Booster Pump Set

Models BPELC1 / BPELC2 - Overview - Datasheet

Overview

Booster Pump Set packaged on a stainless steel base supplied with pressure vessel and ancillary controls ready for installation. A separate cistern (tank) is required to supply the set. The set is approved for drinking (wholesome) water applications.

The primary purpose is to boost the water pressure where the maintained mains supply pressure is less than 1 bar or where significant water storage is desired (e.g. 15 mins). The set may also be used for Fluid Category 5 backflow protection when supplied via a tank with a Type AB air gap.

The standard unit BPELC1 is quiet by virtue of a variable speed centrifugal pump, anti-vibration rubber feet and flexible stainless braided connection hoses. The unit comes with a low level pump cut out, level controller. All sets are supplied with pump controls – inverter, pressure transducer and BMS.

The set has the option of Dual Level Control (model LC2). The level control box provides additional solid state delayed action for cistern (tank) filling, via a solenoid controlled filling arm.

The Arrow Valves automatic Bypass Valve (see page 4) is recommended (up to Fluid Category 3) to enable mains water to be supplied - at mains pressure - during power failure or maintenance.

Arrow Valves also manufacture booster pumps complete with integral filling cistern –
Domestic boosting – (Wholesome water) *"Pent-A-Boost®"*
Backflow protection Fluid Category 5 - *"Boost-A-Break®"*

Applications

- Penthouse (3 storey and taller)
- Boosting low water pressure
- "Combi" boilers & showers
- Fluid Category 5 backflow protection when used with cistern with Type AB air gap

Specification

Pressure Supply min.	1.0 m head (0.1 bar)
Pressure Supply max.	1.0 bar
Pressure Outlet	See flow graph – page 2
Pressure Gauge	Ø63 stainless – glycerine filled
Vessel Capacity	12 Lt
Inlet Size	*See "Inlet Control" table*
Outlet Size	*See "Outlet Pressure Control" table*
Noise	<58 dBa @ 1 m
Temperature	25º max. ambient

Materials

Base / drip tray / fasteners	Stainless steel 304
Pump (wetted parts)	Stainless steel 304
Pipes / fittings	Copper / Brass / Stainless

Model BPE3-10LC1

Conductive Electrodes – supplied with "Level Control". The electrode holder is fitted to the tank lid and one pair of electrodes control low level pump cut-out. A second pair of electrodes control the tank filling (via a suitable solenoid) or high level cut out. Electrodes supplied 1 m long and must be cut to length on site to suit tank.

Water Regulations

The assembly is fully Water Regulations approved & complies with the requirements of the Water Regulations when installed and used correctly. Water supply companies are only obliged to supply a minimum pressure of 1 bar @ 9 Lt/min. This means mains water will only reach 10 m. Since many boilers and showers require 1 bar (or even 1.5 bar) this means boosting is often essential to the third storey and higher.

Variable Speed Merits

Variable speed pumps provide only the pressure required to meet demand making the unit economical and extending the life of the pump.

There is a choice of 7 variable speed pumps – see page 2. Speed control is achieved by a full-wave inverter which varies the frequency to the induction motor. The merits include -

- Higher flow rate – up to 2 Lt/s output
- Variable speed – speed changes to meet demand
- Quiet – especially at low demand
- Surge free – inverter pump avoids high current demand
- Constant supply pressure
- Qualifies for Enhanced Capital Allowance

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Booster Pump Set

Models BPELC1 / BPELC2 – Single Pump 1.0 Lt/s – Datasheet

Connection Pipes

Flexible stainless braided hoses are supplied for the inlet and outlet. These have a female swivel nut (union) and a fibre washer. See Outlet Pressure Control and Codes and Descriptions tables for size. The outlet connection has a double check valve incorporated.

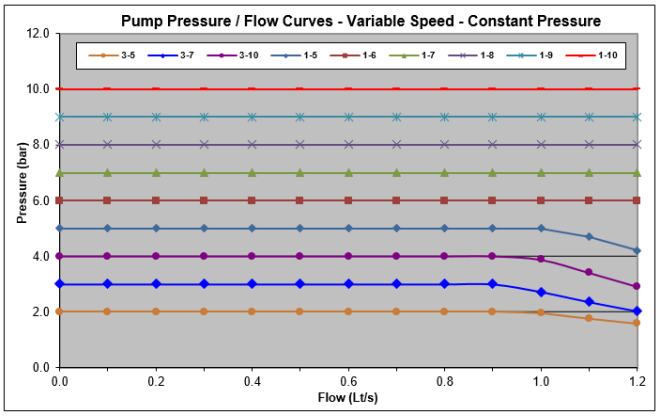
Outlet Pressure Control

The outlet pressure is controlled by a transducer, which is factory set to the "default set point" in the table below and controlled to within a 10% band. The outlet pressure is therefore constant up to the maximum duty of the pump.

