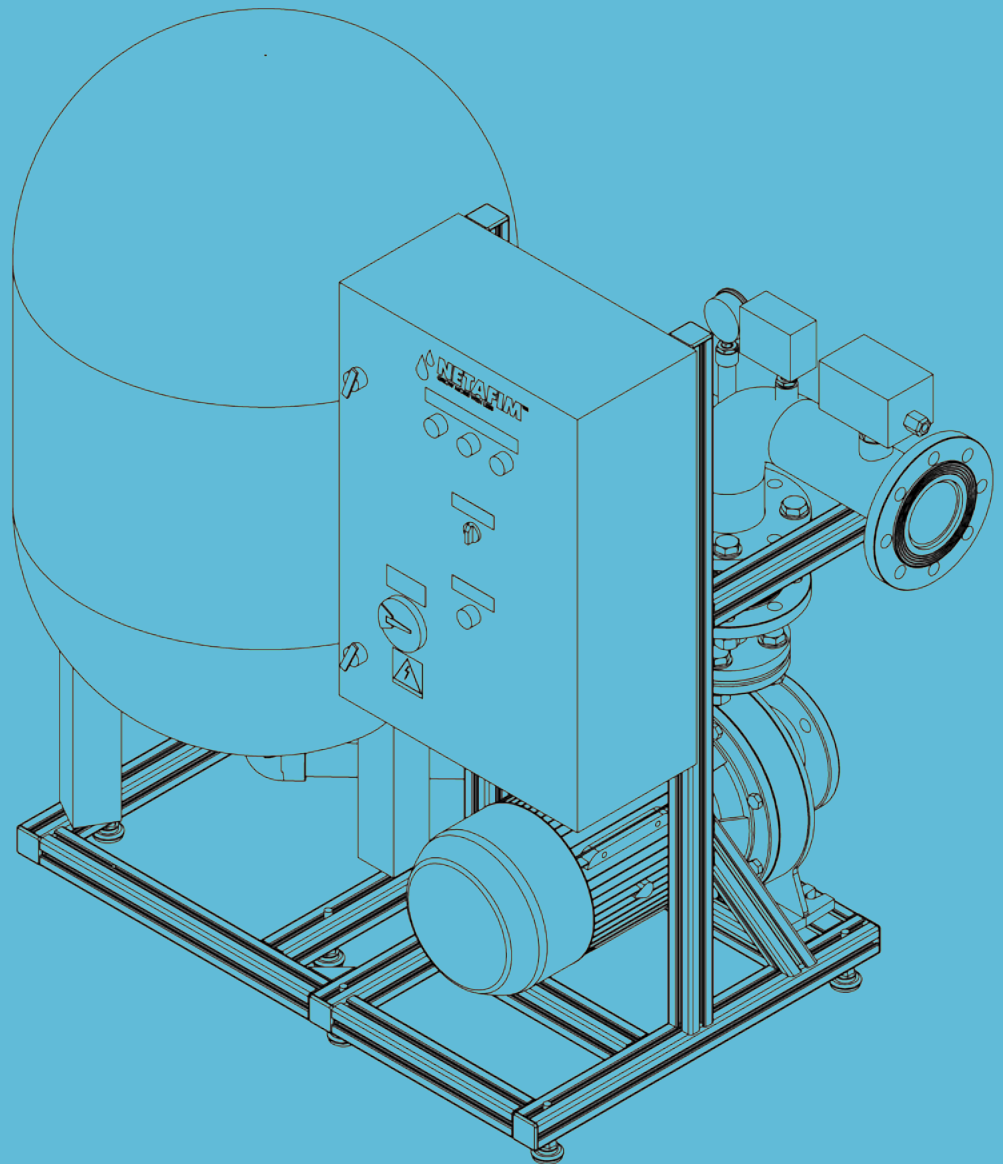


PBS

Pressure Boosting System

Installation and Operation Manual



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Warranty

ABOUT THIS DOCUMENT

Aims of this manual

The aims of this manual are to provide the technician with detailed instructions for the installation of the PBS and to provide the user with instructions for the current operation and troubleshooting of the PBS.

Safety instructions

All local safety regulations must be applied when installing, operating, maintaining and troubleshooting the PBS and its accessories.



WARNING

In agricultural environment - always wear protective footwear.



WARNING

Only authorized electricians are permitted to perform electrical installations!
Electrical installations must comply with the local safety standards and regulations.



CAUTION

When opening or closing any manual valve, always do it gradually, to prevent damage to the system by water hammer.



ATTENTION

Before installing your new PBS, please read all instructions carefully as failures caused by incorrect installation or operation are not covered by the warranty.

The symbols used in this document refer to the following:



WARNING

The following text contains instructions aimed at preventing bodily injury or direct damage to the crops and/or the irrigation system.



CAUTION

The following text contains instructions aimed at preventing unwanted system operation, installation or conditions that, if not followed, might void the warranty.



ATTENTION

The following text contains instructions aimed at enhancing the efficiency of usage of the instructions in the document.



NOTE

The following text contains instructions aimed at emphasizing certain aspect of the operation or installation of the system.



ACID HAZARD

The following text contains instructions aimed at preventing bodily injury or direct damage to the crops and/or the irrigation system in the presence of acid.



ELECTRICAL HAZARD

The following text contains instructions aimed at preventing bodily injury or direct damage to the irrigation system components in the presence of electricity.



SAFETY FOOTWEAR

The following text contains instructions aimed at preventing foot injury.

DESCRIPTION

Netafim™ offers Pressure Boosting System (PBS), a comprehensive, user-friendly pressure boosting system for poultry house and greenhouse cooling, as well as for open-field, and other irrigation applications. Available with a wide variety of pumps according to required flow-rate, PBS always ensures the desired water line pressure based on real-time in-field requirements. Designed with an aluminum frame that houses a pump and several modular components, the compact, cost-effective PBS significantly reduces installation time and cost.



