

EH MECHANICAL BOOSTER PUMPS



The EH mechanical booster pumps feature the unique hydrokinetic drive, providing an efficient power transmission with benefits in economy, performance and compactness. The hydrokinetic drive provides the following features:

- Pump down times cut by 50%, when compared with direct drive pumps
- No bypass lines or pressure switches required
- Universal voltage motors
- Reduced capital and operating costs
- Air cooled motors – with water cooled options
- Quiet, minimum vibration

The EH mechanical booster pumps, based on the simple Roots principle, remain the favorite pumps for applications where high pumping speeds over $3000 \text{ m}^3\text{h}^{-1} / 1776 \text{ ft}^3\text{min}^{-1}$ are required in the pressure region of 0.01 to 50 mbar / 0.0075 to 37.5 Torr. These pumps must always be backed by another pump which can deliver against a high pressure differential to atmospheric pressure.

Operating at relatively low pressures, the mechanical booster pump is not exposed to the same concentrations of corrosive process media as is the backing pump, which makes it highly reliable.

High performance pumping mechanism

The EH has a high quality, oil-free pumping mechanism. This offers:

- Quiet, vibration free operation
- Rugged and corrosion resistant
- Advanced shaft-seal technology – no oil contamination of process chamber

The corrosion resistant pumping mechanism is manufactured from high grade cast iron. The proven shaft-seal arrangement ensures that no oil enters the pumping stator, and the absence of internal and external by-pass lines and valves which may corrode or stick minimizes maintenance requirements.

The design of the shaft seals is optimized to ensure that no lubricants can migrate into the pumping mechanism. This maintains booster pump performance in applications which demand the highest standard of cleanliness. In addition, this prevents the build-up of trapped particles on the rotor lobes and end-faces which have very close tolerances.

The dynamically balanced rotors and precision ground gears contribute to the smooth, quiet operation of the pumps, as demanded by manufacturers of advanced technology equipment.

BROAD APPLICATION COVERAGE

EH mechanical boosters are available to cover a broad range of industrial and chemical process applications.

Industrial

Industrial EH boosters are safe to handle non-flammable gases and vapors within the normal operating parameters of the booster.

ATEX

ATEX classified EH boosters are annotated with the suffix "T3" or "T160".

- EH boosters may be supplied with ATEX classification either as part of a pump system or stand-alone, on application. Please consult BOC Edwards.
- ATEX compliance is typically specified for use in Europe, but may also be required in other areas.

ATEX compliant EH boosters are suitable for operation in ATEX systems rated as follows:

All of the EH1200C, EH1200 T160, EH2600C, EH2600 T3, EH2600 T160, EH4200C, EH4200 T3 and EH4200 T160 chemical EH pumps are fitted with flameproof motors:

- Pumps suitable for 50 Hz operation are fitted with a flameproof motor approved to EEx d. Gas Group IIA, IIB, Temperature Class T4.
- Pumps suitable for 60 Hz operation are fitted with a flameproof motor approved to CSA, Division 1 area, Gas Class I Group C & D, and Dust Class II Group F & G, Temperature Class T3C.

Internal and external classifications

⊕ II 2G c IIB T3

or

⊕ II 2G c IIB T160

The notations used in these ratings are as follows:

Symbol	Meaning
⊕	Specifies that the chemical EH pump can be used in a potentially explosive atmosphere
II	Equipment group II
2 G	Equipment category 2 (gas)
c	Constructional safety
IIB	Suitable to pump gas group IIB
T3 / T160	Gas auto-ignition temperature

Equipment category

For equipment category 1 (gas) consult BOC Edwards.

Gas auto-ignition temperature

The temperature classifications applied to the chemical EH pumps relate to the auto-ignition temperature of flammable materials that can be pumped:

- The EH1200C, EH2600C, EH4200C and chemical EH pumps that have a T3 classification are suitable for pumping flammable materials that have an auto-ignition temperature greater than 200 °C.
- Chemical EH pumps that have a T160 classification are suitable for pumping flammable materials that have an auto-ignition temperature greater than 160 °C.

Explosion proof

Explosion proof boosters are annotated with the suffix "C".

