

Max-E Boost Installation & Operating Instructions

Residential, Light Commercial and Commercial
Package cold water pressure booster set



Declaration of Conformity

For the product Declaration and Conformity please refer to the Installation and Operating Instructions for the CRIE Booster pump and the GT-U-12V Pressure Vessel.

If further details are required, please contact one of the Grundfos offices listed on the back page of these instructions.

General Data

DELIVERY AND HANDLING



The Max-E Boost set is supplied from the factory mounted on a wooden pallet suitable for handling by forklift equipment. The weight and size of the Max-E Boost may require the use of proprietary lifting equipment in order to be handled safely. During installation in the system pipework ensure that the recommended procedures for lifting pallet mounted equipment are observed. Do **not** lift or manoeuvre the Max-E Boost by the pipe work or the pressure vessel.

INSPECTION

The Max-E Boost should be unpacked and inspected. Any damage must be reported to the supplier within seven days in writing.



It is important that these installation and operating instructions are studied carefully before any installation takes place. The installation and operation should also be in accordance with local regulations and accepted codes of practice.



Under no circumstances should the unit be operated until correctly installed in the system pipework and ensure that the terminal box cover, motor fan cover and coupling guards are secured in their appropriate positions.

WARRANTY

1. The Grundfos warranty covers all defects within the Max-E Boost originating from faulty workmanship and/or materials for a period of two years from the date of installation or thirty months from the date of despatch from the factory, whichever is the shorter. The warranty covers the replacement of any faulty parts and our labour cost to replace the faulty parts. It does not cover the cost of removing, returning and refitting the booster set or any secondary losses arising from the failure.
2. Under no circumstances should faulty equipment be dismantled. Failure to comply with this instruction could invalidate the warranty.
3. Defects arising from incorrect installation, water containing debris, or harmful chemicals, inadequate electrical protection, faulty ancillary equipment, lightning or other circumstances beyond our control, are not covered by the warranty.

SITE STORAGE

It is strongly recommended once the Max-E Boost has been delivered to site, that it is placed immediately into a dust, moisture and frost-free area which has been secured to prevent unauthorised interference. If this is not possible then the unit should be stored in an area which is as near as possible to the ideal storage conditions as described above.

APPLICATIONS

The Max-E Boost has been designed to be compact, reliable, and simple to install, and to provide many years of efficient and effective service.

The main applications for the Grundfos Max-E Boost are:

- Domestic pressure boosting
- Light Commercial pressure boosting



The Max-E Boost must be used in conjunction with a cold water storage tank, and is not for direct connection to the cold water mains supply due to the Water Byelaw Regulations.



Booster sets must not be used in an environment which has been classified as hazardous and could therefore cause an explosion if there is a danger of ignition by a flame path. Grundfos Pumps Ltd do not accept any responsibility for the use of booster sets to pump liquids which could be construed as being hazardous to health either by touch, ingestion or inhalation of fumes or gases given off by the liquid.

MAXIMUM OPERATING CONDITIONS

Liquid temperature range: +3°C to +90°C

Ambient temperature: up to +40°C

Relative Humidity: up to 95 % non condensing

Maximum pressures: For CRIE 5-8 pump model
Inlet pressure: 10 bar
Casing pressure rating: 16 bar,
Pump generated pressure: 5.3 bar
Maximum discharge (setpoint) setting: 4.5 bar

NOISE LEVEL



The noise level of the Max-E Boost is 65 dB(A) at full speed.

WRAS APPROVAL REFERENCE

The CRIE booster pump and GT-U-12-V pressure vessel are approved for use with potable water under the WRAS scheme.

Installation



Do not attempt to start the pump even to check the direction of rotation until the system has been filled with water and both the pump and the system have been primed/vented.



All electrical connections should be carried out by a qualified and authorised electrician in accordance with the wiring diagrams supplied and with the latest issue of the I.E.E. regulations. The Home Booster must be earthed. It is strongly recommended that an Earth Leakage Circuit Breaker (ELCB) is fitted on the incoming electrical supply.



Do not remove pump motor coupling guards and electric motor fan covers unless:

- The electricity supply has been suitably isolated.
- The pump isolating valves have been closed.
- The system pressure has been removed from the pump unit.