NOTE

This description refers to all PBS units equipped with a 3-phase pump, intended for flow rates between 5 and 100 m³/h (22 and 440 GPM).

For PBS unit equipped with single-phase pumps, intended for flow rates lower than 5 m³/h (22 GPM) see [page 18](#).

Highlights

- Real-time pressure boosting support system
- Multi-pressure, multi-flow rate coverage
- Plug-and-play installation
- Cost-effective solution

Benefits

- Faster installation time
- Lower capital expenses

Features and Capabilities

- Pressure sensor
- Pressure increase to range of 30-65 meters - as per model
- Flow rate range: From 3 m³/hr up to 100 m³/hr (from 13 GPM up to 440 GPM)
- Pressure control options (starting trigger):
 - Pressure switch
 - VFD (Variable-frequency drive)
 - Irrigation controller command (Ac or Dc)
 - Manual start



WARNING

Your PBS is designed to handle water only. It should not be used for any other purpose. The use of the PBS to handle flammable, corrosive and other materials of a hazardous nature is specifically excluded.



CAUTION

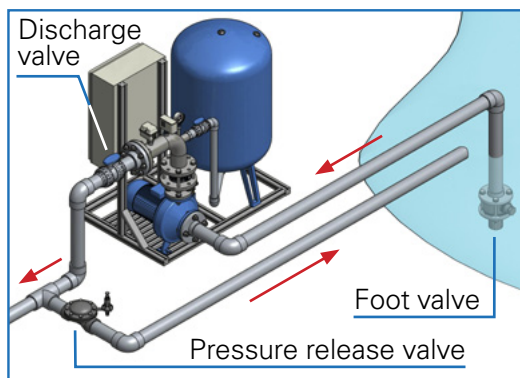
Abrasive Materials

Damage to the PBS due to pumping of abrasive materials will not be covered by the warranty.