Model	Outlet Size	Default Set point	Pressure Switch on (min.)[1]	Pressure Switch off (Max)[1]	Pressure Max[2]	Vessel Air Pressure[3]
3-5	DN20	2.0 bar	1.8 bar	2.2 bar	2.8 bar	1.4 bar
3-7	DN20	3.0 bar	2.7 bar	3.3 bar	4.6 bar	2.1 bar
3-10	DN25	4.0 bar	3.6 bar	4.4 bar	5.5 bar	2.8 bar
1-5	DN25	5.0 bar	4.5 bar	5.5 bar	7.0 bar	3.5 bar
1-6	DN25	6.0 bar	5.4 bar	6.6 bar	7.0 bar	4.2 bar
1-7	DN25	7.0 bar	6.3 bar	7.7 bar	11.7 bar	4.9 bar
1-8	DN25	8.0 bar	7.2 bar	8.8 bar	11.7 bar	5.6 bar
1-9	DN25	9.0 bar	8.1 bar	9.9 bar	11.7 bar	6.3 bar
1-10	DN25	10.0 bar	9.0 bar	11.0 bar	11.7 bar	7.0 bar

Notes - 1. Differential +/- 10% of set point. 2. If set to full speed.
3. Vessel air pressure with zero water pressure, 0.7 X set point.

The graph below illustrates the benefit of variable speed pumps. The outlet pressure is constant despite varying flow demand. *Note – using "default set point". The set point can be altered at the factory. On-site alterations require a commissioning service (this is chargeable).*



Level Control

Supplied with Level Control, the control box on the pump set has an electrode holder with 5 m of cable (as standard). The electrode holder must be fitted to the tank lid and the electrodes cut to length to suit the tank.

LC1 – Pump Protection supplied with a DN25 electrode holder with 3 one metre long electrodes. Pre-wired to control box to stop pump if water level drops too low.

LC2 – Pump Protection as above plus additional level controller for solenoid controlled filling arm. Supplied with a DN25 electrode holder with 5 electrodes supplied with 5 m of cable, pre-wired to control box. The electrodes need cutting to length on site to suit tank

Fast filling is achieved by a servo-controlled solenoid valve with solid-state level probe control. This system has proved to be more reliable and accurate than conventional float valves. Accurate level control is achieved with level electrodes which provide on/off full flow control.

Electrical Specification

Motor 2-Pole 50 Hz 230 V 1 ph (3-5, 3-7, 3-10, 1-5)
400 V 3 ph (1-6, 1-7, 1-8, 1-9, 1-10)

Model	1 phase A (Run)	3 phase A (Run)	Input max kW
3-5	4.2		0.55
3-7	5.5		0.75
3-10	7.5		1.10
1-5	5.0		1.10
1-6		3.7	2.20
1-7, 1-8, 1-9, 1-10		5.0	3.00

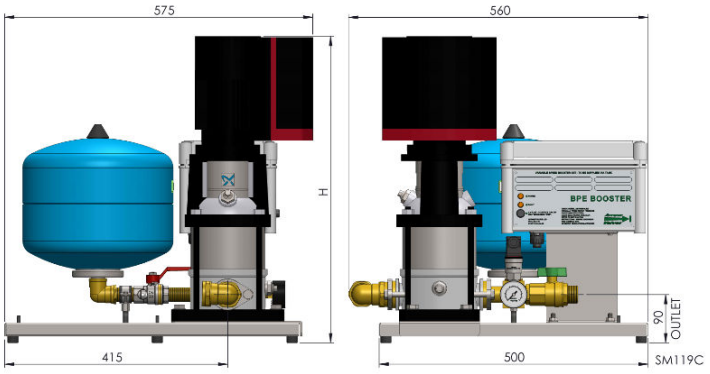
Class Class 1 (requires earth wire)
BMS Volt free SPDT relay general fault - pump / inverter / low level alarm
Low level cut out Stops pump via electrodes in tank (Warning lamp on control box) – auto reset once tank refilled
Protection IP65 (Enclosure) / IP55 (Pump)

Connection

1 phase M20 1 phase + neutral + earth
3 phase[1] M20 3 phases + neutral + earth

Note – 1. The control circuit is 230 V so a neutral supply is required

Dimensions



Model BPE3-10LC1

Model – BPE	3-5	3-7	3-10	1-5	1-6	1-7	1-8	1-9	1-10
H (mm)	534	570	654		775	954	954	954	954

Note – in addition to "H" - allow 25 mm min. for ventilation and ideally 200 mm for servicing.

