TIC TURBO CONTROLLER

A compact turbo controller with a large clear graphical display, an intuitive user interface and serial communications providing full remote control and data logging functions via a new Windows™ based PC program.

The controller automatically recognizes and supports one 24 V turbomolecular pump from the EXT range. Cooling and vent valve support is provided directly from the controller. Backing pump control is provided for a compact 24 V diaphragm pump (on 200 W versions only), or where greater pumping speeds are required, mains backing pumps (up to E2M28) may be controlled via an optional relay box. The relay box can also be used to control a mains heater band and backing line isolation valve.

Time delays and normal speed signals may be used to control events such as turbo start and there is a comprehensive selection of protection and safety interlock features.

The TIC turbo controller may be either rack or bench mounted and provides a useful hub for the flexible operation of a wide range of vacuum system configurations.

Features & benefits

Universal turbo & instrument controller
- TIC automatically recognizes and controls one 24 V turbomolecular pump from either the DX or EXDC ranges. The 200 W version provides sufficient power to ensure optimum performance of larger 255 turbos. DX turbos have full serial communication with TIC and may be both configured and report status via TIC.

Backing pump support
- Both mains and 24 V backing pumps may be controlled by TIC. The 200 W version supports the new XDD1 dry diaphragm pump. For larger vacuum systems both the 100 W and 200 W versions may control mains backing pumps, including XDS10 and up to E2M28, via the optional relay box.

Relay options
- The optional external relay box enables mains backing pumps to be controlled and also provides interfaces for a turbo heater band, a backing line isolation valve and a logic bypass.
- All relay boxes include a logic bypass facility for further system integration.

Simple system configuration
- In most instances, TIC systems may be simply and quickly configured using the range of standard cables on offer, there is therefore no need for the customer to prepare loom assemblies or relay boxes and special interfaces.

Compact instrument
- TIC is packaged in a compact case and may be panel or rack (¼ 19" rack 3U) mounted. With the addition of the bezel it becomes an attractive bench-top instrument.

Clear, easy to use graphical user interface
- The large 128 x 64 pixel backlit graphics LCD and mobile phone style menu system simplifies programing and with a choice of summary screens excellent visibility of displayed parameters is assured.

Universal power supply
- TIC will operate from mains supplies with voltages between 90 and 264 V ac, and frequencies between 47 and 63 Hz. No user intervention being required.

Serial communications
- To enable complete integration into PC and PLC controlled processes all TIC variants include RS232 and RS485 interfaces as standard.

Windows™ PC program
- TIC is supplied with a new Windows™ PC program which enables full setup and control from a PC using the RS232 interface.

Software upgrades
- As new compatible products are released, TIC software may be simply upgraded using the special utility supplied with the Windows™ PC program.
- TIC software upgrades will be made available via e-mail and the Internet.

TECHNICAL DATA

TURBO PUMP 24 V		
TURBO PUMP OPTIONS	TIC VARIANT	
	100 W	200 W
EXT75DX	Fast	Fast
EXT70H & EXDC80	Fast	Fast
EXT255H & EXDC80*	Slow	Slow
EXT255H & EXDC160	N/A	Fast

* Ramp speed is limited by the use of the EXDC80.

Logic Interface	The logic interface connector includes the functions listed below. It may be used either to link to system relays, a higher-level control system, or an optional relay box. By utilizing the relay box pass-through connector, a combination of a higher-level control system and relay box may be used.
Control inputs	
Turbo start/stop*	Closed when low: < 0.5 V dc Open when High: 4 to 24 V dc
Turbo standby	Closed when low: < 0.5 V dc Open when High: 4 to 24 V dc
Backing pump start/stop*	Closed when low: < 0.5 V dc Open when High: 4 to 24 V dc
System interlock SYSI	Closed when low: < 0.5 V dc Open when High: 4 to 24 V dc
Control outputs	
Vent valve control	O/C 24 V dc 100 mA
Heater band control	O/C 24 V dc 50 mA
Backing pump control	O/C 24 V dc 100 mA
Air cooler	O/C 24 V dc 200 mA
Status outputs	
Analog output	0-10 V dc
Set point A, B, C	O/C 24 V dc 50 mA
Turbo normal speed/alarm	O/C 24 V dc 50m A
Serial interface	The TIC has two built-in communications protocols, RS232 and RS485. These may be used either to interface to a PLC or, using the Windows™ PC software package supplied connected to a PC for full monitoring and control of a TIC system.