3 types of hydraulic installations

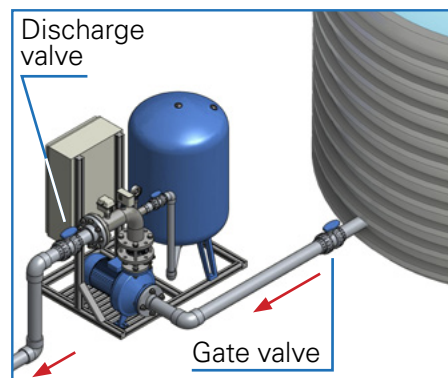
Vertical suction lift

Water source: Reservoir



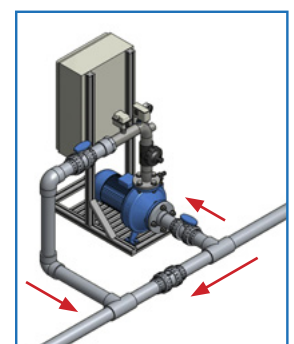
Positive suction

Water source: Water tank



Pressurized line

Water source: Mainline/municipal supply

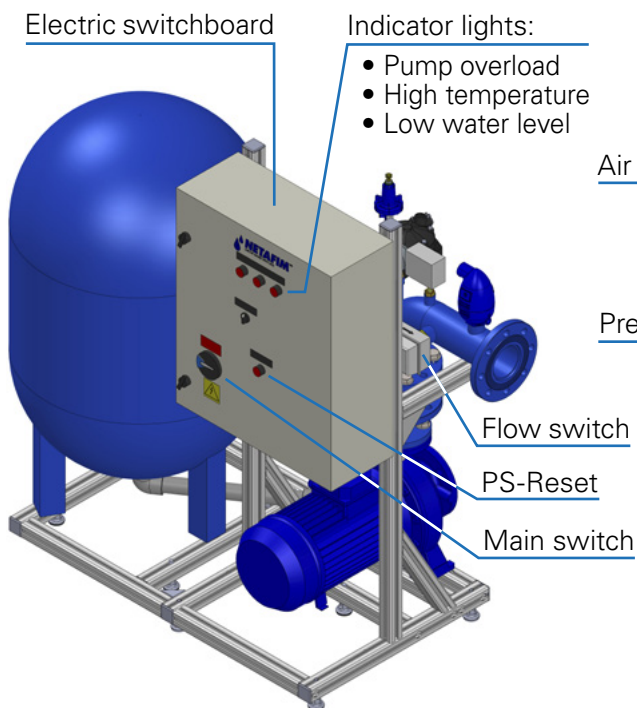


DESCRIPTION

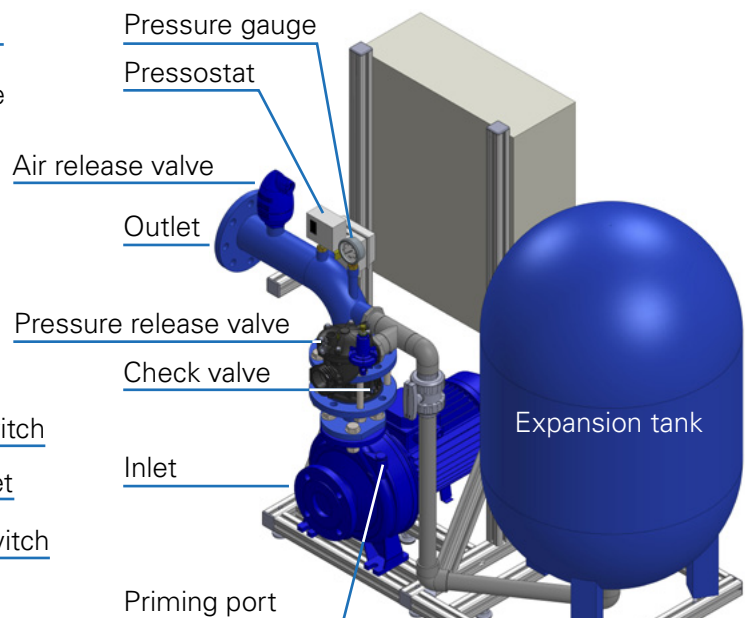
Components

- PBS is available in several models, each equipped with a pump covering a specific range of pressures and flow rates. The comprehensive PBS system is comprised of several modular components that fit on an aluminum frame:
- Expansion tank (up to 200 liters)
- pressostat (pressure switch)
- Flow switch ("No flow" protection)
- pressure gauge
- Electric switchboard with two optional float switches for high- and low level internal-tank protection. Can receive command from AC and DC irrigation controller. (See the enclosed switchboard scheme accompanying each switchboard).
- Optional float switch, air valve and pressure release valve.

Front view



Back view



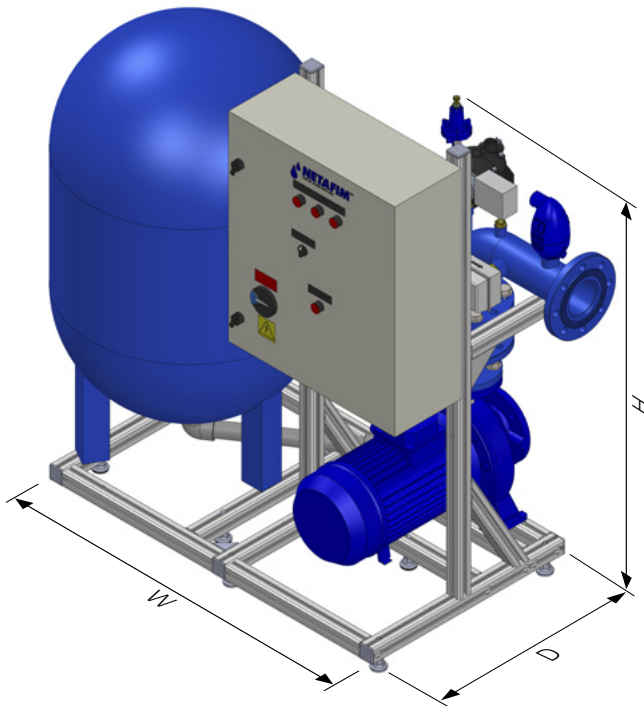
Pump selection

PBS is available with an extensive range of pumps to fit various performance requirements. For the complete selection of pumps, see the online configurator at <http://cmt-configurator.com>.

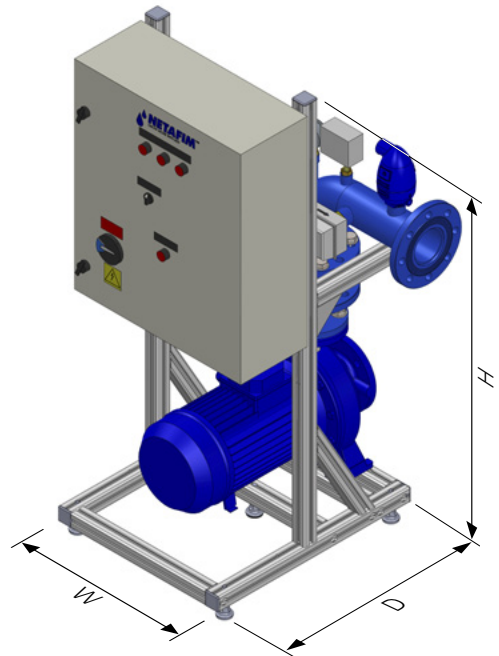
DESCRIPTION

Dimensions

PBS with expansion tank



PBS without expansion tank



Expansion tank	Net dimension (W/D/H*)		Package dimension (W/D/H**)		Package volume	
	cm	inch	cm	inch	m ³	feet ³
With	135/74/140	53.0/29.0/55.0	135/90/161	53.0/35.5/63.5	1.96	69.1
Without	68/74/140	27.0/29.0/55.0	75/85/150	29.5/33.5/59.0	1.03	36.3

*The height varies by ± 1 cm (± 0.5 ") according to the adjustment of the legs.

**The package height includes the pallet height of 15 cm (6").

Package weight

The weight of the PBS varies according to the selected pump.

The table below represents order of magnitude only - final weights will be issued with the product order.

Pump model	With expansion tank		Without expansion tank	
	Kg	Pound	Kg	Pound
32	140 - 170	309 - 375	114 - 144	251 - 317
40	146 - 240	322 - 529	120 - 214	265 - 472
50	184 - 249	406 - 549	158 - 223	348 - 492
65	196 - 253	432 - 558	170 - 227	375 - 500

DESCRIPTION

Inlet and outlet flange connectors

Flange connectors diameter

The size of the inlet and outlet flange connectors depend on the selected pump:

Pump model	Flow range - m ³ /h (GPM)											
	5-24 (22-106)				24-54 (106-238)				54-100 (238-440)			
	Inlet flange		Outlet flange		Inlet flange		Outlet flange		Inlet flange		Outlet flange	
	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch
32	DN50	2"	DN50	2"								
40	DN65	2½"	DN50	2"	DN65	2½"	DN80	3"				
50					DN65	2½"	DN80	3"	DN65	2½"	DN100	4"
65									DN80	3"	DN100	4"

Flange connectors height

The height of the inlet and outlet flange connectors depend on the selected pump and the diameter of the outlet manifold:

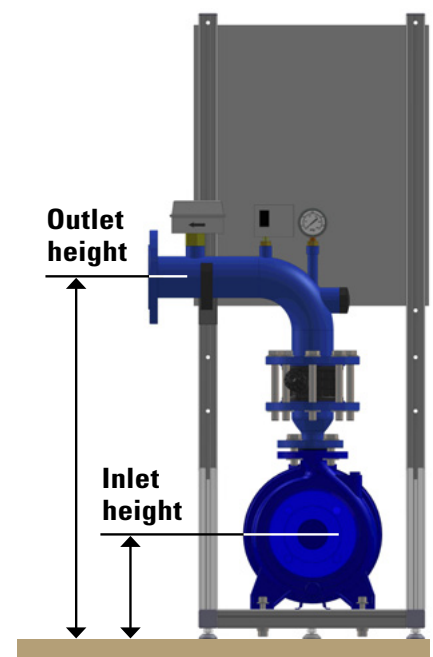
- The table below represents the rough inlet and outlet heights for each family of pumps (Tolerance: ±10 cm (±4"), and is not intended for planning purpose.
- For the exact data for a specific pump and outlet manifold consult your Netafim™ local representative.

Pump model	Flow range - m ³ /h (GPM)											
	5-24 (22-106)				24-54 (106-238)				54-100 (238-440)			
	Inlet height*		Outlet height*		Inlet height*		Outlet height*		Inlet height*		Outlet height*	
	cm	inch	cm	inch	cm	inch	cm	inch	cm	inch	cm	inch
32	20-23	8-9	74-79	29-31								
40	18-25	7-10	70-87	27-34	18-25	7-10	88-105	34-41				
50					23-25	9-10	97-105	38-41	23-25	9-10	103-111	40-44
65									23-25	9-10	103-111	40-44



NOTE

The height of the inlet and the outlet can be fine-tuned by ±1 cm (±0.5") by adjustment of the PBS legs.



INSTALLATION

Choosing a Site

Choose a site with a firm base and as close to the water source as possible with correct power supply. Make sure the PBS is always connected to an adequate, reliable source of water.



CAUTION

The PBS should:

- be placed in a roofed building
- not be exposed to direct sunlight
- be kept at an ambient temperature between 5°C and 40°C (41°F and 104°F)
- be kept at a maximum relative air humidity of 85%
- be properly ventilated
- be protected from dust
- be protected from splashes or direct spraying with water or chemicals



NOTE

Allow 40 cm (16") around the PBS for inlet and outlet connections.



WARNING

Insects tend to nest inside electrical devices.

If the location is susceptible to insect infestation, suitable pest control should be implemented.

Power Connection



WARNING

The electrical connections and checks must be made by a qualified electrician and comply with applicable local standards.

A qualified electrician should install a grounded power supply outlet with circuit breaker according to the particular PBS (see the enclosed pump manual and switchboard scheme).

For the selection of the supply wire size - consider:

- The PBS total rated power.
- Whether the electricity supply is single-phase or three-phase.
(see the enclosed pump manual and switchboard scheme).

Mains wire size for three-phase system*

5 wires: GND, N, L1, L2, L3

PWS power consumption (kW)	Main wire size and nominal current for three-phase system	
	3 x 200-250 VAC	3 x 400-480 VAC
Up to 1.5	≥ 2.5 mm ² (≤ 13 awg), 6A	≥ 2.5 mm ² (≤ 13 awg), 4A
1.6 - 2.2	≥ 2.5 mm ² (≤ 13 awg), 9A	≥ 2.5 mm ² (≤ 13 awg), 5A
2.3 - 3.0	≥ 4 mm ² (≤ 11 awg), 11A	≥ 2.5 mm ² (≤ 13 awg), 7A
3.1 - 4.0	≥ 4 mm ² (≤ 11 awg), 14A	≥ 2.5 mm ² (≤ 13 awg), 8A
4.1 - 5.5	≥ 6 mm ² (≤ 9 awg), 19A	≥ 2.5 mm ² (≤ 13 awg), 11A
5.6 - 7.5	≥ 10 mm ² (≤ 7 awg), 25A	≥ 4 mm ² (≤ 11 awg), 15A
7.6 - 11.0	≥ 16 mm ² (≤ 5 awg), 36A	≥ 10 mm ² (≤ 7 awg), 21A
11.1 - 15.0	≥ 25 mm ² (≤ 3 awg), 46A	≥ 10 mm ² (≤ 7 awg), 27A

*Using a cable not longer than 25 meter (82 feet) between the power supply and the PBS.

INSTALLATION

Electrical Power Surge Protection

An electrical power surge or spike can travel along the supply lines and cause serious damage to electrical equipment.

If the installation site is subject to electrical power surges or lightning, the use of suitable surge protection devices is strongly recommended.

- Connect the PBS to the power supply.

Expansion tank precharge

If the PBS includes an expansion tank see the enclosed expansion tank manual.

Pipe Connections

For best performance the delivery pipe should be of the minimum diameter allowing for a velocity of not more than 2.5 m/sec (8.2 ft/sec).

For best performance the suction pipe should be of the minimum diameter allowing for a velocity of not more than 1.5 m/sec (5.0 ft/sec).

The suction pipe may be of a larger diameter than the PBS inlet to minimize resistance to flow when pumping longer distances.

Make sure the inlet and outlet pipes are properly supported and do not exert strain on the PBS connectors.

A strainer of adequate screen size should be installed upstream from the pump to protect the pump impeller from solid elements that may be present in the water.

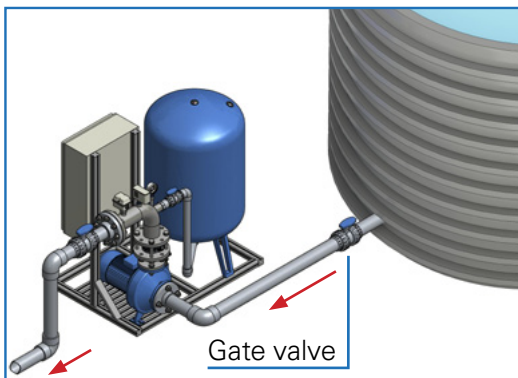
(for the adequate screen size of the strainer see the enclosed pump manual).

