Scientific vapor pumps

Vapor pumps for scientific instruments and R&D applications

VAPOR PUMPS FOR SCIENTIFIC INSTRUMENTS AND R&D APPLICATIONS

Scientific and R & D applications require special vapor pumps and accessories. It is important to minimize any backstreaming of the vapor pump fluid, and the number of elastomer seals used in system design needs to be kept to a minimum, to give clean pumping with minimal outgassing. For bench-top or transportable instruments, compact air-cooled pumps are essential.

BOC Edwards offers a range of vapor pumps and accessories which are designed to meet these needs.

Measurement methods

The methods used to measure pressure and flow have become more accurate in recent years allowing much tighter controls over system conditions. The speeds and throughputs quoted in the catalog for the diffusion pumps are based on actual pump data derived from measurements made with the latest technology total pressure gauges and mass flow transducers in accordance with ISO standards.

Some confusion could arise with previously published speed and throughput figures for older designed pumps where, historically, pressure measurements were made with partial pressure gauges like the McLeod gauge. This older gauge can indicate speeds up to 30% higher than that expected using state of the art total pressure gauges.

Further confusion could arise from the measurement standards chosen to determine pumping performance. In the case of AVS (American Vacuum Society), this can indicate speeds and throughput up to 15% higher than ISO figures.

Historical industry practice meant that in considering the above, and potential gauge accuracy of ± 15%, it was possible to have speeds quoted 60% higher than might be expected using modern total pressure measurement equipment. This should be carefully considered when comparing specifications for older derived data published for similarly sized competitor pumps and BOC Edwards diffusion pumps.

Ultimate vacuum

The ultimate vacuum of a vapor pump is the lowest pressure achieved in tests on the pump, measured above the inlet of the pump (or above the high vacuum valve for the Diffstaks). The ultimate vacuum depends on: the type of fluid used in the pump; the temperature of the inlet baffle; the amount of outgassing from the vacuum system; and the amount of leakage into the system.

Critical backing pressure

The critical backing pressure is the highest pressure that a pump can tolerate in the backing line. If the pressure is higher than the critical backing pressure, the pump may stall. The critical backing pressure depends on: the pump design; the power of the heaters; and the fluid used in the vapor pump.

Backstreaming

Backstreaming is the direct movement of molecules of pump fluid vapor from the pump toward the vacuum system. All BOC Edwards pumps are specially designed to minimize backstreaming; the pumps have a guard ring (sometimes called a cool-cap) fitted above the top jet. The guard ring condenses vapor molecules moving from the top jet toward the vacuum system.

In some sensitive applications, backstreaming may be very undesirable; you can minimize backstreaming if you fit a baffle or a trap to the top of the pump.

Diffstak vapor diffusion pumps

The compact water-cooled Diffstak pumps with an integral cooled baffle offer exceptionally clean pumping with very low backstreaming, reduced outgassing, and a reduction in the number of elastomer seals required for installation.

The Diffstak design has been proven over many years with thousands of pumps installed. They are supplied in three types: standard, cryo-cooled and unvalved. (C – collar model pumps).

The standard Diffstak pumps have integral high vacuum valves and water-cooled baffles. The cryo-cooled versions (CR – model pumps) have a liquid nitrogen cooled baffle supplied from a reservoir attached to the pump and are intended for pumping heavy vapor loads. Valves on both versions are supplied as either manually operated (M-model pumps) or pneumatically operated (P-model pumps). When comparing pumping speeds, note that the speeds quoted for valved Diffstaks are the speeds above the high vacuum valve, taking full account of the valve's impedance.

The unvalved Diffstaks are for systems requiring the highest possible ultimate vacuum or for those which do not need a high vacuum valve. All sizes are available with ISO flanges while two sizes are also available with CF flanges. (F – ConFlat® model pump).

The complete range is shown in the table below. Refer to the following pages for full technical data for each of the pumps and also for full details of installations, spares and accessories.

STANDARD DIFFSTAK	CRYO-COOLED DIFFSTAK	UNVALVED DIFFSTAK	
		ISO FLANGE	CF FLANGE
63/150M or P	CR63/150M or P	63/150C	–
100/300M or P	CR100/300M or P	100/300C	100/300F
160/700M or P	CR160/700M or P	160/700C	160/700F
250/2000M or P	CR250/2000M or P	250/2000C	–

Fast cycling on unvalved systems

For fast cycling pumping systems we recommend our TV range of water or air-cooled pumps. Primarily designed for the evacuation of cathode ray tubes, they will also suit other fast cycling pumping applications.

Accessories

For vapor pump accessories see page 3-15.

APPLICATIONS

- Mass spectrometry
- Gas analysis
- Leak detection
- Thin film coating
- High vacuum systems
- Lamp evacuation
- Surface physics
- Small vacuum ovens
- Vacuum isolation/cryo transfer

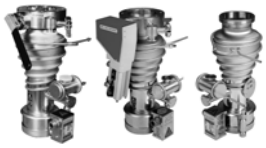
EO50/60 diffusion pump

The EO50/60 is a compact, fast warm-up, air-cooled diffusion pump and makes a good choice for small, low-cost systems. The high helium pumping speed from a pump only 176 mm high is a particular benefit for GCMS applications.

For EO2, EO4, EO6 diffusion pumps contact BOC Edwards.

DATA SUMMARY VAPOR PUMPS

PUMP		63/150M 63/150P	63/150C
Catalog page		3-4	3-5
Pumping speed			
Nitrogen	l s^{-1}	135	150
Hydrogen	l s^{-1}	200	225
Hydrogen (baffled)	l s^{-1}	–	–
Minimum backing pump displacement*	m^3h^{-1}	5	5
Inlet connection		ISO63	ISO63
Backing connection		NW10	NW10



PUMP		100/300M 100/300P	100/300C 100/300F
Catalog page		3-6	3-7
Pumping speed			
Nitrogen	l s^{-1}	280	300
Hydrogen	l s^{-1}	500	535
Hydrogen (baffled)	l s^{-1}	–	–
Minimum backing pump displacement*	m^3h^{-1}	5	5
Inlet connection		ISO100	ISO100 / 6 in
Backing connection		NW25	NW25

PUMP		160/700M 160/700P	160/700C 160/700F
Catalog page		3-8	3-9
Pumping speed			
Nitrogen	l s^{-1}	700	760
Hydrogen	l s^{-1}	1300	1410
Hydrogen (baffled)	l s^{-1}	–	–
Minimum backing pump displacement*	m^3h^{-1}	12	12
Inlet connection		ISO160	ISO160 / 8 in

PUMP		250/2000M 250/2000P	250/2000C
Catalog page		3-10	3-11
Pumping speed			
Nitrogen	l s^{-1}	2000	2130
Hydrogen	l s^{-1}	3000	3200
Hydrogen (baffled)	l s^{-1}	–	–
Minimum backing pump displacement*	m^3h^{-1}	40	40
Inlet connection		ISO250	ISO250
Backing connection		NW40	NW40

PUMP		EO50/60
Catalog page		3-14
Pumping speed		
Air	l s^{-1}	60
Air (baffled)	l s^{-1}	27
Nitrogen	l s^{-1}	–
Hydrogen	l s^{-1}	70
Hydrogen (baffled)	l s^{-1}	50
Minimum backing pump displacement*	m^3h^{-1}	1
Inlet connection		NW50 flange
Backing connection		NW10 flange

* For maximum throughput. (63/150M and 63/150P – For applications where maximum throughput is not required, use an RV3.)

STANDARD DIFFSTAK 63/150M AND 63/150P

Standard Diffstak 63/150M

Standard Diffstak 63/150P

TECHNICAL DATA

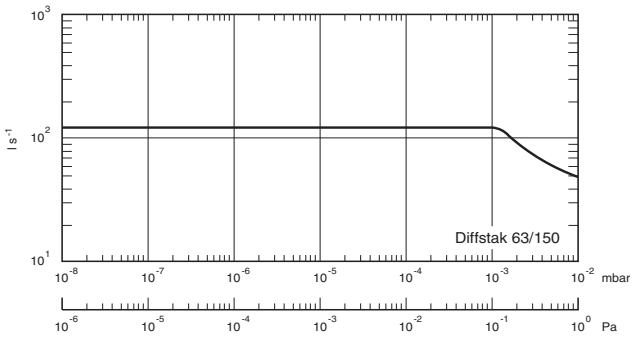
M – model pumps have a manually operated high vacuum isolation valve.
P – model pumps have a pneumatically actuated high vacuum isolation valve.