* Start/stop commands are 'edge triggered'.

|	TIC TURBO CONTROLLER INSTRUMENTS 100 W RS232	TIC TURBO INSTRUMENTS CONTROLLER 200 W RS232
Mains input		
Electrical supply	90 to 264 V ac 47 to 63 Hz	
Power consumption (max)	215 VA	350 VA
Peak inrush current	10.3 A @ 110 V ac	
	23.0 A @ 230 V ac	
Fuse	TIC is self-protecting and has no user replaceable fuse. The unit will recover when the overload is removed	
Earth stud	M4	
Auxiliary terminals		
Air cooling fan	24 V dc 3 W max, ACX70, ACX75 & ACX250H	
Vent Valve	24 V dc 2 W max, TAV5 & TAV6	
Interface cables	Use cables as specified in 'ordering information'	
Dimensions		
Electronics housing	110 mm high x 105 mm wide x 245 mm deep	
Front panel	106 mm wide x 128 mm high	
Weight		
TIC Turbo controller 100 W RS232	2.75 kg	
TIC Turbo controller 200 W RS232	3.5 kg	
Operating temperature	+0° to +40° C	
Storage temperature	-30° to +70° C	
Maximum ambient operating humidity	90% RH non-condensing at 40° C	
Maximum operating altitude	3000m	
Electronic design	EN 61010-1	
Electromagnetic compatibility	EN 61326 (Industrial Location, Class B Emissions)	
Enclosure rating	IP20	