Codes and Descriptions – Single Pump 1.0 Lt/s

Inlet Size	Code	Description
DN20	BPE3-5LC1	Booster pump 3-5 with low level pump cut out
DN20	BPE3-7LC1	Booster pump 3-7 with low level pump cut out
DN25	BPE3-10LC1	Booster pump 3-10 with low level pump cut out
DN25	BPE1-5LC1	Booster pump 1-5 with low level pump cut out
DN25	BPE1-6LC1	Booster pump 1-6 with low level pump cut out
DN25	BPE1-7LC1	Booster pump 1-7 with low level pump cut out
DN25	BPE1-8LC1	Booster pump 1-8 with low level pump cut out
DN25	BPE1-9LC1	Booster pump 1-9 with low level pump cut out
DN25	BPE1-10LC1	Booster pump 1-10 with low level pump cut out
DN20	BPE3-5LC2-20	Booster Pump 3-5 Variable Dual Level Control 230 V
DN20	BPE3-7LC2-20	Booster Pump 3-7 Variable Dual Level Control 230 V
DN25	BPE3-10LC2-25	Booster Pump 3-10 Variable Dual Level Control 230 V
DN25	BPE1-5LC2-25	Booster Pump 1-5 Variable Dual Level Control 230 V
DN25	BPE1-6LC2-25	Booster Pump 1-6 Variable Dual Level Control 400 V
DN25	BPE1-7LC2-25	Booster Pump 1-7 Variable Dual Level Control 400 V
DN25	BPE1-8LC2-25	Booster Pump 1-8 Variable Dual Level Control 400 V
DN25	BPE1-9LC2-25	Booster Pump 1-9 Variable Dual Level Control 400 V
DN25	BPE1-10LC2-25	Booster Pump 1-10 Variable Dual Level Control 400 V

Optional extras – see pages 6 and 7

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Booster Pump Set

Models BPELC1 / BPELC2 – Single Pump 2.0 Lt/s – Datasheet

Description – Speed 2.0 Lt/s

There is a choice of 7 single pump models with a 2.0 Lt/s output – see chart below.

The higher flow units are suitable for supplying multiple outlets or applications where a greater flow rate is required.

Inlet Control

Fast and accurate level control is achieved with two 1" filling solenoid valves (except model 5-4 which has a single solenoid). Level electrodes provide on/off full flow control with 60 mm delayed action.

Model	Inlet Size	Minimum Dynamic Pressure	Pipe Velocity m/s
5-4	DN25 female union	1.0 bar	2.8
5-8, 5-10, 2-5, 5-16, 2-7, 2-8	DN32 female union	1.0 bar	2.4

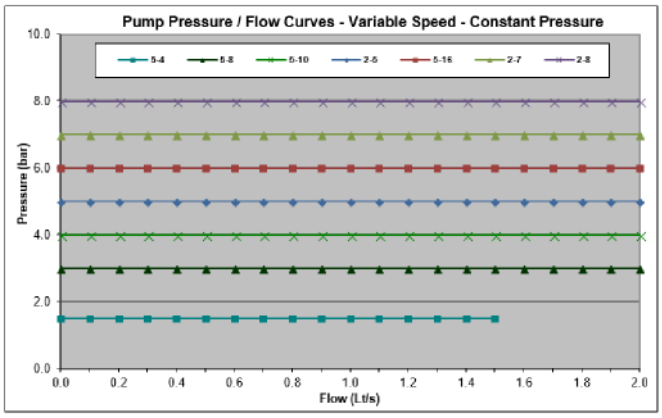
Outlet Pressure Control

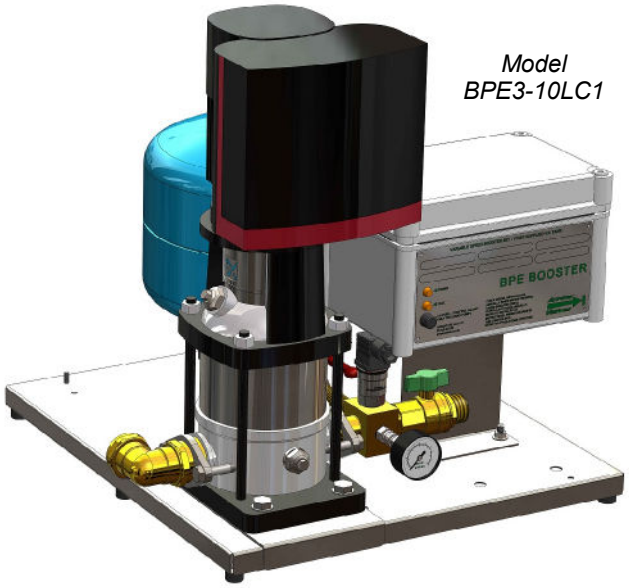
The outlet pressure controlled by a transducer, which is factory set to the "default set point" in the table below and controlled to within a 10% band. The outlet pressure is therefore constant up to the maximum duty of the pump.

Model	Outlet Size	Default Set Point	Pressure Switch on (min.)[1]	Pressure Switch off (Max)[1]	Pressure Max[2]	Vessel Air Pressure[3]
5-4	DN25	1.5 bar	1.4 bar	1.7 bar	2.8 bar	1.1 bar
5-8	DN32	3.0 bar	2.7 bar	3.3 bar	5.0 bar	2.1 bar
5-10	DN32	4.0 bar	3.6 bar	4.4 bar	7.0 bar	2.8 bar
2-5	DN32	5.0 bar	4.5 bar	5.5 bar	7.0 bar	3.5 bar
5-16	DN32	6.0 bar	5.4 bar	6.6 bar	11.7 bar	4.2 bar
2-7	DN32	7.0 bar	6.3 bar	7.7 bar	11.7 bar	4.9 bar
2-8	DN32	8.0 bar	7.2 bar	8.8 bar	11.7 bar	5.6 bar

Notes - 1. Differential +/- 10% of set point. 2. If set to full speed.
3. Vessel air pressure with zero water pressure, 0.7 X set point.