Pumping speed	
nitrogen	135 l s^{-1}
hydrogen	200 l s^{-1}
Minimum backing pump displacement*	5 m^3h^{-1}
Recommended backing pump	RV5
Recommended fluid	Santovac® 5
Fluid charge (dry)	60 ml
Inlet connection compatible with	ISO63
Backing connection	NW10
Cooling water connection	6 mm compression fittings
Heater power	0.45 kW
Minimum cooling-water flow at 20 °C	42 l h^{-1}
Pneumatic connections†	6 mm coupling x ¼ BSP male stud
Pneumatic actuating pressure†	
Minimum	2.4 bar / 35 psi
Maximum	6.9 bar / 100 psi
Weight	
63/150M	8 kg
63/150P	9 kg

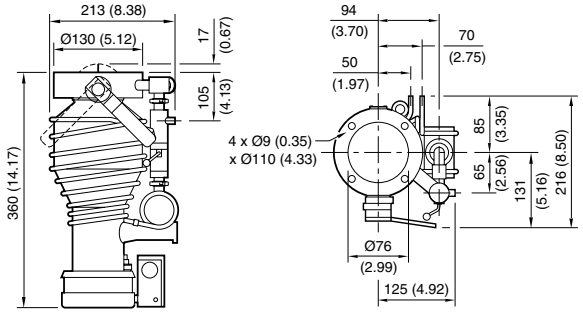
* For maximum throughput. For applications where maximum throughput is not required, use an RV3.

† 63/150P only

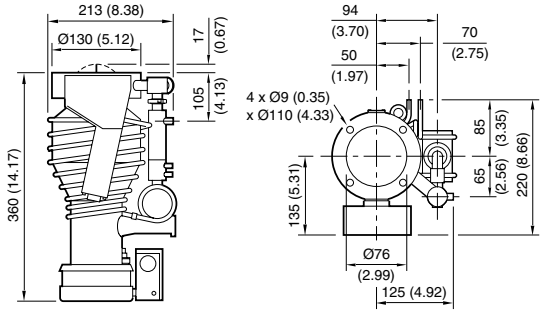
FLUID	CRITICAL BACKING PRESSURE (mbar)	ULTIMATE PRESSURE (mbar)
Santovac® 5	0.6	5×10^{-9}
Silicone DC702	1.2	7×10^{-6}
Silicone DC704EU	0.8	7×10^{-8}
Silicone DC705	0.6	3×10^{-8}



Santovac® is a registered trademark of Santovac Fluids Inc, USA



Diffstak 63/150M



Diffstak 63/150P

The BRV and PVK valves shown in these dimension diagrams are optional accessories.

ORDERING INFORMATION

PRODUCT DESCRIPTION	ORDERING NUMBER
Diffstak 63/150M	
110-125 V 1-ph 50/60 Hz	B34431976
210-225 V 1-ph 50/60 Hz	B34431977
230-250 V 1-ph 50/60 Hz	B34431978
Diffstak 63/150P	
110-125 V 1-ph 50/60 Hz	B34432976
210-225 V 1-ph 50/60 Hz	B34432977
230-250 V 1-ph 50/60 Hz	B34432978
Supplied with: NW10 elbow, NW10 centering-ring, NW10 clamp, water pipe couplings and ferrules, inlet ISO 63 Co-Seal	

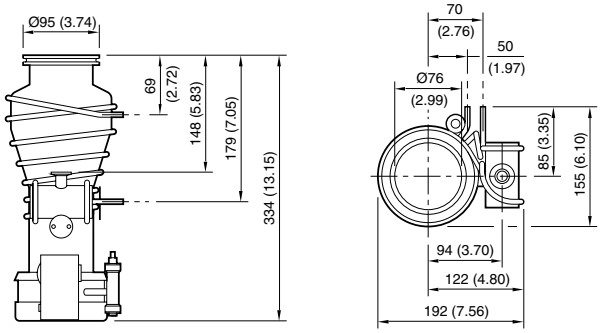
SPARES	ORDERING NUMBER
Heater (0.45 kW)	
110-125 V	H01700182
210-225 V	H01700186
230-250 V	H01700191
Valve plate "O" ring VIT0335	H02106050
Valve shaft seal "O" ring VIT0012*	H02106010
Valve blanking plate "O" ring VIT0112*	H02106012
Backing "O" ring assembly (fluoroelastomer)	C10511395
Drain and filler plug "O" rings*	H02123027

* Pack of 5

For information about installation of Diffstak pumps, see page 3-12. For details of suitable backing/ roughing valves, see page 5-14; for electropneumatic control valves, see page 5-20; for thermal snap-switch accessories, see page 3-15; for hardware components, see page 6-1; and for vapor pump fluids, see page 6-46.

UNVALVED DIFFSTAK 63/150C

Unvalved Diffstak 63/150C



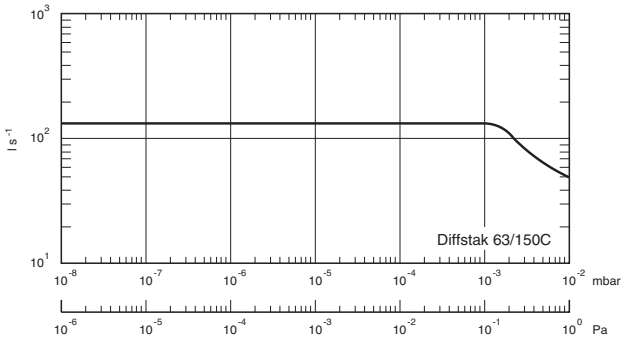
TECHNICAL DATA

C – model pumps have an unvalved ISO collar inlet flange.

Pumping speed	
nitrogen	150 l s^{-1}
hydrogen	225 l s^{-1}
Minimum backing pump displacement*	5 m^3h^{-1}
Recommended backing pump	RV5
Recommended fluid	Santovac® 5
Fluid charge (dry)	60 ml
Inlet connection	ISO63
Backing connection	NW10
Cooling water connection	6 mm compression fittings
Minimum cooling-water flow at 20 °C	42 l h^{-1}
Heater power	0.45 kW
Weight	5 kg

* For maximum throughput.

FLUID	CRITICAL BACKING PRESSURE (mbar)	ULTIMATE PRESSURE (mbar)
Santovac® 5	0.6	5×10^{-9}
Silicone DC702	1.2	7×10^{-6}
Silicone DC704EU	0.8	7×10^{-8}
Silicone DC705	0.6	3×10^{-8}



ORDERING INFORMATION

PRODUCT DESCRIPTION	ORDERING NUMBER
Diffstak 63/150C	
110-125 V 1-ph 50/60 Hz	B34433976
210-225 V 1-ph 50/60 Hz	B34433977
230-250 V 1-ph 50/60 Hz	B34433978

Supplied with: NW10 elbow, NW10 centering-ring, NW10 clamp, water pipe couplings and ferrules, inlet ISO 63 Co-Seal.

SPARES	ORDERING NUMBER
Heater (0.45 kW)	
110-125 V	H01700182
210-225 V	H01700186
230-250 V	H01700191

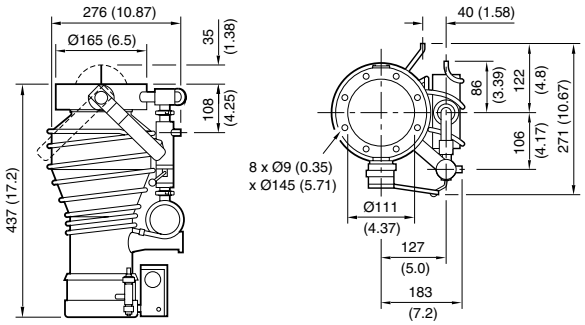
For information about spares, refer to standard Diffstak 63/150 (see page 3-4). For information about installation of Diffstak pumps, see page 3-12. For details of suitable backing/ roughing valves, see page 5-14; for electropneumatic control valves, see page 5-20; for thermal snap-switch accessories, see page 3-15; for hardware components, see page 6-1; and for vapor pump fluids, see page 6-46.