External interfaces

Bench and rack mounting options (1/4 19" 3U sub rack)
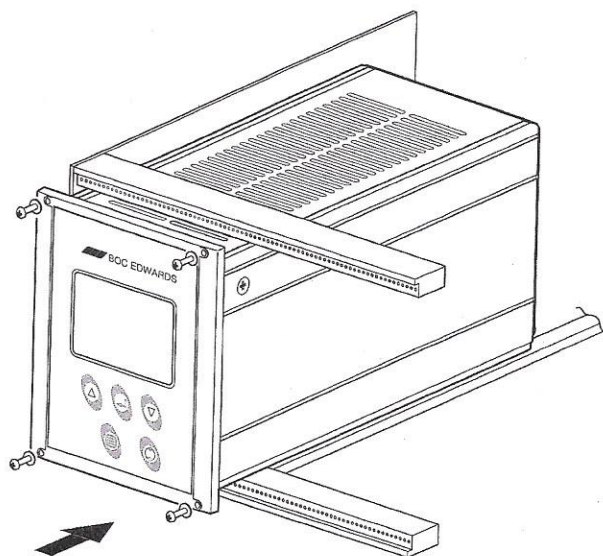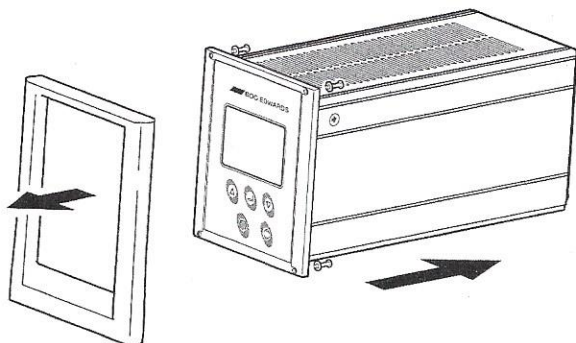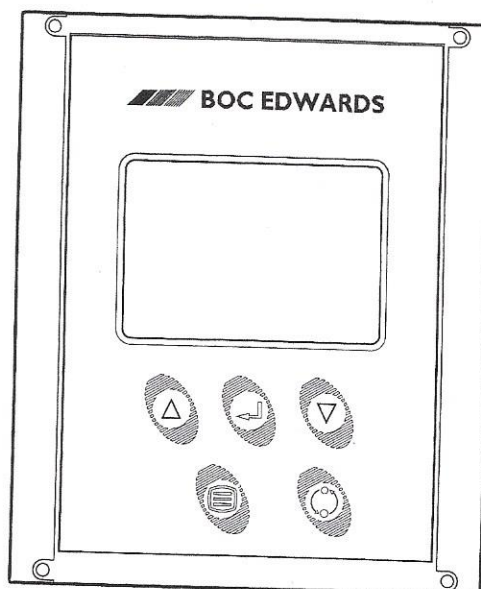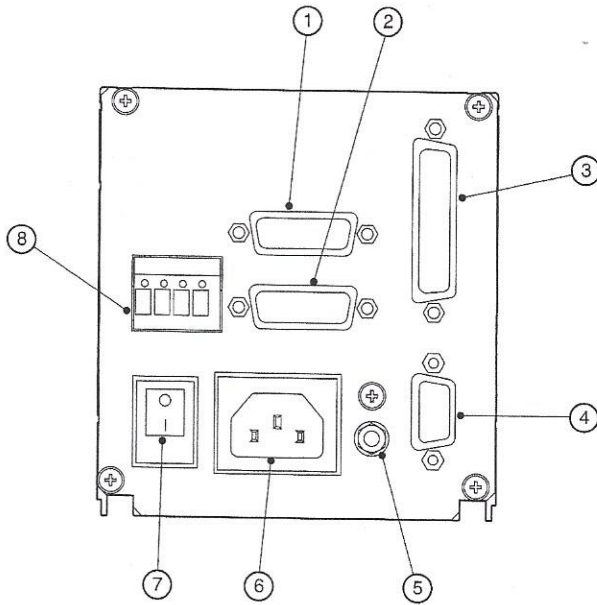

Display - 128 x 64 pixel backlit graphics LCD
Front panel keypad control functions include:

△ Scroll up button

▽ Scroll down button

⏎ Enter/Select button

▤ Menu/Back button

○ Cycle button

1 Backing pump 24 V   15-way 'D' socket *
2 Turbo pump 24 V   15-way 'D' socket
3 Logic Interface   25-way 'D' socket
4 RS232/485   9-way 'D' socket
5 Earth stud   M4
6 Mains input   CEE/IEC 320 plug
7 Mains on/off switch   valve and fan
8 Auxiliary vent terminals (24 V) supply   4-way screw term
* Available on 200 W versions only

Display interface
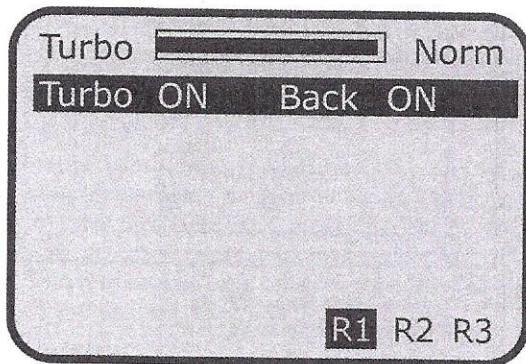
TIC software is structured through a series of easily accessible screens, similar to a mobile telephone.

TIC automatically recognizes which turbo connected and displays the appropriate information on the default summary screen. Scrolling and selecting accesses the control and set-up menus for that item.

Turbo speed is shown as a proportion of full speed by a bar graph. 'Norm' indicates that the turbo has reached its Normal Speed, whilst forward or reverse facing chevrons indicate acceleration and deceleration.

Two levels of password protection are available, effectively restricting or preventing unauthorized intervention.

Pump status is displayed, giving a clear indication of what is currently happening in the vacuum system.