Do not remove electrical panel enclosures, panel enclosures, panel components, motor terminal box covers, electrical cables or any other electrical protective covering without first ensuring that the electrical supply is suitably isolated and cannot be switched on.



Do not attempt to supply electricity to the control panel and run the pump electric motors without ensuring that all electrical fittings, cables and enclosures are intact and suitably electrically isolated from human touch during operation.

Do not attempt to supply electricity to the electric motor or re-pressure the pipe work system without first ensuring that the coupling guards and motor fan covers are held securely in their correct positions.

GENERAL INFORMATION

- The suction and discharge pipework must be at least the same size as the booster set manifolds, as a smaller size may result in reduced pump performance or increased system resistance leading to a reduced flow.
- The installation suction and discharge pipework must be properly supported **before** being connected to the booster set so that the booster set is not stressed.
- The pipework installation from the booster set should be in accordance with local water authority regulations.
- The electrical installation of the booster set should be in accordance with the latest issue of the I.E.E. regulations.
- Check that the cold water storage tank has adequate capacity to meet the maximum demand.

LOCATION



The Max-E Boost must not be installed into roof spaces, the small level of vibration associated with any rotating equipment will cause disturbance, and considerable water damage could result if a leak occurs. Please provide drainage facilities for the unit in case of leakage or loss of water during commissioning and service.

- The Max-E Boost set should be sited in a dry, well ventilated, **and frost-free position**, where it will not be subjected to extremes of temperature. The Max-E Boost may be located outdoors in a weather, frost and rodent proof enclosure with adequate ventilation especially during hot weather. All pipe work subject to freezing conditions must be adequately protected.
- Ensure that the Max-E Boost is positioned to allow access for examination and service. A minimum of 75cm should be left all around the booster set. **Adequate drainage facilities and protection from water damage in the immediate vicinity of the booster set must be provided.**
- To enable maintenance and service of the unit to be carried out satisfactorily, the area should have adequate lighting for this work to be carried out safely.
- The Max-E Boost should not be installed in an unventilated small space, ensure adequate ventilation for the motor.

FOUNDATION & MOUNTING

The Max-E Boost is fitted with anti-vibration mountings to reduce vibration transmission into the structure of the building.

If the Max-E Boost is installed with the anti-vibration mountings or an inertia base with springs, then flexible connectors should be fitted between the booster set and the system pipe work to vibration transmission into the system pipe work.

Alternatively, the Max-E Boost can be mounted directly to a concrete plinth, in this case the anti-vibration mountings may be removed. If installed on a concrete base, ensure the surface is both horizontal and flat to avoid distortion of the base plate, use shims if necessary to ensure that the base mounting frame is level and properly supported.

If the Max-E Boost is to be installed close to living accommodation, it is advisable to retain the anti-vibration mountings on the set and use flexible pipe couplings, or alternatively install the Max-E Boost with an inertia base with springs.

Grundfos does not recommend installation of the Max-E Boost onto a wooden substrate. Booster sets installed onto wooden flooring must be provided with an inertia base with springs, in this case flexible connections are also required.

STORAGE TANK



The Max-E Boost must be used in conjunction with a cold water storage tank having a type AB Air Gap, supplied and installed in accordance with the Water Byelaws Regulations. The Max-E Boost must NOT be directly connected directly to the incoming water company mains water supply pipe. This will cause local depressurisation of the water supply, and possible contamination of the mains water supply.

Check that the tank cold water storage tank has adequate capacity to meet the demand of the users within the building. As a general rule, allow 125 litres storage per person. Alternatively the storage can be based on the number of bedrooms, in which case multiply 125 litres by the number of bedrooms plus one.

A person will use approximately 150 litres per day, for standard fittings and use. Where space is restricted the amount of storage can be reduced on the basis that half of this volume is used in the morning and evening.

The ability of the cold water mains supply should also be taken into account when selecting the size of the cold water storage tank.

BYPASS

In the event of a failure of the Max-E Boost, it is recommended to install a cold water mains water bypass, to allow continued water supply albeit at a reduced pressure to the installation. The bypass arrangement must be installed in accordance with the Water Byelaws Regulations.

VESSEL PRECHARGE PRESSURE



When adjusting the vessel pre-charge pressure, the vessel connection must effectively be **open to atmosphere**. Failure to set the pre-charge pressure correctly will cause incorrect operation of the booster set.