For information on the Cryo-cooled version, contact BOC Edwards.

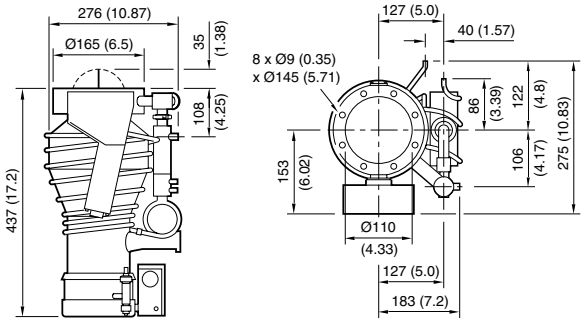
STANDARD DIFFSTAK 100/300M AND 100/300P

Standard Diffstak 100/300M

Standard Diffstak 100/300P



Diffstak 100/300M



Diffstak 100/300P

The BRV and PVK valves shown in these dimension diagrams are optional accessories.

TECHNICAL DATA

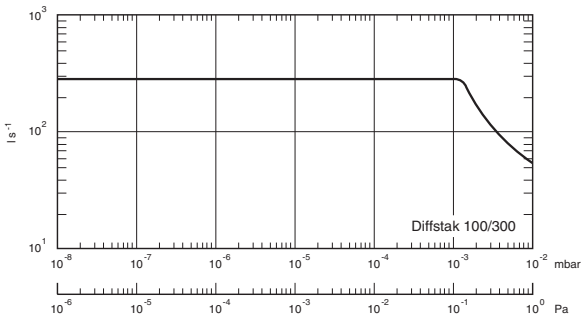
M – model pumps have a manually operated high vacuum isolation valve.
P – model pumps have a pneumatically actuated high vacuum isolation valve.

Pumping speed	
nitrogen	280 l s^{-1}
hydrogen	500 l s^{-1}
Minimum backing pump displacement*	5 m^3h^{-1}
Recommended backing pump	RV5 or RV8
Recommended fluid	Santovac® 5
Fluid charge (dry)	125 ml
Inlet connection compatible with	ISO100
Backing connection	NW25
Cooling water connection	6 mm compression fittings
Heater power	0.65 kW
Minimum cooling-water flow at 20 °C	60 l h^{-1}
Pneumatic connections†	6 mm coupling x ¼ BSP male stud
Pneumatic actuating pressure†	
Minimum	2.4 bar / 35 psi
Maximum	6.9 bar / 100 psi
Weight	
100/300M	12 kg
100/300P	13 kg

* For maximum throughput

† 100/300P only

FLUID	CRITICAL BACKING PRESSURE (mbar)	ULTIMATE PRESSURE (mbar)
Santovac® 5	0.6	5×10^{-9}
Silicone DC702	1.2	7×10^{-6}
Silicone DC704EU	0.8	7×10^{-8}
Silicone DC705	0.6	3×10^{-8}



ORDERING INFORMATION

PRODUCT DESCRIPTION	ORDERING NUMBER
Diffstak 100/300M	
110-125 V 1-ph 50/60 Hz	B34631976
210-225 V 1-ph 50/60 Hz	B34631977
230-250 V 1-ph 50/60 Hz	B34631978
Diffstak 100/300P	
110-125 V 1-ph 50/60 Hz	B34632976
210-225 V 1-ph 50/60 Hz	B34632977
230-250 V 1-ph 50/60 Hz	B34632978
Supplied with: NW25 elbow, NW25 centering-ring, NW25 clamp, water pipe couplings and ferrules, inlet ISO 100 Co-Seal	

SPARES	ORDERING NUMBER
Heater (0.65 kW)	
110-125 V	H01700199
210-225 V	H01700097
230-250 V	H01700190
Valve plate "O" ring VIT0346	H02106061
Valve shaft seal "O" ring VIT0012*	H02106010
Valve blanking plate "O" ring VIT0112*	H02106012
Backing "O" ring assembly (fluoroelastomer)	C10514395
Drain and filler plug "O" rings*	H02123027

* Pack of 5

For information about installation of Diffstak pumps, see page 3-12. For details of suitable backing/ roughing valves, see page 5-14; for electropneumatic control valves, see page 5-20; for thermal snap-switch accessories, see page 3-15; for hardware components, see page 6-1; and for vapor pump fluids, see page 6-46.

UNVALVED DIFFSTAK 100/300C AND 100/300F

Unvalved Diffstak 100/300C

Unvalved Diffstak 100/300F

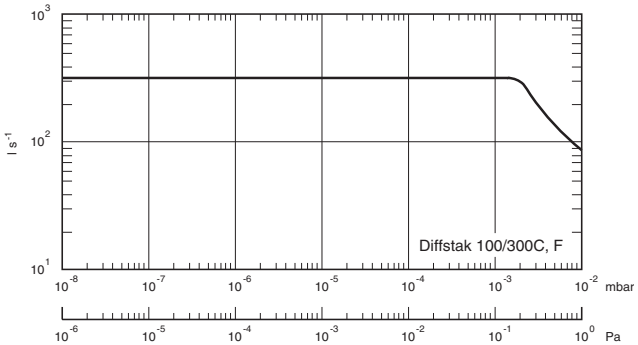
TECHNICAL DATA

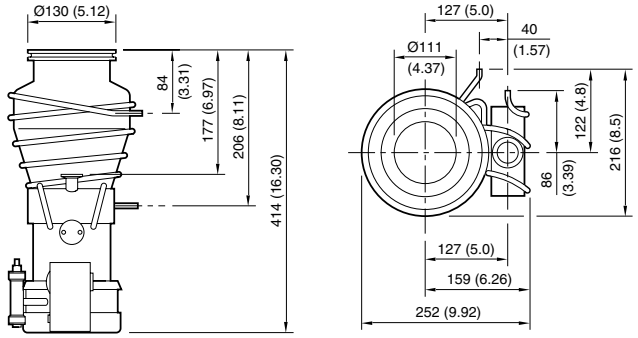
C – model pumps have an unvalved ISO collar inlet flange.
F – model pumps are unvalved and have a copper compression gasket flange (ConFlat®).

Pumping speed	
nitrogen	300 l s^{-1}
hydrogen	535 l s^{-1}
Minimum backing pump displacement*	5 m^3h^{-1}
Recommended backing pump	RV5 or RV8
Recommended fluid	Santovac® 5
Fluid charge (dry)	125 ml
Inlet connection	
100/300C	ISO100
100/300F	6 inch
Backing connection	NW25
Cooling water connection	6 mm compression fittings
Minimum cooling-water flow at 20 °C	60 l h^{-1}
Heater power	0.65 kW
Weight	
100/300C	9 kg
100/300F	10 kg

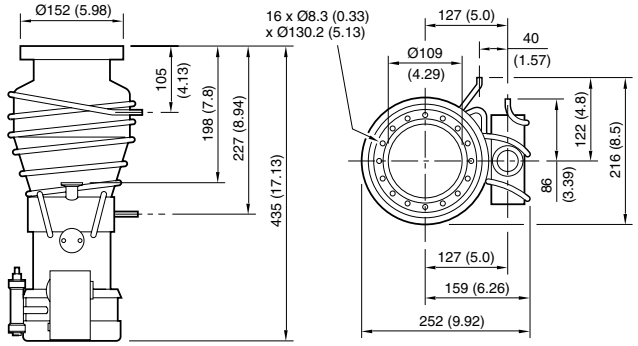
* For maximum throughput

FLUID	CRITICAL BACKING PRESSURE (mbar)	ULTIMATE PRESSURE (mbar)
Santovac® 5	0.6	5×10^{-9}
Silicone DC702	1.2	7×10^{-6}
Silicone DC704EU	0.8	7×10^{-8}
Silicone DC705	0.6	3×10^{-8}





Diffstak 100/300C



Diffstak 100/300F

ORDERING INFORMATION

PRODUCT DESCRIPTION	ORDERING NUMBER
Diffstak 100/300C	
110-125 V 1-ph 50/60 Hz	B34633976
210-225 V 1-ph 50/60 Hz	B34633977
230-250 V 1-ph 50/60 Hz	B34633978
Diffstak 100/300F	
110-125 V 1-ph 50/60 Hz	B34640976
210-225 V 1-ph 50/60 Hz	B34640977
230-250 V 1-ph 50/60 Hz	B34640978

Supplied with: NW25 elbow, NW25 centering-ring, NW25 clamp, water pipe couplings and ferrules inlet ISO Co-Seal (C version only).