In the event of an error occurring, TIC will display either a WARNING or flash an ALARM. A warning advises of a condition outside normal parameters, requiring no action, but an alarm must be cleared before normal operation may resume

The three setpoint relays, which are highlighted when tripped, may be linked to turbo speed.

Backing pump 24 V

(For mains backing pump support, see below.)

200 W turbo supporting TIC variants recognize and control the following 24 V backing pumps:

XDD1

Relay box (optional)

General description A range of relay boxes has been developed to allow TIC to operate mains backing pumps and accessories.

The mains backing pump relay controls a backing line isolation valve, such that when the backing pump is switched off the isolation valve closes.

The relay box is connected to the TIC via the logic interface connector, which is also provided with a bypass connector for interfacing with OEM equipment.

Relay box options

	Changeover relays (3 off 250 V ac 3 A)	Heater band & backing line isolation valve	Small backing pump	Large backing pump
TIC Relay Box Small Backing pump		✓	✓	
TIC Relay Box Inst & Smalll Backing pump	✓			
TIC Relay Box Inst & Large Backing pump*	✓	✓	✓	✓

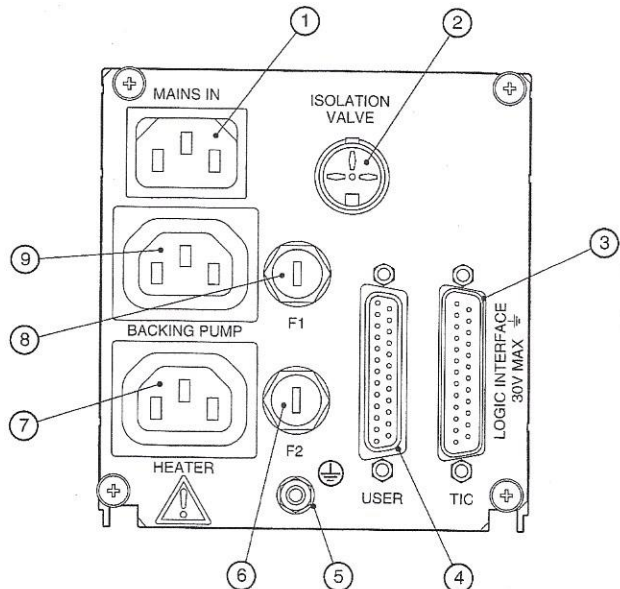* Large backing pump variant currently available as non-standard only

Compatible mains backing pumps and accessories

Small backing pumps: E2M0.7 & 1.5, RV3, 5, 8 & 12, XDSC5 & 10, XDS5 & 10, ESDP12

Large backing pumps: E2M0.7 & 1.5, RV3, 5, 8 & 12, XDSC5 & 10, XDS5 & 10, ESDP12 & GVSP30, E1M18, E2M18 & E2M28

Heater band: BX70 & BX250

Backing line isolation valve: LCPV16EKA & LCPV25EKA

1 Mains input   CEE/IEC 320 plug
2 Backing line isolation valve   3-way DIN socket
3 Logic interface (from TIC)   25-way 'D' socket
4 Logic bypass (to PC, PLC etc.)   25-way 'D' socket
5 Earth stud   M4
6 Heater band fuse
7 Heater band   CEE/IEC 320 socket
8 Mains backing pump fuse
9 Mains backing pump   CEE/IEC 320 socket

Windows™ PC program

TIC is supplied with a fully functional Windows™ based PC software, which replicates and adds to the TIC embedded control menus.
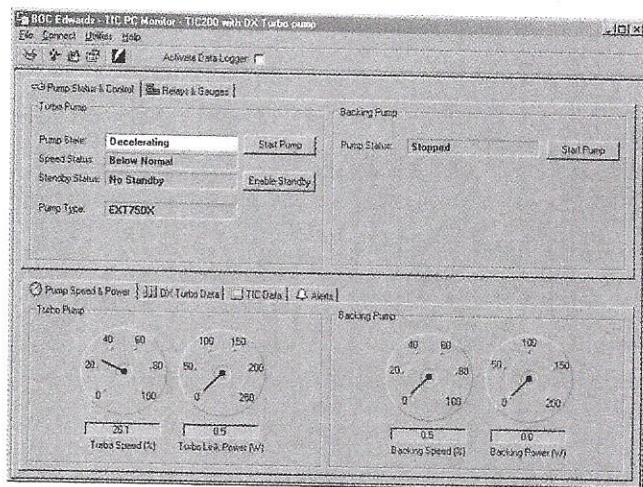