- EH boosters may be ordered with explosion proof motors either individually, or as part of an explosion proof system.
- Explosion proof is generally applicable in N. America and the rest of the world (excluding Europe).

Explosion-proof boosters will be supplied fitted with an explosion-proof motor (suitable for 60 Hz operation) approved to CSA, Division 1 area, Gas Class I Group C & D and Dust Class II Group F & G, Temperature Class T3C.

EH pumps with hydrokinetic drive

EH booster pumps have a unique and patented hydrokinetic fluid drive, which couples the motor to the pumping mechanism. The hydrokinetic drive offers the following advantages:

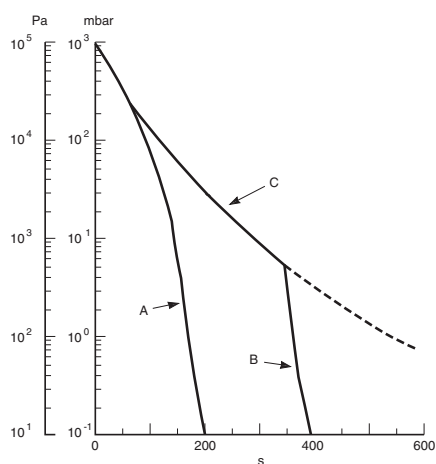
- Pump down times cut by up to 50%
- Reduced capital and operating costs
- No pressure sensors, by-pass lines or valves
- Can operate continuously at all pressures – when used with a backing pump

EH booster pumps have universal voltage, air-cooled motors and are available with effective pumping speeds of up to 4140 m³h⁻¹ / 2440 ft³min⁻¹. The pump bodies of the EH1200, EH2600 and EH4200 pumps are water-cooled.

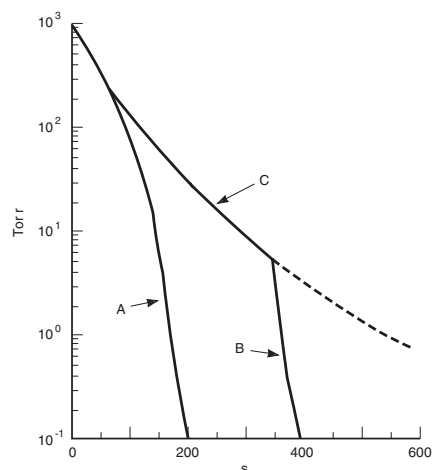
Two versions of each EH booster pump are available, with different oils used for the lubrication of the seals and gears. The standard version uses mineral oils, such as Ultragrade 20. The alternative version has PFPE (perfluoropolyether) oils and is suitable for applications where oxygen or other reactive and corrosive gases are processed.

Pump-down times cut by up to 50% The hydrokinetic drive allows the booster pump to be started at the same time as the backing pump (at atmospheric pressure) as it prevents motor overload. The EH booster pump therefore assists the pumping process from the start of pump-down. In comparison pumping systems with conventional, direct drive mechanical booster pumps (where the booster pump is switched on when the chamber pressure has been reduced to, typically, less than 10 mbar / 7.5 Torr), the total evacuation time can be reduced by as much as 50%.

The graph below shows data for a 2.8 m³ / 100 ft³ chamber, with a 2600 m³h⁻¹ / 2600 ft³min⁻¹ mechanical booster pump and a 255 m³h⁻¹ / 150 ft³min⁻¹ backing pump.



- A With backing pump and EH mechanical booster pump switched on together
- B With mechanical booster pump switched on at 5 mbar
- C With backing pump only (pumping through booster pump)



- A With backing pump and EH mechanical booster pump switched on together
- B With mechanical booster pump switched on at 5 mbar
- C With backing pump only (pumping through booster pump)

Automatic overload protection The hydrokinetic drive automatically varies the rotational speed of the pump. This protects the motor from overload, prevents over-heating, and allows the pump to operate with high pressure differentials. Consequently, EH booster pumps are not damaged by sudden increases of inlet pressure and even by the entry of solid debris into the pump.

Important cost savings When you use EH mechanical booster pumps, you save money on installation and operation. Your capital costs are reduced as you do not need valves, by-pass lines and pressure switches, and you can use a smaller backing pump than with conventional drive booster pumps. Operation costs are reduced because EH booster pumps have smaller motors than direct drive pumps and, when operating at full speed, they use only a fraction of the rated power.