The graph below illustrates the benefit of variable speed pumps. The outlet pressure is constant despite varying flow demand. Illustrated using *"default set point". The set point can be altered at the factory. On-site alterations require a commissioning service.*





Model BPE3-10LC1

Electrical Specification

Motor 2-Pole 50 Hz 230 V 1 ph (5-4, 5-8)
400 V 3 ph (5-10, 2-5, 5-16, 2-7, 2-8)

Model	1 phase A (Run)		3 phase A (Run)		Input max kW
5-4	7.5				1.10
5-8	7.5				1.50
5-10, 2-5			3.7		2.20
5-16, 2-7, 2-8			5.0		3.00

Class — Class 1 (requires earth wire)
BMS — Volt free SPDT relay general fault – Pump / inverter / low level alarm
Low level cut out — Stops pump via electrodes in tank (Warning lamp on control box) – auto reset once tank refilled
Protection — IP65 (Enclosure) / IP55 (Pump)

Connection
1 phase — M20 1 phase + neutral + earth
3 phase[1] — M20 3 phases + neutral + earth

Note – 1. The control circuit is 230 V so a neutral supply is required

Codes & Descriptions – Single Pump 2.0 Lt/s

Inlet Size	Code	Description
DN25	BPE5-4LC1	Booster pump 5-4 with low level pump cut out
DN32	BPE5-8LC1	Booster pump 5-8 with low level pump cut out
DN32	BPE5-10LC1	Booster pump 5-10 with low level pump cut out
DN32	BPE2-5LC1	Booster pump 2-5 with low level pump cut out
DN32	BPE5-16LC1	Booster pump 5-16 with low level pump cut out
DN32	BPE2-7LC1	Booster pump 2-7 with low level pump cut out
DN32	BPE2-8LC1	Booster pump 2-8 with low level pump cut out
DN25	BPE5-4LC2-25	Booster Pump 5-4 Variable Dual Level Control 230 V
DN32	BPE5-8LC2-25	Booster Pump 5-8 Variable Dual Level Control 230 V
DN32	BPE5-10LC2-32	Booster Pump 5-10 Variable Dual Level Control 400 V
DN32	BPE2-5LC2-32	Booster Pump 2-5 Variable Dual Level Control 400 V
DN32	BPE5-16LC2-32	Booster Pump 5-16 Variable Dual Level Control 400 V
DN32	BPE2-7LC2-32	Booster Pump 2-7 Variable Dual Level Control 400 V
DN32	BPE1-8LC2-32	Booster Pump 2-8 Variable Dual Level Control 400 V

Optional extras – see pages 6 and 7

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Booster Pump Set

Models BPELC1 / BPELC2 – Duty Standby – Datasheet

Dual Pump – Duty Standby

Both pumps are variable speed and set to provide constant pressure. Remarkably, the foot print is the same as the single pump set. Only one pump runs at any one time, the pumps alternate on a daily basis to avoid stagnation and ensure even use. A manual override switch "hand" allows either pump to be isolated and run only the healthy pump.

Connection Pipes

Flexible stainless braided hoses are supplied for the inlet and outlet. These have a female swivel nut (union) and a fibre washer. See Codes and Descriptions and Outlet Pressure Control tables for size.

Electrical Specification

Motor 230 V 1 phase

	1 phase		Input max
Model	A (Run)		kW
3-5S	4.2		0.55
3-7S	5.5		0.75
3-10S	7.5		1.10
5-4S	7.5		1.10
5-8S	7.5		1.50

Class Class 1 (requires earth wire)

BMS Volt free SPDT relay general fault- pump / inverter / low level alarm
Volt free SPDT for low level alarm

Low level cut out Stops pump via electrodes in tank (Warning lamp on control box) – auto reset once tank refilled

Protection IP65 (Enclosure) / IP55 (Pump)