The PC software enables TIC systems to be configured, controlled and monitored from a single PC.

A useful data logging facility is also included, which saves user selectable parameters to file (in .csv format) for later analysis using suitable software.
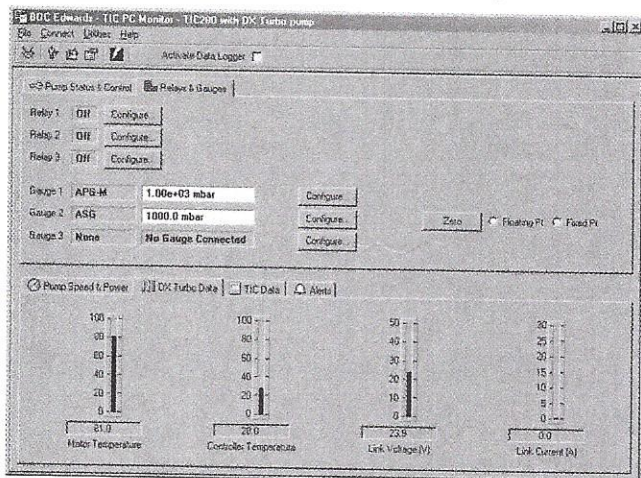
TIC system configurations may be created and saved for use at a later date, thus saving programing time.

The PC software includes an upgrade utility, which enables the TIC embedded software to be upgraded over the serial link from files supplied electronically.
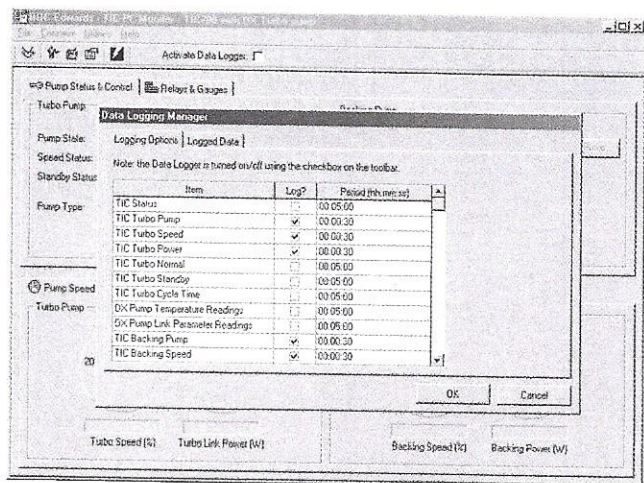
Configuration examples

ITEM	ORDERING NUMBER	DESCRIPTION
A	D397-12-000	TIC turbo 200 W RS232*
B	D400-13-025	2m UK mains cable
C	A746-01-991	XDD1 24 V dc diaphragm pump
D	B722-41-000	EXT75DX ISO63
E	B580-53-075	ACX75 air-cooler
F	D397-00-836	XDD/DX/EXDC extension cable 2m
G	D397-00-836	XDD/DX/EXDC extension cable 2m (optional)

* When using an XDD1 pump, the turbo should be subjected to a short delay.