DATA SUMMARY EH MECHANICAL BOOSTERS

PUMP		EH250	EH500	EH1200	EH2600	EH4200
Catalog page		9-63	9-63	9-64	9-65	9-65
Displacement (swept volume)						
50 Hz supply	m ³ h ⁻¹ / ft ³ min ⁻¹	310 / 185	505 / 300	1195 / 715	2590 / 1525	4140 / 2440
60 Hz supply	m ³ h ⁻¹ / ft ³ min ⁻¹	375 / 220	605 / 355	1435 / 845	3110 / 1830	4985 / 2935
Effective pumping speed* with backing pump						
E1M40 or E2M40	m ³ h ⁻¹ / ft ³ min ⁻¹	240 / 141	350 / 206			
E1M80 or E2M80	m ³ h ⁻¹ / ft ³ min ⁻¹	274 / 161	400 / 236	840 / 495		
E1M175 or E2M175	m ³ h ⁻¹ / ft ³ min ⁻¹		440 / 259	930 / 548	1750 / 1031	
E1M275 or E2M275	m ³ h ⁻¹ / ft ³ min ⁻¹		460 / 271	1020 / 601	1900 / 1119	3100 / 1825
Pressure differential across pump [‡]						
50 Hz supply	mbar / Torr	0 – 180 / 0 – 140	0 – 110 / 0 – 68	0 – 90 / 0 – 68	0 – 80 / 0 – 60	0 – 60 / 0 – 45
60 Hz supply	mbar / Torr	0 – 150 / 0 – 115	0 – 90 / 0 – 825	0 – 75 / 0 – 56	0 – 67 / 0 – 50	0 – 50 / 0 – 38
Inlet connection		ISO63	ISO100	ISO160	ISO160	ISO250
Outlet connection		ISO40	ISO63	ISO100	ISO100	ISO100

EH250/EH500 MECHANICAL BOOSTER PUMP



TECHNICAL DATA

	EH250	EH500
Rotational speed [†]		
50 Hz supply	0 – 2900 rpm	0 – 2900 rpm
60 Hz supply	0 – 3500 rpm	0 – 3500 rpm
Operating continuous inlet pressure	0 – 1000 mbar (0 – 760 Torr)	0 – 1000 mbar (0 – 760 Torr)
Maximum outlet pressure	1000 mbar (760 Torr)	1000 mbar (760 Torr)
Recommended backing pumps	GV80, E1M/ E2M40, E1M/ E2M80	GV80, GV160, E1M/E2M80
Electrical supply voltage, 3-phase		
50 Hz	220 – 240 V / 380 – 415 V	220 – 240 V / 380 – 415 V
60 Hz	208 – 230 V / 460 V	208 – 230 V / 460 V
Motor power		
Hydrocarbon	2.2 kW (3 hp)	2.2 kW (3 hp)
PFPE	1.5 kW (2 hp)	1.5 kW (2 hp)
ATEX	2.2 kW	2.2 kW
Explosion proof	3 hp	3 hp
Ambient temperature range		
Operating	5 to 40 °C (40 to 104 °F)	5 to 40 °C (40 to 104 °F)
Storage	-10 to 80 °C (14 to 176 °F)	-10 to 80 °C (14 to 176 °F)
Maximum operating humidity	90% RH	90% RH
Recommended cooling water flow (inlet temperature 20 °C) ^{**}	N/A	N/A
Recommended cooling water supply pressure ^{**}	N/A	N/A
Cooling water connections ^{**}	N/A	N/A
Recommended oil		
Standard version	Ultragrade 20	Ultragrade 20
PFPE version	Fomblin [®] YVAC 16/6	Fomblin [®] YVAC 16/6
Oil capacity		
Gear case		
Coupling cover	1.5 liter (1.6 qt)	1.5 liter (1.6 qt)
Shaft seal reservoir	0.125 liter (0.25 qt)	0.125 liter (0.25 qt)
Weight	61 kg (134 lb)	74 kg (163 lb)

^{**} Under many circumstances, pumps may operate without cooling water.
Apply to BOC Edwards for more information.

[†] Depends on pressure.