SPARES	ORDERING NUMBER
Heater (0.65 kW)	
110-125 V	H01700199
210-225 V	H01700097
230-250 V	H01700190

For information about spares, refer to standard Diffstak 100/300 (see page 3-6). For information about installation of Diffstak pumps, see page 3-12. For details of suitable backing/ roughing valves, see page 5-14; for electropneumatic control valves, see page 5-20; for thermal snap-switch accessories, see page 3-15; for hardware components, see page 6-1; and for vapor pump fluids, see page 6-46.

For information on the Cryo-cooled version, contact BOC Edwards.

STANDARD DIFFSTAK 160/700M AND 160/700P

Standard Diffstak 160/700P

TECHNICAL DATA

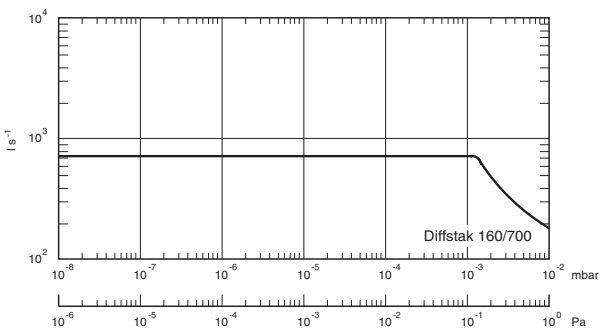
M – model pumps have a manually operated high vacuum isolation valve.
P – model pumps have a pneumatically actuated high vacuum isolation valve.

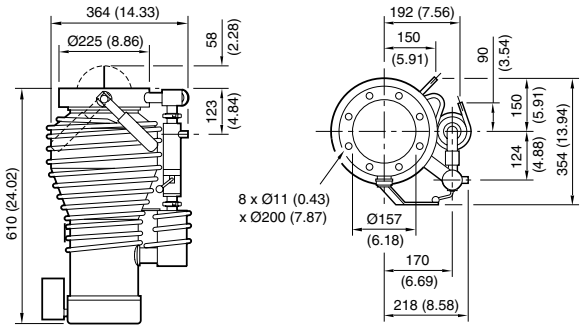
Pumping speed	
nitrogen	700 l s^{-1}
hydrogen	1300 l s^{-1}
Minimum backing pump displacement*	12 m^3h^{-1}
Recommended backing pump	RV12 or E2M18
Recommended fluid	Santovac® 5
Fluid charge (dry)	255 ml
Inlet connection compatible with	ISO160
Backing connection	NW25
Cooling water connection	10 mm compression fittings
Heater power	1.35 kW
Minimum cooling-water flow at 20 °C	115 l h^{-1}
Pneumatic connections†	6 mm coupling x ¼ BSP male stud
Pneumatic actuating pressure†	
Minimum	2.4 bar / 35 psi
Maximum	6.9 bar / 100 psi
Weight	
160/700M	26 kg
160/700P	27 kg

* For maximum throughput

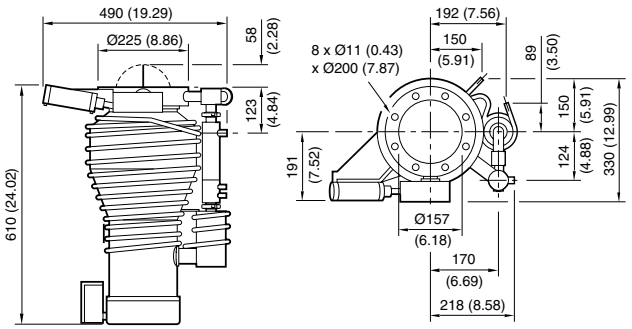
† 160/700P only

FLUID	CRITICAL BACKING PRESSURE (mbar)	ULTIMATE PRESSURE (mbar)
Santovac® 5	0.6	5×10^{-9}
Silicone DC702	1.2	7×10^{-6}
Silicone DC704EU	0.8	7×10^{-8}
Silicone DC705	0.6	3×10^{-8}





Diffstak 160/700M



Diffstak 160/700P

The BRV and PVK valves shown in these dimension diagrams are optional accessories.

ORDERING INFORMATION

PRODUCT DESCRIPTION	ORDERING NUMBER
Diffstak 160/700M	
110-125 V 1-ph 50/60 Hz	B34831976
210-225 V 1-ph 50/60 Hz	B34831977
230-250 V 1-ph 50/60 Hz	B34831978
Diffstak 160/700P	
110-125 V 1-ph 50/60 Hz	B34832976
210-225 V 1-ph 50/60 Hz	B34832977
230-250 V 1-ph 50/60 Hz	B34832978
Supplied with: NW25 elbow, NW25 centering-ring, NW25 clamp, water pipe couplings and ferrules, inlet ISO 160 Co-Seal	

SPARES	ORDERING NUMBER
Heater (one heater of each power is required)	
110-125 V 0.35 kW	H01700102
110-125 V 1 kW	H01700059
210-225 V 0.35 kW	H01700107
210-225 V 1 kW	H01700063
230-250 V 0.35 kW	H01700113
230-250 V 1 kW	H01700054
Valve plate "O" ring VIT1221	H02106221
Valve shaft seal "O" ring VIT0111*	H02106011
Valve blanking plate "O" ring VIT0111*	H02106011
Backing "O" ring assembly (fluoroelastomer)	C10514395
Drain and filler plug "O" rings*	H02123027

* Pack of 5

For information about installation of Diffstak pumps, see page 3-12. For details of suitable backing/ roughing valves, see page 5-14; for electropneumatic control valves, see page 5-20; for thermal snap-switch accessories, see page 3-15; for hardware components, see page 6-1; and for vapor pump fluids, see page 6-46.

UNVALVED DIFFSTAK 160/700C AND 160/700F

Unvalved Diffstak 160/700C

Unvalved Diffstak 160/700F

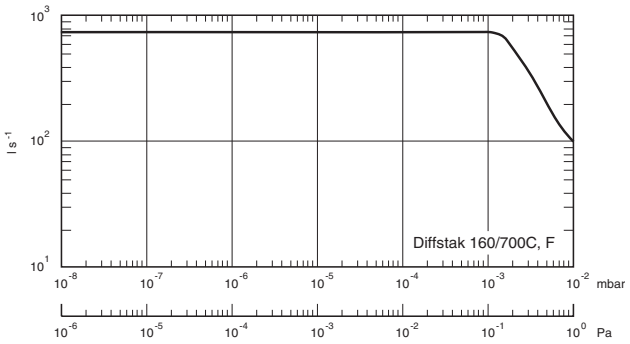
TECHNICAL DATA

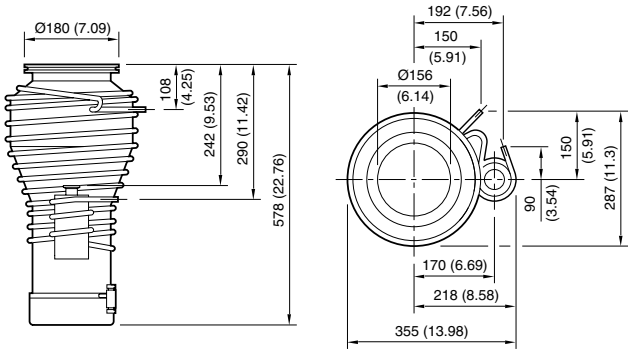
C – model pumps have an unvalved ISO collar inlet flange.
F – model pumps are unvalved and have a copper compression gasket flange (ConFlat®).