For installations with vertical suction lift (negative suction), lay the suction pipe at a constant gradient to avoid air pockets which may reduce pump efficiency.

For types and diameters of Inlet and outlet connectors see the PBS online configurator at <http://cmt-configurator.com>.

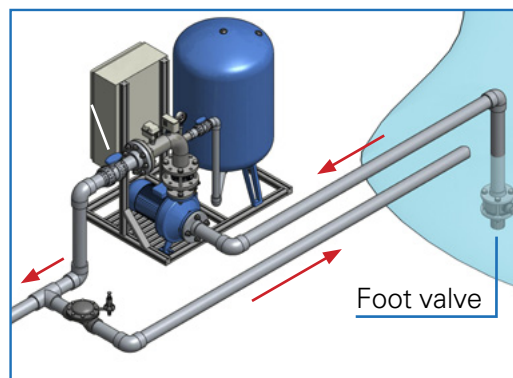
Gate valve

Installations with positive suction require a gate valve so water supply can be turned off for pump removal and servicing.



Foot valve

Installations with a vertical suction lift require a good quality foot valve fitted with a strainer of adequate screen size.



INSTALLATION



ATTENTION

On installations with suction lift, PBS initial performance will be attained only if installation was carried out properly.



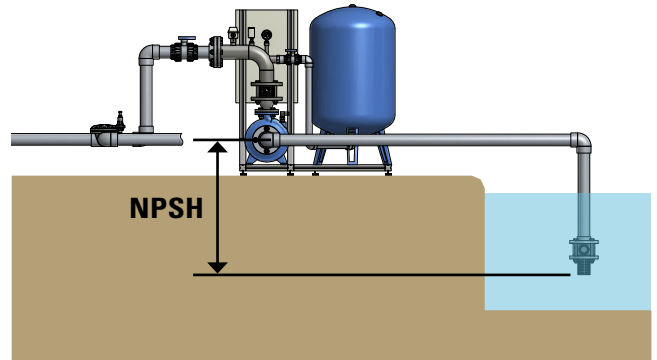
CAUTION

Leaks of the suction pipe are the largest cause of poor pump performance and are difficult to detect. Ensure all connections are correctly sealed.

NPSH

The vertical suction lift depends on the type of pump (NPSH required by the pump) and on the installation (altitude, flow resistance in the suction pipe, water temperature, etc.).

Net positive suction head (NPSH) is the required head value (vertical suction lift) at the inlet of a pump enabling pulling water upwards while keeping the water from cavitating*



*Cavitation - The formation of vapor cavities ('bubbles' or 'voids') in a liquid. It usually occurs when a liquid is subjected to rapid changes of pressure that cause the formation of cavities where the pressure is relatively low. When subjected to higher pressure, the voids implode and can generate an intense shockwave causing significant damage to the pump's impeller and chamber.

For the specific NPSH data of your pump consult the pump performance curve supplied with the pump.



ATTENTION

When installing a system with vertical suction lift, refer to the enclosed pump manual. In case of doubt consult a Netafim™ expert.

Calibration of the pressostat (pressure switch)

The PBS should have the correct pressure switch setting for zero vertical suction lift.

On installations with vertical suction lift, adjustment of the pressure setting to suit may be needed (see the enclosed pressostat manual).

Any adjustment of the pressostat (pressure switch) settings should be made according to the pump curve (see the enclosed pump manual).

The cut-out pressure should never be higher than 90% of the maximum pump shut head pressure OR higher than the maximum operating pressure for the expansion tank and the cut-in pressure should be set within the pump curve.

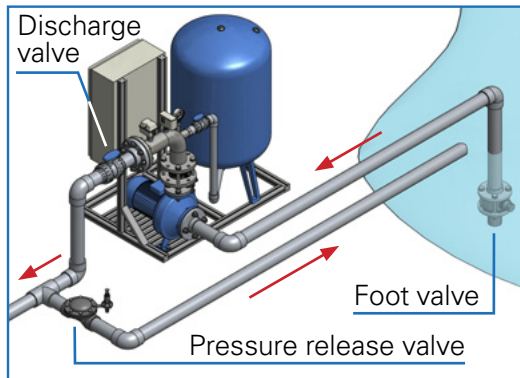


CAUTION

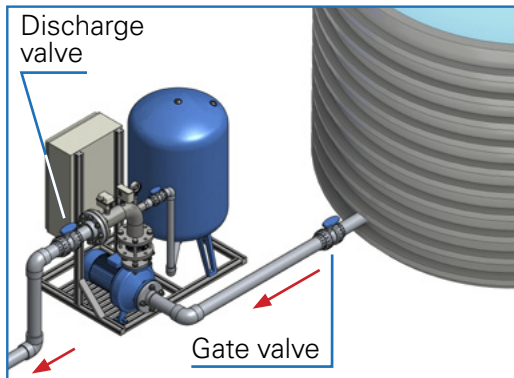
Take care not to exceed the pump's maximum authorized number of starts per hour (see the enclosed pump manual).