The vessel pre-charge pressure should be adjusted before the pump is filled with water. The pressure vessel pre-charge must be set to 70% of the required pump discharge (setpoint) pressure.
 Example, if the required discharge pressure is 3.0 bar, then the pre-charge pressure must be set to $0.7 \times 3.0 = 2.10$ bar.

The pre-charge pressure can be checked and adjusted using a car tyre pressure gauge. For small pressure adjustments a foot pump can be used. If large amounts of gas are required then dry nitrogen should be used in order to prevent corrosion within the vessel.



PRESSURE VESSEL

The Max-E Boost is supplied with a loose 24 litre pressure vessel for transport reasons. The 24 litre vessel is to be installed on site to avoid damage to the pressure vessel. The pressure vessel has a 1" BSP threaded connection for screwing into the pipe work fitting on the pipe work. The threaded connection should be sealed using a WRAS approved thread sealing material or compound.



Pipe work fitting into which the pressure vessel is screwed into.

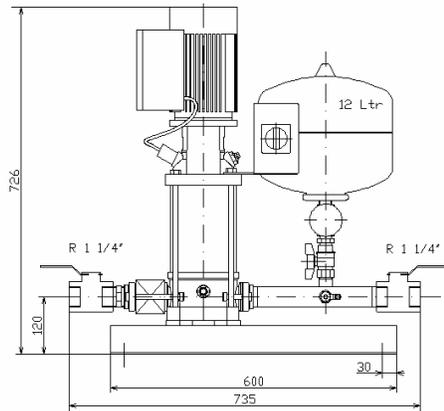


Pressure vessel threaded connection.



Pressure vessel installed in position.

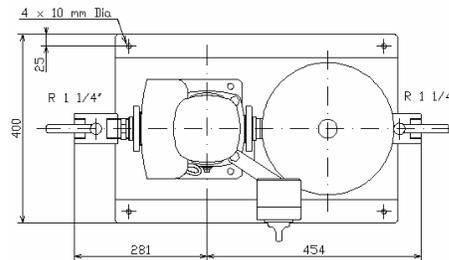
WEIGHTS & DIMENSIONS



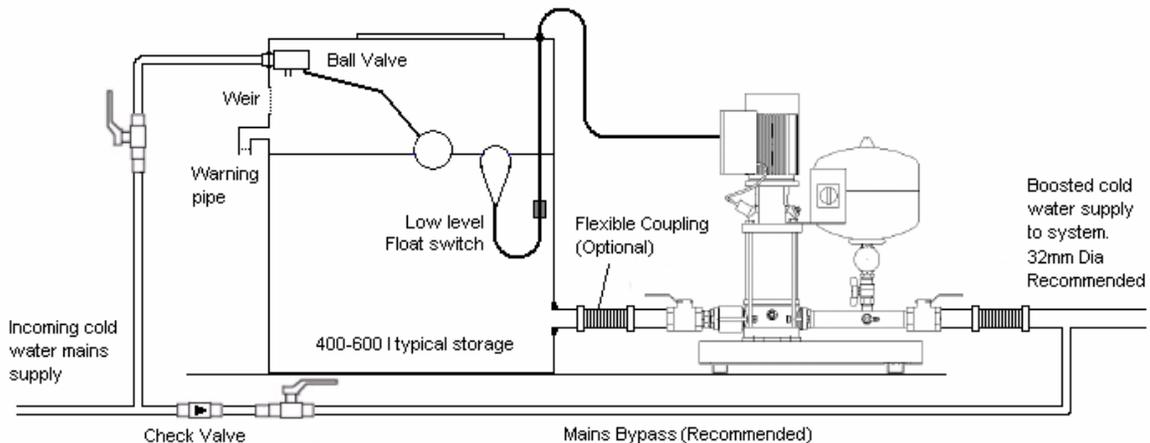
All dimensions in (mm)

Max-E Boost

Weight dry: 44.5kg
 Weight wet: 60.0kg
 Shipping weight: 50.0kg



TYPICAL INSTALLATION



For guidance only, please refer to the Water Byelaws Regulations for details

Electrical General



Ensure that the electricity supply has been suitably isolated and cannot be switched on, before removing the terminal box covers of the pump motor, and before any removal or dismantling of either item.