Pumping speed	
nitrogen	760 l s^{-1}
hydrogen	1410 l s^{-1}
Minimum backing pump displacement*	12 m^3h^{-1}
Recommended backing pump	RV12 or E2M18
Recommended fluid	Santovac® 5
Fluid charge (dry)	250 ml
Inlet connection	
160/700C	ISO160
160/700F	8 inch
Backing connection	NW25
Cooling water connection	10 mm compression fittings
Minimum cooling-water flow at 20 °C	115 l h^{-1}
Heater power	1.35 kW
Weight	
160/700C	18 kg
160/700F	20 kg

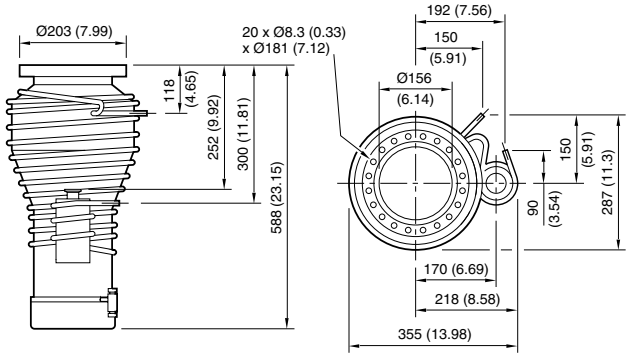
* For maximum throughput

FLUID	CRITICAL BACKING PRESSURE (mbar)	ULTIMATE PRESSURE (mbar)
Santovac® 5	0.6	5×10^{-9}
Silicone DC702	1.2	7×10^{-6}
Silicone DC704EU	0.8	7×10^{-8}
Silicone DC705	0.6	3×10^{-8}





Diffstak 160/700C



Diffstak 160/700F

ORDERING INFORMATION

PRODUCT DESCRIPTION	ORDERING NUMBER
Diffstak 160/700C	
110-125 V 1-ph 50/60 Hz	B34833976
210-225 V 1-ph 50/60 Hz	B34833977
230-250 V 1-ph 50/60 Hz	B34833978
Diffstak 160/700F	
110-125 V 1-ph 50/60 Hz	B34840976
210-225 V 1-ph 50/60 Hz	B34840977
230-250 V 1-ph 50/60 Hz	B34840978

Supplied with: NW25 elbow, NW25 centering-ring, NW25 clamp, water pipe couplings and ferrules, inlet ISO 160 Co-Seal (C version only).

SPARES	ORDERING NUMBER
Heater (one heater of each power is required)	
110-125 V 0.35 kW	H01700102
110-125 V 1 kW	H01700059
210-225 V 0.35 kW	H01700107
210-225 V 1 kW	H01700063
230-250 V 0.35 kW	H01700113
230-250 V 1 kW	H01700154

For information about spares, refer to standard Diffstak 160/700 (see page 3-8). For information about installation of Diffstak pumps, see page 3-12. For details of suitable backing/ roughing valves, see page 5-14; for electropneumatic control valves, see page 5-14; for thermal snap-switch accessories, see page 3-15; for hardware components, see page 6-1; and for vapor pump fluids, see page 6-46.

For information on the Cryo-cooled version, contact BOC Edwards.

STANDARD DIFFSTAK 250/2000M AND 250/2000P

Standard Diffstak 250/2000M

TECHNICAL DATA

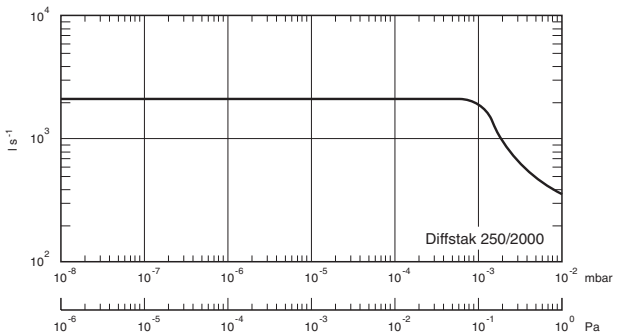
M – model pumps have a manually operated high vacuum isolation valve.
P – model pumps have a pneumatically actuated high vacuum isolation valve.

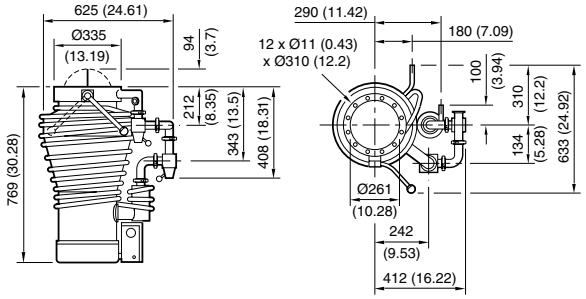
Pumping speed	
nitrogen	2000 l s^{-1}
hydrogen	3000 l s^{-1}
Minimum backing pump displacement*	40 m^3h^{-1}
Recommended backing pump	E2M40
Recommended fluid	Santovac® 5
Fluid charge (dry)	500 ml
Inlet connection compatible with	ISO250
Backing connection	NW40
Cooling water connection	10 mm compression fittings
Heater power	2.25 kW
Minimum cooling-water flow at 20 °C	180 l h^{-1}
Pneumatic connections†	6 mm coupling x ¼ BSP male stud
Pneumatic actuating pressure†	
Minimum	2.4 bar / 35 psi
Maximum	6.9 bar / 100 psi
Weight	
250/2000M	59 kg
250/2000P	60 kg

* For maximum throughput.

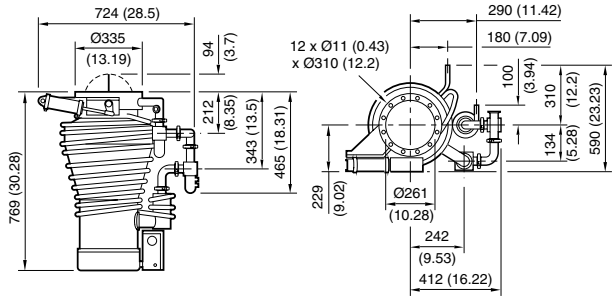
† 250/2000P only

FLUID	CRITICAL BACKING PRESSURE (mbar)	ULTIMATE PRESSURE (mbar)
Santovac® 5	0.6	5×10^{-9}
Silicone DC702	1.2	7×10^{-6}
Silicone DC704EU	0.8	7×10^{-8}
Silicone DC705	0.6	3×10^{-8}





Diffstak 250/2000M



Diffstak 250/2000P

The BRV and PVK valves shown in these dimension diagrams are optional accessories.

ORDERING INFORMATION

PRODUCT DESCRIPTION	ORDERING NUMBER
Diffstak 250/2000M	
110-125 V 1-ph 50/60 Hz	B35031976
210-225 V 1-ph 50/60 Hz	B35031977
230-250 V 1-ph 50/60 Hz	B35031978
Diffstak 250/2000P	
110-125 V 1-ph 50/60 Hz	B35032976
210-225 V 1-ph 50/60 Hz	B35032977
230-250 V 1-ph 50/60 Hz	B35032978
Supplied with: NW40 elbow, NW40 centering-ring, NW40 clamp, water pipe couplings and ferrules, inlet ISO 250 trapped "O" ring	

SPARES	ORDERING NUMBER
Heater (one heater of each power is required)	
110-125 V 0.85 kW	H01700140
110-125 V 1.4 kW	H01700161
210-225 V 0.85 kW	H01700134
210-225 V 1.4 kW	H01700155
230-250 V 0.85 kW	H01700137
230-250 V 1.4 kW	H01700158
Valve plate "O" ring VIT0449	H02106093
Valve shaft seal "O" ring VIT1121 (pack of 2)	H02106121
Valve blanking plate "O" ring VIT1128 (pack of 2)	H02106128
Backing "O" ring assembly (fluoroelastomer)	C10516395
Drain and filler plug "O" rings (pack of 5)	H02123027

For information about installation of Diffstak pumps, see page 3-12. For details of suitable backing/ roughing valves, see page 5-14; for electropneumatic control valves, see page 5-20; for thermal snap-switch accessories, see page 3-15; for hardware components, see page 6-1; and for vapor pump fluids, see page 6-46.