5
PAGE
272
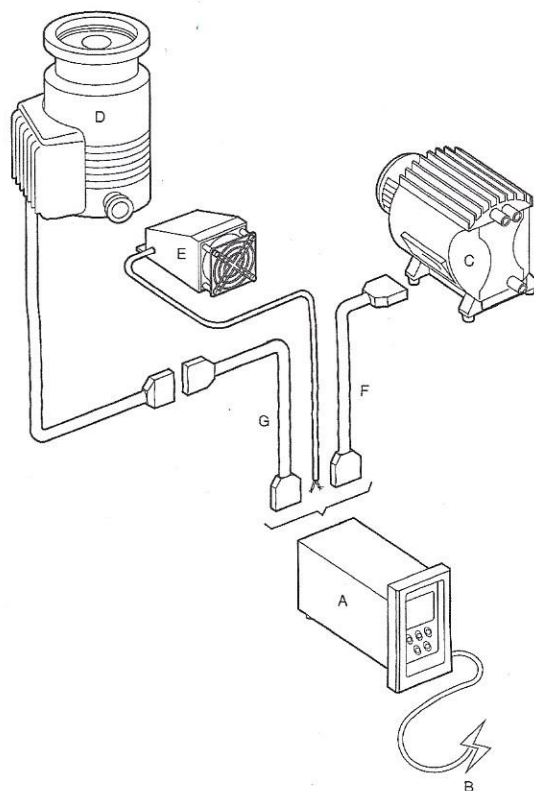
ITEM	ORDERING NUMBER	DESCRIPTION
A	D397-12-000	TIC turbo cont 200 W RS232
B	D400-13-025	2m UK mains cable
C	D397-11-805	TIC relay box sml bkg
D	A746-01-991	XDD1 24V dc diaphragm pump
E	B722-41-000	EXT75DX ISO63
F	B580-52-060	BX70 heater band 240 V 60 W
G	B580-66-010	TAV5 vent valve
H	B580-53-075	ACX75 air-cooler
J	D397-00-833	TIC logic interface cable 2 m
K	D397-00-836	XDD/DX/EXDC extension cable 2 m
L	D397-00-836	XDD/DX/EXDC extension cable 2 m (optional)
M	D397-00-834	TIC RS232 interface cable 2 m (optional)
N	N/A	PC with RS232 interface (optional)