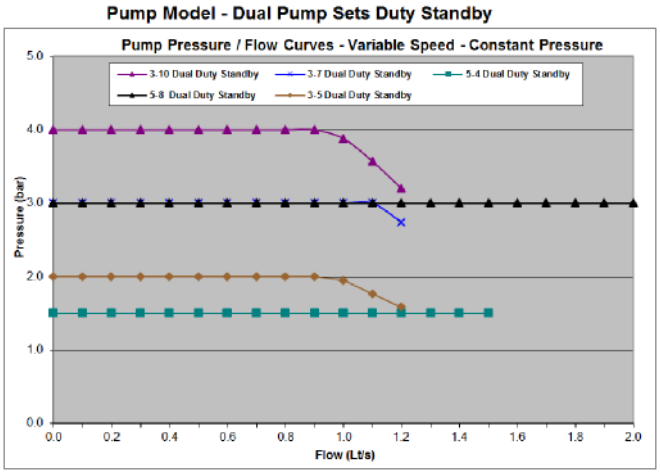
Connection

1 phase M20 1 phase + neutral + earth

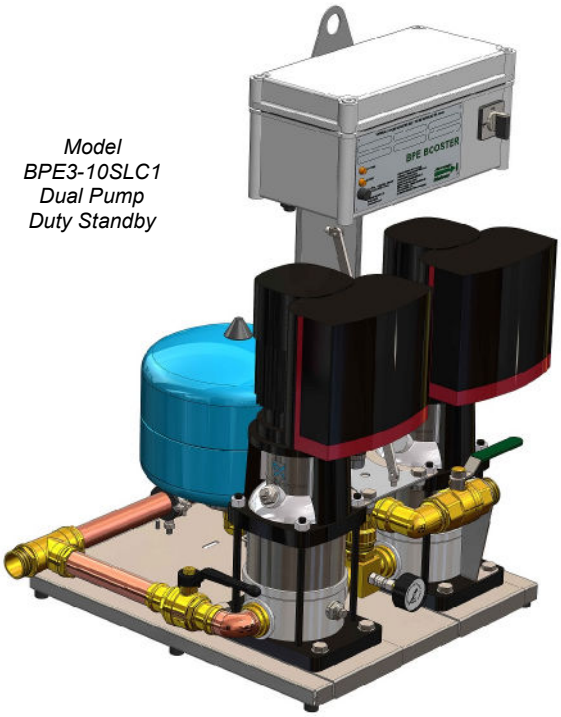
Outlet Pressure Control

Model	Outlet Size	Default Set point	Pressure Switch on (min.)[1]	Pressure Switch off (Max)[1]	Pressure Max[2]	Vessel Air Pressure[3]
3-5S	DN20	2.0 bar	1.8 bar	2.2 bar	2.8 bar	1.4 bar
3-7S	DN20	3.0 bar	2.7 bar	3.3 bar	4.6 bar	2.1 bar
3-10S	DN25	4.0 bar	3.6 bar	4.4 bar	5.5 bar	2.8 bar
5-4S	DN25	1.5 bar	1.4 bar	1.7 bar	2.8 bar	1.1 bar
5-8S	DN32	3.0 bar	2.7 bar	3.3 bar	5.0 bar	2.1 bar

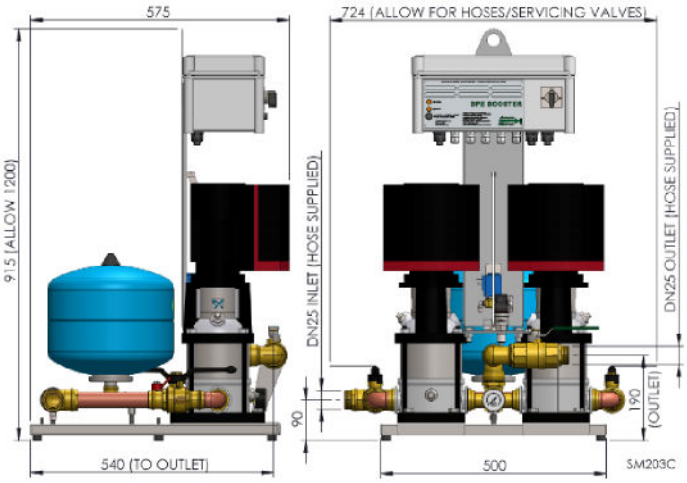
Notes - 1. Differential +/- 10% of set point. 2. If set to full speed.
3. Vessel air pressure with zero water pressure, 0.7 X set point.



Model BPE3-10SLC1 Dual Pump Duty Standby



Dimensions



Model BPE3-10S-LC1 Shown (Dimensions apply to all 3 Series Dual Pump units)

Codes and Descriptions – Duty Standby

Inlet Size	Code	Description
DN20	BPE3-5S-LC1	Booster pump 3-5 Duty Standby LC1 230 V
DN20	BPE3-7S-LC1	Booster pump 3-7 Duty Standby LC1 230 V
DN25	BPE3-10S-LC1	Booster pump 3-10 Duty Standby LC1 230 V
DN25	BPE5-4S-LC1	Booster pump 5-4 Duty Standby LC1 230 V
DN32	BPE5-8S-LC1	Booster pump 5-8 Duty Standby LC1 230 V
DN20	BPE3-5S-LC2	Booster Pump 3-5 Duty Standby LC2-20 230 V
DN20	BPE3-7S-LC2	Booster Pump 3-7 Duty Standby LC2-20 230 V
DN25	BPE3-10S-LC2	Booster Pump 3-10 Duty Standby LC2-25 230 V
DN25	BPE5-4S-LC2	Booster Pump 5-4 Duty Standby LC2-25 230 V
DN32	BPE5-8S-LC2	Booster Pump 5-8 Duty Standby LC2-25 230 V
Optional extras – see pages 6 and 7		

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Booster Pump Set

Models BPELC1 / BPELC2 – Duty Assist – Datasheet

Duty Assist

Allows the second pump to automatically switch on when required, thus doubling the output. Alternate starting avoids stagnation and ensures even use. If one pump develops a fault, the controller isolates and continues with the healthy pump (the BMS fault relay activates together with panel lamps). Normal demand is often met with only one small pump running at optimum efficiency, offering substantial energy saving compared to one larger pump. Furthermore smaller pumps are quieter.