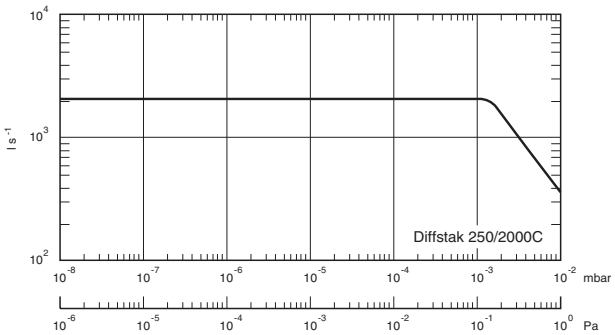
TECHNICAL DATA

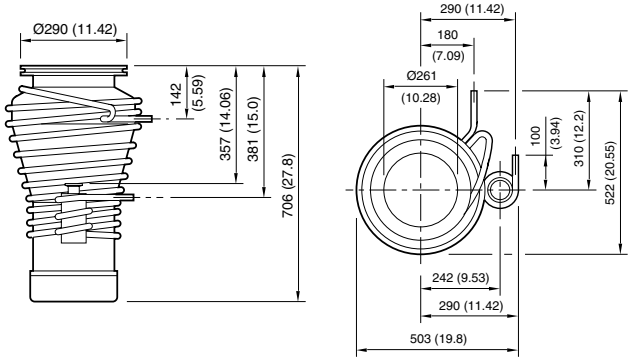
C – model pumps have an unvalved ISO collar inlet flange.

Pumping speed	
nitrogen	2130 l s^{-1}
hydrogen	3200 l s^{-1}
Minimum backing pump displacement*	40 m^3h^{-1}
Recommended backing pump	E2M40
Recommended fluid	Santovac® 5
Fluid charge (dry)	500 ml
Inlet connection	ISO250
Backing connection	NW40
Cooling water connection	10 mm compression fittings
Minimum cooling-water flow at 20 °C	180 l h^{-1}
Heater power	2.25 kW
Weight	46 kg

* For maximum throughput

FLUID	CRITICAL BACKING PRESSURE (mbar)	ULTIMATE PRESSURE (mbar)
Santovac® 5	0.6	5×10^{-9}
Silicone DC702	1.2	7×10^{-6}
Silicone DC704EU	0.8	7×10^{-8}
Silicone DC705	0.6	3×10^{-8}





ORDERING INFORMATION

PRODUCT DESCRIPTION	ORDERING NUMBER
Diffstak 250/2000C	
110-125 V 1-ph 50/60 Hz	B35033976
210-225 V 1-ph 50/60 Hz	B35033977
230-250 V 1-ph 50/60 Hz	B35033978

Supplied with: NW40 elbow, NW40 centering-ring, NW40 clamp, water pipe couplings and ferrules, inlet ISO 250 trapped "O" ring

SPARES	ORDERING NUMBER
Heater (one heater of each power is required)	
110-125 V 0.85 kW	H01700140
110-125 V 1.4 kW	H01700161
210-225 V 0.85 kW	H01700134
210-225 V 1.4 kW	H01700155
230-250 V 0.85 kW	H01700137
230-250 V 1.4 kW	H01700158

For information about spares, refer to standard Diffstak 250/2000 (see page 3-10). For information about installation of Diffstak pumps, see page 3-12. For details of suitable backing/ roughing valves, see page 5-14; for electropneumatic control valves, see page 5-20; for thermal snap-switch accessories, see page 3-15; for hardware components, see page 6-1; and for vapor pump fluids, see page 6-46.

For information on the Cryo-cooled version, contact BOC Edwards.

DIFFSTAK INSTALLATION

- M-model pumps have a manually operated high vacuum valve. P-model pumps have a pneumatically operated high vacuum valve. Both M-model and P-model pumps have inlet flanges which are compatible with ISO flanges: the internal diameter of the inlet flange is narrower and the flange is deeper than a standard ISO flange, to accommodate the high vacuum valve.
- C-model pumps do not have a high vacuum valve and have an ISO flange on the inlet (see pages 3-5 – 3-11).
- F-model pumps do not have a high vacuum valve and have a CF flange on the inlet (see pages 3-7 and 3-9).

Refer to the diagrams and the tables on these pages to identify the pipeline components and valves required to complete the typical Diffstak installation shown. Items supplied with the pump are shown as a dotted line. Read the footnotes below the diagrams and the tables for more information and for details of the installation requirements for the different models of Diffstaks.

63/150, 100/300, 160/700 installation

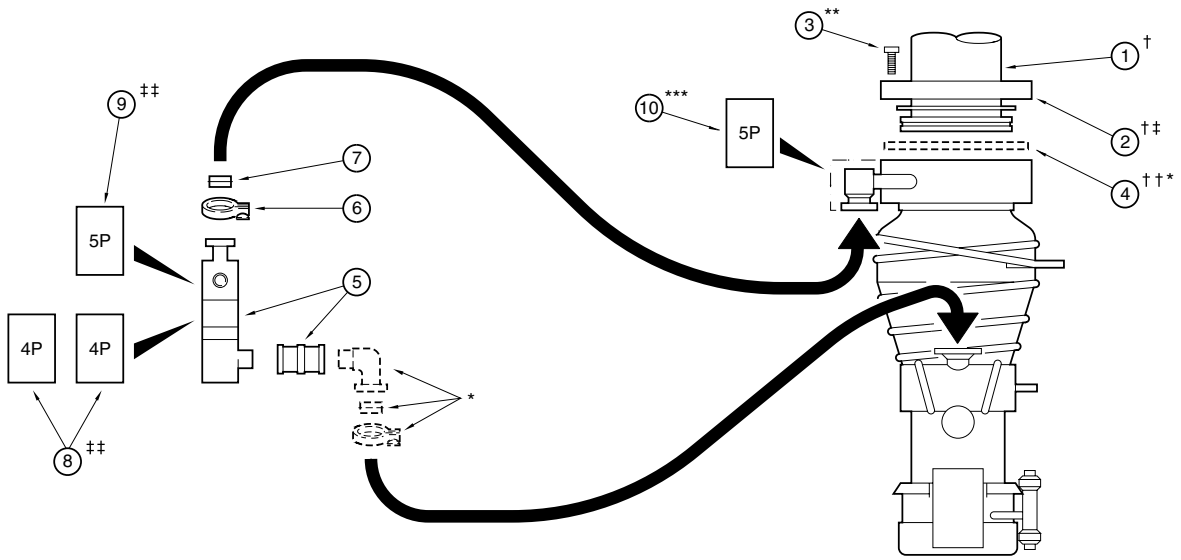


DIAGRAM KEY	COMPONENT DESCRIPTION	63/150 COMPONENT SIZE	63/150 COMPONENT QUANTITY	100/300 COMPONENT SIZE	100/300 COMPONENT QUANTITY	160/700 COMPONENT SIZE	160/700 COMPONENT QUANTITY
1 †	ISO tube/collar assembly	ISO63	1	ISO100	1	ISO160	1
2 †‡	Rotable flange pack	ISO63	1	ISO100	1	ISO160	1
3 **	Bolts (size × minimum length, mm)						
	M- and P-model	M8 × 75	4	M8 × 75	8	M10 × 90	8
	F-model	–	–	M8 × 55	16	M8 × 60	20
4 ††	Inlet seal	ISO63	1	ISO100	1	ISO160	1
5	BRV valve, manual	BRV10M	1	BRV25M	1	BRV25M	1
	BRV valve, pneumatic	BRV10P	1	BRV25P	1	BRV25P	1
6	Clamp	NW10	1	NW25	1	NW25	1
7	"O' ring assembly	NW10	1	NW25	1	NW25	1
8 ‡‡	4-port light-weight electropneumatic control valve	–	2	–	2	–	2
9 ‡‡	5-port electropneumatic control valve	–	1	–	1	–	1
10 ***	5-port electropneumatic control valve	–	1	–	1	–	1

* These items are supplied with the pumps, except that the inlet seal for the F-model pumps is not supplied.

† Not required for F-model pumps; use CF fittings (which must be obtained from another supplier)

‡ Not required for C-model pumps; use claw clamps to bolt the pump ISO inlet flange directly to the ISO tube/collar assembly.

** Bolts are not available from BOC Edwards. Bolts are not required for C-model pumps; use claw clamps to bolt the pump ISO inlet flange directly to the ISO tube/collar assembly; use 4 claw clamps for ISO63, ISO100 and ISO160 flanges.

†† These inlet seals are suitable for standard, cryo-cooled and C-model pumps only; use CF fittings (which must be obtained from another supplier) for F-model pumps.

‡‡ Required only for pneumatic operation BRV valves; use either 1 5-port control valve or 2 4-port control valves. If you use 2 4-port control valves, you can use the isolation position of the BRV valve.