ORDERING INFORMATION

PRODUCT DESCRIPTION	ORDERING NUMBER
EH250 Industrial	
EH250IND 220-240 V or 380-415 V, 3-ph, 50 Hz, 2.2 kW	A30151945
EH250IND 200 V, 3-ph, 50 Hz, 2.2 kW	NRC222000
EH250IND 208-230 V or 460 V, 3-ph, 60 Hz, 3 hp	A30152946
EH250IND 200 V, 3-ph, 60 Hz, 3 hp	NRC221000
EH250 PFPE*	
EH250FX 220-240 V or 380-415 V, 3-ph, 50 Hz, 1.5 kW	A30153935
EH250FX 208-230 V or 460 V, 3-ph, 60 Hz, 2 hp	A30154936
EH250 Chemical**	
EH250C 460 V, 3-ph, 60 Hz, 3 hp	NRA997000
EH250T160 220-240 V or 380-415 V, 3-ph, 50 Hz, 2.2 kW	NRA996000
EH500 Industrial	
EH500IND 220-240 V or 380-415 V, 3-ph, 50 Hz, 2.2 kW	A30271945
EH500IND 200 V, 3-ph, 50 Hz, 2.2 kW	NRC220000
EH500IND 208-230 V or 460 V, 3-ph, 60 Hz, 3 hp	A30272946
EH500IND 200 V, 3-ph, 60 Hz, 3 hp	NRC219000
EH500 PFPE*	
EH500AFX 220-240 V or 380-415 V, 3-ph, 50 Hz, 1.5 kW	A30273935
EH500AFX 208-230 V or 460 V, 3-ph, 60 Hz, 2 hp	A30274936
EH500 Chemical**	
EH500C 460 V, 3-ph, 60 Hz, 3 hp	NRA999000
EH500T3 220-240 V or 380-415 V, 3-ph, 50 Hz, 2.2 kW	NRA998000
[*] BOC Edwards does not recommend continuous running of PFPE boosters at >10 mbar.	
^{**} Chemical boosters may be supplied with ATEX classification either as part of a pump system or stand-alone, on application. Please consult BOC Edwards.	
SPARES	ORDERING NUMBER
The clean and overhaul kit contains seals, gaskets, sleeves and other components required for routine maintenance and whenever the pump is dismantled. The module kit contains additional bearings and seals for a full service. The shim kit contains a selection of shims for correct pump setup.	
Clean and overhaul kit	A30151815
Module kit	A30151820
Shim kit	A30151825
ACCESSORIES	ORDERING NUMBER
EH250	
Inlet Mesh Assy 3.3 mm ISO63	C10521085
Inlet Mesh Assy 3.5 mm STST ISO63	A60041029
EH500	
Inlet Mesh Assy 3.3 mm ISO100	C10523085
Inlet Mesh Assy 3.5 mm STST ISO100	A60041569

EH1200 MECHANICAL BOOSTER PUMP



TECHNICAL DATA

Rotational speed [†]	
50 Hz supply	0 – 2900 rpm
60 Hz supply	0 – 3500 rpm
Operating continuous inlet pressure	0 – 1000 mbar (0 – 760 Torr)
Maximum outlet pressure	1000 mbar (760 Torr)
Recommended backing pumps	GV160, GV250, E2M80, E2M175
Electrical supply voltage, 3-phase	
50 Hz	220 – 240 V / 380 – 415 V
60 Hz	208 – 230 V / 460 V
Motor power	
Hydrocarbon	3 kW (4 hp)
PFPE	3 kW (4 hp)
ATEX	3 kW
Explosion proof	4 hp
Ambient temperature range	
Operating	5 to 40 °C (40 to 104 °F)
Storage	-10 to 80 °C (14 to 176 °F)
Maximum operating humidity	90% RH
Recommended cooling water flow (inlet temperature 20 °C) ^{**}	120 l h ⁻¹ (0.53 gal min ⁻¹)
Recommended cooling water supply pressure ^{**}	2 – 6 bar
Cooling water connections ^{**}	3/8 inch BSP male
Recommended oil	
Standard version	Ultragrade 20
PFPE version	Fomblin [®] YVAC 16/6
Oil capacity	
Gear case	1.25 liter (1.3 qt)
Coupling cover	2.4 liter (2.5 qt)
Shaft seal reservoir	0.125 liter (0.25 qt)
Weight	149 kg (329 lb)

** Under many circumstances, pumps may operate without cooling water. Apply to BOC Edwards for more information.

† Depends on pressure.