All electrical connections should be carried out by a qualified and authorised electrician in accordance with local site regulations and also in accordance with the latest issue of the I.E.E. regulations.



The metal work of the Max-E Boost must be earthed. It is strongly recommended that an Earth Leakage Circuit Breaker (ELCB) is fitted to the incoming electrical supply.



Ensure that the electrical supply and the cabling to the Max-E Boost isolator switch is able to meet the current load of the booster set.

GENERAL INFORMATION

The Max-E Boost is suitable for a single phase supply voltage of 230V +/- 6%, with a 10 amp maximum MCB or fuse. The Max-E Boost full load current is 6.8 amps on a 240V 1ph 50Hz supply.

Electrical Connections



Do not attempt to start the pump even to check the direction of rotation until the system has been filled with water and both the pump and the system have been vented.

Please ensure that the booster set is suitable for the electricity supply on which it will be used. All cables must be of an adequate size to prevent an excessive voltage drop in the supply to the booster set, the required cable size is 1.5mm². The electrical installation should be in accordance with the latest issue of the I.E.E. regulations.

ELECTRICAL SUPPLY CONNECTION

The mains electricity supply is connected into the isolator switch mounted on the base plate. Follow the sequence below to open the isolator switch housing in order to connect the electrical supply wires into the isolator switch.

The Max-E Boost must be permanently wired into a fused switched outlet, or a consumer box with a 10 amp MCB.



Release the screw in the side of the isolator switch knob, and remove knob.



Remove four screws securing isolator switch bezel, and remove bezel.



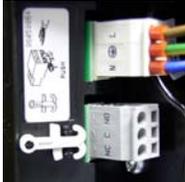
Remove security tab, and undo the two screws securing the isolator switch housing, and remove housing.



Knock out a cable entry, and fit an appropriate cable gland. Connect the single phase supply wires into isolator switch terminals as shown.

ANCHOR TOOL

The anchor tool is used to open the jaws of the connector blocks, and is stored in the motor terminal box.



Storage position of the anchor tool within the motor terminal box.



The anchor tool is double sided, to suit the two styles of terminal blocks used in the terminal box. The anchor tool requires a slight modification for it to work correctly with the white terminal blocks. Trim off a small amount of material from the peg as shown.



The anchor tool is located into the terminal block as shown.



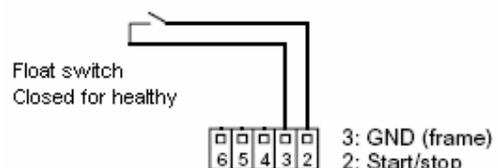
Pushing down on tool causes the pin of the anchor to operate the jaw mechanism. The jaw opens allowing the wire to be inserted.

If the tool is damaged or breaks, a very small flat bladed screw driver can be carefully used to operate the jaw mechanism.

FLOAT SWITCH

To connect the float switch, remove the factory fitted white wire link between terminals 2 and 3, using the anchor tool provided.

Then connect the float switch wires into the same terminals. The motor requires a closed contact on terminals 2 and 3 for a healthy condition to run.



Commissioning



Max-E Boost set is fitted with an IP65 rated isolator on the incoming mains supply. This isolator must be turned to the OFF position before carrying out the following procedures, and also the more specific procedures that follow this section. Do not attempt to start the pump even to check the direction of rotation until the system has been filled with water, and both the pump and the system have been vented.



Pay attention to the direction that any water will take and ensure that the escaping water does not cause injury to persons or damage or enter and subsequently damage the pump motor/motor terminal box.

Before carrying out any of the commissioning procedures on the following pages please ensure that the following connections and checks have been carried out on the booster set.

1. The discharge manifold is connected to the system flow pipework.
2. The suction manifold is connected to cold water supply pipework.
3. The electrical supply cables are connected correctly to the isolator switch.
4. If applicable connect the low water level switch into the pump motor terminal box using terminals 2 and 3.
5. Check that the precharge pressure in the pressure tanks is set to **70% x the required discharge (setpoint) pressure**.
6. Check that the pump shaft is free to turn, by rotating the motor coupling by hand. This is particularly important where the booster set may have been in storage for a long time.
7. Check that both suction and discharge pipework mounted isolating valves are open.
8. Check that all isolating valves on the booster set are open.
9. Check the booster set manifold to pipework connections for leaks.
10. Vent the pumps, undo the vent screw at the top of the pump casing, and wait until water with no air comes out, then re-tighten. For details on how to vent the pumps correctly, please refer to the pump installation and operating instructions supplied with the booster set covering the pump model fitted.