PRIMING AND OPERATION

Vertical suction lift



Positive suction



- After installing the PBS, open the gate valve and shut the discharge valve.
- Fill the pump, suction line and impeller chamber with water via the priming ports (on flooded suction simply open suction gate valve to the PBS). When full, close priming plugs and hand tighten firmly.
- Ensure an outlet nearest to the pump is open.
- Ensure all valves in the suction line are open.
- Switch pump on and gradually open the discharge valve.
- Prime should be established almost immediately and a strong flow of water should be evident from the outlet. Allow water to flow until it is free of air bubbles.
If little or no flow is evident from the outlet, switch pump off and repeat from step 1, ensuring that there is adequate supply of water available to the pump.
- Once water flow has been achieved, shut the discharge gate valve. The pump should slowly build up pressure (on the gauge) and turn off at the cut-out pressure that was set on the pressostat (pressure switch).
- Check the pressostat (pressure switch) settings by opening and closing the discharge gate valve slowly and reading the pressure on the pressure gauge. Adjust if necessary. Refer to the Calibration of the pressostat (pressure switch) section above (see the enclosed pressostat document).
- If a pressure release valve is installed, set its release pressure to 5 meters (7.25 PSI) higher than the pressostat's cut-out pressure setting.
- To prime the discharge pipe, partially open the discharge gate valve and then open all the outlets on the system in turn. Allow water to flow from each outlet until it is free of air bubbles, then close it.

MAINTENANCE

Inspection

Regular inspection should be carried out every 4 weeks:

- Visually check the intake and discharge pipes for leaks.
- Visually check the pump's shaft for leaks (see the enclosed pump manual).
- Visually check the switchboard for insect infestation, if present suitable pest control should be implemented.
- If the PBS includes a expansion tank, check the expansion tank's air charge*.
This can be checked at the air valve with a hand-held pressure gauge.



CAUTION

Do not charge the tank to a higher pressure than noted in the enclosed expansion tank manual.

***To check the air pressure in the expansion tank:**

- Switch off the pump.
- Open the outlet nearest to the pump to release water pressure.
- Remove the air valve cap from the top of the expansion tank and charge the tank to the correct pressure using an air pump and check with a hand-held pressure gauge.
- Reprime the system and switch the PBS on.

TROUBLESHOOTING



ATTENTION

When troubleshooting the PBS always refer to the enclosed documentation of its components, i.e. pump, pressostat (pressure switch) and expansion tank manuals, and switchboard scheme.



WARNING

When servicing a pump, always ensure power is switched off and lead unplugged. Electrical connections should be serviced only by a qualified electrician.

Checklist

Identify the specific malfunction below and check all the possible causes for it step by step:

Motor runs when switched on but does not pump

- Motor is rotating in the wrong direction (see the enclosed pump manual).
- Suction line and pump body are not filled with water.
- Air leaks in suction lines or suction pipe inlet not under water.
- Air trapped in suction lines (also possible with flooded suction due to uneven slope of the pipe - eliminate humps and hollows).
- No water at source or water level too low.
- Valve on suction line closed.

Pump switches on and off frequently (cycling)

- In PBS with a pressostat (pressure switch) and an expansion tank, Check that tank air pressure is correct (see the enclosed expansion tank manual).
- Check for leaks from valves, float valves, foot valve etc.
- The pressostat may require adjustment (see [page 12](#)).

Motor doesn't start when switched on (see the enclosed pump manual)

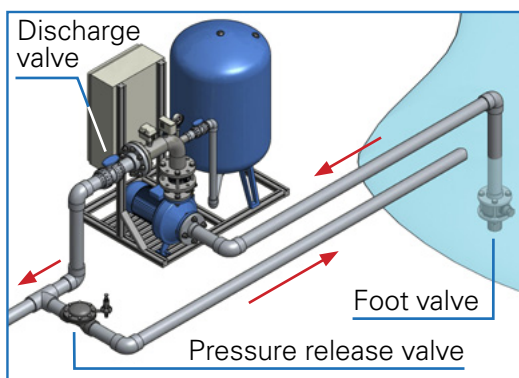
- Power is not connected.
- Supply voltage too low.
- Motor is not free to turn e.g. a jammed impeller.
- Internal motor fault.



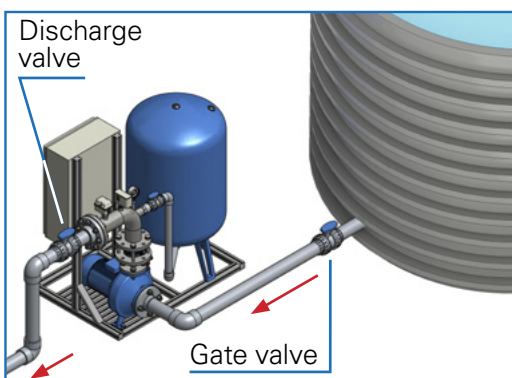
CAUTION

Care should be taken when servicing or disassembling a pump to avoid possible injury from hot pressurized water. Unplug the pump, relieve the pressure by opening a valve on the discharge side of the pump and allow any hot water in the pump to cool before attempting to dismantle.