ORDERING INFORMATION

SPARES	ORDERING NUMBER
The clean and overhaul kit contains seals, gaskets, sleeves and other components required for routine maintenance and whenever the pump is dismantled. The module kit contains additional bearings and seals for a full service. The shim kit contains a selection of shims for correct pump setup.	
Clean and overhaul kit	A30551815
Module kit	A30551820
Shim kit	A30551825
ACCESSORIES	ORDERING NUMBER
Inlet Mesh Assy 3.3 mm ISO160	C10524085
Inlet Mesh Assy 3.5 mm STST ISO160	A60041570

ORDERING INFORMATION

PRODUCT DESCRIPTION	ORDERING NUMBER
EH1200 Industrial	
EH1200IND 220-240 V or 380-415 V, 3-ph, 50 Hz, 3 kW	A30590935
EH1200IND 200 V, 3-ph, 50 Hz, 3 kW	NRC218000
EH1200IND 208-230 V or 460 V, 3-ph, 60 Hz, 4 hp	A30591936
EH1200IND 200 V, 3-ph, 60 Hz, 4 hp	NRC217000
EH1200 PFPE*	
EH1200FX 220-240 V or 380-415 V, 3-ph, 50 Hz, 3 kW	A30592935
EH1200FX 208-230 V or 460 V, 3-ph, 60 Hz, 4 hp	A30593936
EH1200 Chemical**	
EH1200C 230 V or 460 V, 3-ph, 60 Hz, 4 hp	A30556982
EH1200T160 380-415 V, 3-ph, 50 Hz, 3 kW	A30557900

* BOC Edwards does not recommend continuous running of PFPE boosters at >10 mbar.

** Chemical boosters may be supplied with ATEX classification either as part of a pump system or stand-alone, on application. Please consult BOC Edwards.

EH2600/EH4200 MECHANICAL BOOSTER PUMP



TECHNICAL DATA

	EH2600	EH4200
Rotational speed [†]		
50 Hz supply	0 – 2900 rpm	0 – 2900 rpm
60 Hz supply	0 – 3500 rpm	0 – 3500 rpm
Operating continuous inlet pressure	0 – 1000 mbar (0 – 760 Torr)	0 – 1000 mbar (0 – 760 Torr)
Maximum outlet pressure	1000 mbar (760 Torr)	1000 mbar (760 Torr)
Recommended backing pumps	GV250, GV400, E2M175, E2M275	GV400, E2M275
Electrical supply voltage, 3-phase		
50 Hz	220 – 240 V / 380 – 415 V	220 – 240 V / 380 – 415 V
60 Hz	208 – 230 V / 460 V	208 – 230 V / 460 V
Motor power		
Hydrocarbon	11 kW (15 hp)	11 kW (15 hp)
PFPE	7.5 kW (10 hp)	11 kW (15 hp)
ATEX	11 kW	11 kW
Explosion proof	15 hp	15 hp
Ambient temperature range		
Operating	5 to 40 °C (40 to 104 °F)	5 to 40 °C (40 to 104 °F)
Storage	-10 to 80 °C (14 to 176 °F)	-10 to 80 °C (14 to 176 °F)
Maximum operating humidity	90% RH	90% RH
Recommended cooling water flow (inlet temperature 20 °C) ^{**}	250 l h ⁻¹ (1.1 gal min ⁻¹)	250 l h ⁻¹ (1.1 gal min ⁻¹)
Recommended cooling water supply pressure ^{**}	2 – 6 bar	2 – 6 bar
Cooling water connections ^{**}	¾ inch BSP male	¾ inch BSP male
Recommended oil		
Standard version	Ultragrade 20	Ultragrade 20
PFPE version	Fomblin [®] YVAC 16/6	Fomblin [®] YVAC 16/6
Oil capacity		
Gear case	3.5 liter (3.3 qt)	3.5 liter (3.3 qt)
Coupling cover	6.5 liter (7 qt)	6.5 liter (7 qt)
Shaft seal reservoir	1.5 liter (1.4 qt)	1.5 liter (1.4 qt)
Weight	308 kg (679 lb)	400 kg (882 lb)

** Under many circumstances, pumps may operate without cooling water. Apply to BOC Edwards for more information.

† Depends on pressure.