VESSEL PRE-CHARGE PRESSURE



When adjusting the vessel precharge pressure, the vessel connection must effectively be **open to atmosphere**. Failure to set the precharge pressure correctly will cause incorrect operation of the booster set.

The pressure vessel precharge must be set to 70% of the required pump discharge (setpoint) pressure.

Example, if the required discharge pressure is 3.0 bar, then the precharge pressure must be set to $0.7 \times 3.0 = 2.10$ bar.

The vessel precharge pressure should be adjusted before the pump is filled with water.

If the system has already been filled and the pump run, then:

1. Switch off the pump.
2. Close both inlet and outlet isolating valves.
3. The water pressure in the vessel can then be released using the drain cock beneath the pressure vessel.

The precharge pressure can now be checked and adjusted using a car tyre pressure gauge.

The drain cock should be left open while adjusting the precharge pressure.

For small pressure adjustments a foot pump can be used. If large amounts of gas are required then dry nitrogen should be used in order to prevent corrosion within the vessel.



DISCHARGE PRESSURE SETTING



The Max-E Boost discharge (setpoint) pressure is factory set to 3 bar.

The maximum discharge pressure setting should not be set higher than 4.5 bar.

If set higher the pump will not stop with a no water demand condition, and will result in heating of the liquid in the pump, and possible shaft seal damage.

1. Determine the pump discharge pressure required. As a guide the setpoint is the height of the system plus 0.5 to 1 bar.
2. Partially open an outlet supplied by the Max-E Boost.
3. Switch on the electricity supply to the pump, the pump will now start to run.
4. Monitor the pump pressure on the pressure gauge.
5. Use the up/down arrow buttons on the pump motor terminal box to adjust the pump discharge as shown on the gauge.
6. The pump discharge setpoint pressure is now set.

If the discharge pressure setting is changed, the pressure vessel pre-charge pressure must also be adjusted accordingly. The pre-charge pressure must be set to 70% of the required pump discharge (setpoint) pressure, see above section Vessel Pre-charge Pressure.



LOW LEVEL FLOAT SWITCH

The float switch protects the Max-E Boost against dry running, should the level of cold water storage tank fall too low.

The float switch should be installed and the trip point set such that the water level is above the tank connection feeding the pump.

An allowance of 100mm above the tank connection should be made in order to prevent vortex formation and air being drawn in.

Operation



The isolator when in the OFF position isolates the electrical supply to the pump motor, it does **not** isolate the electrical supply to the isolator itself. A fused isolator located elsewhere should be provided for this purpose.

The CRIE pump is a variable speed pump, and operates to maintain a constant discharge pressure within the flow capacity of the pump. A pressure transducer located at the top of the pump casing measures the pump discharge pressure. The controller within the motor adjusts the speed in order to maintain a constant discharge pressure.

The CRIE has a built in stopped function to stop the pump when there is no demand for water. At intervals the pump will carry out a flow test, by reducing the speed slightly, if there is a demand the discharge pressure will fall and the pump will continue to run. If however, there is no demand, the pressure will remain steady, in which case the stop function is activated.

The pump will then increase pressure by 5% before stopping. The pump continues to monitor the pressure, when the pressure falls to 5% below the set pressure the pump resumes operation.

FROST PROTECTION

The Max-E Boost must be protected from freezing conditions. If the booster set is being stored during periods of frost the tank, pump and pipework should be drained to avoid damage. Remove all drain and vent plugs and allow the pump to drain. Do not replace the plugs until the booster set is to be used again.

The pump must be vented/primed before it is started again.

Maintenance

The GRUNDFOS Max-E Boost has been designed for the minimum of maintenance. However, it should be inspected on a regular basis, as a failure of the set could potentially cause considerable water damage.

It is therefore recommended that a GRUNDFOS maintenance contract is taken out to cover maintenance of the set. For further details please contact Grundfos Europump Ltd for on 01942 263628.