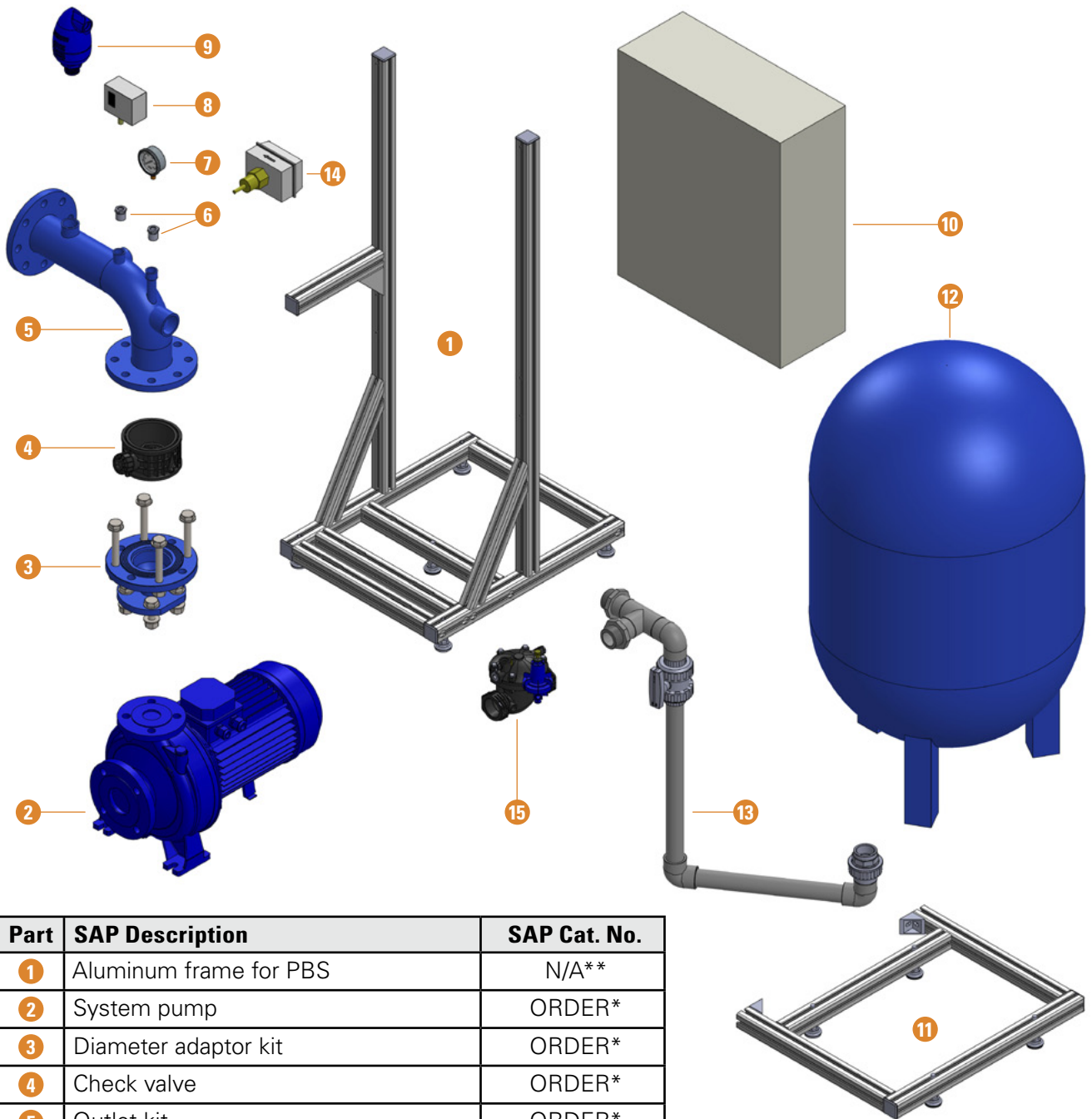
Vertical suction lift



Positive suction



PART LIST



Part	SAP Description	SAP Cat. No.
1	Aluminum frame for PBS	N/A**
2	System pump	ORDER*
3	Diameter adaptor kit	ORDER*
4	Check valve	ORDER*
5	Outlet kit	ORDER*
6	Brass HEX bushing 1/2M X 1/4F	78300-004900
7	Pressure gauge	77540-003350
8	Pressure switch	77800-002250
9	NAVc 10 1" Combination AV PN10 BSP	32600-002000
10	PBS - electric board	ORDER*
11	Aluminum frame for expansion tank	N/A**
12	Expansion tank 200L	77800-002450
13	Expansion tank manifold	ORDER*
14	Flow switch	77540-008440
15	Pressure release valve	71600-001912

* For spare part ordering call your local Netafim™ representative having at hand the Serial Number of your PBS. **Only with this number we can supply the correct part for your specific PBS.** The Serial Number is inscribed on the side of the switchbox.

**Not available as spare part

APPENDIX 1

List of configurator items

See the online configurator at <http://cmt-configurator.com>

PBS -S 2" 50H 400 -D32-160/22 -PR -AC -T -AV -DN
A B C D E F G H I J K

A PBS

B Water source

Code	Description
-L	Live line
-S	Storage Tank

C Outlet diameter

Code	Description
1.5"	1.5" up to 5 m ³ /h
2"	2" up to 24 m ³ /h
3"	3" up to 54 m ³ /h
4"	4" up to 100 m ³ /h

D Frequency

Code	Description
50H	50Hz
60H	60Hz

E Voltage

Code	Description	Location
400	3x400 - 440V	Europe, Africa, Middle East, Australia, India, China
440	3x400 - 440V	USA, Mexico, Peru, Korea, Brazil
220	3x220V	USA, Mexico, Central America, Colombia
200	3x200V	Japan
1X220	1x220V	

F Pump

50 Hz	
Code	Description
-MTX55	MATRIX5-5
-D32-160/15	3D 32-160/1.5
-D32-160/22	3D 32-160/2.2
-D32-200/30	3D 32-200/3.0
-D32-200/40	3D 32-200/4.0
-M32-250/55	3M 32-200/5.5
-D40-125/22	3D 40-125/2.2
-D40-160/30	3D 40-160/3.0
-D40-160/40	3D 40-160/4.0
-D40-200/55	3D 40-200/5.5
-D40-200/75	3D 40-200/7.5
-D40-250/110	3D 40-200/11
-D50-160/55	3D 50-160/5.5
-D50-160/75	3D 50-160/7.5
-D50-200/110	3D 50-200/11
-D50-250/150	3D 50-250/15
-D65-125/55	3D 65-125/5.5
-D65-125/75	3D 65-125/7.5
-D65-160/110	3D 65-160/11
-D65-160/150	3D 65-160/15
-D65-200/150	3D 65-200/15