ORDERING INFORMATION

PRODUCT DESCRIPTION	ORDERING NUMBER
EH2600 Industrial	
EH2600IND 380-415 V, 3-ph, 50 Hz, 11 kW	A30775946
EH2600IND 200 V, 3-ph, 50 Hz, 11 kW	NRC216000
EH2600IND 230 V or 460 V, 3-ph, 60 Hz, 15 hp	A30776982
EH2600IND 200 V, 3-ph, 60 Hz, 15 hp	NRB989000
EH2600 PFPE*	
EH2600FX 220-240 V or 380-415 V, 3-ph, 50 Hz, 7.5 kW	A30753935
EH2600FX 208-230 V or 460 V, 3-ph, 60 Hz, 10 hp	A30754936
EH2600 Chemical^{l**}	
EH2600C 230 V or 460 V, 3-ph, 60 Hz, 15 hp	A30756982
EH2600T3 380-415 V, 3-ph, 50 Hz, 11 kW	A30741935
EH2600T160 380-415 V, 3-ph, 50 Hz, 11 kW	A30779900
EH4200 Industrial	
EH4200IND 380-415 V, 3-ph, 50 Hz, 11 kW	A30975946
EH4200IND 200 V, 3-ph, 50 Hz, 11 kW	NRC215000
EH4200IND 208-230 V or 460 V, 3-ph, 60 Hz, 15 hp	A30976982
EH4200IND 200 V, 3-ph, 60 Hz, 15 hp	NRB988000
EH4200 PFPE*	
EH4200FX 220-240 V or 380-415 V, 3-ph, 50 Hz, 11 kW	On application
EH4200FX 208-230 V or 460 V, 3-ph, 60 Hz, 15 hp	On application
EH4200 Chemical^{l**}	
EH4200C 230 V or 460 V, 3-ph, 60 Hz, 15 hp	A30956982
EH4200T3 380-415 V, 3-ph, 50 Hz, 11 kW	A30941935
EH4200T160 380-415 V, 3-ph, 50 Hz, 11 kW	A30979900
* BOC Edwards does not recommend continuous running of PFPE boosters at >10 mbar.	
** Chemical boosters may be supplied with ATEX classification either as part of a pump system or stand-alone, on application. Please consult BOC Edwards.	
SPARES	ORDERING NUMBER
The clean and overhaul kit contains seals, gaskets, sleeves and other components required for routine maintenance and whenever the pump is dismantled. The module kit contains additional bearings and seals for a full service. The shim kit contains a selection of shims for correct pump setup.	
Clean and overhaul kit	A30751815
Module kit	A30751820
Shim kit	A30751825
ACCESSORIES	ORDERING NUMBER
EH2600	
Inlet Mesh Assy 3.3 mm ISO160	C10524085
Inlet Mesh Assy 3.5 mm STST ISO160	A60041570
EH4200	
Inlet Mesh Assy 3.5 mm STST ISO250	A60041571

MECHANICAL BOOSTER PUMP ACCESSORIES

OLM500 OIL LEVEL MONITOR



Fit the OLM500 in place of the oil sight-glass on the EH250 and EH500 oil seal reservoirs, and on the EH1200, EH2600 and EH4200 oil seal reservoirs and gear boxes. The OLM500 provides a switched output for remote activation or warning devices. Technical data: 24 V a.c. or d.c., maximum current 0.5 A.

ORDERING INFORMATION

PRODUCT DESCRIPTION	ORDERING NUMBER
OLM500 oil level monitor*	A50434000

* Not suitable for ATEX boosters

INLET SEAL WITH MESH SCREEN

Designed to prevent objects falling into the inlet of our booster pumps, the mesh aperture is 3.3 mm.

ORDERING INFORMATION

PRODUCT DESCRIPTION	ORDERING NUMBER
Inlet seal with mesh screen	
ISO63	C10521085
ISO100	C10523085
ISO160	C10524085