However, it is the customer's responsibility to inspect the Max-E Boost in addition to any maintenance contract to ensure the safety and correct operation of the set during the interim period between service visits.



Before removing the terminal box cover from the electric motor or before any removal/dismantling of the pump/motor unit takes place, ensure that the electricity supply to the control panel has been suitably isolated and cannot be switched on.



Care should be exercised when carrying out maintenance work as there may be sharp edges exposed which can cut skin.

INSPECTION

The Home Booster should be inspected at regular intervals of not more than six months, this must be carried out when the Home Booster has been shut down.

The following checks should be carried out at this time.

1. Check that there are no leaks on the internal pipe work, the pump particularly around the shaft seal, and pressure tank.
2. Check for any corrosion particularly on the pressure tank.
3. Check that the pump shaft is free to rotate.
4. Check that water does not appear at the valve on the pressure tanks when the air valve is depressed.
5. Check that the pump operate quietly and smoothly.
6. Check and adjust if necessary the precharge pressure of the pressure tank against the actual figures for the system.
7. Check correct operation of the low level float switch in the storage tank.

Any large deviations from the system values should be investigated for a possible fault. Should any faults be found check the symptoms with the Fault Finding Chart, and if necessary contact Grundfos Pump Ltd for advice or Grundfos Europump for service.

Once inspection and any maintenance work is completed, ensure that the isolating valves are opened fully, and that the electricity supply to the booster set is restored. Check that the correct system pressure is achieved.

Fault Finding Chart

FAULT	INDICATION/CAUSE	CORRECTIVE ACTION
1)No lights on motor.	a)No electrical supply to motor. b)Motor faulty or damaged.	a)Check main isolator is ON. Check Max-E Boost isolator is ON. Check electrical supply to motor. Confirm 240V between Live and Neutral b)Contact your original supplier for remedial action.
2)Pump runs for a short time, then stops and red light flashes.	a)Incorrect pressure transducer signal. b)Mechanical fault with pump. c)Motor internal fault.	a)Check transducer signal is in the range 4-20mA. b)Check that pump shaft is free to rotate. c)Contact Grundfos Euroump Ltd.
3)Lights on motor, but motor does not run, and no red light.	a)Green light on motor is flashing, and a light field light is not visible. b)Green light on motor solid on, and field light is illuminated.	a)Setpoint has been set to stop. Use up arrow button to increase setpoint. If the motor runs straight to maximum speed, check that start/stop link is fitted between terminals 2 and 3. If float switch is fitted check water level in storage tank. If water level is OK, fit link between terminals 2 and 3, if pump runs check operation of float switch. Setpoint pressure has been satisfied, and pump has stopped because of no demand. b)Open an outlet to create a demand, pump should start.
4)Pump runs, but only at a low speed, and does not build up pressure.	a)Setpoint has been set to minimum, bottom field light flashing.	a)Use up arrow button to restore correct setpoint setting.
5)Pump runs at full speed and does not control pressure.	a)Pump has been set to Max. Top field light and top field light is flashing.	a)Use down arrow button to restore correct setpoint setting.
6)Pumps delivers correct pressure, but does not stop with no demand.	a)Small system demand or leak. b)Precharge pressure in pressure vessel incorrect. c)Non-return valve leaking.	a)Close outlet isolating valve, if pump stops, check system for leaks. b)Check precharge pressure, should be 0.7 x setpoint pressure setting. Close outlet isolating valve, and switch off pump, if pressure falls on gauge the non-return valve is leaking. c)Inspect non-return valve and replace if defective.

SPARES PARTS

Description	Product Code
Pump CRIE 5-8 with sensor	96545406
Sensor 0-6 bar	91072076
12 litre Pressure Vessel	96573348
Non-return valve	91040183
Isolator switch	91071656
AV mounting, 1off	96412344

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Leigh, Lancashire: Tel: 08707 503888, Fax: 01942 605970

Livingston, West Lothian: Tel: 01506 461666, Fax: 01506 461555.

Grundfos Europump Ltd:

Tel: 01942 263628, Fax: 01942 602830.

REF: GB/MEB/OM/DBS/02/10



It is the continuing policy of Grundfos to develop and improve our products, and we reserve the right to amend prices and specification without prior notice.