*** Required only for P-model pumps, to control the operation of the high vacuum valve.

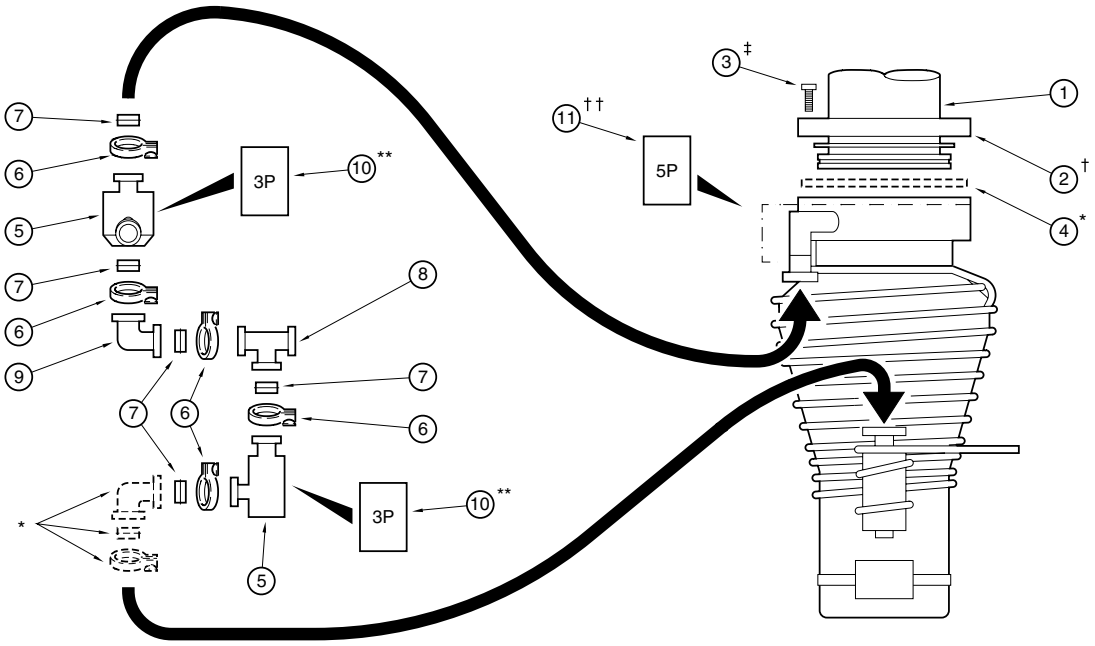


DIAGRAM KEY	COMPONENT DESCRIPTION	COMPONENT SIZE	QUANTITY
1	ISO tube/collar assembly	ISO250	1
2 †	Rotatable flange pack	ISO250	1
3 ‡	Bolts (size, minimum length, mm) M- & P-model	M10 × 110	12
4	Inlet seal, trapped "O" ring	ISO250	1
5	PV40 valve, manual	PV40MK	2
	PV40 valve, pneumatic	PV40PK	2
6	Clamp	NW40	5
7	"O' ring assembly	NW40	5
8	"T' piece	NW40	1
9	Elbow	NW40	1
10 **	3-port electropneumatic control valve		2
11 ††	5-port electropneumatic control valve	–	1

* These items are supplied with the pump.

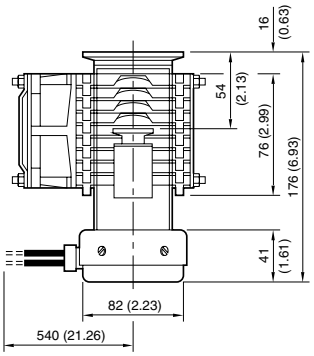
† Not required for C-model pumps; use 6 claw clamps to bolt the pump ISO inlet flange directly to the ISO tube/collar assembly.

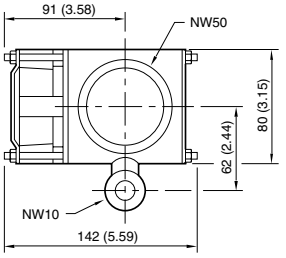
‡ Bolts are not available from BOC Edwards. Bolts are not required for Model-C pumps; use 6 claw clamps to clamp the pump ISO inlet flange directly to the ISO tube/collar assembly.

** Required only for pneumatic operation PVPK valves; use 1 3-port control valve for each of the two PVPK valves.

†† Required only for P-model pumps, to control the high vacuum valve.

EO50/60 AIR COOLED DIFFUSION PUMP





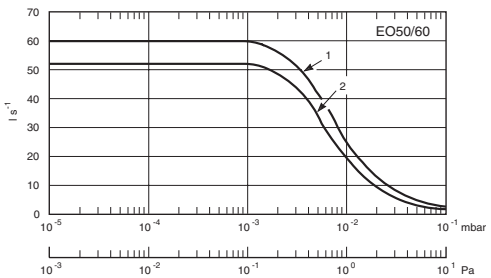
The model EO50/60 is a compact, fast warm-up air-cooled diffusion pump supplied complete with high integrity inlet Co-Seal, flange clamping ring and optional baffle. The jet assembly is removable for easy cleaning. It meets the need for a low-cost, high vacuum pump for use in desk top or mobile scientific instruments, leak detectors, and general laboratory applications.

In many applications the rapid warm-up capability will enable the EO50/60 to be used without an isolation valve. However, the pump is not intended for use on valveless systems where rapid cycling from atmospheric pressure through the hot pump is required. BOC Edwards offers the TV range of diffusion pumps for these applications.

TECHNICAL DATA

Pumping speed	
Air	60 l s^{-1} (27 l s^{-1} baffled)
Hydrogen	70 l s^{-1} (50 l s^{-1} baffled)
Fluid charge	20 ml
Recommended fluid	Santovac® 5, Silicone DC704EU
Minimum backing pump displacement	1 m^3h^{-1}
Recommended backing pump	E2M1.5
Inlet connection	NW50 flange
Backing connection	NW10 flange
Heater power	200 W or 250 W
Warm-up time	4 min
Weight	2 kg
Minimum cooling air flow	4.5 m^3h^{-1}

FLUID	CRITICAL BACKING PRESSURE (mbar)	ULTIMATE PRESSURE (mbar)
Santovac® 5	0.6	5×10^{-8}
Silicone DC702	1.2	5×10^{-6}
Silicone DC704EU	0.8	5×10^{-7}
Silicone DC705	0.6	5×10^{-7}



1 DC704EU **2** Santovac® 5

ORDERING INFORMATION

PRODUCT DESCRIPTION		ORDERING NUMBER
EO50/60 pump, 50/60 Hz, single phase		
Pump voltage	Fan voltage	
90 V (0.25 kW)	115 V	B30207090
110-125 V (0.2 kW)	115 V	B30207110
180 V (0.25 kW)	230 V	B30207180
210-225 V (0.2 kW)	230 V	B30207210
230-250 V (0.2 kW)	230 V	B30207240
Supplied with: NW50 combined baffle and centering-ring, NW50 centering-ring and "O" ring, NW50 clamp and NW10 Co-Seal and clamp.		

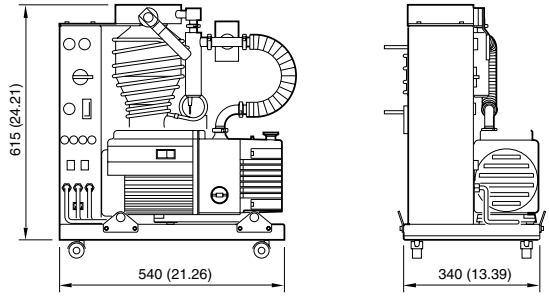
SPARES	ORDERING NUMBER
Heater (0.2 kW)	
110-125 V	H01707060
210-225 V	H01707062
230-250 V	H01707063
Heater (0.25 kW)	
90 V	H01707075
180 V	H01707073
Inlet Co-Seal fluoroelastomer	B27158466
Backing NW10 "O" ring assembly, nitrile	C10511393

ACCESSORIES	ORDERING NUMBER
Pump ready thermal snap-switch	B02304000
Cooling fail thermal snap-switch	B27903006
Santovac® 5 (100 ml)	H11401001
Silicone DC704EU (500 ml)	H11201040

For valves, see page 5-4. For NW pipeline fittings, see page 6-7. For vapor pump fluids, see page 6-46.

For EO2, EO4, EO6 diffusion pumps contact BOC Edwards.