Model	Outlet Size	Default Set point	Pressure Switch on (min.)[1]	Pressure Switch off (Max)[1]	Pressure Max[2]	Vessel Air Pressure[3]
3-5A	DN32	2.0 bar	1.8 bar	2.2 bar	2.8 bar	1.4 bar
3-7A	DN32	3.0 bar	2.7 bar	3.3 bar	4.6 bar	2.1 bar
3-10A	DN32	4.0 bar	3.6 bar	4.4 bar	5.5 bar	2.8 bar
5-4A	DN32	1.5 bar	1.4 bar	1.7 bar	2.8 bar	1.1 bar
5-8A	DN32	3.0 bar	2.7 bar	3.3 bar	5.0 bar	2.1 bar
5-10A	DN32	4.0 bar	3.6 bar	4.4 bar	7.0 bar	2.8 bar

Notes - 1. Differential +/- 10% of set point. 2. If set to full speed.
3. Vessel air pressure with zero water pressure, 0.7 X set point.

Specification & Materials

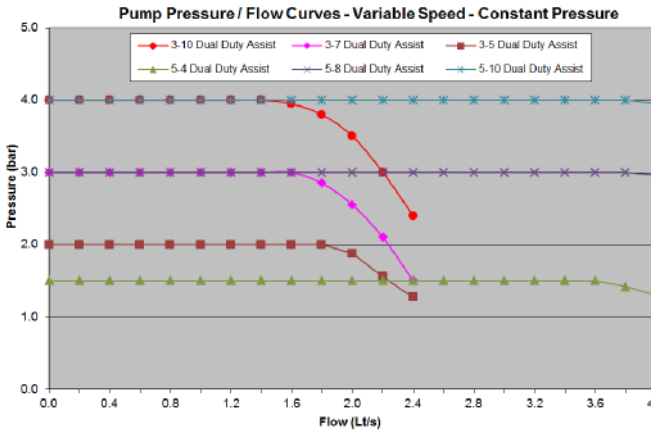
See page 1

Motor

Voltage — 230 V 1 ph (3 series & 5-4,5-8)
400 V 3 ph (5-10)

Protection — MCB in control box for each pump
motors thermal protection (IEC 34-11: TP 211)

Model	1 phase A (Run)		3 phase A (Run)		Input max kW
3-5A	8.4				1.10
3-7A	11.0				1.50
3-10A	15.0				2.20
5-4A	15.0				2.20
5-8A	15.0				3.00
5-10A			7.4		4.40



Digital Controller

The controller includes a digital display with setting buttons and button lock to prevent tampering. Both pumps can be tested and disabled if necessary via the display. Controller features include pump changeover every 24 hours if continuous draw off causes one pump to run and pump pulse every 24 hours to avoid seizure. The user can also view the set pressure and when the pump was last started and stopped via the display.

Vessel Purge

The digital controller also features an automatic vessel purge facility for Legionella control. Every 24 hours the switch-on pressure is dropped below the vessel pre charge pressure, ensuring the entire contents of the vessel is emptied.

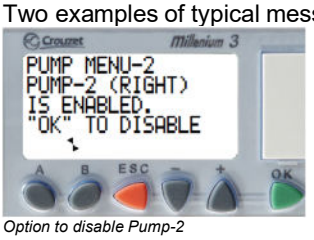
Information display messages include

- Healthy
- Pump-1 running
- Pump-2 running
- Last started
- Last stopped
- Pressure
- Set point pressure

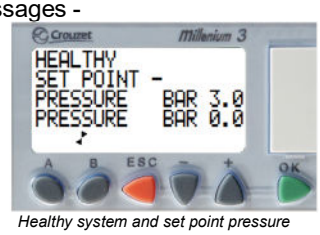
Fault display messages include

- Pump-1 fault
- Pump-2 fault
- Pump-1 disabled
- Pump-2 disabled
- Low-level fault
- High-level fault

Two examples of typical messages -

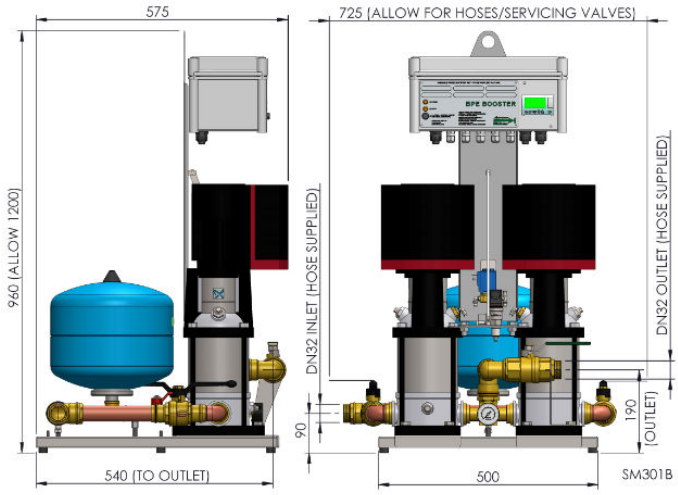


Option to disable Pump-2



Healthy system and set point pressure

Dimensions



Model BPE5-8A-LC1 Shown (Dimensions apply to all 5 Series Dual Pump units)