60 Hz	
Code	Description
-MTX53	MATRIX5-3
-D32-125/226	3D 32-125/2.26
-D32-160/306	3D 32-160/3.06
-D32-160/406	3D 32-160/4.06
-D32-200/556	3D 32-200/5.56
-D40-125/306	3D 40-125/3.06
-D40-125/406	3D 40-125/4.06
-D40-160/556	3D 40-160/5.56
-D40-160/756	3D 40-160/7.56
-D40-200/1106	3D 40-200/116
-D40-200/1506	3D 40-200/156
-D50-125/556	3D 50-125/5.56
-D50-125/756	3D 50-125/7.56
-D50-160/1106	3D 50-160/116
-D50-160/1506	3D 50-160/156
-D65-125/556	3D 65-125/5.56
-D65-125/756	3D 65-125/7.56
-D65-160/1106	3D 65-160/116
-D65-160/1506	3D 65-160/156
-D65-200/1506	3D 65-200/156

G Pressure release

Code	Description
-PR	Yes
N/A	No

J Air release valve

Code	Description
-AV	Yes
N/A	None

H Command

Code	Description
-AC	AC + Pressure switch
-DC	DC + Pressure switch
-FC	AC + Frequency Controller
-PFM	AC + Pressure and flow controller, 1 - 5 m ³ /h (4.4 - 22 GPM)

K Standard

Code	Description
-DN	DIN
-BSP	Threaded BSP

I Expansion tank

Code	Description
-T	3 liter (0.8 Gallon) or 200 liter (53 Gallon)
N/A	None (or External)

APPENDIX 2

Single-phase PBS

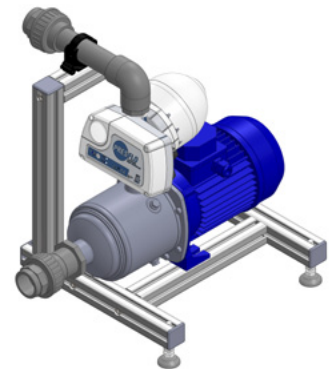
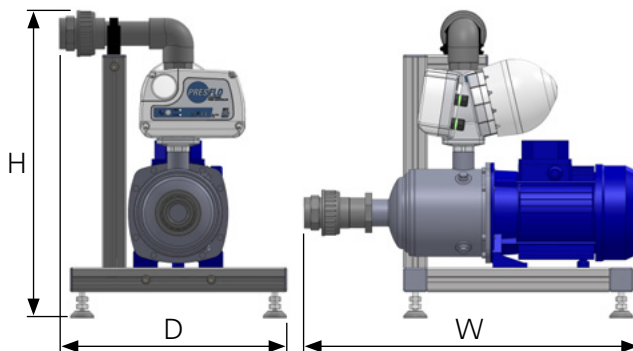
PBS unit equipped with a single-phase pump, intended for flow rates between 1 and 5 m³/h (4.4 - 22 GPM). (see the online configurator at <http://cmt-configurator.com>).

For the operation of the pressure controller, see the manual supplied with the product.

Inlet and outlet connectors

40 mm PVC cement connectors or 2" female threaded connectors (dismantling half the union).

Dimensions



Net dimension (W/D/H*)		Package dimension (W/D/H**)		Package volume	
cm	inch	cm	inch	m ³	feet ³
56/38/51	22/15/20	67/63/99	26.5/25/39	0.42	14.8

*The height varies by ±1 cm (±0.5") according to the adjustment of the legs.

**The package height includes the pallet height of 15 cm (6").

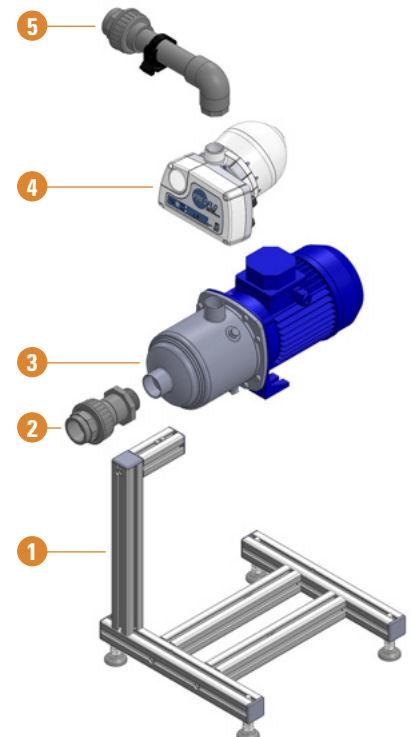
Package weight

The weight of the PBS varies according to the selected pump. The table below represents order of magnitude only - final weights will be issued with the product order.

Pump model	Kg	Pound
M 5-5 50 Hz / M 5-3 60 Hz	30	66

part list

Part	SAP Description	SAP Cat. No.	
1	Aluminum frame for single-phase PBS	45000-040400	
2	Diameter adaptor kit	33360-001310	
3	System pump	M 5-5 50 Hz	77800-002618
		M 5-3 60 Hz	77800-023250
4	Pressure controller	77800-027800	
5	Outlet kit	33360-001320	



WARRANTY

Netafim™ warrants all the components of the PBS to be free of defects in material and workmanship for 1 (one) year from the date of installation, provided the installation has been reported to Netafim™ within 30 days of installation.

If the installation was not reported or was reported later than 30 days from the date of installation, Netafim™ will warrant the PBS for a period of 18 months from the date of production, according to its serial number.

If a defect is discovered during the applicable warranty period, Netafim™ will repair or replace, at its discretion, the product or the defective part.

This warranty does not extend to repairs, adjustments or replacements of a PBS or part that results from misuse, negligence, alteration, force majeure, lightning, power surge, improper installation or improper maintenance.

If a defect arises in your PBS during the warranty period, contact your local Netafim™ representative.

Limited warranty

This warranty is subject to the conditions in Netafim's official warranty statement.

(For the full text of Netafim's official warranty statement, please contact your local Netafim™ representative).

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