DIFFSTAK COMBINED OUTFITS



- Compact unit, delivering ~3 x 10^{-8} mbar ultimate pressure (depending on vapor pump fluid used)
- Integrated manual backing/roughing valve and water cooled baffle
- Active Pirani gauge head* in backing line automatically interlocks the Diffstak
- Enhanced safety shields for the highest temperature surfaces
- Castors are fitted as standard
- Fully factory tested

These are compact, high performance units featuring either the 63 mm or 100 mm Diffstak both backed by the RV5 two-stage rotary pump. Inlet pumping speeds above the valve are 135 l s^{-1} and 280 l s^{-1} respectively.

The Diffstak has an integral water cooled baffle and is fitted with manual quarterswing and backing/roughing valves. A manual air admittance valve and a Pirani gauge are fitted in the backing line to the rotary pump. The unit is supplied complete with rotary pump oil but vapor pump fluid should be selected from the fluids and sealants section. Additional gauges are optional extras.

* A separate display or controller is required to show the pressure measured by the Pirani gauge head.

TECHNICAL DATA

63 mm Diffstak outfit	
Pumping speed above Diffstak valve	135 l s^{-1}
Ultimate vacuum (with Santovac® 5 fluid)	3 x 10^{-8} mbar 3 x 10^{-6} Pa
Minimum cooling water flow	42 l h^{-1}
Maximum power	0.8 kW
Weight (approx.)	51 kg
Vapor pump	Diffstak 63 / 150M
Rotary vacuum pump	RV5
Backing/roughing valve	BRV10K
Vacuum gauge – pirani	APG-M-NW16
100 mm Diffstak outfit	
Pumping speed above Diffstak valve	280 l s^{-1}
Ultimate vacuum (with Santovac® 5 fluid)	3 x 10^{-8} mbar 3 x 10^{-6} Pa
Minimum cooling water	60 l h^{-1}
Maximum power	1.0 kW
Weight (approx.)	61 kg
Inlet connection	ISO 100
Outlet connection	NW25
Vapor pump	Diffstak 100 / 300M
Rotary vacuum pump	RV5
Backing/roughing valve	BRV25K
Vacuum gauge – pirani	APG-M-NW25

ORDERING INFORMATION

PRODUCT DESCRIPTION	ORDERING NUMBER
63 mm Diffstak Combined Outfit (requires electrical supply cable)	
115 V 1-ph 50/60 Hz	B62426990
220 V 1-ph 50/60 Hz	B62426952
245 V 1-ph 50/60 Hz	B62426960
100 mm Diffstak Combined Outfit (requires electrical supply cable)	
115 V 1-ph 50/60 Hz	B62613990
220 V 1-ph 50/60 Hz	B62613952
245 V 1-ph 50/60 Hz	B62613960
ACCESSORIES	**ORDERING NUMBER**
Line cords for combined outfit – 2m electrical supply cable with IEC socket	
UK, three pin plug	A50505000
North European plug	A50506000
No plug	A50508000
USA plug	A50507000

The Diffstak combination includes the inlet flange Co-Seal, rotary pump oil and instruction manual.

The Diffusion pump oil is not included, but can be ordered through BOC Edwards, see page 6-46.

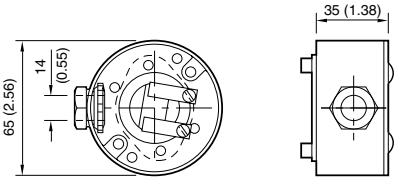
The power cable (line cord) is not included and needs to be ordered separately, through BOC Edwards, see above.

To meet your special requirements we also offer custom built Diffstak combined outfits or combined outfits featuring turbomolecular pumps, see page 2-27. Please contact us for further details.

VAPOR PUMP – THERMAL SNAP-SWITCHES

COOLING-FAIL THERMAL SNAP-SWITCH

This switch opens at a preset temperature to indicate failure of the cooling water flow. The switch resets (closes) when the pump cools down to a preset temperature.



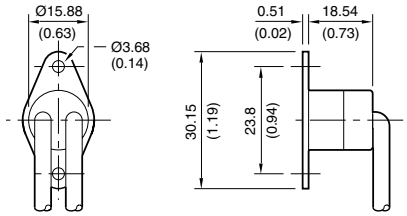
Use with these pumps	Diffstak, EO2, EO4, EO6, EO9 18B4A and 30B5A
Electrical data	25 A at 120 V a.c. or 240 V a.c.
Preset operation temperatures	
Open	46 ± 5 °C
Close (automatic reset)	38 ± 5 °C

ORDERING INFORMATION

PRODUCT DESCRIPTION	ORDERING NUMBER
Cooling-fail thermal snap-switch	B02302000

COOLING-FAIL THERMAL SNAP-SWITCH (EO50/60 AND SI100)

This switch opens at a preset temperature to indicate failure of the cooling water flow. The switch resets (closes) when the pump cools down to a preset temperature.



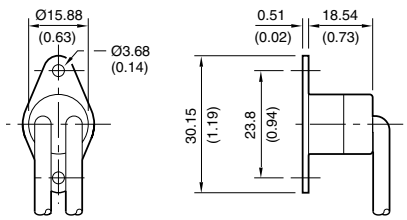
Use with these pumps	EO50/60, SI100, EO100/90
Electrical data	15 A at 120 V a.c. resistive or 10 A at 240 V a.c. resistive
Preset operation temperatures	
Open	50 ± 3 °C
Close (automatic reset)	35 ± 3 °C

ORDERING INFORMATION

PRODUCT DESCRIPTION	ORDERING NUMBER
Cooling-fail thermal snap-switch	B27903006

COOLING-FAIL THERMAL SNAP-SWITCH (TVA50/60 AND TVW50/60)

This switch opens at a preset temperature to indicate failure of the cooling water flow. The switch resets (closes) when the pump cools down to a preset temperature.



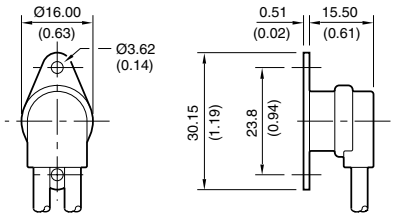
Use with these pumps	TVA50/60, TVW50/60
Electrical data	15 A at 120 V a.c. resistive or 10 A at 240 V a.c. resistive
Preset operation temperatures	
Open	60 ± 3 °C
Close (automatic reset)	50 ± 3 °C

ORDERING INFORMATION

PRODUCT DESCRIPTION	ORDERING NUMBER
Cooling-fail thermal snap-switch	B02304002

PUMP-READY THERMAL SNAP-SWITCH

This switch opens at a preset temperature to indicate that the pump is at operating temperature. It can be used to control the opening of a high vacuum valve. The switch resets (closes) when the pump cools down to a preset temperature.



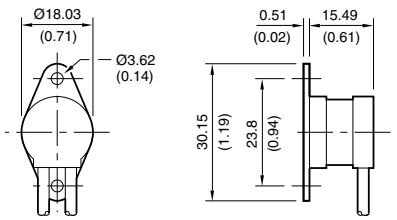
Use with these pumps	All Diffstak, EO50/60, SI100, EO100/90 EO4, EO6, EO9
Electrical data	6 A at 120 V a.c. resistive or 3 A at 240 V a.c. resistive or 7 A ar 30 V a.c. or dc, resistive
Preset operation temperatures	
Open	80 ± 2.8 °C
Close (automatic reset)	60 ± 2.8 °C

ORDERING INFORMATION

PRODUCT DESCRIPTION	ORDERING NUMBER
Pump-ready thermal snap-switch	B02304000

BOILER PROTECTION THERMAL SNAP-SWITCH

This switch opens at a preset temperature when the pump boiler base exceeds the maximum safe operating temperature. The switch resets (closes) when the pump cools down to a preset temperature.



Use with these pumps	EO50/60, EO100/90, SI100
Electrical data	15 A at 220 V a.c. 50/60 Hz 10 A at 240 V a.c. 50/60 Hz
Pre-set operation temperatures	
Open	200 ± 4.4 °C
Close (automatic reset)	184 ± 4.4 °C

ORDERING INFORMATION

PRODUCT DESCRIPTION	ORDERING NUMBER
Boiler protection thermal snap-switch	B02304001