Codes and Descriptions – Duty Assist

Inlet Size	Code	Description
DN32	BPE3-5A-LC1	Booster Pump 3-5 Duty Assist LC1 230 V
DN32	BPE3-7A-LC1	Booster Pump 3-7 Duty Assist LC1 230 V
DN32	BPE3-10A-LC1	Booster Pump 3-10 Duty Assist LC1 230 V
DN32	BPE5-4A-LC1	Booster Pump 5-4 Duty Assist LC1 230 V
DN32	BPE5-8A-LC1	Booster Pump 5-8 Duty Assist LC1 230 V
DN32	BPE5-10A-LC1	Booster Pump 5-10 Duty Assist LC1 230 V
DN32	BPE3-5A-LC2	Booster Pump 3-5 Duty Assist LC2-25 230 V
DN32	BPE3-7A-LC2	Booster Pump 3-7 Duty Assist LC2-25 230 V
DN32	BPE3-10A-LC2	Booster Pump 3-10 Duty Assist LC2-25 230 V
DN32	BPE5-4A-LC2	Booster Pump 5-4 Duty Assist LC2-25 230 V
DN32	BPE5-8A-LC2	Booster Pump 5-8 Duty Assist LC2-25 230 V
DN32	BPE5-10A-LC2	Booster Pump 5-10 Duty Assist LC2-25 400 V
Optional extras – see pages 6 and 7		

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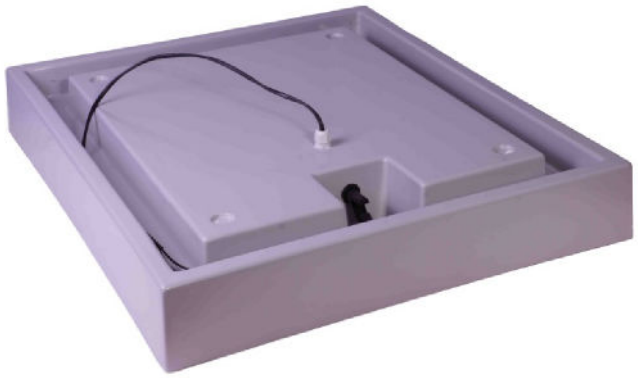
Booster Pump Set
Models BPELC1 / BPELC2 - Options - Datasheet

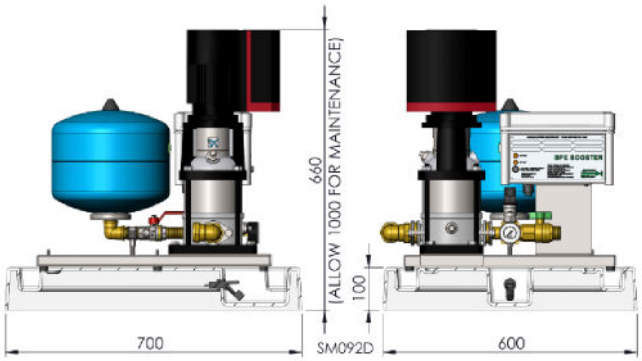
Options
- Bypass Valve
- Wall Brackets – *not suitable for 5-16, 2-7, 2-8 or duals*
- GRP Drip Tray – *up to 3-7S*
- GRP Wall Cover – *use wall brackets*
- GRP Enclosures – for exterior use
- Pulse timer – prevents pump sticking if infrequently used – *all except dual (already included)*

Suitability	Code	Description
Up to 5-8 single	BTBRA	Wall Bracket for Break Tanks AV Mounts
All except dual	BTPT	Pulse Timer - Infrequent Use/Anti Seize
Up to 3-7 single	BTDT1	GRP Drip Tray c/w Float Switch (up to 3-7S)
All	BTCAB1	Enc. 1120x1120x1050 GRP c/w Heating
Up to 5-4 Single	BTCAB2	Enc. 700x700x950 GRP c/w Frost Protection
Up to 5-10 Single	BTCAB5	BT Wall Cover 1150hx775Wx750D
All except BTCAB1	BTFPS	BT Frost Protection System

GRP Drip Tray
BTDT1 – GRP Drip Tray for use with Booster Set units (up to the 3-7S), where it is impractical to fit an overflow – e.g. when retro fitting in a stairwell.

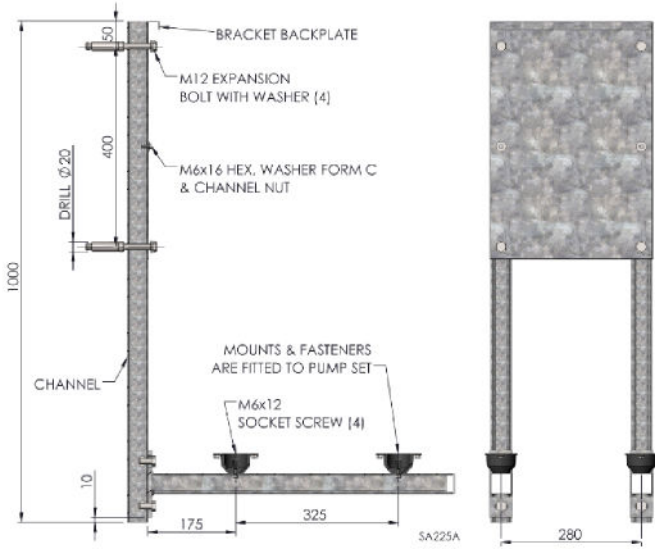
The whole pump set sits on top of the Drip Tray so any water leaking from the pump is captured in the "moat" and runs into the well, activating the float switch and isolating the water supply, which stops the pump. The pump restarts pump once water is drained from the well.