Configuration examples

EXT TURBOMOLECULAR PUMPS
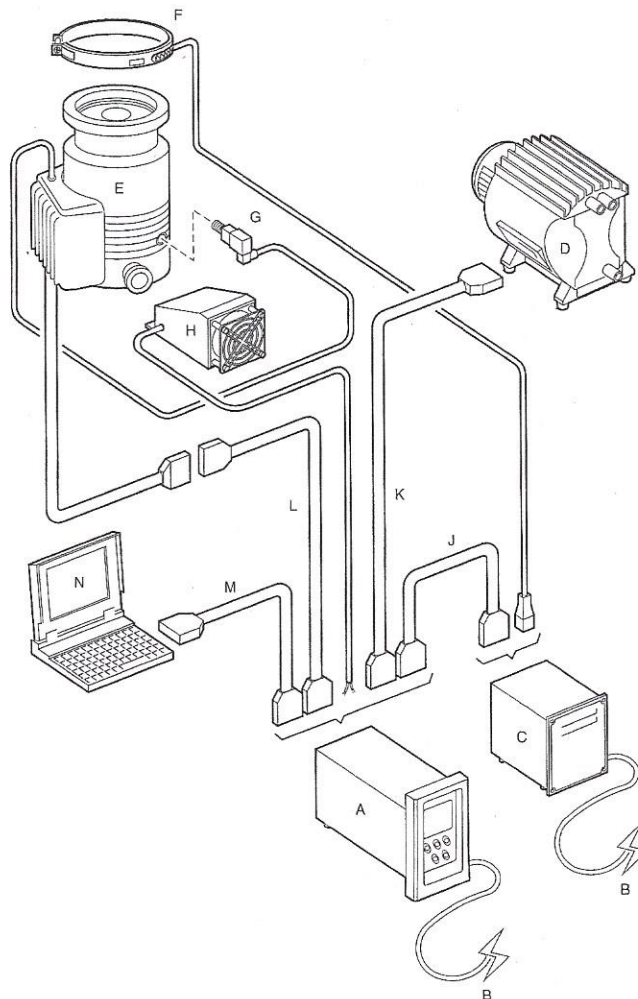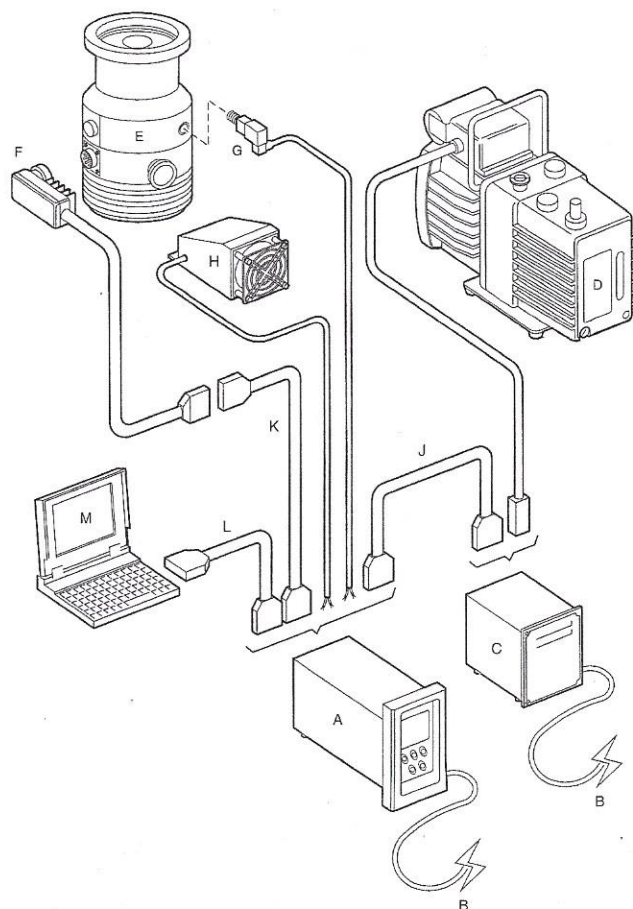
PRODUCT DESCRIPTION	ORDERING NUMBER
Controllers (supplied with manuals & software)	
TIC turbo controller 100 W RS232	D397-11-000
TIC turbo controller 200 W RS232	D397-12-000
Relay boxes (supplied with a set of mating connectors)	
TIC relay box small backing	D397-11-805
Cables	
Mains cables (TIC and relay box supply)	
2m UK plug	D400-13-025
2m USA plug	D400-13-120
2m Northern European plug	D400-13-030
Mains cables (relay box to RV and XDS type pumps)	
2m TIC mains cable IEC320 m/f	D397-00-831
5m TIC mains cable IEC320 m/f	D397-00-832
Interface cables	
2m TIC logic interface cable	D397-00-833
2m TIC RS232 interface cable	D397-00-834
24V pump extension cables (use with EXDC, DX & XDD1 type pumps)	
1m XDD/DX/EXDC extension cable	D397-00-835
2m XDD/DX/EXDC extension cable	D397-00-836
5m XDD/DX/EXDC extension cable	D397-00-837
Other accessories and supporting products	
TIC front bezel kit (spare)	D391-00-822

ITEM	ORDERING NUMBER	DESCRIPTION
A	D397-11-000	TIC turbo cont 100 W RS232
B	D400-13-025	2m UK mains cable
C	D397-11-805	TIC relay box sml bkg
D	A371-22-919	E2M1.5 pump 1-phase
E	B722-21-991	EXT70H DN63ISO-K 24 V
F	D396-45-000	EXDC80 24 V
G	B580-66-010	TAV5 vent valve
H	B580-53-075	ACX75 air-cooler
J	D397-00-833	TIC logic interface cable 2m
K	D397-00-836	XDD/DX/EXDC extension cable 2m (optional)
L	D397-00-834	TIC RS232 interface cable 2 m (optional)
M	N/A	PC with RS232 Interface (optional)