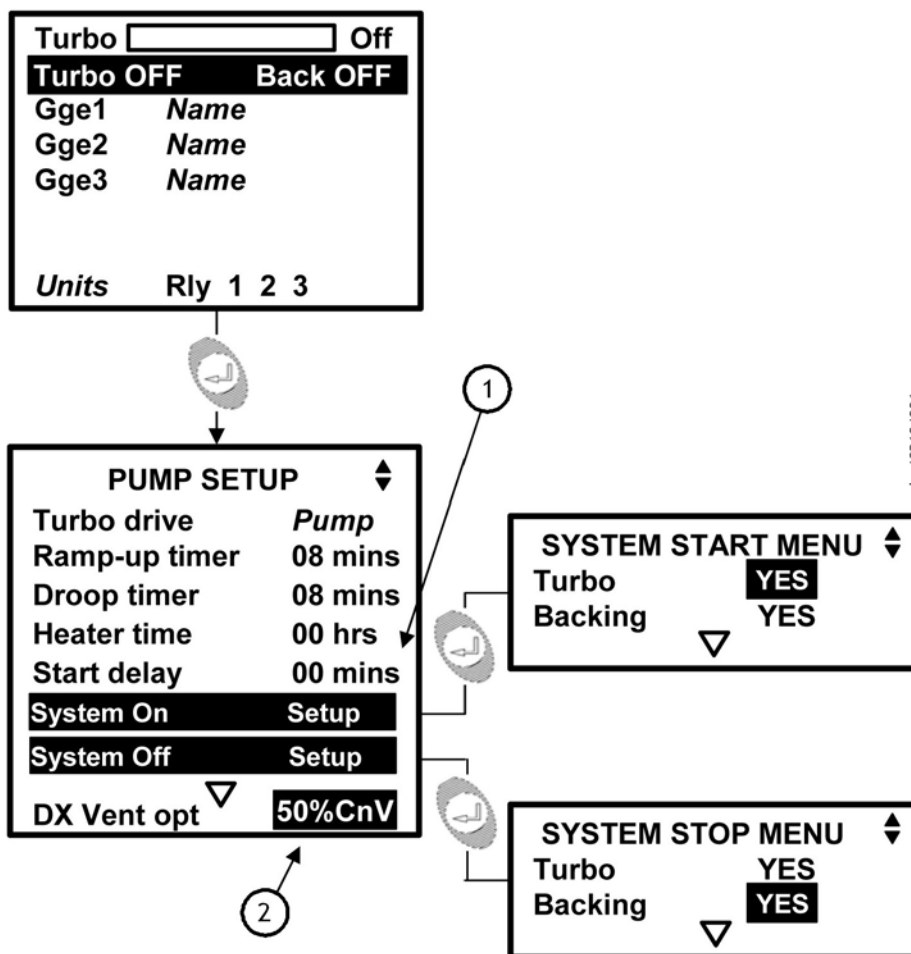
5.6 EXPT TIC controller factory default

The EXPT TIC controller has been setup to provide optimum control for the Pumping Cart, however, the default settings can be changed to suit the system control.

Note: When performing a software update, the TIC will resume back to its original factory default setting. This is different to the nEXPT Turbopumping Station settings. The Pumping Station settings or personal settings may need to be uploaded using the TIC PC Monitoring software before performing a software update. Once the update is complete, the previous settings can be downloaded back into the TIC controller.

Figure 7 below shows the view screen shortcuts and menu structure for the Pumping Station TIC setup. For details of navigating and changing system parameters, refer to the TIC instruction manual.

Figure 7 - EXPT TIC



1. A 2 minute start delay is recommended if the Pumping Station has been configured to use an XDD1 diaphragm pump.

2. This option should be used if the system uses a DX pump.

This page has been intentionally left blank.

6 Storage and disposal

Note: Edwards recommends that long-term storage of the nEXPT Turbopumping Station is avoided. Storing the nEXPT Turbopumping Station for several months, refer to the storage instructions in the relevant instruction manual.

6.1 Storage

Use the following procedure to store the nEXPT Turbopumping Station:

1. Shut down the nEXPT Turbopumping Station as described in [Section 4.3](#).
2. Isolate the nEXPT Turbopumping Station from the electrical supply and disconnect it from the vacuum system.
3. Drain the oil from the backing pump (rotary vane pumps only) as described in the instruction manual for the pump. Refer to the following documents:

Refer to [Table 1](#).

4. Place protective covers over the inlet and outlet-flanges.
5. For the fastest pump-down after the nEXPT Turbopumping Station is re-installed, seal the turbomolecular pump inside a plastic bag together with a suitable desiccant.
6. Store the nEXPT Turbopumping Station in cool, dry conditions until required for use.

6.2 Disposal

Dispose of the nEXPT Turbopumping Station and any components safely in accordance with all local and national safety and environmental requirements.

Particular care must be taken with components which have been contaminated with dangerous process substances.

This page has been intentionally left blank.

7 Spares and accessories

7.1 Introduction

Edwards products, spares and accessories are available from Edwards companies in Belgium, Brazil, Canada, France, Germany, Hong Kong, Italy, Japan, Korea, Switzerland, United Kingdom, U.S.A. and a worldwide network of distributors. The majority of these centres employ Service Engineers who have undergone comprehensive Edwards training courses.

Order spare parts and accessories from the nearest Edwards company or distributor. When ordering, state for each part required:

- Model and Item Number of the equipment
- Serial number (if any)
- Item Number and description of the part.

Fit accessories as described in the Supplementary Publications and in the instruction manual supplied with the accessory.

7.2 Spares

The spares available for use with the nEXPT Turbopumping Station (including replacement component parts) are listed in the instruction manuals supplied as Supplementary Publications.

7.3 Accessories

Refer to the Edwards product catalogue for all turbo and backing pump accessories used on the nEXPT Turbopumping Station.

7.3.1 Bakeout band

Bakeout bands should only be used with air cooling while mounted to the turbomolecular pumping station. Consult the pump instruction manual for maximum bakeout temperature with air cooling. Higher bakeout temperatures can be achieved by mounting the pump away from the system and using water cooling.

7.3.2 nXDS Exhaust Silencer

Reduces noise levels where scroll pump exhaust is open to atmosphere. Suitable for use with systems fitted with nXDS which are not connected to an exhaust system.

This page has been intentionally left blank.

This page has been intentionally left blank.

This page has been intentionally left blank.

Return the equipment or components for service

Before you send your equipment to us for service or for any other reason, you must send us a completed Declaration of Contamination of Vacuum Equipment and Components - Form HS2. The HS2 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.

We provide instructions for completing the form in the Declaration of Contamination of Vacuum equipment and Components - Procedure HS1.

If you are returning a vacuum pump, note the following:

- If a pump is configured to suit the application, make a record of the configuration before returning the pump. All replacement pumps will be supplied with default factory settings.
- Do not return a pump 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 www.edwardsvacuum.com/HSForms/, follow the procedure in HS1, fill in the electronic HS2 form, print it, sign it, and return the signed copy to Edwards.

Note: *If we do not receive a completed HS2 form, we will not accept the return of the equipment.*