Dimensions


Bypass Valve
If the pump fails or is turned off for maintenance, the Bypass Valve continues to feed water through the system at mains pressure, which is often sufficient to provide water for domestic purposes – *see "BPV" datasheet.*

Wall Brackets
BTBRA - Galvanised Steel Wall Mounting Brackets with Anti Vibration mounts. For use with single pump Booster Set units, except for the 5-16, 2-7 and 2-8. Not suitable for dual pump units.

Dimensions


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All unit-less dimensions in mm.
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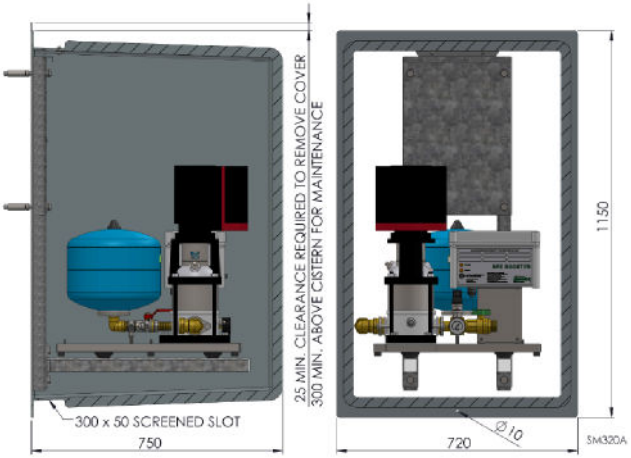
GRP Wall Cover

BTCAB5 – Insulated GRP Wall Cover, for use with the BTBRA Wall Mounting Brackets. The GRP colour is BS 00-A-05 (RAL equivalent is 7038). Integrated Frost Protection System (BTFPS – see BTCAB2 section below) can be added to the Wall Cover.
Not suitable for dual pump units or the 5-16, 2-7 and 2-8.

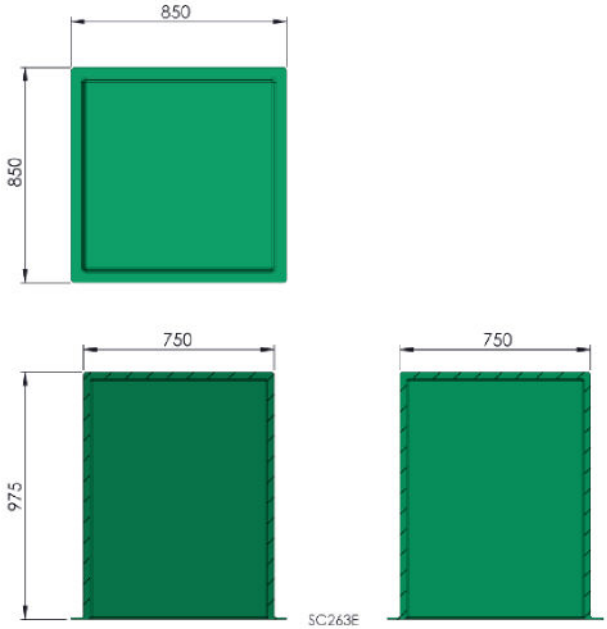
Dimensions



GRP Enclosures

BTCAB2 – Lift Off GRP Enclosure for exterior use, supplied with a Padlock and Integrated Frost Protection System. A thermostat attached to the control box will cause the pump to run against a closed head to generate heat. The colour of the enclosure is RAL 6005, not suitable for dual pump units or single pumps larger than the BTAB5-4.

BTCAB2 Dimensions



BTCAB1 – GRP Heated Enclosure with Kiosk Door, for external use of all Booster Set units. The housing has an integrated bar heater, complete with thermostat. The exterior colour of the enclosure is RAL6005 – *see "Boost-A-Break®" datasheet for dimensions.*

Installation Notes

The unit must be located in a frost-free area (or use a GRP enclosure) that is not liable to flooding. The unit is generally floor mounted on standard rubber feet. Alternatively use the wall brackets which feature special acoustic mounts and where possible mount to a solid external wall.

All controls and serviceable components are accessible from the front, so allow room for servicing. The vessel air charge valve is located on the left.

The flexible stainless hose provided should be connected to the outlet pipe. Thoroughly flush supply pipes before connecting.

The unit must be hardwired through a 2 pole isolator (4 pole for 3 phase) and protected with a suitable MCB.

Check the pump switches on and off at the required pressures using the gauge fitted.

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